

# SPECIMEN EXAMINATIONS

FOR

## MERCHANT MARINE DECK OFFICERS



CG-101

JULY 1, 1963

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UNITED STATES COAST GUARD  
TREASURY DEPARTMENT



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FOR  
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**U.S. GOVERNMENT PRINTING OFFICE  
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FOREWORD

Candidates for merchant marine deck officer's licenses are required to pass written examinations to demonstrate their professional qualifications. This publication contains questions which should acquaint those seeking such licenses with the nature of the material they will be required to know.

The pamphlet "Specimen Examinations for Merchant Marine Deck Officers," CG-101, dated July 1, 1958, is superseded by this publication.

It is hoped that the specimen questions and information contained herein will be helpful to those endeavoring to qualify for licenses as deck officers.

A handwritten signature in black ink, reading "E. J. Roland".

E. J. ROLAND,  
Admiral, U.S. Coast Guard,  
*Commandant.*

Dist. (SDL No. 77)

A : None

B : n(100) ; e(9) ; e(5) ; d(2) ; b, p(1)

C : m(1)

D : i, m, n, or(1)

E : l, m(1)

List 112

List 160

## INTRODUCTION

The specimen examinations published herein are for the purpose of acquainting prospective candidates with the nature of the material they will be required to answer in order to qualify for licenses. Candidates will not be asked the same number of questions published under the respective grades and titles; nor are the examining officers precluded from using questions not contained in this publication. However, this book provides a fairly comprehensive guide to the nature of the material used. Candidates should also be prepared to answer questions of the multiple-choice type.

In order to conserve space, duplication of questions under the different grades has been eliminated as far as practical. In studying for the higher grades of license, similar subject matter shown for the lower grades should be carefully reviewed. Candidates for lower grades should also acquaint themselves with the material given for required subject matter in the higher grades, although they will not be required to show the same degree of knowledge of the more difficult problems.

Candidates must be prepared to demonstrate their proficiency in the use and adjustment of the sextant; plotting of courses, bearings, and lines of position on charts, and the application of the International, Inland, and Pilot Rules of the Road through the use of models. An actual demonstration of the candidates knowledge of signaling is also required. A minimum qualifying speed of six words per minute is required for signaling with flashing light.

Effective January 1, 1959, every applicant for an original deck officer's license, raise in grade, or increase in scope of license for service on ocean, coastwise, or Great Lakes vessels of 300 gross tons or over shall be required to qualify as a radar observer. Questions of the type that will be given have been included in this publication under the separate heading "Radar Observer."

Subjects have been numbered in accordance with Table 10.05-45(b). "Subjects for Deck Officers of Ocean or Coastwise Steam or Motor Vessels" in the Rules and Regulations for Licensing and Certifying of Merchant Marine Personnel. A copy of the table is included for convenient reference. Further Table 10.05-45(b) has been categorized into five groups as shown below to set forth the order in which groups of subjects shall be given. The groups will be administered in the order shown. For example, a candidate will be given the applicable subjects in Group One first. These shall be completed in their entirety before proceeding to Group Two and so on. However, the subjects within each particular group will not necessarily be given in the order set forth. This will be left to the discretion of the officer administering the examination in order to provide for the most efficient use of his and the candidate's time.

### *Group One*

#### *Navigation*

1. Latitude by Polaris
2. Latitude by Meridian Altitude Method
3. Fix or Running Fix
4. Star Identification
5. Compass Deviation
6. Middle Latitude Sailing

7. Mercator Sailing
8. Great Circle Sailing
9. Piloting

*Group Two*

1. International and Inland Rules of the Road

*Group Three*

1. Chart Navigation
2. Aids to Navigation
3. Instruments and Accessories
4. Magnetism, Deviation and Compass Compensation
5. Chart Construction
6. Tides and Currents

*Group Four*

1. Ocean Winds, Weather and Currents
2. Nautical Astronomy and Navigation Definitions
3. Stability and Ship Construction
4. Seamanship
5. Cargo Stowage and Handling
6. Change in Draft due to Density
7. Determination of Area and Volume
8. Speed by Revolutions
9. Fuel Conservation

*Group Five*

1. Signaling by International Code Flags, Flashing Light; Lifesaving, Storm and Special Signals
2. Lifesaving Apparatus and Firefighting Equipment
3. Ship Sanitation
4. Rules and Regulations for Inspection of Merchant Vessels
5. Laws Governing Marine Inspection
6. Ship's Business
7. General
8. Practical demonstration of knowledge and use of the sextant

A bibliography of texts which may be helpful is included. This cannot be regarded as complete, and failure to list any specific work is not intended to slight its value. Material in the examination has been drawn from other sources as well as the references cited.

Prior to sitting for a license examination, applicant must meet other requirements. A brief summary of these follows.

#### AGE AND EXPERIENCE

Applicants must be at least 21 years of age, with the exception of third mates, who must be at least 19 years of age. Minimum qualifying experience is required for each grade of license. These requirements are set forth in detail in CG-191, Rules and Regulations for Licensing and Certifying of Merchant Marine Personnel.

#### CITIZENSHIP

All applicants for an original, renewal, or raise of grade of license must be citizens of the United States, native born, or fully naturalized. This must be established by acceptable documentary evidence. Persons not able to prove American citizenship will not be examined for an original license.

## APPLICATIONS

Form CG-866 (License Applications) may be obtained either by written request or personal application to any Officer in Charge, Marine Inspection, U.S. Coast Guard. It must be completed in all respects. All statements of sea service made therein must be supported by documentary evidence, issued by responsible persons, officers, or organizations. When the application has been completed, it must be presented personally by the applicant at a Marine Inspection Office. Each applicant for an original license is required to have a written endorsement from a Master and two other licensed officers of a vessel on which he has served.

## PHYSICAL EXAMINATION

Upon acceptance and approval of his application, the candidate will be sent to one of the offices of the U.S. Public Health Service for a physical examination.

For an original license as master, mate, or pilot, the applicant must have either with or without glasses, at least 20/20 vision in one eye and at least 20/40 in the other. The applicant who wears glasses, however, must also be able to pass a test without glasses of at least 20/40 in one eye and at least 20/70 in the other. The color sense will be tested by means of a pseudo-isochromatic plate test, but any applicant who fails this test will be eligible if he can pass the "Williams" lantern test or equivalent.

## REEXAMINATION AND REFUSAL OF LICENSES

Any applicant for license or endorsement who has been duly examined and refused may come before the same Officer in Charge, Marine Inspection, for reexamination at any time thereafter that may be fixed by such Officer in Charge, Marine Inspection, but such time shall not be less than 1 month from the date of his last failure. In the case of another failure, he will not be reexamined until after a lapse of at least 6 months from date of last failure.

A candidate who has been duly examined and refused a license by an Officer in Charge, Marine Inspection, shall not be examined by any other Officer in Charge, Marine Inspection, until 1 year has elapsed from the date of the last refusal without the sanction of the Officer in Charge, Marine Inspection, that refused the applicant.

## REQUIREMENTS FOR RENEWAL OF LICENSE

Every Officer in Charge, Marine Inspection, shall, before renewing an existing license to a master, mate, or pilot who has served under the authority of his license within the 3 years next preceding the date of application for renewal, or who has been employed in a position closely related to the operation of vessels during the same 3 year period, require that such licensed officer present an affidavit that he has read within the 3 months next preceding the date of application the Rules of the Road applicable to the waters for which he is licensed and demonstrate his knowledge of the application of the Rules of the Road.

Every Officer in Charge, Marine Inspection, shall, before renewing an existing license to a master, mate, or pilot who has not served under the authority of his license within the 3 years next preceding the date of application for renewal, or who has not been employed in a position closely related to the operation of vessels during the same 3 year period, satisfy himself that such licensed officer is thoroughly familiar with the Rules of the Road applicable to the waters for which he is licensed. A written examination may be required for this purpose, or the applicant may be examined orally and a summary of the oral examination placed in the officer's license file.



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**SUBJECTS NUMBERED IN ACCORDANCE WITH THIS TABLE**

TABLE 10.05-45 (b)—SUBJECTS FOR DECK OFFICERS OF OCEAN OR COASTWISE STEAM OR MOTOR VESSELS

Subjects	Master			Chief mate		Second mate		Third mate		Mate— Limited mineral and oil industry	
	Ocean	Coast- wise	Yachts	Limited mineral and oil industry	Ocean	Coast- wise	Ocean	Coast- wise	Ocean		Coast- wise
1. Latitude by Polaris.....	X	X			X		X		Sun	Sun	
2. Latitude by meridian altitude method.....	Any body	Sun or star.	Any body		Any body	do.	do.	do.	do.	do.	
3. Fix or running fix.....	X	X	X		X	X	X	X	X	X	
4. Star identification (any method).....	X	X	Sun.		Sun or star.	Sun or star.	Sun or star.	Sun or star.	Sun	Sun	X
5. Chart navigation.....	Any body	Sun or star.	Any body		Sun or star.	Sun or star.	Sun or star.	Sun or star.	Sun	Sun	
6. Compass deviation.....											
7. (Canceled)											
8. Middle latitude sailing.....	X	X	X		X	X	X	X	X	X	
9. Mercator sailing.....	X	X	X		X	X	X	X	X	X	
10. Great Circle sailing.....	X	X	X		X	X	X	X	X	X	
11. Piloting.....	X	X	X		X	X	X	X	X	X	
12. Aids to navigation.....	X	X	X		X	X	X	X	X	X	
13. Speed by revolutions.....	X	X	X		X	X	X	X	X	X	
14. Fuel conservations.....	X	X	X		X	X	X	X	X	X	
15. Instruments and accessories.....	X	X	X		X	X	X	X	X	X	
16. Magnetism, deviation and compass compensation.....	X	X	X		X	X	X	X	X	X	
17. Chart construction.....	X	X	X		X	X	X	X	X	X	
18. Tides and currents.....	X	X	X		X	X	X	X	X	X	
19. Ocean winds, weather and currents.....	X	X	X		X	X	X	X	X	X	
20. Nautical astronomy and navigation definitions.....	X	X	X		X	X	X	X	X	X	
21. International and inland rules of the road.....	X	X	X		X	X	X	X	X	X	
22. Signaling by international code flags, flashing light; life- saving, storm and special signals.....	X	X	X		X	X	X	X	X	X	
23. Stability and ship construction.....	X	X	X		X	X	X	X	X	X	
24. Seamanship.....	X	X	X		X	X	X	X	X	X	
25. Cargo stowage and handling.....	X	X	X		X	X	X	X	X	X	
26. Change in draft due to density.....	X	X	X		X	X	X	X	X	X	
27. Determination of area and volume.....	X	X	X		X	X	X	X	X	X	
28. Lifesaving apparatus and firefighting equipment.....	X	X	X		X	X	X	X	X	X	
29. Ship sanitation.....	X	X	X		X	X	X	X	X	X	
30. Rules and regulations for inspection of merchant vessels	X	X	X		X	X	X	X	X	X	
31. Laws governing marine inspection.....	X	X	X		X	X	X	X	X	X	
32. Ship's business.....	X	X	X		X	X	X	X	X	X	
33. Such further examination of a nonmathematical char- acter as the Officer in Charge, Marine Inspection, may consider necessary to establish the applicant's proficiency.....	X	X	X		X	X	X	X	X	X	

1 Practical use of the magnetic compass.      2 Lifesaving, storm and special signals.      3 Navigation definitions only.

**SPECIMEN EXAMINATION  
FOR  
THIRD MATE**

**2. LATITUDE BY MERIDIAN ALTITUDE METHOD.**

Enroute from Argentina to Capetown, a meridian altitude of the sun was observed at D. R. Latitude  $37^{\circ}-02'$  South with the sun bearing North. The observed altitude was  $75^{\circ}-11'$  and the

declination was  $23^{\circ}-10'.6$  South.

*Required:* The Latitude at time of sight.

Candidates may use any method of solution.

**3. RUNNING FIX-SUN.**

Enroute from New Orleans, La. to Tampico, Mexico, in D. R. Latitude  $25^{\circ}-55'$  North, Longitude  $93^{\circ}-10'$  West,

an observation of the sun was taken and the following data recorded:

<i>Observed Altitude (ho)</i>	<i>Greenwich Hour Angle</i>	<i>Declination</i>
$29^{\circ}-20'.1$	$55^{\circ}-37'.4$	$22^{\circ}-47'.0$ S.

The ship's course was  $230^{\circ}$ , speed 20.3 knots. At LAN a meridian altitude

was taken and the following data recorded:

<i>Observed Altitude (ho)</i>	<i>Declination</i>
$41^{\circ}-55'.7$	$22^{\circ}-46'.3$ S.

*Required:* The ship's position at Local Apparent Noon.

Enroute from Toledo, Ohio to Port of Spain, Trinidad in D. R. Latitude  $14^{\circ}-36'$  North and Longitude  $62^{\circ}-32'$  West

an observation of the sun was taken and the following data recorded:

<i>Observed Altitude (Ho)</i>	<i>Greenwich Hour Angle</i>	<i>Declination</i>
$37^{\circ}-28'.7$	$7^{\circ}-48'.1$	$23^{\circ}-01'.4$ N.

The ship's course was  $165^{\circ}$ , speed 11.7 knots. 3h-50m-13s after the a. m. observation, a p. m. observation of the

sun was taken and the following data recorded:

<i>Observed Altitude (Ho)</i>	<i>Greenwich Hour Angle</i>	<i>Declination</i>
$80^{\circ}-16'.0$	$65^{\circ}-20'.9$	$23^{\circ}-00'.6$ N.

*Required:* The ship's position at the time of p. m. observation.

Candidates may use any method to obtain solution.

In the winter, the following 3 sextant altitudes of the sun were obtained. The height of eye was 65 feet, the sextant

index error was 0.5 on the arc in all observations. Given:

	<i>Observation No. 1</i>	<i>Observation No. 2</i>	<i>Observation No. 3 (Upper Limb)</i>
Sun Sext. alt. -----	$8^{\circ}-34'.2$	$31^{\circ}-46'.8$	$49^{\circ}-26'.7$
Bar. Pressure. -----	29.2 in.	1034 mb	30.0 in.
Temperature -----	$+20^{\circ}$ F.	$+40^{\circ}$ Celsius (Centigrade)	$+60^{\circ}$ F.

*Required:* The observed altitude.

GIVEN:

	No. 1	No. 2	No. 3
Date -----	1 January 1958	2 May 1958	3 September 1958
GMT -----	12h-04m-57s	5h-29m-33s	21h-09m-43s
Long. -----	57°-32'.0 West	15°-29'.0 East	157°-18'.0 West

*Required:* The meridian angle and declination of the sun in each of the 3

cases. Indicate whether the sun is east or west of the meridian in each case.

## 5. CHART NAVIGATION.

What regions of the earth may not be shown by the ordinary Mercator chart projection?

What would be the appearance of straight lines on a Mercator chart if transferred to a globe?

What government agency of the United States publishes charts of foreign waters?

What government agency of the United States publishes charts of the United States and its possessions?

If you wished to measure the distance between point "A" at Latitude 30° and point "B" at Latitude 40° on a Mercator chart with the dividers set to measure 30' at each step, at what two points on the latitude scale would you set each leg of the dividers in order to obtain the most accurate measurements?

How does a great circle appear when plotted on a gnomonic chart?

Name the various instruments or devices that may be employed in determining the course on a Mercator chart.

What chart would you consult to determine weather conditions, currents, or locations where ice might be encountered?

Distinguish between small scale charts and large scale charts, and state the use of each.

How are charts kept up to date? How would you know when a chart was last corrected?

Having once determined the course to sail a great circle, can this course be used until the destination is reached?

How may the likelihood of encountering gales be determined from a pilot chart?

How is normal *barometric* pressure and temperature indicated on the pilot charts?

What is the true shape of the earth?

Describe the polyconic projection.

Describe the tidal current charts published by the U.S. Coast and Geodetic Survey.

How is the ship's position determined by means of cross bearings (3 bearings) which are taken at different times?

When observing cross bearings of objects, how much should their bearings differ to obtain a good fix?

When obtaining distance off by two bearings on a single object, how is the distance run between bearings determined?

Explain the use of the 26½° to 45° bearing, and state how it can be used to predict the time due abeam.

In taking a vertical sextant angle to determine the distance off an object, where would you find the height of the object?

Explain the 30-60 case, or ⅔ rule, for determining distance off an object by means of two relative bearings on the object and the run between the bearings.

For what purpose is the "danger bearing" used by the navigator?

In the vertical danger angle, what is indicated when the sextant angle is found to be greater than that determined by the desired distance off the vertical object?

By whom are chart catalogues issued, and what information do they contain?

What is meant by "Doubling the angle on the bow," and how is this method used?

What information is contained in the Coast Guard "List of Lights and other Marine Aids"?

What Government agency publishes the Tide Tables?

What publication contains astronomical data for use by mariners?

How may a range provide a bearing?

Where can detailed information about ocean currents be obtained?

State the use of the "bow and beam" or "4 point" bearing, and describe how one is obtained.

State how middle latitude sailing can be used when a vessel's course crosses the equator.

Describe briefly the use of aeronautical radio ranges for surface navigation. What signal is emitted by such stations?

How would you check the calibration for a radio direction finder?

Why is it desirable that a ship's radio direction finder set be capable of receiving signals between 275 and 515 kilocycles?

What publications give information about stations which may be employed by the navigator in determining position by radio?

How are Sailing Directions corrected?

Of what use are Notices to Mariners in correcting charts?

How often are the Notices to Mariners published?

A vessel is on course 045° at a speed of 10 knots. What is her departure each hour? If the vessel is at Latitude 45°, what is her hourly change of longitude?

A vessel is on a course of 060° at a speed of 20 knots. How much does she change her latitude each hour?

How would you obtain a radio bearing, when the minimum, or null, is not well defined?

In picking up a light, what advantage might you gain by going on to the upper bridge, or posting the lookout aloft?

Running coastwise, you sight a buoy bearing 10° on the starboard bow. The buoy marks a dangerous shoal to the right of the buoy with safe water to the left. If, after an interval, the buoy bears 6° on the starboard bow, what would be indicated? What action would you take?

How may vessels in distress enable ships and radio direction finder stations to take radio bearings?

Describe the effect of electrical conductors near the radio direction finder.

A radio beacon is 6° east of your vessel in Latitude 45° North. State the amount and direction to correct a bearing for plotting on a Mercator chart.

From Latitude 60° South and Longitude 150° East to Latitude 60° South and Longitude 150° West, determine the distance by parallel sailing.

A vessel's noon position by observation is Latitude 40°-02' South and Longitude 15°-09' West. Her dead reckoning position advanced from the previous noon position is Latitude 40°-20' South and Longitude 15°-09' West. *Required:* The set and drift of the current for the previous 24 hours.

You sight a mountain peak just breaking clear over the horizon. If the chart lists the height of the mountain

as 720 feet and your height of eye is 45 feet, what is your distance off?

Give the meaning of the following symbols as shown on a chart:



State the meaning of the following abbreviations used on charts to indicate bottom characteristics:

Cl.	P.
Co.	S.
G.	Sh.
M.	Sn.
Oz.	St.

State the characteristics of Deer Island Light in Boston Harbor for which the light list gives the following information:

F. W., Alt. Fl., R., 30 sec., R. sector.

What precaution is necessary if you use a pilot chart to determine variation?

How are ocean currents and their drift indicated on pilot charts?

Describe plotting sheets and their use.

On a vessel outward bound, range lights are seen in line over the stern. If the ship is on gyro-compass heading 150°.5, what is the gyro-compass error, if the chart shows the range line to be 331°-30' true?

On what part of a Mercator chart do you:

- Find the longitude scale;
- Find the latitude scale;
- Measure distance?

How would one know whether the figures on charts indicating depths mean fathoms, feet and fathoms, or feet?

Do the figures shown on Atlantic Coast charts indicate depths at high or low water?

What is the length of a statute mile?

How is variation indicated on a chart?

**6. COMPASS DEVIATION.**

Enroute from New York to Rio de Janeiro, in D. R. Latitude  $9^{\circ}-16'$  South and Longitude  $32^{\circ}-02'$  West, an azimuth of the sun was observed.

The following data was recorded at the time of observation:

*Compass Bearing of Sun*  
 $273^{\circ}-00'$  psc

*Greenwich Hour Angle*  
 $75^{\circ}-39'.1$

*Declination of Sun*  
 $21^{\circ}-02'.0$  S.

Candidates may use any method of solution.

---

Variation for the locality was  $21^{\circ}-30'$  West.

*Required:*

The true azimuth.

The deviation of the standard compass.

**8. MIDDLE LATITUDE SAILING.**

By middle latitude sailing, find the true course and distance from Gedney Channel lighted whistle buoy in Latitude  $40^{\circ}-28'.8$  North and Longitude

$73^{\circ}-53'.7$  West, to Nantucket Shoals Lightship, in Latitude  $40^{\circ}-37'$  North and Longitude  $69^{\circ}-37'.1$  West. Show all work.

---

**11. PILOTING.**

A vessel is heading  $205^{\circ}$ . At first bearing, a light bears  $241^{\circ}$  and the log reads 87 miles. At second bearing, the same light bears  $258^{\circ}$  and the log reads 98 miles. What is the distance off at time of second bearing and when abeam?

Your course is  $255^{\circ}$  p.s.c., variation  $23^{\circ}$  East, deviation  $2^{\circ}$  East. A light is sighted bearing  $255^{\circ}$  True. On what compass bearing must the light be observed such that the run between bearings would equal your distance off when abeam?

Compass course is North, speed 10 knots, and the first bearing of a light ashore is  $26\frac{1}{2}^{\circ}$  on the bow at 10:10

a.m. At 10:52 a.m., the same light bears  $45^{\circ}$  on the bow. Give the distance the vessel will pass off the light when abeam.

A vessel steering  $10^{\circ}$  picks up a shore light bearing  $30^{\circ}$ , log reading 45 miles. Later the same light bore  $75^{\circ}$ , log reading 56 miles. What is the distance off when abeam?

A vessel is steering North, speed 10 knots, and a bearing is taken of a light 2 points on the bow at 0800. At 0900, the same light bears four points on the bow. How far will the ship pass off the light when abeam on the same course and at what time will she be abeam?

NOTE: Problems may be given pertaining to piloting which are under other titles in this book.

**12. AIDS TO NAVIGATION.**

When a buoy marks the starboard side of a channel for a vessel entering port, state:

- The shape of the buoy;
- The color of the buoy;
- The type of number on the buoy;
- The color of its light.

Define exactly what is meant by an occulting light. (Candidates may submit a sketch such as those contained in the light lists to help demonstrate complete comprehension of the term.)

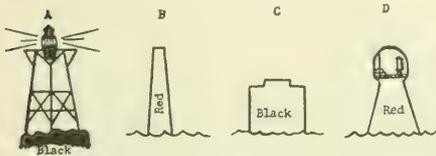
What is meant by the "Period" of a light as listed in the light list?

What height of eye on the part of the observer is assumed in calculating the geographic ranges of lights for charts and light lists?

What significance have buoys which are fitted with a light which shows not less than 60 flashes per minute?

Define exactly what is meant by a quick flashing light. (Candidates may submit a sketch such as that contained in the light list to help demonstrate their complete comprehension of the term.)

Name the types of buoys sketched below and sketch the chart symbol for each.



What system is followed in assigning colors to the lights of buoys in the

lateral system of buoyage of the United States?

A vessel hears the radio distance finding signal from a light vessel and 5 seconds later hears the corresponding sound signal. What is her distance from the light vessel?

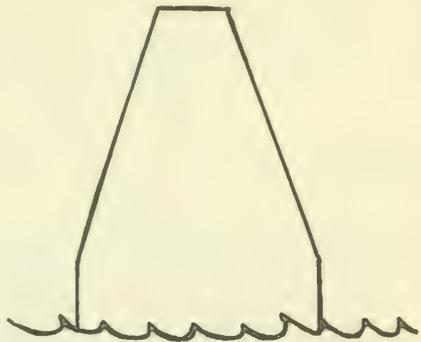
How are the buoys numbered in the United States lateral system of buoyage?

(a) What color would the buoy illustrated be painted?

(b) What sort of number would be assigned such a buoy?

(c) How should such a buoy be left in passing when entering from seaward?

(d) How is such a buoy shown on a chart? Sketch chart marking for such a buoy.



On a clear night, how could you determine whether a navigational light is at its maximum geographic range of visibility when you first sight it?

**15. INSTRUMENTS AND ACCESSORIES.**

What is the purpose of the liquid used in the magnetic compass?

Give a brief description of the gyro-compass.

What is a Pelorus?

Describe the Azimuth Circle.

How often should a chronometer be wound?

How are ship barometers checked for accuracy?

What is a chronometer used for?

Define the daily rate of a chronometer.

Describe the Aneroid barometer.

In a heavy sea, the gyro alarm unit in the wheelhouse sounds. What would you do?

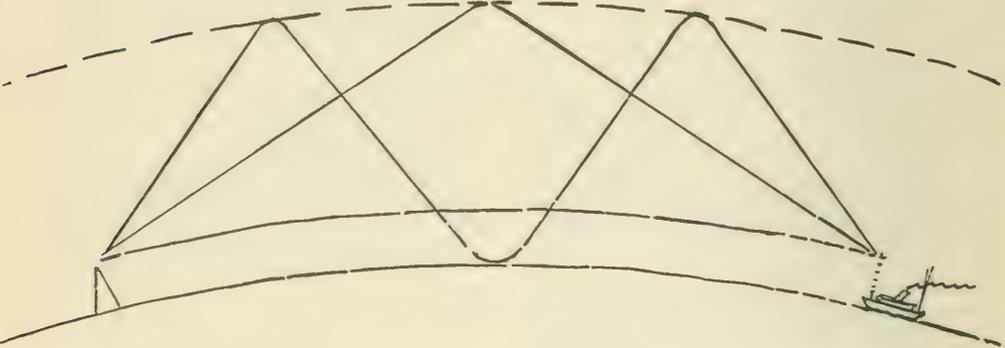
What properties of the earth make the gyro-compass a meridian seeking device?

What three forms of steering are available on a vessel equipped with a gyro pilot or iron mike?

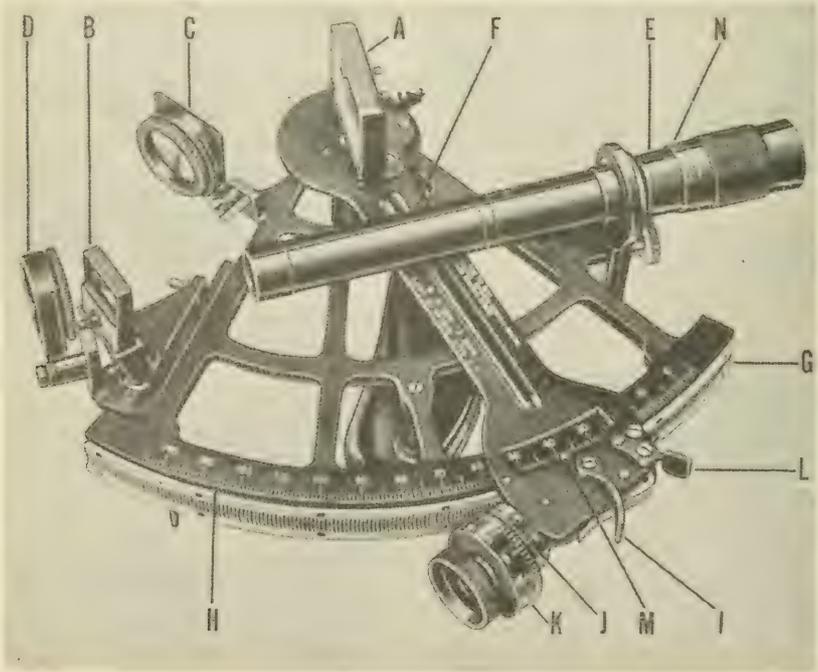
In what direction does the axle of a gyro-compass wheel point?

Make a rough copy of the sketch below and label on it the following: Ground wave, Second sky wave, First sky wave, and Ionosphere.

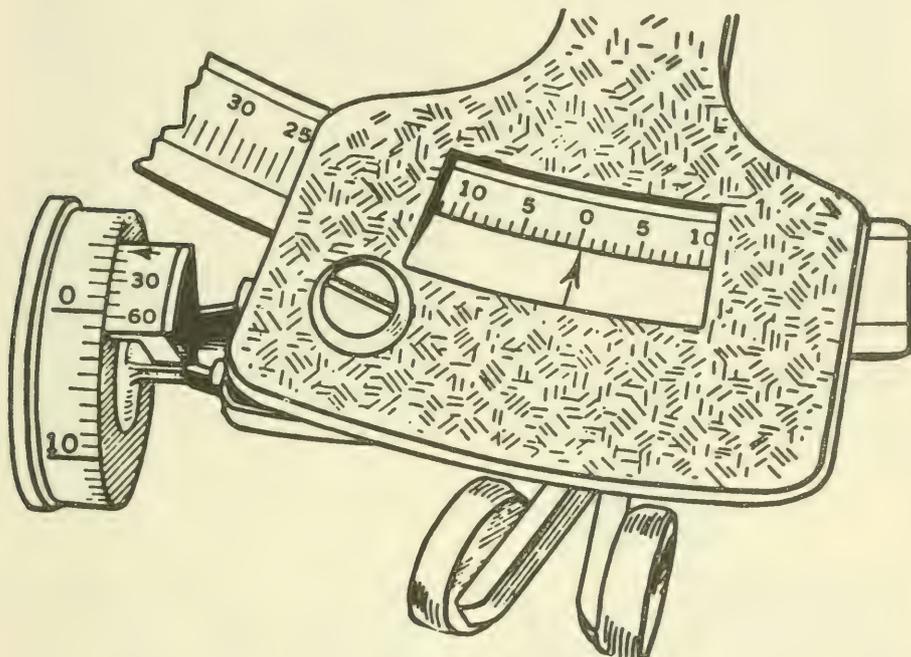
State the names of the waves in the order in which they appear from left to right on the Loran receiver-indicator.



Name the parts of a sextant indicated by the letters "A" through "N" in the diagram below:



What index error is indicated by the reading of the vernier on the micrometer sextant shown below?



Along what line is the value of microseconds in miles the least; i.e., where does the Loran reading give the greatest positional accuracy?

What is a clinometer?

What is a "microsecond"?

Make a rough copy of the sketch below and indicate on it the ground wave, first sky wave and second sky wave.



In using sky waves to obtain a Loran line of position, what precaution is necessary to insure that the complete wave is being used?

What care do you use in handling glass sounding tubes?

Give a brief description of the Radio Direction Finder.

Describe the use of parallel rules.

What errors affect a radio bearing?

When using the fathometer, suppose three distinct flashes are registered on the dial; by which one would you be guided?

How do you haul in a log line and care for it while not in use?

How would you determine whether you are holding the sextant vertically when taking a sight and making the final adjustment of the tangent screw?

What would be the effect on the altitude if the sextant is not held vertically when the sight is taken?

In what position is the loop antenna of a radio direction finder:

(a) When the loudest signal is received;

(b) When the minimum signal is received;

(c) Which is used to obtain the bearing and why?

What do you mean by "arming" the lead?

Describe an engine room telegraph.

What is a taffrail log?

How do you mark a fifty-fathom lead line?

What is a protractor?

Upon what principle do echo sounders operate?

Describe the mechanical sounding machine, its parts, and the procedure for taking soundings.

Why is it necessary to calibrate or compensate radio direction finders?

How would you examine a sextant for detection of error due to the horizon glass being out of adjustment for perpendicularity?

What conditions are likely to cause patent logs to give inaccurate readings?

On 12 June, at 0100 GMT a radio time signal shows chronometer "C" to be 1m-42s slow. On 17 June, at 0900 GMT a radio time signal shows chro-

nometer "C" to be 1m-50s slow. On 18 June, at 0100 GMT an observation was taken. Assuming a constant chronometer rate, what correction should be applied to chronometer "C"?

On 12 December, a radio time signal at 0300 GMT shows chronometer "A" to be 12m-29s slow. On 14 December, a radio time signal at 1200 GMT shows chronometer "A" to be 12m-10s slow. On 16 December, an observation is taken at 2100 GMT. What correction to chronometer "A" is required, assuming there was a constant chronometer rate?

In taking the time for an observation, how should the chronometer be read; i.e., in what sequence do you note the hours, minutes and seconds of time on the chronometer?

If your vessel was on the meridian of Greenwich and the sun was on the meridian; i.e., its bearing was due South or due North, would the chronometer read 12-00-00 if it had no error?

#### 18. TIDES AND CURRENTS.

What is a reference station as used in the tide tables?

What is meant by the "height of tide"?

What is meant by the "range of the tides"?

At Portland, Maine on 16 August 1958:

(a) What is the tabulated time and height of a.m. low water?

(b) If your chart for Portland showed a depth of 24 feet for a given area, what would be the depth at low water for that area?

(c) If your vessel had its clocks set for Eastern Daylight Saving Time, what would be the ship's time at low water?

At Balboa, Canal Zone, Panama on 6 March 1958:

(a) What is the tabulated time and height of p.m. high water?

(b) If your chart showed a depth of 20 feet for a given area in this vicinity, what would be the depth at high water at this area?

NW of Capul Island, San Bernardino Straits, P. I. on 16 November 1958:

(a) What is the tabulated time and velocity of maximum p.m. flood current?

(b) In what direction does the flood current flow at this position?

(c) What time meridian is used in tabulating the times given for the currents?

#### 19. OCEAN WINDS, WEATHER AND CURRENTS.

What is "humidity"?

What is a "psychrometer"?

Describe the Centigrade scale for measuring temperature.

Convert 15° Celsius (Centigrade) into the temperature Fahrenheit.

What is atmospheric pressure and what instruments may be used to measure it?

What is normal atmospheric pressure?

On a weather map:

(a) A region where the atmospheric pressure is higher than that of surrounding regions is called a.....

(b) A region where the atmospheric pressure is lower than that of surrounding regions is called a.....

Explain the pressure-volume relationship of gases if temperature is constant. Either state in words or in mathematical notation. (*Boyles Law*).

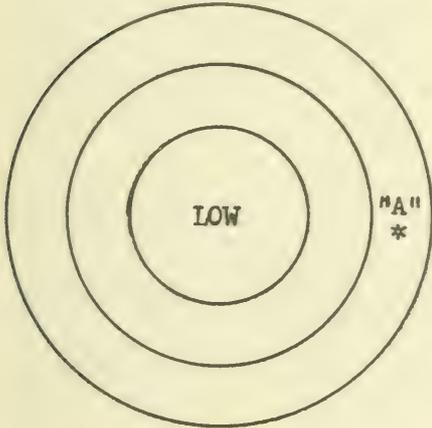
State "*Buys Ballot's Law*".

What is meant by the daily pressure variation of the atmosphere? Where is this weather phenomenon most characteristic?

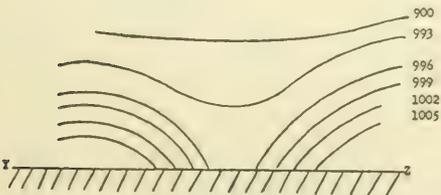
What is an "isobar"?

What wind direction would be most likely for a vessel at position "A" on the weather chart sketched?

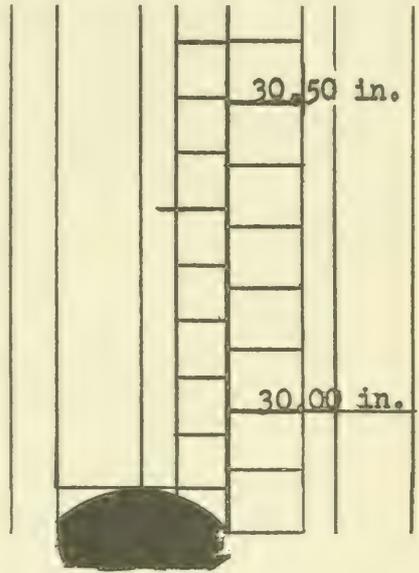
- (a) In the Northern Hemisphere;
- (b) In the Southern Hemisphere?



Sketched below is a vertical section through an air mass. Show how the isobars on the weather map would represent such an air mass assuming that the air mass is round and concentric. Label appropriately the center of the air mass.



What is the reading on the mercurial barometer sketched below?



What are the "horse latitudes"?

What is "wave direction"?

(a) How is it recorded on the weather report?

(b) How is the wave direction determined?

What are the "doldrums"?

What is a "monsoon"? State its causes.

Make a rough copy of the sketch below and indicate thereon the length and height of the waves.



What is an "anemometer"?

What is a cold front?

Cirrus clouds are composed of what form of water vapour?

Low clouds are defined as those whose mean upper level is 6,500 feet. Middle clouds are defined as those whose mean lower level 6,500 feet and whose mean upper level is 20,000 feet. High clouds are defined as those whose mean lower level is 20,000 feet.

Classify as low, middle, or high the following cloud forms:

- (a) Cirrus;
- (b) Nimbostratus;
- (c) Altostratus.

In order for clouds to form in the atmosphere, what must be present besides water vapor?

Why do clouds always appear thicker, darker, and closer together near the horizon?

Why do thunderstorms occur most frequently from midnight to early morning at sea, whereas, on land they occur frequently in the late afternoon?

What sequence of cloud types is characteristic of the approach of a cold front?

What is a "growler"?

What is meant by:

- (a) Hummocked ice;
- (b) Ice jamming;
- (c) Icebergs?

A vessel's true course is  $175^\circ$  and speed is 18 knots. The apparent wind is from SSW with a 15 knot apparent wind velocity.

Required:

(a) The direction from which the true wind is blowing.

(b) The velocity of the true wind.

To what wind force on the Beaufort Scale do the following conditions correspond?

*Wind Speed* . . . . . less than 1 knot;

*Sea Condition* smooth and mirror like.

What is a squall?

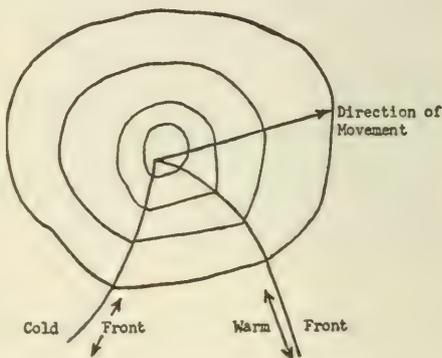
What is a tropical cyclone?

How may clouds provide early indication of a tropical cyclone?

Interpret the wind rose, sketched as it would be shown on a Pilot Chart together with the scale of wind percentages.

When a tornado moves out over the water from land, what name is applied to the resulting phenomenon?

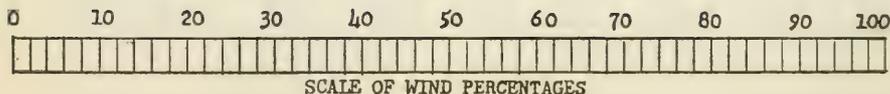
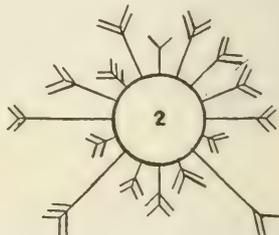
State the usual sequence of winds, clouds, precipitation, pressure and temperature which will be observed on the line of direction of movement of the depression illustrated.



What is the usual sequence of directions in which a tropical cyclone in the Northern Hemisphere moves?

State the rule for determining the dangerous and navigable semicircle of tropical cyclones.

What is the general direction in which storms move in the temperate zones?



Listed below are four months during which tropical cyclones are known to occur in the North Atlantic. Arrange them with the month of highest frequency of such storms first; the next highest, next, etc.

*October*  
*May*  
*September*  
*June*

Where do tropical cyclones form?

Why do tropical cyclones never form closer than 5 degrees to the equator?

The reported wind velocity in three areas of a weather map are:

Area 1.....10 knots;

Area 2.....20 knots;

Area 3.....30 knots.

In which of the three areas will the isobars be spaced closest?

How should isobars be drawn on a weather chart at a front?

What is the angle that wind arrows normally make with the isobars on weather charts of ocean areas?

In what direction does the wind blow around a cyclonic storm in:

(a) The Northern Hemisphere;

(b) The Southern Hemisphere?

Why are anticyclonic areas normally accompanied by clear and fine weather, whereas cyclonic areas are accompanied by clouds, precipitation, and generally foul weather?

In the Northern Hemisphere, how should a steam vessel maneuver in the navigable semicircle of a tropical cyclone?

If the wind velocity about the center of a tropical cyclone is 75 miles an hour and the speed of the storm along its direction of advance is 25 miles per hour, what is the maximum wind velocity that may be encountered in the dangerous semicircle, and what would be the minimum wind velocity in the navigable semicircle?

What are the "roaring forties," and where are they located?

What weather conditions may result from the movement of a warm air mass over a colder sea surface?

What are the Aleutian and Icelandic lows?

Is it possible for open isobars to exist, that is, isobars that do not form a closed curve? Explain your answer.

Are the Weather Codes provided by the U.S. Weather Bureau solely for use with United States weather reports, or may they be used in coding and decoding weather reports of other nations?

What is the Gulf Stream?

Describe the California current and state what segment it forms in the general circulation of the waters of the North Pacific Ocean.

The direction of the wind is denoted by the direction from which it is blowing. How is the direction of a current denoted?

Under certain conditions in the Northern Hemisphere it may be assumed that the current sets 30° to the right of the direction in which it is driven by the wind and its velocity is 2 percent of the wind velocity. Basing your answer on the foregoing statement, estimate the direction and velocity of the current that may be expected if the wind is from the South South West at 35 knots.

*Given:*

Noon D. R. position;

Latitude 45°-06' South;

Longitude 30°-51' West;

Noon observed position;

Latitude 44°-54' South;

Longitude 30°-51' West.

*Required:* The set and drift of the current, assuming a 24 hour run from the previous noon.

## 20. NAUTICAL ASTRONOMY AND NAVIGATION DEFINITIONS.

What is:

- |                                |   |
|--------------------------------|---|
| 1. Parallax?                   | 27. The secant of an angle?   |
| 2. Computed altitude?          | 28. The cosine of an angle?   |
| 3. The mean sun?               | 29. The tangent of an angle?  |
| 4. Refraction?                 | 30. Mean time?  |
| 5. A time zone?                | 31. A fix?  |
| 6. A meridian?                 | 32. The sine of an angle?   |
| 7. A great circle?             | 33. Interpolation?  |
| 8. The equation of time?       | 34. A meridian transit?   |
| 9. Greenwich hour angle?       | 35. Relative bearing?   |
| 10. Local hour angle?          | 36. The meaning of the term "departure" as used in the sailings?    |
| 11. Dead reckoning?            | 37. The cosecant of an angle?                                       |
| 12. Observed altitude?         | 38. Semi-diameter of a celestial body? Draw a sketch to illustrate. |
| 13. The Zenith?                | 39. An intercept?   |
| 14. Meridian angle?            | 40. Zenith distance?  |
| 15. Magnetic variation?        | 41. Declination?  |
| 16. Local mean time?           | 42. A celestial meridian?   |
| 17. A knot?                    | 43. A reciprocal bearing?   |
| 18. A planet?                  | 44. A vertical circle?  |
| 19. An assumed position?       | 45. The elevated pole?  |
| 20. The date line?             | 46. The celestial horizon?  |
| 21. An Azimuth?                | 47. The supplement of an angle?                                     |
| 22. Apparent noon?             | 48. Magnetic deviation? State its cause.                            |
| 23. A line of position?        |   |
| 24. The cotangent of an angle? |   |
| 25. Dip?                       |   |
| 26. Local apparent time?       |   |

22. SIGNALING BY INTERNATIONAL CODE FLAGS,  
FLASHING LIGHT;  
LIFESAIVING, STORM AND SPECIAL SIGNALS.

How would you indicate in signalling by blinker light that you were going to send a message in code?

In receiving a message by blinker you miss all but the last two words "in distress." How would you request the transmitter to repeat that part of the message which you missed?

What is the procedure sign for "Message received"?

Draw all the symbols of the Morse code.

In the Morse code, what does the letter "G" signify when signalling by blinker?

In exchanging messages by means of flashing light, is it always necessary for vessels to establish their identity?

Under what circumstances can vessels signalling by flashing light omit both call and identity components of the message?

W W W W

What does --- ···· --- ···· --- ···· --- ···· signify during a communication when sent

by blinker"

What is the general call employed in signalling by means of flashing light?

If you missed part of a message being sent by blinker light, how would you send "Repeat all after"?

What is the procedure sign for "you are correct"?

In signalling by blinker light, how would you signal: "Erase entire message"?

What is the procedure for the space sign?

Write the entire procedure of a plain language message in Morse Code, leaving out any text.

What code message would you send to a pilot station with the ship's signal searchlight to indicate "I desire a pilot"?

How does a receiving ship acknowledge code groups and numbers in signalling by blinker light?

What is the procedure sign for "from" in blinker signalling?

At night when a breeches buoy has been rigged from shore to a stranded vessel, what is the meaning of the waving of a white flag or arms in a vertical motion by day, or at night a white light or flare being waved in the same manner?

What is the color of rockets, shells, or rocket parachute flares used as distress signals to indicate that the vessel firing them is in distress, and requires assistance from other vessels, or the shore?

What is the lifesaving signal for "This is the best place to land"?

When using a breeches buoy what signals are used at night to signify:

- (a) Haul away;
- (b) Slack away;
- (c) Avast hauling?

What is the lifesaving signal for "you are seen," "assistance will be rendered as soon as possible"?

- (a) By day.
- (b) By night.

During the day, at sea, a vessel is sighted displaying the international code flags "NC." What would this indicate to you, and what action would you take?

What signals are employed in connection with the use of shore lifesaving apparatus to signify in general, "Affirmative"?

What is indicated when a vessel displays a red light over a white light, not over six feet apart, on her arrival in port?

What is the signal used on vessels equipped with radio telephone by which they can inform other vessels or shore stations that they are in distress and require assistance? Will such a signal be understood in any language?

What distress signals would be appropriate for use in international waters in a fog to obtain assistance from other vessels in the vicinity?

What are the day and night signals to be made by a vessel seeking the services of a pilot?

If you sighted several red parachute flares, but no aircraft or surface vessels in the vicinity, what would be indicated and what should be your action?

What does a day signal consisting of a square flag with a ball above or below it indicate?

Should you sight rockets or shells, throwing red stars one at a time at short intervals, what would be indicated?

What custom is followed in hoisting the ensign, jack, house flag, etc.?

What signal should be displayed, by day and by night, when loading or discharging oil in bulk at a dock?

Should you sight a yellow flare floating downward from a small parachute about three hundred feet in the air, what would it indicate, and what action would you take?

At night a vessel is reported showing flames on board (as from a burning tar or oil barrel). What would this indicate and what action would you take?

What is the lifesaving signal for "slack away"?

- (a) by day;
- (b) by night?

What does the following landing signal for the guidance of small boats bringing away the crew of the wrecked ship signify?

(a) Vertical motion of a white flag.

What is the lifesaving signal for "haul away"?

- (a) by day;
- (b) by night?

Describe the day and night Hurricane warning.

Describe the Small Craft storm warning signals, day and night.

## 24. SEAMANSHIP.

What precautions should be taken with respect to portable stanchions on a gangway or accommodation ladder?

In using an accommodation ladder at

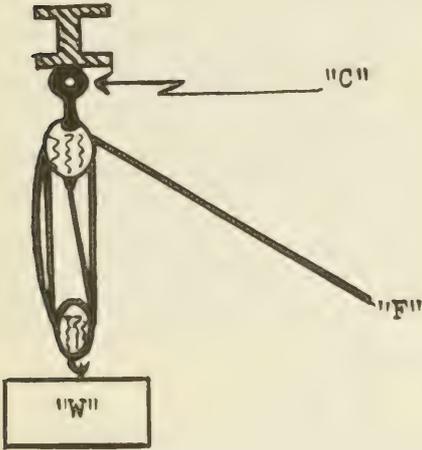
anchor in a seaway how can boats be prevented from getting under the ladder because of their rising and falling with the waves?

If a force of 50 pounds is applied at point "F" of a two fold tackle as shown;

(a) What weight may be lifted at "W," allowing 10 percent friction loss at each sheave?

(b) If "W" is lifted 2 feet, how far must the line at "F" be pulled?

(c) What is the stress on the padeye at "C" when lifting the weight?



What objection could be raised to a number of men, such as troops, marching in step up a gangway?

How is the size of a shackle measured?

What precautions would you take with regard to a shackle used aloft on a boom or the mast?

When a seaman shackles his bos'n's chair to rigging for work aloft such as slushing down, what precaution must be taken if a screw pin shackle is used?

In handling a weight, what part of a tackle has the greatest stress?

(a) In hoisting.

(b) In lowering.

(c) State reasons for answers to (a) and (b).

What should be done when, in transferring bulk oil, an oil hose leaks badly at the connection?

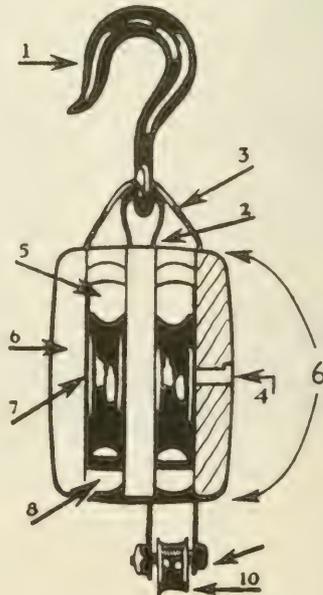
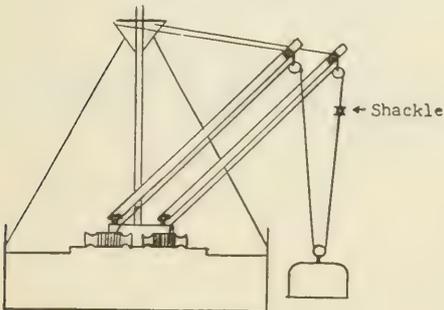
Describe the proper method of closing a valve in cargo piping, and state the reasons for doing it in this manner.

Describe the proper method of opening a valve in cargo piping.

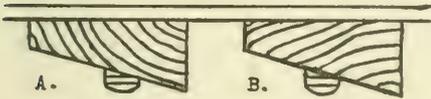
What precautions should be taken before starting a steam windlass or winch which has been standing idle?

Name seven of the ten parts of a block indicated on the diagram below.

Stevedores employed on vessels fitted with two booms at a hatch occasionally use a floating block between the two booms for handling weights, swinging the two booms together, as shown in the sketch below. If the weight is 6 tons, what is the weight on each boom? If the shackle joining the two runners should fetch up on the floating block, what will be the effect?



Would you drive in wooden wedges with the smooth grain parallel to the cleat as in Figure "A" or with the smooth grain parallel to the batten as shown in Figure "B"? Why?



Name three types of pumps used in the handling of liquid cargo.

When using turnbuckles for securing gear, particularly where the turnbuckles are inaccessible for routine inspection, what precautions should be taken to insure that the turnbuckle does not back off?

Is a hook or a shackle of the same size stronger?

Give two good reasons why wire rope cargo falls, topping lifts for booms, and other wire rope gear should be lubricated periodically.

What is the minimum size block you would use with a specified size of manila rope?

What is the minimum size block that should be used for a 3" manila rope?

What is the minimum diameter sheave that should be used with a 3" manila rope?

When a vessel is fitted with sideports, what precautions must be taken to assure that they are accessible for being secured, and for inspection at sea?

How are sideports usually secured?

If the warranted breaking strength of a wire rope is divided by the safety factor required for a particular application, the result is known as the \_\_\_\_\_

\_\_\_\_\_ This question may be stated also as follows:

$\frac{BS}{FS} = ?$  where BS = breaking strength  
FS = factor of safety

Some grades of sisal rope are listed by their manufacturer as having 80 percent of the strength of the same size manila. For a certain sling, a 3 inch manila line was necessary. What size sisal would you use for the same sling?

If the 3 inch manila was used for 2000 pounds of weight, what weight would you lift with 3 inch sisal having 80 percent of the strength of manila?

What precautions must be enforced by ship's officers when working cargo at a hatch with only part of the portable hatch beams or pontoons removed?

On freight vessels what is the purpose of the wooden ceilings under the square of a hatch?

What precautions should be taken with wet manila rope?

Does a splice or a knot weaken a manila line more?

What is a preventer stay and how is it rigged?

Name at least five factors that make an adequate factor of safety necessary on any wire rope purchases or topping lifts.

Describe the proper method of opening and uncoiling a new manila line.

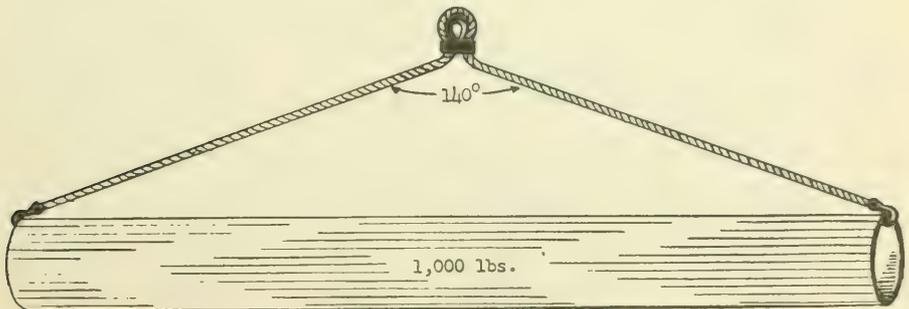
Using the formula  $B = C^2 \times 900$ , where "B" is the breaking stress in pounds and "C" is the circumference, compute the breaking stress of a 3 inch manila rope.

How is the draft of a vessel affected when passing from salt to fresh water? Give reasons.

What precautions must be taken with respect to stuffing-boxes and glands on pumps when discharging petroleum cargoes?

What precautions should be taken when using a spray gun for painting?

A sling is rigged on a piece of pipe weighing 1,000 pounds. What stress is exerted on each sling leg when the pipe is lifted? See sketch below.



What is the purpose of the telemotor equalizing valve and bypass valve in the wheelhouse on vessels fitted with this type steering apparatus?

What devices, other than telemotors, are used to control steering engines from the pilot house?

In the event that the pump room on a tank vessel becomes flooded with oil, what means must be provided for pumping it out?

When electric cable passes through a watertight bulkhead, what equipment must be provided and maintained in good condition? When electric cable passes through a fire-screen bulkhead, what care is needed?

In what condition is armored electric cable required to be maintained?

Describe briefly a marine boiler and precautions that deck officers should bear in mind with respect to its operation.

What precautions should be enforced when men are working with pneumatic or electric chipping hammers?

What is the purpose of the fresh water line on the load line markings?

Where machinery, such as gears, piston cranks, or other hazards, is exposed, what safety measures are required by the Regulations?

Name at least three types of engines used on merchant vessels and state briefly their characteristics with respect to maneuvering the vessel, i. e., backing power, starting and stopping, etc.

On vessels fitted with power ventilation, where may the switches be found for shutting off the ventilation in the event of an emergency such as a fire?

What care should be taken of steam deck machinery during freezing weather?

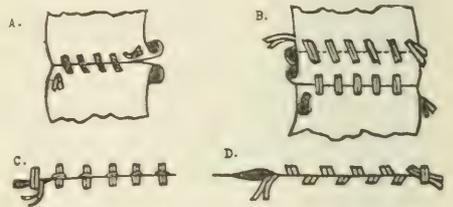
Describe reciprocating steam engines, and state the usual method of connecting them to the shaft when they are used as main propulsion units.

On vessels equipped with refrigeration, other than small unit type refrigeration of not more than 20 cubic feet capacity, what equipment is required to be provided so that men may work on the machinery in the event of leakage of the refrigerant?

What is the purpose of the following:

- (a) Main circulating pump;
- (b) Main bilge and ballast pump;
- (c) Thrust bearing?

Name the four following canvas stitches and describe briefly the use of each.



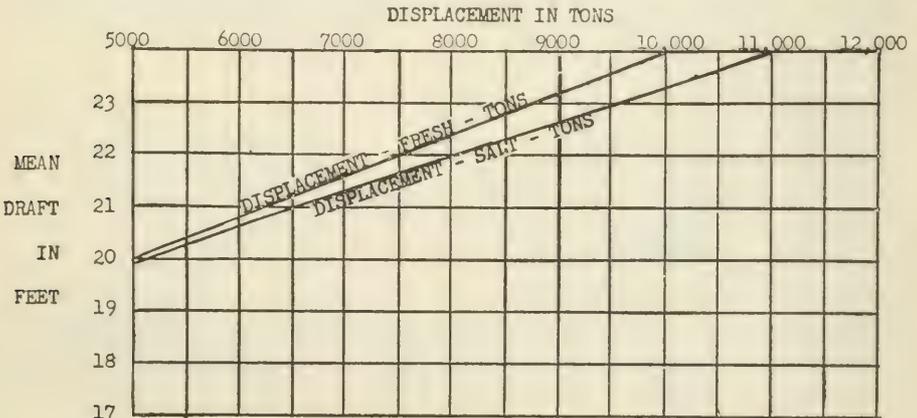
(a) Which is longer, a No. 15 sail needle or a No. 10 sail needle?

(b) From what materials is canvas made?

What is meant by the phrase "reefing a sail" or "taking a reef" in a sail?

What precautions should be taken when stretching tarpaulins to cover hatches?

A vessel in fresh water draws 23 feet. What does she draw in salt water, using the scale below?



Describe briefly diesel engines. State how they are connected to a propeller shaft. What are their maneuvering characteristics?

Describe a capstan.

Describe briefly turbo-electric drive.

What is freeboard?

What is the purpose of a towing engine?

Where must draft marks be placed on a vessel?

What is loaded displacement?

What is light displacement?

What type of sails are required in lifeboats?

Give the steps, in rigging a lifeboat mast and sail.

What is the total deadweight capacity of a ship?

What is "gybing"?

Where is the load line located on a ship?

What is net tonnage?

What is gross tonnage?

How are grommets installed on canvas work?

What equipment is required by the Regulations to enable persons to get in and out of a boat in the water and climb to the boat deck?

How do you know how many persons a lifeboat is allowed to carry?

If you were hove to by the sea anchor and the dragline carried away, how would you keep the boat's head up to the wind and sea?

How is a sea anchor hauled in?

Which oar is the stroke in a lifeboat?

What are the parts of an oar?

From what wood are oars usually made?

How is a sea anchor used?

What may be used in lieu of a sea anchor?

In addition to sufficient air tankage to float when it is filled with water, what quantity of air tankage is required for each person permitted in a lifeboat?

How are air tanks of lifeboats tested?

What materials are used for the construction of lifeboats?

When steel or iron is used for the construction of lifeboats, what is done to prevent corrosion?

In sailing a lifeboat:

(a) What is the effect of putting more weight in the forward end of the boat?

(b) What is the effect of putting more weight aft?

In a lifeboat under sail, what is meant by:

(a) Tacking;

(b) Wearing?

Canvas is normally designated as to weight by a number. Is No. 0 canvas heavier or lighter than No. 4?

How are lifeboats numbered on board a vessel?

What is a bolt rope?

What is a trysail?

How would you test canvas?

What equipment is required for signalling distress from a lifeboat at sea in the daytime?

State the procedure that you would use in bringing a lifeboat aboard.

How would you land a lifeboat on a beach with a strong wind blowing on shore, a high sea, and heavy surf?

Lowering a lifeboat when the ship has stern-way, what precautions would you take?

Where vessels are provided with manila lifeboat falls, how must such falls be stowed in order to protect them from ice?

List the equipment for a lifeboat which would be suitable for signalling purposes during the hours of darkness.

In a lifeboat which is not equipped with simultaneous releasing gear, which fall should be unhooked first?

State in sequence the commands usually employed by the person in charge of a lifeboat in the water to get the boat under way using oars. At the start of the sequence the oars are in the stowed position in the boat.

What command is usually employed, meaning, "Complete the stroke and then temporarily cease rowing"?

What command is used when it is desired to check the headway of a lifeboat?

Before swinging out a lifeboat, which gripes would you let go first? Why?

In a motor lifeboat, how does the torque of a right-handed propeller affect the boat?

What are the most important things to be done before a boat is lowered?

In what part of a lifeboat are the hatchets kept and for what purpose?

How would you launch a boat in a heavy seaway?

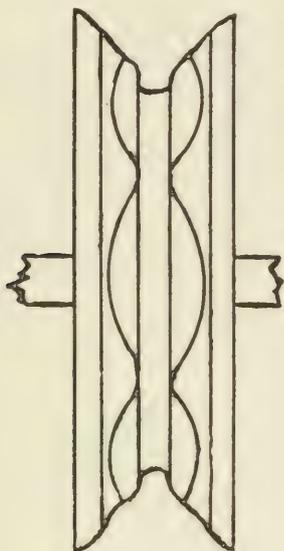
Which end of an anchor chain connecting shackle is placed outboard and why?

Why are studs used in an anchor chain?

State the advantages in having an ample scope of chain out when anchored. (Illustrate by sketch if you desire).

How would you let go an anchor in deep water?

Name the device pictured and describe one or more methods of engaging the motor or engine drive to heave up the anchor chain.



What precautions must be observed by a vessel anchored in an exposed roadstead?

Standing anchor watch in a fog, what signal can you give when a vessel approaches so close that collision seems possible?

If an anchor drags in a clay bottom, how may its holding power be affected?

Describe the advantage of detachable links over U-shaped connecting shackles in anchor cable.

How do crosses, elbows, or round turns get into cables?

Where would you make an anchor buoy-rope fast?

How is the size of a chain cable measured?

Name the mooring lines in the sketch below.

Why is it advisable to have a man stationed at the windlass to handle the anchors, if necessary, when proceeding in constricted or congested waters?

Describe the use of the anchor in turning a ship.

What would you do if, riding to a single anchor, you found you were dragging?

A vessel 450 feet long anchors with 105 fathoms of chain, and with 20 fathoms from her hawse pipe to the bottom. What diameter circle will she describe as she swings to the tide?

What is a lee tide? What is a weather tide?

Anchored in an exposed roadstead, what precautions should you observe?

When a vessel is moored to two anchors, what is the most advantageous position for the cable shackles, or detachable links, in event of a foul hawse?

Why are ships moored with two anchors?

What is the length of a shot of chain?

In a congested anchorage, what precautions are necessary at slack water when the tide is changing?

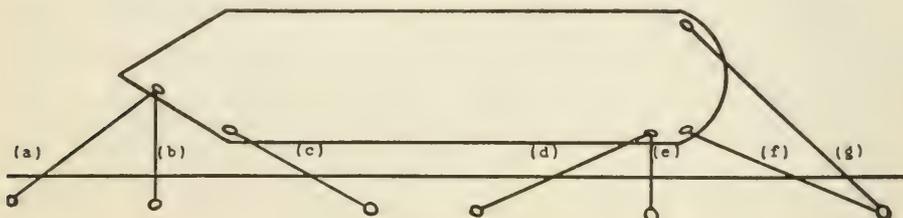
Describe how you might carry out an anchor using ship's lifeboats.

On a vessel fitted with cowl type ventilators it is necessary to trim the ventilators at night with only one standby man available. The ventilators are stiff so that using the handles he could not trim them alone. Using a pinch bar through the handle would break off the handle. How could he trim the vent alone? (If you wish, illustrate the answer by a sketch).

You are left in charge of a vessel at night alongside of a dock in New York Harbor, and you discover that a serious fire has started on your vessel. Explain in detail what you would do.

A mate standing on the port wing of the bridge, 30 feet from the vessel's center line, sights a vessel across the jackstaff, 200 feet forward of the bridge, and assumes the vessel is dead ahead. How much is he in error?

What is the best position for determining the relative bearing of an object seen from the bridge?



What is the usual method employed on merchant vessels to stopper off a wire mooring line?

What is the usual method employed on merchant vessels to stopper off a manila mooring line?

Why is the rudder of a single screw vessel most effective when the propeller is turning ahead?

What are the Coast Guard instructions for use of the breeches buoy?

What are two reliable signs that the vessel is in the vicinity of field ice?

In the event of grounding, what consideration must be kept in mind before ordering the use of the engines in an effort to get into deeper water?

Man overboard from a steamship. What would you do?

Describe at least three methods which are employed on merchant vessels to reduce corrosion.

On a steamship running into and shipping heavy seas, what would you do?

How can two mooring lines be made fast to one bollard on a pier so as to permit casting off either line without slacking the other?

On a deep-sea vessel you receive orders to get the anchors ready for anchoring in an hour. Describe in detail all the steps that should be taken to have both anchors in complete readiness. What other gear should be available?

What is the usual amount of chain used when anchoring to a single anchor? What factors must be considered in determining the amount of chain used?

On a single screw steamer (right-hand propeller) going full ahead, the engine is put full speed astern. Which way will the stern swing (no wind or current) if the rudder was:

- (a) Amidship;
- (b) Hard left;
- (c) Hard right?

Why should rubber gaskets not be painted or greased?

Is it possible to steer a vessel laying at anchor?

List at least six items of ground tackle ordinarily carried by an ocean-going power-driven vessel of 15,000 tons displacement (approximately).

When making fast alongside where there is a big rise and fall of tide, what care is required?

How could you make the eye of a mooring line safe for handling?

What is the effect of storm oil?

Why is a buoy-rope used on an anchor?

How would you make a quick turn to starboard in a twin-screw vessel with headway and both propellers turning full ahead?

With what equipment should a ship be provided to prevent injury from stepping into the hawse pipes?

If you were in charge of the foc'sle head when getting underway from an anchorage, what information would you furnish the bridge?

How would you protect a line in way of a mooring chock?

On an old-fashioned stock anchor, what is the purpose of the stock?

On the modern, commonly used form of stockless anchor, what part serves the same purpose as the stock of an old-fashioned anchor?

State the effect on handling qualities caused by variation in a vessel's displacement; i.e., what may be expected in a deeply loaded ship, a ship in the light condition, etc.

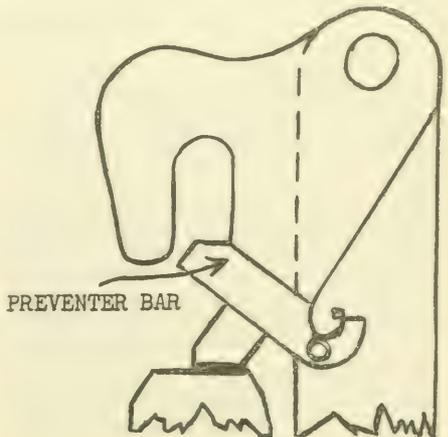
Is a vessel under better control when going ahead on the engines or when backing?

What is a devil's claw and how is it used?

What is meant by a left-handed screw?

Describe briefly the action of educators fitted on many modern vessels for pumping water out of a chain locker.

What is the purpose of the preventer bars on the Rottmer type releasing gear illustrated?



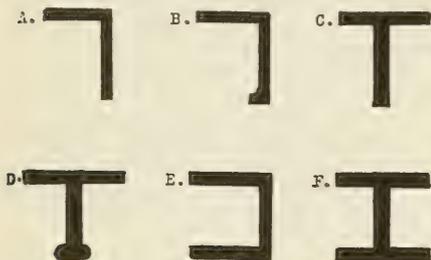
How are the shots of chain in an anchor cable joined together?

How are the shots of chain marked?

Lying at anchor, you dropped a second anchor when it started to blow. When would you pick up the second anchor? Why?

What is a messenger?

Name the types of beams sketched below:



What steps to avoid oil pollution should be taken by a vessel when loading or discharging bulk petroleum products?

What is the advantage of taking a round turn on the bitt toward the direction of strain before taking the other turns on a set of bits?

Where must a ship's lookout be stationed during the hours of darkness, and poor visibility?

What are the dangers involved in paint or oil soaked rags on a vessel, and how would you avert these dangers?

Describe the precautions that should be observed to eliminate fire hazards in paint lockers.

May paints be stowed in locations other than in properly equipped and fitted paint lockers?

Because of fire on board, you have to abandon ship and take to the lifeboats. After leaving the burning vessel, should the boats be sailed away or kept near the position of the ship?

In a smooth sea, how would you approach a burning foreign vessel in a lifeboat to take the passengers and crew off?

You are using a steel snatch block on deck through which is rove a steel cable used for a heavy strain. What precautions would you take?

Describe the precautions that should be observed when men work over the side on stages.

How often must a vessel be placed in dry dock or hauled out for examination?

What is the purpose of the nonreturn valves or valves fitted with reach rods to the deck on bilge suction piping in the holds of all passenger ships and many freight vessels?

Why is the use of doubler plating for repairs or alterations to be avoided on plating of compartments designed to carry fuel oil or other inflammable or combustible liquids?

If the power plant of a vessel is shut down and she is rolling heavily in a seaway, how may the rudder be held steady?

What is the purpose of ballast tanks aboard ship?

How would you prevent chafing damage to tarpaulins from the locking bars on the hatches?

## 25. CARGO STOWAGE AND HANDLING.

When cargo is marked "USE NO HOOKS," what precaution may be taken to avoid damage by longshoremen?

To avoid oil pollution, what precautions should be observed when discharging ballast in coastal waters?

When cargo received for shipment appears in poor condition or deficient in packing, what measures are necessary to protect the vessel against damage claims?

In writing a report for the Chief Officer or Master concerning cargo which appears to be in poor condition, what information should be included?

In examining a cargo hold prior to loading general cargo, name at least ten points to which you should pay particular attention.

Describe briefly the purpose of a dock receipt.

Describe briefly the purpose of a mate's receipt.

In the event that cargo is damaged by longshoremen, what information should be contained in the report of the officer observing the goods?

What method of extinguishing fire in a cargo hold is the best to minimize damage to the cargo?

Why should full barrels be stowed "bung up and bilge free"?

Referring to the illustration:

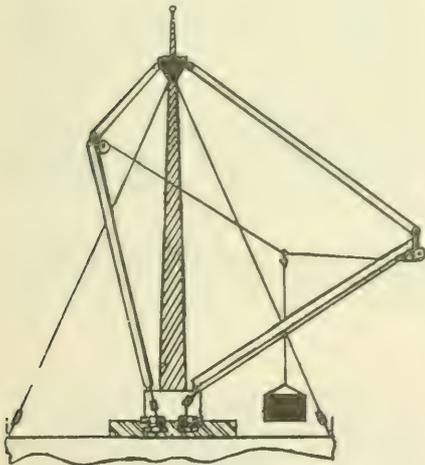
(a) What objections may be raised to the stowage shown?

(b) What measures could be taken if such a stowage was necessary?



Describe briefly at least four methods by which pilferage of cargo can be reduced.

What measure could you require to eliminate need for a "fiddle-string" span when handling cargo as shown?



Define:

(a) Grain Cubic.

(b) Bale Cubic.

(c) Measurement ton (used in computing freight charges).

When stowing deck cargo, what areas of the deck must be kept free?

What is a good method for cautioning longshoremen against using for

stowage areas of the deck which should be kept free?

When filling oil or water tanks contiguous to loaded cargo holds, what precautions should be observed to protect the cargo?

When a vessel is loading a general cargo for discharge at several different ports, what precautions are usual to minimize the dangers of short landing or overcarriage of cargo?

What are the duties, during transfer operations, of the senior deck officer on duty on a tank vessel?

Describe briefly how you would avoid cargo damage caused by leakage or drainage from wet cargo.

On a tank vessel, under what conditions must cargo operations be stopped?

Why is it advisable to make frequent inspections of the pump room when loading a tank vessel?

What must be done by the deck officer on duty when loading or discharging is suspended because of failure of deck machinery?

What are the meanings of the following three terms used in marking shipping containers: Gross, Tare, Net?

What precaution is necessary to avoid danger from an accumulation of hazardous gases prior to and during operation of pump room machinery?

What are the seven classifications of dangerous articles that may be carried as cargo?

What is meant by the term "dew-point"?

What care must be taken in the stowage of 'tween deck cargo to assure the safety of men handling 'tween deck hatches and beams, or working cargo in the lower hold?

In loading general cargo, why should the space between the spar battens (sweat boards) and the shell be kept free of cargo?

How would you stow metal drums?

Why is it inadvisable to stow cargoes susceptible to heat damage on tank tops of tanks carrying fuel oil?

What is a bill of lading?

What is a stiff ship?

What is a tender ship?

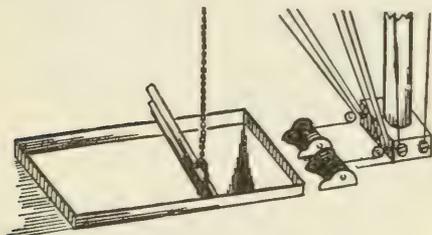
In handling cargo by the "yard and stay" or "married falls" method, how would you rig to assure that both preventer and guy are taking their share of stress?

Why should preventer and guy take stress together rather than preventer being slack?

What is a measurement ton?

What is the advantage of a net sling fitted with a "pie-plate" over a plain net?

When loading long reinforcing rods, pipe, rails, or similar steel items using a single chain sling as shown, what is the usual method employed to prevent the draft slipping out of the sling? Explain the reasons for this.



How should cargo falls be wound on a drum?

What precautions to avoid injury should be observed by men landing drafts?

If the dry bulb temperature is 80° and the wet bulb temperature 70°, what is the relative humidity in a cargo hold?

From what book could you determine the applicable regulations relating to a dangerous commodity to be transported?

How does measurement cargo differ from deadweight cargo?

In loading a general cargo, what provisions could you make to minimize loss of cubic space due to broken stowage?

Name the sources of moisture in the air of a cargo hold.

What is spontaneous combustion?

What types of cargoes are most liable to take fire through spontaneous combustion?

What measures should be taken to avoid fires caused by spontaneous combustion?

What reasons, other than preventing sweat, make ventilation necessary for many cargoes?

What is meant by the stowage factor of any consignment? Of what use is it?

What is meant by the absolute humidity of the air?

What does "full and down" mean?

What is the difference between a long ton and a short ton?

How could you find the bung of a dirty cask?

What type of dangerous cargo is indicated by each of the following?

- (a) Green label.
- (b) Red label.
- (c) Skull & crossbones.

In loading or discharging automo-

biles, what precautions should be taken against damage?

In stowing automobiles, state the measures that should be taken to assure their discharge in good condition.

Would you secure a boom guy and preventer to the same cleat?

Would you secure a boom guy and preventer to the same shackle at the boom head?

What stowage must be provided fibers of animal or vegetable origin that have been involved in a fire or that have been wet?

What stowage must be provided fibers or fabrics impregnated with more than 5 percent of animal or vegetable oil?

How must lumber be handled in the holds of vessels loading, unloading, or containing explosives?

What are three uses of dunnage?

How should dunnage be stacked?

In what part of the hold would you require most dunnage? Explain your answer.

In what direction would you lay dunnage?

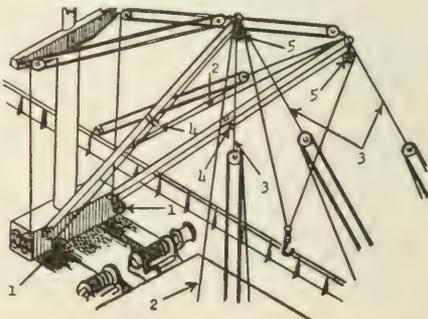
What precautions must be taken when stowing containers of inflammable liquid in a hold whose boundary bulkhead adjoins the boiler or engine room?

Why are cargo battens, or spar ceiling, fitted on the sides of cargo holds?

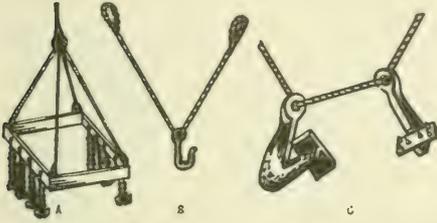
What care must be taken in laying dunnage over a finished commodity block?

If the portable electric cord for a cargo cluster light were cut in two during cargo operations, would it be permissible to use it after carefully splicing and wrapping it with insulating tape?

Name the numbered parts of the booms and cargo gear fittings illustrated.



On what types of cargo would you use the slings illustrated?



How many board feet of dunnage would you estimate to be in a stack whose outside dimensions are 6 feet high, 4 feet wide, and 14 feet long?

What precaution is advisable in stowing cargo adjacent to a ladder?

What precautions are necessary in the loading or unloading of sulfur in bulk?

Why is sulfur dust dangerous?

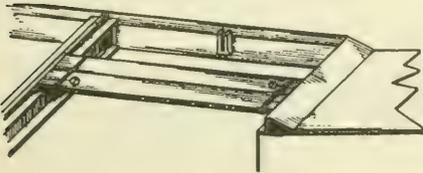
What precautions should be observed when stowing fibers of vegetable origin, such as jute, hemp, flax, sisal, coir and kapok?

What precautions should be observed in the stowage of excelsior either as cargo or as packaging material for other commodities?

In order to load a consignment of goods into the 'tween decks, stevedores in a foreign port request permission to use one king beam and hatch boards, leaving the blind beam out to expedite resuming work in the lower hold.

(a) Would you regard this as an advisable procedure?

(b) What precaution against men falling into the open hold from the 'tween deck should be taken?



Why is it important that the switch for an electric cargo winch be in the off position when the winch is not being operated?

When the controller for an electric winch is in the neutral or off position, what prevents the winch drum paying out when the cargo whip is subject to tension?

In carrying fresh vegetables to ports subject to severe winter conditions, what precautions may be necessary?

What care would you take to avoid sweat damage when stowing cargo in a deep tank not fitted with ventilation?

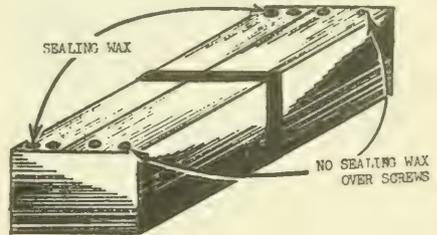
What precautions are necessary in the stowage of matches which may be struck anywhere?

What precautions are required in the stowage on deck of combustible liquids?

What are the general stowage requirements for corrosive liquids?

What precaution is necessary when using a gasoline powered fork lift truck for stowing tin plate in the hold of a vessel?

Checking parcels into a special cargo locker you receive a small case as sketched. What action would you take?



Would you permit longshoremen to move railroad freight cars or barges with cargo falls led from the booms?

How may cargo be protected against possibility of falling into the water between the ship and the dock?

If a boom could not be lowered to rig a rain tent gantline, how would you send a man aloft on the purchase?

What precautions should be taken during the loading of a cargo of grain in bulk?

When is the use of redwood, oak, mahogany, or similar types of wood inadvisable for dunnaging?

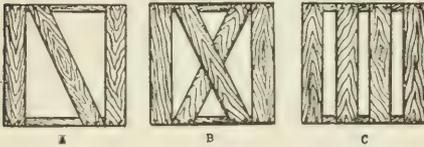
When is the use of resinous pine wood inadvisable for dunnage?

Would you permit longshoremen employed by a stevedore to perform cargo operations while under the influence of liquor?

How should dunnage be laid for bag goods and fragile paper cartons?

How would you secure a deck cargo of empty drums or barrels?

In stowing crated cargo in the holds, you are obliged to stack vertically the three crates whose ends are illustrated. How would you arrange them in order to have the strongest on the bottom supporting the others, the next strongest in the middle and the weakest on top? The materials used in fabricating the crates are of equal strength, the only difference being in the manner of construction.



Describe the hazard involved in the transportation of the various types of fish oils, and the care necessary in stowing such oils.

How would you stow nitrocellulose motion picture film used for the entertainment of passengers on a passenger vessel? What care is required in the stowage and use of acetate or slow-burning film?

How should coffee beans in bags be stowed, and what precautions should be taken during the voyage to insure the arrival in good condition?

A vessel is fitted with deep tanks with a capacity of 1000 tons of fresh water. What quantity of peanut oil with a specific gravity of 0.92 could be transported in such tanks?

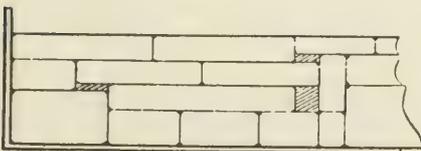
Where would you stow bags of strong smelling cargo?

A crate of machinery has a hole knocked through a board and tar paper lining in the process of loading. Should you note an exception? State your reasons.

In stowing cartons of canned goods how could you avoid soiling and crushing by longshoremen?

What care must be taken in a cargo hold following leakage from packages containing poisonous material?

What precautions would be necessary in the stowage of the cased goods as shown?



When it is necessary to heat a vegetable oil, such as palm oil, to keep it liquid for discharge, what care is necessary to avoid damage?

What care is necessary in stowing foodstuffs in general cargo?

If the rate of loading at a given port is about 30 tons per gang hour for bagged flour, how long would it take to load 600 tons, using two gangs?

How would you stow potatoes?

How would you stow bags of seeds?

How should case goods be stowed?

What quantity of marble with a stowage factor of 20 (including allowance for broken stowage) can be loaded into a hold containing 40,000 cubic feet of stowage space?

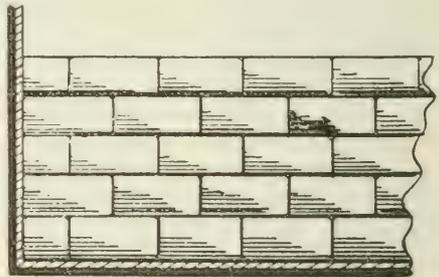
During the loading of explosives, what should be done with damaged or leaking containers of explosives?

Describe the stowage required for rice.

What precautions are necessary when stowing tea?

How do you stow steel plates?

What are the advantages of stowing cases or cartons as sketched?



When refrigerated spaces are accessible to personnel during a voyage, what devices are fitted to enable a man to warn other crewmen should he be locked in the cold compartment?

If a longitudinal bulkhead divides a refrigerated space, how is it fitted to prevent asymmetrical flooding in the event of damage?

Describe the care necessary in carrying fresh fruits and vegetables.

How would you determine the temperature of frozen meat before stowage?

Into what three general classes are refrigerated cargoes divided?

In connecting cargo hose, what is the minimum number of bolts permitted at a flanged joint?

What provisions should be made for any leakage from cargo hose connections?

How would you remove any odors after discharging refrigerated cargo?

After discharging refrigerated cargo, what are the advantages of thoroughly airing the cold storage compartments?

In defrosting coils in reefer spaces using sea water, what precautions should be taken to assure cleanliness?

How are drains in refrigerated 'tween deck spaces fitted to preserve insulation when carrying cargoes that require a very low temperature?

Where lower holds are used for frozen cargoes, how may bilges be kept free from frozen water?

Describe briefly the methods employed to provide refrigeration in the holds of vessels.

What would you do if you noticed a large quantity of oil on the water near your vessel while loading bulk oil on a tanker?

If you were loading a cargo of gasoline and a tug tried to come alongside in the way of cargo tanks, what would you do?

What should be done with oil in the oil hose after the oil transfer has been completed?

State the hazards incident to the refrigeration of perishable cargo by means of blocks of so-called "dry ice."

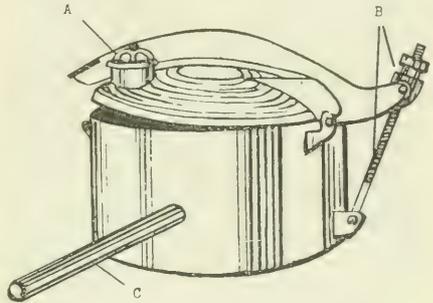
In lifting a cargo of heavy oil, when the vessel is down to her marks before all tanks are full, is it best to leave each tank slack or to fill up as many tanks as possible, and leave only the minimum number of tanks slack? Explain your answer.

In an emergency, is it necessary for the senior officer on a tank vessel to follow the tanker rules?

In transferring an oil cargo, what would you do if your vessel surges badly along the dock?

An oil hose has an inside diameter of 6 inches. What is the minimum radius circle in which such an oil hose should be bent?

Sketched is a typical tank top arrangement on a tank vessel. Name and state the purpose of "A," "B," and "C."



What precaution should be taken to prevent a deck spill from running overboard?

In transferring an oil cargo, what would you do if the oil hose got pinched between vessel and the dock?

What is meant by "topping off" an oil tanker?

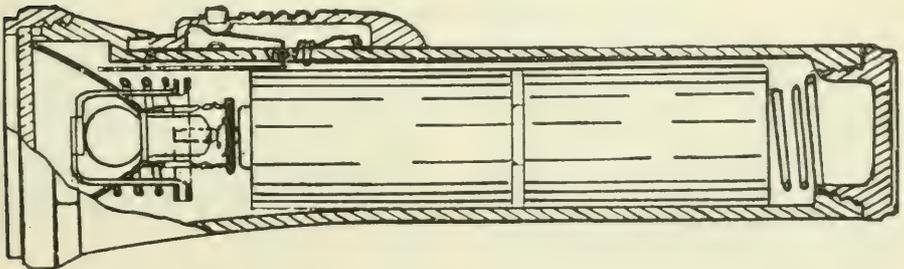
In starting to transfer an oil cargo, what would be your duties and how would the oil pumps be operated?

Describe what is meant by:

- Grade A inflammable liquid.
- Grade B inflammable liquid.
- Grade C inflammable liquid.
- Grade D combustible liquid.
- Grade E combustible liquid.

In rigging a windsail to ventilate oil tanks after cleaning operations, would you place the lower end of the canvas duct at the top or bottom of the tank? Why?

What safety features make the type flashlight illustrated below suitable for use on board tank vessels where an ordinary flashlight might be hazardous?



Describe the operation of a jet exhauster.

How often must cargo piping be tested on tank vessels?

How often must cargo pump pressure gauges on a tank vessel be tested for accuracy?

How often must cargo pump relief valves on a tank vessel be tested for satisfactory operation?

What pressures are forbidden by regulation for cargo hose when transferring cargo on a tank vessel?

What type of device may be used by shippers and consignees to detect any variation in cargo temperature that may have occurred during a voyage?

What precautions should be taken in opening a hold in which barrels or cases of gasoline are stowed?

As applied to bulk oil cargoes, what is meant by:

- (a) Ullage;
- (b) Innage;
- (c) Thieftage?

What is the usual method of cleaning oil tanks?

What would you do if you had a bad

oil spill on deck while transferring oil cargo on a tanker?

In loading an oil cargo, what would you do if the tank valve jammed when open?

When loading case oil, what should be done with leaking cases?

What permission should be secured before general cargo, freight, etc. can be handled at the same time that gasoline in bulk is being transferred?

How could you determine the regulations governing shipment of animals exported from the United States?

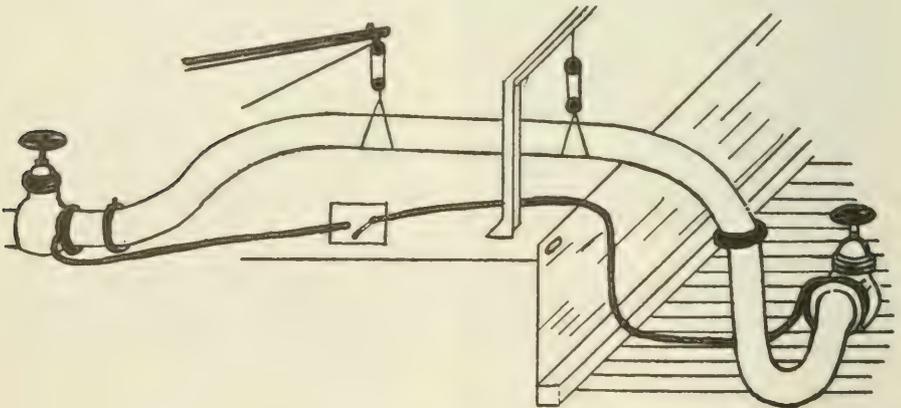
What should be done if an oil hose leaks badly at the hose connection?

How should the sampling or sounding hole (ullage hole) in an oil tank be protected when the tank is open and not gas free?

What is the purpose of a bonding wire as illustrated and where should it be connected?

Why should a bonding wire be connected before the cargo hose, and the connection maintained until the hose is removed?

Explain the use of a switch in a bonding cable.



## 28. LIFESAVING APPARATUS AND FIREFIGHTING EQUIPMENT.

Describe the purpose and use of the following lifeboat equipment.

- (a) Hatchets.
- (b) Smoke signals.
- (c) Drinking cups.

What is the length of line which is required to be attached to one of the lifebuoys on each side of a vessel?

What amount of buoyant apparatus is required on ocean passenger vessels, and how is it to be stowed?

How many lifeboats and type "A" life rafts are required aboard coastwise passenger vessels of over 300 gross tons?

One of the lifeboats on each side of a passenger vessel shall be of suitable size and design for doing emergency work at sea. Describe how these boats are to be fitted and carried while at sea.

What defects make cork life preservers unfit for service?

Describe the daytime distress smoke signals required on lifeboats and life rafts, and state how they are operated.

Describe the distribution and stowage of life preservers aboard ocean passenger vessels.

Would it be necessary to turn a life raft over if it capsized?

How do you know how many persons a lifeboat is allowed to carry?

Describe the construction of a life preserver.

Describe the auxiliary line required to be carried aboard ocean passenger vessels as equipment for the impulse-projected rocket type line throwing appliance or the Lyle gun.

How many service lines are required, and how shall they be stowed?

Can a painter of a lifeboat be of any size besides  $2\frac{3}{4}$  inch rope?

Describe a lifeboat compass, and state the requirements for compass and mountings in new installations or replacements.

Name the items carried in lifeboats for signalling or attracting attention.

What care should be given ring buoys?

How are all ring life buoys to be distributed and secured aboard ocean passenger vessels?

How many means of escape must be provided on steamers from all enclosures where passengers or crew may be quartered, or where anyone may be employed? How are such avenues of escape required to be located?

Describe in detail the markings required to be shown on each lifeboat of a vessel.

How would you test the air tanks of a lifeboat for tightness?

How are lifeboats required to be numbered and marked?

Describe the electric water light, and state how it is ignited.

What is the service use of the following items of lifeboats equipment:

- (a) Batteries in flashlights;
- (b) Red hand flare distress signals;
- (c) Floating orange smoke distress signals?

What equipment is required for each lifeboat of less than 60 persons capacity carried aboard ocean passenger vessels?

What color are the sails carried in

lifeboats aboard ocean and coastwise passenger vessels?

Are all lifeboats installed on a particular passenger vessel required to be fitted with the same type of releasing gear?

What markings do the Regulations require for watertight doors and associated equipment?

How long may the spare flashlight batteries be used as equipment in lifeboats aboard ocean passenger vessels?

How many spare bulbs must be provided for each lifeboat flashlight?

How many years after the date of manufacture may red flare distress signals be used as lifeboat equipment?

Describe the following items which are required to be carried in lifeboats aboard ocean passenger vessels.

- (a) Heaving line.
- (b) Jackknife.
- (c) Ditty bag.
- (d) Bucket.

How many of each of the following distress signals must be carried as lifeboat equipment aboard ocean and coastwise passenger vessels, and what is the limit of their service use?

(a) Floating orange smoke signals.

(b) Red hand flare signals.

(c) Red parachute flare signals.

How many of each of the following distress signals must be carried in lifeboats aboard ocean cargo vessels?

(a) Floating orange smoke signals;

(b) Red hand flare signals;

(c) Red parachute flare signals?

How must a water light be attached to a life float or buoyant apparatus?

What care should be given kapok life preservers?

Describe the calcium carbide water light, and state how it is ignited.

How are all lifeboats and liferafts required to be carried or stowed?

What equipment for the stowage and protection of falls must be provided for properly lowering the lifeboats aboard ocean passenger vessels of over 1000 gross tons, where lifeboat winches are not used?

State the number of lifeboatmen required for:

(a) A lifeboat carrying less than 41 persons.

(b) A lifeboat carrying from 41 to 60 persons.

(c) A lifeboat carrying from 61 to 85 persons.

(d) A lifeboat carrying from 86 to 110 persons.

(e) A lifeboat carrying over 110 persons.

Describe the distress lights or flares with which lifeboats and liferafts are equipped, and state how they are ignited.

To what equipment are self-igniting water lights attached, and what two types of water lights are in general use?

Who must be placed in charge of a lifeboat on all services other than rivers?

How often are fire and boat drills required?

What is the minimum length of lifeboat falls?

Describe briefly the Carbon Dioxide Fire Extinguisher System.

In what weather conditions are tank vessels forbidden by the regulations to start or continue transfer operations?

Would you use a canister type gas mask for entering a hold into which CO<sub>2</sub> gas had been injected to extinguish a fire?

Describe the Smoke Pipe Fire Detection System.

Where will you find listed the life-saving and fire-fighting equipment required to be carried aboard ocean passenger vessels?

How many complete recharges must be carried for each gas mask required to be carried aboard ocean passenger vessels and where must they be stored?

Where shall fire axes be located aboard passenger vessels?

How is fire hose tested, how often, and by whom?

What care would you give the ship's davits?

What are the three basic methods of fighting fire?

Name three types of fire detecting systems.

How many extra charges are required to be carried for portable fire extinguishers?

When a tank vessel is provided with steam smothering system for the extinction of fire in the liquid cargo tanks, in what position should the valves to the tanks be left? Under what circumstances may they be in other than the normal position?

How would you mark the steam smothering line valve to a dry cargo hold on a tank vessel, unless a line independent of the line for the liquid cargo tanks was provided?

On a tanker at sea carrying cargo, would you use portable electric lights to provide illumination for work being performed in the enclosed space below the midship house directly above the cargo tanks? If you use portable lights, what type should you use?

How would you mark a locker containing oxygen breathing apparatus?

How is the location of emergency squad equipment indicated?

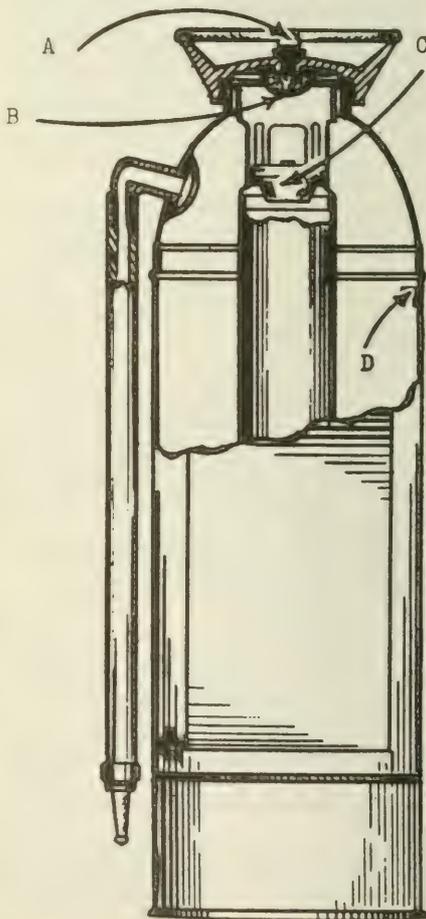
How are fire doors marked?

What distress signals are required to be carried within the pilot house or on the navigators bridge of ocean and coastwise vessels?

Name the four types of fire extinguishers, and state the kind of fire on which each is most effective.

How often should all fire equipment be examined and inspected by the vessel's personnel?

On the foam type fire extinguisher sketched, name and describe the function of each of the parts indicated by letters.



Who shall be assigned the duty of seeing that the lifeboats and other life-saving equipment is at all times ready for immediate use?

How would you combat fire in a cargo hold using a CO<sub>2</sub> extinguishing system? State in detail the steps you would take.

What is the purpose of the electric drill required to be carried in the emergency equipment? How would you make use of a half-inch electric drill for this purpose?

Describe the steam fire-extinguishing system for cargo spaces on tank vessels and its method of operation.

Describe the sign required to be posted at the gangway of tank vessels at a dock transferring cargo.

Describe the signals required to be displayed by a tank vessel at a dock transferring cargo.

In the event that the remote controls for release of CO<sub>2</sub> gas failed to operate for a fire, what alternate method of release is required by the regulations?

What regulation has for its purpose the placing of fire extinguishers only in the correct and authorized position should they be moved temporarily for any reason?

What precautions are to be taken regarding paint and lamp lockers?

How would you combat a fire in the engine room of a vessel fitted with CO<sub>2</sub> extinguishing equipment?

When must a supervised patrol be maintained aboard ocean passenger vessels on an international voyage?

How do the Regulations define an "inflammable liquid?"

Certificates of Inspection often use the phrase "approved for the carriage of Grade 'E' liquids in the deep tanks." What is meant by Grade "E" liquids?

What equipment must a fire watchman have in his possession at all times when on duty?

Is it permissible to require a watchman to sweep passageways in the early hours of morning when no other crew members are available for this work?

How is the spread of fire by convection prevented?

How are manual alarm boxes for use in event of fire marked?

How are the bells or other alarm devices which operate from manual alarm boxes, sprinkler devices, or smoke detectors identified?

How are fire extinguishing system controls marked?

State the precautions demanded by the Regulations with respect to cargo tank hatches, ullage holes and Butterworth plates on a tank vessel which is not gas free.

In working on tanker hatch covers, what type of tools must be used?

How would you prevent the spread of fire by conduction of heat?

### 30. RULES AND REGULATIONS FOR INSPECTION OF MERCHANT VESSELS.

When the seamen of a merchant vessel sign articles, how do they agree to conduct themselves?

What do the articles stipulate must be done in event of embezzlement, or willful or negligent destruction of any part of the vessel's cargo or stores?

In what manner must any member of the crew who feels aggrieved by any breach of the articles of agreement or otherwise represent the same, and to whom must he state his case?

What recourse is provided in the articles for the master of a vessel when an individual signs on for a rating which he is incompetent to perform?

What is the penalty for coercing of witnesses or inducing a person to testify falsely in a marine investigation of a shipping casualty?

When and how are passengers and crew instructed in the method of putting on and adjusting life preservers?

What is the duty of the master, or person in charge of a vessel in the

event of collision with another vessel, and what is the penalty for failing to perform this duty?

What is the penalty for unreasonably refusing to serve after signing articles?

For what reasons may an officer's license be suspended or revoked?

What is the Law regarding lookouts at night?

Should the passengers aboard an ocean passenger vessel be encouraged to participate in fire and boat drills?

What is the penalty for inattention to, and neglect of duty whereby the life of any person is destroyed?

What is the penalty for being under the influence of liquor aboard ship and thereby failing to perform duty in preventing danger to vessel and persons aboard?

What is the penalty for a licensed officer if he places his license beyond his control, or voluntarily parts with it?

When, where, and how should the license of officers be posted on a vessel? What is the penalty for failure to comply with this rule?

What attention should be given to airports, coal ports, or other openings in the ship's side:

(a) When ready to leave port;

(b) At sea?

What is the minimum diameter required for a fog bell?

Where must a fog bell be located?

What is the law regarding officers and crew frequenting steerage passengers quarters?

Describe the draft marks required to be marked on vessels 50 gross tons and over.

What is the law on bringing a dangerous weapon or explosive aboard a vessel of the merchant marine?

How often must the lifeboats aboard ocean cargo vessels be swung out to ascertain that the gear is in proper order?

How often must fire and boat drills be held?

Where must the whistle for a vessel be located?

Where shall station bills be posted?

What is the law relating to smuggling goods into the United States, and what is the penalty for its violation?

What is the fire alarm signal?

What sort of report is made of the fire and boat drills?

What does the law require regarding hatches, side ports, etc., before proceeding to sea?

What is the signal for boat stations?

How are steering orders to be given?

What information must the station bill show?

What is the purpose of a station bill?

What is the signal for dismissal of fire drill?

What color must side light screens be painted?

What is the signal for dismissal from boat stations?

**SPECIMEN EXAMINATION  
FOR  
SECOND MATE**

**1. LATITUDE BY POLARIS.**

On 25 July 1958 in D. R. Longitude 160°-03' West, Polaris was observed at morning twilight to have a sextant altitude of 49°-02' and a bearing of 002° by gyro-compass. The chronometer read 2h-18m-12s. The chronometer was fast

6 minutes and 4 seconds. The sextant error was 1' off the arc. The height of eye was 25 feet.

*Required:*

The latitude at time of sight.  
The gyro-compass error.

**2. LATITUDE BY MERIDIAN ALTITUDE METHOD.**

Alpheratz is observed on the meridian bearing South with an observed altitude of 75°-03'.8. Declination of Alpheratz is 28°-51'.1 North.

*Required:* The latitude at time of sight.

Show all work.

**3. FIX OR RUNNING FIX.**

Enroute from Naples, Italy to the Dardanelles, in D. R. Latitude 36°-21' North and Longitude 19°-45' East, four celestial bodies were observed. Given

the following information on the celestial bodies, determine the ship's position.

<i>Body</i>	<i>Observed Altitude</i>	<i>Greenwich Hour Angle</i>	<i>Declination</i>
VEGA -----	29°-03'.4	260°-38'.7	38°-44'.5 N.
DUBHE -----	56°-48'.0	14°-20'.8	61°-59'.4 N.
SPICA -----	42°-38'.1	338°-57'.9	10°-56'.2 S.
ALPHECCA -----	59°-59'.2	306°-31'.6	26°-51'.7 N.

Candidates may use any method of solution.

**4. STAR IDENTIFICATION (any method).**

On 18 March 1956, at Latitude 15°-08' South, Longitude 64°-19' East, an evening observation is taken at 14h-32m-44s GMT of a star whose corrected altitude is 43°-02'.7 and whose

azimuth is 338°.5 True.

*Required:* Identify the star.

Candidates may use any method of solution. Show all work.

<i>Given:</i>	<i>No. 1 Alpheratz</i>	<i>No. 2 Ankaa</i>	<i>No. 3 Schedar</i>
Date -----	7 January 1958	12 January 1958	17 January 1958
GMT -----	1h-14m-37s	12h-39m-53s	18h-03m-49s
Long. -----	125°-36' West	05°-27' East	02°-58' East

*Required:* The meridian angle and declination of the star in each of the 3 cases. Indicate whether the star is

East or West of the Meridian in each case.

The following 3 sextant altitudes of stars were obtained. The height of eye was 22 feet; the sextant index error was 2'.0 on the arc in all observations.

Given:

	Observation No. 1	Observation No. 2	Observation No. 3
Star Sext. Alt.-----	4°-19'.8	14°-05'.1	48°-56'.2
Bar. Pressure-----	30.6 in.	980 mb	29.6 in.
Temperature -----	92° F.	(-) 20° Celsius (Centigrade)	48° F.

Required: The observed altitudes.

5. CHART NAVIGATION.

How would you assess the accuracy of a nautical chart?

What type pencils and erasers are best for chart work?

What care should be taken in using pencils and erasers, to keep charts in good condition?

How is information concerning magnetic variation shown on Pilot Charts?

Some foreign charts are published with the depths shown in meters. Convert 10 meters into fathoms.

How should charts be stowed?

What is the importance of the issue date shown on charts?

A vessel steams 27 minutes at 20 knots from bearing "1" to bearing "2." Would the position of the vessel at bearing "2" be at point "A," "B" or "C," assuming she sailed along one of the tracks plotted?

Where may the issue date be found on a chart?

When Notices to Mariners are received on board a vessel, how long should they be retained before being discarded?

What is the vertex of a great circle?

What is a chain of soundings?

What is composite sailing, and when is it used?

How can you determine what charts and publications are to be corrected by the notices listed in the Notices to Mariners?

What government agency prepares light lists for foreign waters?

What government agency prepares light lists for the United States and its possessions?

When plotting a fix by means of three cross bearings taken at approximately the same time, what would you assume if the three bearing lines do not intersect in a point or in a very small triangle?

What branch of the government prepares the American Ephemeris, the Air Almanac and the Nautical Almanac?

Describe briefly the contents of at least two of the three publications mentioned in the preceding question.

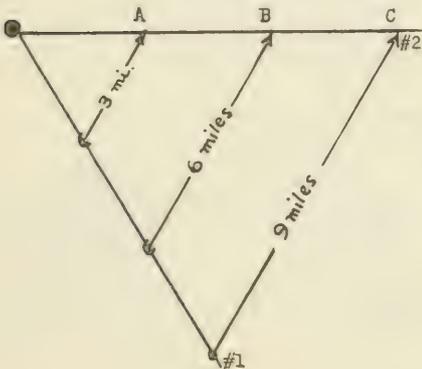
Why are the backs of pages in "Notices to Mariners" left blank?

What government agency publishes the Coast Pilot?

What government agency publishes the Sailing Directions?

Describe what is meant by the point of tangency on a gnomonic chart.

What information is contained in H. O. No. 205, "Radio Navigational Aids"?



If the co-ordinates on a great circle course are transferred from a gnomonic chart to a Mercator chart and the lines connecting them drawn, what is the appearance of the great circle course on the Mercator Chart?

How should charts be kept corrected?

What precautions are necessary when charts have laid unused for a lengthy period after the date of issue?

If a vessel has laid off a great circle track and has departed from the track through bad weather or lack of observations, should she attempt, when her position is determined, to get back on the original track laid down or work out a new course from her determined position?

A vessel on course 000° sights a light vessel dead ahead at a distance of 10 miles. What course should she set to pass the light vessel one mile off her port side?

What information is provided by the Daily Memoranda?

Is the water ever shallower than indicated on a chart? Explain.

In approaching land, what scale chart should be used?

Name the reference planes of soundings used on charts and state how you would determine the reference plane when consulting a chart.

What precautions would you take when transferring positions from one chart to another?

What information is contained in the Coast Pilots?

How is the latitude and longitude of a particular point on a Great Circle chart determined?

How would you know of the issuance of new editions of Hydrographic Office charts in order to replace the old corrected charts aboard ships?

Are parallels of latitude straight lines on a polyconic chart? Explain your answer.

Explain the limitations on the use of middle latitude sailing when crossing the equator.

In taking a vertical sextant angle, what care is required if the object observed is situated far inland from the shore?

State three methods by which, without obtaining the precise position, the navigator may assure himself visually that he is clear of any particular danger.

A vessel desires to make good a course of 100° and a speed of 9 knots through a current setting NE. True

with a drift of three knots.

*Required:* The course and speed required to accomplish this.

What precautions should be taken when obtaining the position of a ship by means of a "bow and beam" or "four point" bearing?

Why should bearings of near objects be used in preference to objects farther away, even though the latter may be more prominent?

What caution should be observed in "homing" on the bearing of a light-ship's radio beacon signal?

Why is a correction necessary in plotting on a Mercator chart bearings obtained through the use of a radio direction finder?

What preparation would you make when planning to enter a strange port?

A vessel hears a radio distance finding signal from a light vessel and 10 seconds later hears the sound signal. What is her distance from the light vessel?

What measures should be taken to check the accuracy of direction finder bearings?

When taking radio direction finder bearings off a coast with islands between your ship and the shore transmitter, what care would you exercise? Why?

Describe briefly how ocean station vessel's radio beacons may be located on the chart.

When a vessel equipped with a radio direction finder hears a distress signal, what measures should be taken?

What factors must be considered in obtaining radio direction finder bearings on a station broadcasting entertainment programs?

How is a radio direction finder on board ship calibrated for errors caused by electrical conductors nearby?

How are bearing errors caused by nearby electrical conductors corrected on board ship?

What is the meaning of the following information taken from the radio beacon chart for the stations indicated?

I San Francisco L.S. 314 (3-6).

II Farallon 314 (3-6).

III Bonita Pt. 314 (3-6).

How is "night effect" usually manifested in radio-direction finder bearings?

Why is night effect unusual when a vessel obtains a bearing from a position less than 50 miles from the radio beacon?

**6. COMPASS DEVIATION.**

Enroute from New York to Cape of Good Hope in D. R. Latitude  $31^{\circ}-26'$  North and Longitude  $55^{\circ}-17'$  West, an

azimuth of the star  $\delta$  (Delta) Cygni was observed. The following data was obtained at the time of observation:

<i>Compass Bearing of Star</i>	<i>Greenwich Hour Angle</i>	<i>Declination of Star</i>
329°-00' psc	150°-36'.3	45°-01'.9

Variation for the locality was  $18^{\circ}-30'$  West.

*Required:*

The true azimuth.

The deviation of the standard compass.

Candidates may use any method of solution.

**9. MERCATOR SAILING.**

By mercator sailing, find the true course and the distance from Ambrose Channel Lightship (Lat.  $40^{\circ}-27'.1$  North and Long.  $73^{\circ}-49'.4$  West) to a

point in Lat.  $32^{\circ}-22'$  North and Long.  $64^{\circ}-39'.0$  West, off St. David Island Lighthouse, Bermuda. Show all work.

**11. PILOTING.**

Running along the coast off a lighthouse listed as 145 feet high. You measure its vertical sextant angle and find it to be  $1^{\circ}-3'$ . How far off the lighthouse are you?

Steaming south by gyro at a speed of 12 knots, a lighthouse was observed bearing  $126^{\circ}-00'$  by gyro. After a run of 30 minutes the same lighthouse bore  $100^{\circ}$  by gyro.

*Required:*

Distance off at second bearing.

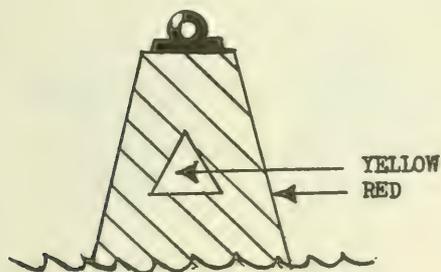
Distance off when abeam.

A ship is steering  $101^{\circ}$  p.g.c., Variation  $23^{\circ}$  East, deviation  $3^{\circ}$  West, which is  $82^{\circ}$  p.s.c. A light is sighted bearing  $129^{\circ}$  true. On what gyro bearing must the light be observed so that the run between bearings would equal the distance off the light when the light bears  $191^{\circ}$  gyro?

NOTE: Problems may be given pertaining to piloting which are under other titles in this book.

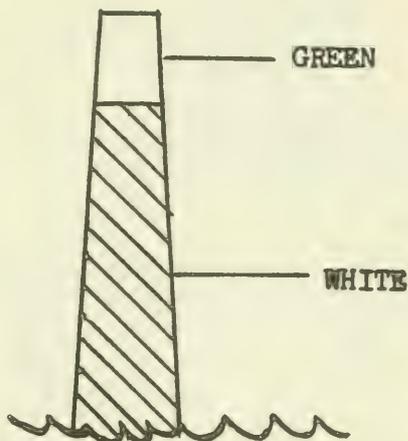
## 12. AIDS TO NAVIGATION.

What is the meaning of a red nun marked with a yellow triangle as illustrated?



Where it is desired to show the need for particular caution, at important turns, etc., what light period is given buoys?

What is indicated by the white buoy with green top as sketched?



What is the meaning of the "class" of a buoy as specified in the U.S. Coast Guard Light List?

When a buoy is in position during a certain period of the year only, how may the dates when the buoy is available be determined?

Describe the use of a range (or leading lights) in entering or leaving a harbor. What precautions must be observed in the use of such ranges?

What is the significance of the shape of unlighted buoys as used in the lateral system in United States waters?

On a clear, dark night, a light is sighted just breaking clear of the horizon. If your height of eye is 50 feet and the charted visibility of the light is 12.5 miles, what is your distance from the light?

Define exactly what is meant by a group occulting light. (Candidates may submit a sketch such as that contained in the light list to help demonstrate complete comprehension of the term).

Name the different types of buoys sketched.

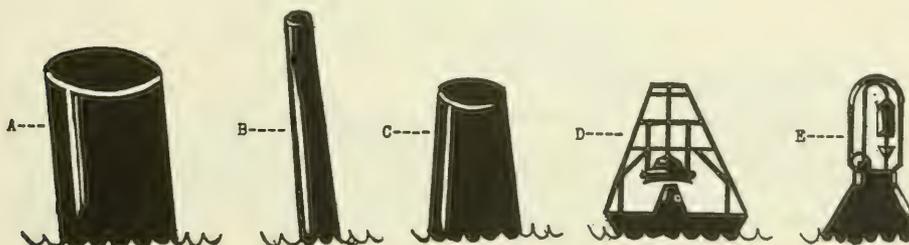
How would you identify a lighthouse in the daytime?

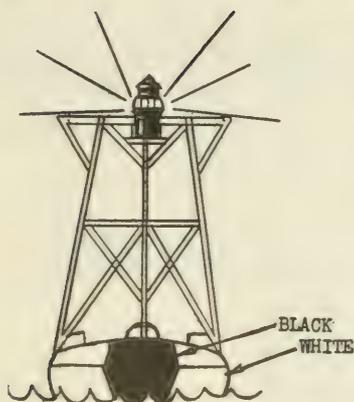
Where are station buoys found and what is their function?

How far could you see a powerful navigational light whose height is 100 feet from the bridge of a vessel where your height of eye would be 80 feet above the water?

What word indicates color variations in the characteristics of a light?

Define exactly what is meant by an interrupted quick flashing light. (Candidates may submit a sketch such as that contained in the light list to demonstrate their complete comprehension of the term).





- a. On which side would you leave this buoy in passing?
- b. What number would such a buoy have?
- c. What color light would the buoy display?
- d. What phase characteristics would the light of this buoy have?
- e. How would this buoy be indicated on a chart?

Entering from seaward you sight the black and white vertically striped lighted buoy illustrated above.

How are bearings relating to sectors of visibility of lights stated in light lists?

What are the standard light colors used for lighted aids to navigation?

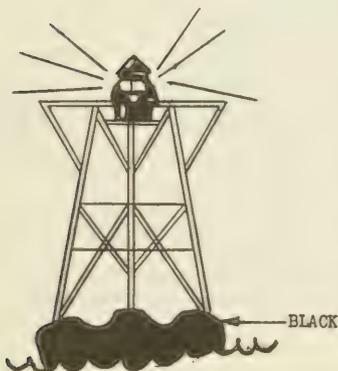
What do colored sectors in lights mark?

How is the power of a light expressed in the light list?

How would you determine if the visibility given for a light is the geographic or luminous range?

Describe the effect of atmospheric refraction on the visibility of navigational aids.

In entering a United States port the black lighted buoy is sighted as shown below:



- a. On what side should it be left in passing?
- b. What type number would it have?
- c. What color light would it show?
- d. How would this buoy be indicated on a chart?
- e. What phase characteristics would this light have?

## 15. INSTRUMENTS AND ACCESSORIES.

How would you clean the arc of a sextant?

What is the purpose of the mercury ballistic wicks on the master gyro-compass?

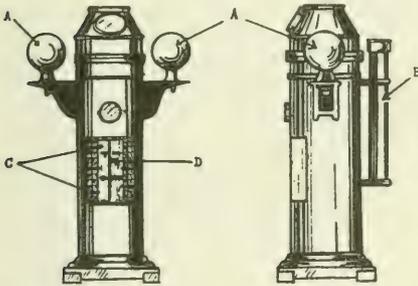
Why are corrections for latitude, height and temperature applied to a

mercurial barometer?

Describe in detail the procedure of stopping the gyro-compass.

What routine inspection of the gyro-compass should be made each watch at sea? State briefly what you would check?

Name the corrector indicated by each letter on the sketch and state the type of magnetism each is designed to correct.



How can the brightness of the reflection from the horizon glass be varied in a sextant?

How is the master gyro-compass compensated for permanent errors? Suppose the master gyro heading is  $278^\circ$  and it has been definitely established (by azimuth, bearings, etc.,) that the compass has a  $2^\circ$  easterly permanent error, state how you would compensate the master to read true.

How do you determine the accuracy of a ship's barometer, whether mercurial or aneroid?

Why is mercury used in the barometer in preference to other liquids?

Make a rough copy of the sketch below and on it label the following: "E-Layer," "F-layer," "One Hop F," "Two Hop F," "One Hop E," "Two Hop E," and "ground wave."

In taking a loran reading:

(a) What will be the result of matching a first sky wave with a ground wave, or matching a first sky wave with a second sky wave?

(b) What precautions should be taken to insure that the first pulse in a train of pulses is not being overlooked?

In the loran method of navigation:

(a) What is the base line?

(b) What is the base line extension?

In using a loran chart, the lines on the chart are for ground waves. Where are the corrections to be found when using sky waves?

When sky waves are used for computing loran lines of position, are they more accurate close to the station or far away from the station?

What does blinking of a loran signal indicate?

How is a chronometer's accuracy checked?

What is the error of collimation of a sextant?

What is a ground wave?

What is a sky wave?

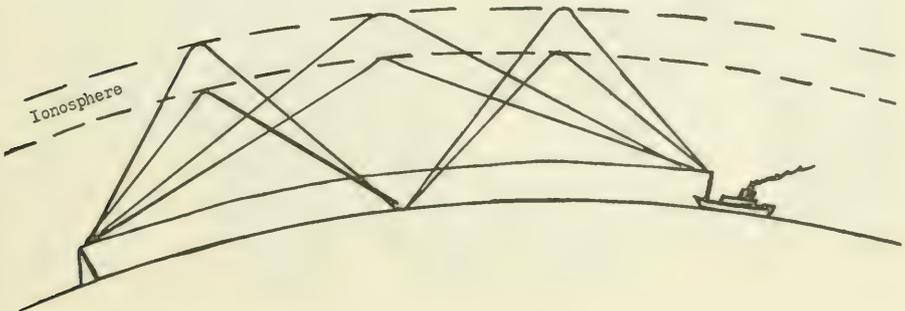
What is the critical range in loran reception; why is it critical; and what precautions must be taken with regard to the use of signals?

Explain the construction, principle, and care of the barograph.

Upon what 2 natural forces does the directive force of the gyro-compass depend?

State briefly the routine inspection and maintenance care which should be given the master gyro-compass each month.

What are the markings of the hand lead line?



What is a hygrometer and what is it used for?

What is a Pitometer Log? Describe its principle.

When a patent log line is hauled in, how do you take the turns out before drying it and stowing it away?

What is a stadimeter?

What is a hydrometer and what is it used for?

What is a psychrometer?

Where is information concerning loran coverage, charts, and tables available?

Which end of a Kelvin sounding tube must be uppermost when taking a sounding?

Describe the glass sounding tube or other depth recording device used with a patent sounding machine, and state how Boyle's law applies to the principle upon which it operates.

Give a brief description of the principle and operation of the Fathometer.

Explain the use of chemical tubes to record soundings.

What effect will an unusually soft bottom have on soundings obtained by fathometers?

Explain in detail and in proper order the procedure to be followed in taking soundings with a sounding machine.

What method is generally employed aboard merchant ships for checking accuracy of a chronometer and determining its rate?

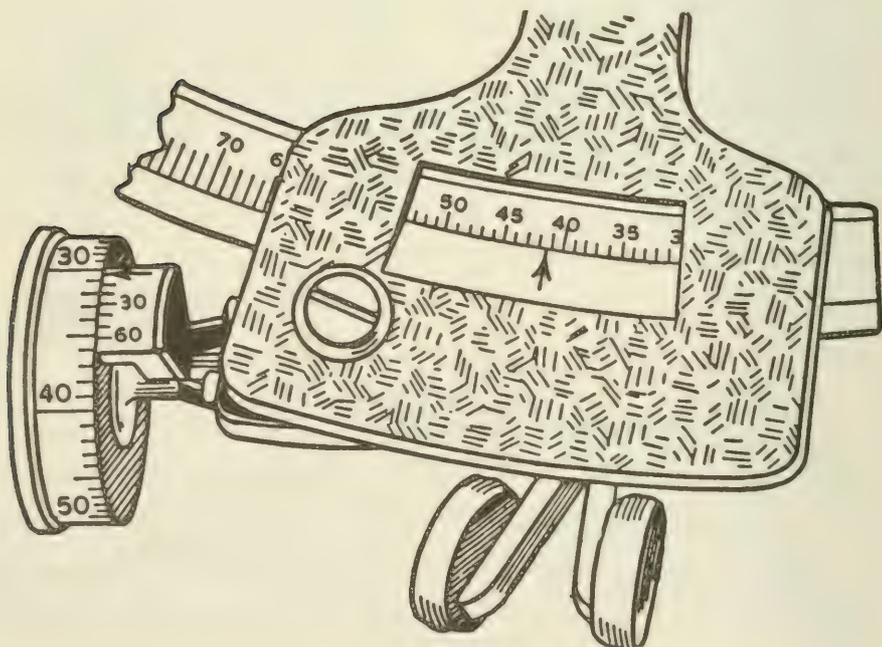
Why is the morning normally the best time of day for winding time pieces?

Where will complete information be found on the times, frequencies of emissions, and characteristics of radio time signals?

On 1 June, a time signal at 1200 GMT shows chronometer "A" 3m-52s fast. On 5 June, a time signal at 1800 GMT shows chronometer "A" 3m-35s fast. An observation is taken on 7 June at 1800 GMT. Assuming a constant chronometer rate, what correction should be applied to chronometer "A"?

In New York (Zone +5) a time signal was heard, and at 1400 Eastern Standard Time, the chronometer read 18h-35m-38s. What was the chronometer error?

What is the reading of the micrometer sextant illustrated?



**18. TIDES AND CURRENTS.**

Define:

- (a) Flood tide.
- (b) Ebb tide.
- (c) Set of tide.
- (d) Drift of tide.

Where would you find the time of slack water after high or low water in any given port of the United States?

What are subordinate stations, as used in the Tide Tables?

What is the purpose of the ratios given in the Tide Tables for computing height of tide and how would you use such ratios?

Name three planes of references to which soundings and tidal data are referred.

Describe the effect of wind and abnormal barometric conditions on the tides.

What celestial body is principally responsible for the tides, and what additional celestial body influences the tide?

At St. Johns, New Brunswick on 7 February 1958:

(a) What is the tabulated time and height of a.m. high water?

(b) If the largest scale chart of the locality showed a depth of 10 feet

for a given area, what would be the depth at high water at that area?

At Anchorage, Alaska on 3 May 1958:

(a) What is the tabulated time and height of p.m. low water?

(b) If your chart of Anchorage showed a depth of 20 feet for a given area, what would be the depth at low water at this area?

At Deer Island Light, Boston, Mass. Harbor on 28 March 1958:

(a) What is the tabulated time and velocity of maximum p.m. ebb current?

(b) In what direction does the ebb current flow at this position?

(c) What time meridian is used in tabulating the times given for the currents at this port?

At San Diego Bay Entrance, California on 13 January 1958:

(a) What is the tabulated time and velocity of maximum a.m. flood current off Ballast Point?

(b) In what direction does the flood current flow at this position?

(c) What time meridian is used in tabulating the times given for the currents at this port?

**19. OCEAN WINDS, WEATHER AND CURRENTS.**

How is the sea water temperature obtained for a weather observation?

How would you read a thermometer? State the sources of possible error.

How should a wet and dry bulb hygrometer be placed and what care should be given to this instrument?

Convert (—) 10° Celsius (Centigrade) into temperature Fahrenheit.

What is "sleet"?

Define the term "temperature".

On a weather map:

(a) An elongated area of high pressure extending from an eminence (or high) is called a .....

(b) An elongated area of low pressure extending from a depression (or low) is called a .....

What is "wave height"?

What "wave height" should be recorded?

How is the visibility determined?

What is a "synoptic chart"?

What is an "occluded front"?

What is the meaning of the term "sky cover" and how is the "sky cover" de-

termined for purposes of weather reports?

What is meant by the cloud "ceiling"?

How would you determine the "cloud ceiling"?

What are the four principal families or types of clouds, and what feature forms the basis of the classification?

Low clouds are defined as those whose mean upper level is 6,500 feet.

Middle clouds are defined as those whose mean lower level is 6,500 feet and whose mean upper level is 20,000 feet.

High clouds are defined as those whose mean lower level is 20,000 feet.

Classify as low, middle, or high the following cloud forms:

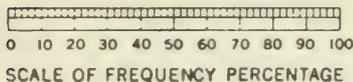
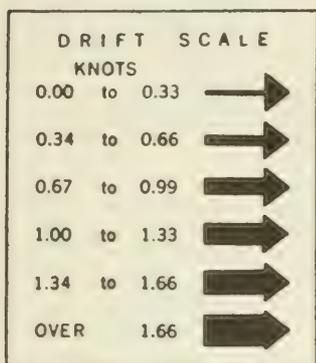
(a) Altocumulus.

(b) Cirrostratus.

(c) Stratus.

Why are islands or shore lines in the tropics often marked by cumulus type clouds in the daytime, particularly in the afternoon?

Interpret the data provided by the current rose shown from the Atlas of Surface Currents, North Atlantic Ocean. (H. O. Publication 571).



What is the meaning of the term "drift-ice" (or "pack-ice"), used in a wide sense?

Discuss the ice movements in the North Atlantic.

What is "fast-ice"?

What is the best position for conning a ship in ice?

Explain the temperature volume relationship of gases if pressure is held constant. State in words or mathematical notation. (*Charles Law*).

How is the correction for an aneroid barometer noted and where should this correction be posted?

How often should the correction for an aneroid be checked?

How is the correction for an aneroid determined?

What action is taken by the weather bureau when comparison indicates that a barometer is defective?

What care must be given an aneroid barometer to assure that it will retain its calibration?

State the precautions necessary to obtain the correct sea level pressure when using an aneroid barometer.

Describe briefly the relationship between barometric pressures and the corrections that must be applied to altitudes of celestial bodies observed by sextant.

What is "vapor pressure"?

A vessel's true course is  $025^\circ$  and speed 22 knots. The apparent wind direction is from NE. with 16 knots apparent wind velocity.

REQUIRED:

(a) The direction from which the true wind is blowing.

(b) The velocity of the true wind. To what wind force on the Beaufort Scale do the following conditions correspond?

WIND SPEED.....17 to 21 knots.

SEA CONDITIONS.....Moderate waves, taking a more pronounced long form; many white foam crests; there may be some spray.

What is a cyclone?

Distinguish between a tropical cyclone and an extra-tropical cyclone.

Describe squall lines and the conditions associated with them.

How can the barometer show the approach of a cyclone in the tropics?

At what latitude (North or South) does a tropical cyclone normally recurve?

When do tropical cyclones usually move at the slowest speed?

State two reasons why tropical cyclones are divided into semi-circles, one considered dangerous and the other considered navigable.

What is the effect of current upon the waves caused by a storm?

What provides the energy for atmospheric disturbances along frontal zones?

What name is applied to tropical cyclones in:

- The North Atlantic.
- The western North Pacific.
- The Phillipines.
- Western Australia.

What causes the fog frequently associated with the frontal areas between two air masses? Why are night conditions more conducive to such fogs than day conditions?

Is fog more common and dangerous along cold fronts or warm fronts? Why?

When water vapor condenses in a storm area and is precipitated in the form of rain, snow, etc., what is the effect upon the temperature of the air?

Which is lighter:

- (a) dry air;
- (b) moisture laden air?

What are isallobars? What is their value in constructing weather maps and forecasting?

In what direction do warm fronts usually move and what is their average speed of movement?

In the Southern Hemisphere, in which semi-circle of a tropical cyclone would a vessel be if the wind shifted counter-clockwise, while she was hove to?

In the Northern Hemisphere, how should a steam vessel maneuver in the dangerous semi-circle of a tropical cyclone?

Hove to in the Southern Hemisphere under tropical cyclone conditions with the barometer falling and the wind shifting clockwise, what is the vessel's probable position relative to the center of the storm, and what action should be taken if possible to avoid the center of the storm?

Describe the use of a "storm card" or diagram of wind direction in maneuvering in a tropical cyclone area.

What weather conditions may result from the movement of a cold air mass over a warmer sea surface?

If the smoke from the funnel does not rise, but lays horizontally, what atmospheric conditions are indicated?

What is the "Bermuda high"?

What causes the fog frequently encountered off the grand banks of Newfoundland?

How can a ridge of high mountains give rise to a depression?

What is a central area of high pressure called and in what direction do winds circulate around it in both the Northern and Southern Hemispheres?

What is a line called which connects all points on a weather chart that have the same reading of the barometer?

What is the relation between wind direction and the direction of the isobars on a weather chart?

Draw a sketch of the earth showing the location of high and low pressure belts and the general wind systems.

What is the normal barometric pressure at sea level?

Where can detailed information about ocean winds and currents be obtained?

How do you determine the reliability of the ship's barometer, whether mercurial or aneroid?

State how Buys-Ballot's law is used at sea in order to determine the approximate bearing of a storm center.

What is the dew point of the atmosphere and how is it determined?

What is the distinction between tide and current?

Hove to in advance of a tropical cyclonic storm, in what position would a vessel be with respect to the track followed by the storm center if:

- (a) The wind veered;
- (b) The wind backed;
- (c) The wind remained steady in direction and increased in force?

What are the dangerous and navigable semicircles of a tropical revolving storm in the Northern Hemisphere?

What are the indications of the approach of revolving storms?

What is a Warm Front?

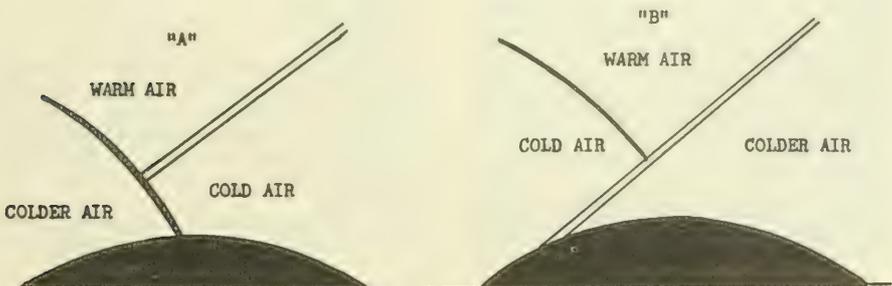
What does the size of waves depend upon?

What are the two reliable signs of field ice?

Sketched below are vertical cross sections through two types of frontal systems.

(a) What are fronts called when the warm air is aloft?

(b) What type of such a front is "A" and what type is "B"?



**20. NAUTICAL ASTRONOMY AND NAVIGATION DEFINITIONS.**

What is:

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Vernal equinox?</li> <li>2. Conversion angle?</li> <li>3. Hour circle?</li> <li>4. Logarithm?</li> <li>5. Nautical twilight?</li> <li>6. Time signal?</li> <li>7. Occultation?</li> <li>8. Solstice?</li> <li>9. Meridional parts?</li> <li>10. Prime meridian?</li> <li>11. Greenwich apparent time?</li> <li>12. Greenwich mean time?</li> <li>13. Sidereal hour angle?</li> <li>14. Apparent time?</li> </ol> | <ol style="list-style-type: none"> <li>15. Polar distance?</li> <li>16. Amplitude?</li> <li>17. Diurnal circle?</li> <li>18. Sidereal day?</li> <li>19. Circle of equal altitude?</li> <li>20. Parallel of altitude?</li> <li>21. Most probable position?</li> <li>22. Greenwich sidereal time?</li> </ol> |
|--|--|

Define the term "magnitude" as it is employed in nautical astronomy.

What is meant when two celestial bodies are said to be in:

- (a) Conjunction;
- (b) Opposition?

**22. SIGNALLING BY INTERNATIONAL CODE FLAGS, FLASHING LIGHT; LIFESAIVING, STORM AND SPECIAL SIGNALS.**

What would be indicated by a black or green signal seen floating in the air from a parachute about 300 feet above the water?

State the meaning of the following hoist in International Code Flag Signalling:

	(a)	(b)	(c)
Answering pennant	X	T	
E	2	1	
	1st	1st	
	repeater	repeater	
	0	0	
		3rd	
		repeater	

- (a) Five minutes past midnight.
- (b) Six-forty-five p.m.
- (c) Ten o'clock a.m.
- (d) Ten o'clock p.m.

What signal, that may be transmitted by flashing light, is provided by the International Rules of the Road to indicate that a vessel is in distress and requires assistance from other vessels or from the shore?

When a vessel in distress in International Waters requires assistance from the shore, what signals are provided by the International Rules of the Road for her to use?

What is indicated by an aircraft circling a vessel at least once, then crossing the bow close at a low altitude opening and closing the throttle or changing the pitch of the propellers, and then flying away on a particular bearing?

Describe the procedure for calling another vessel, or vessels, using the International Code flags.

Describe the procedure for answering flag signals.

Describe the correct use of the erase sign and show how the erase sign is made in signalling by flashing light.

For what purpose is the model verb "to glean" printed in all of its forms in the text of the International Code of Signals?

What is the lifesaving signal indicating, "landing here highly dangerous"?

When signalling by International Code Flags and using the code flags or answering pennants to indicate a decimal point, is the code flag included in determining which repeater or substitute is to be used?

In sending a message to a vessel by Morse Code using flashing light, how would you indicate that the message would be coded from the International Code of Signals?

Describe how the International Code flags are used to signal the position of the ship expressed in terms of latitude and longitude.

Name the component parts of a Morse Code message.

Show exactly how you would signal the following times, using the International Code flags:

How would you transmit the following procedure signals and signs in signalling by blinker light:

- (a) Space sign;
- (b) "Everything which follows in this message is to be repeated back word by word, as soon as received;"
- (c) Ending sign;
- (d) From;
- (e) "You are correct"?

How do you complete a signal using flags?

What are the meanings of the flag letters, "D," "E," "F," "G" when flown as single letter signals?

How would you signal the following message by International Code Flags? "Bearing 45 miles 90° true from Diamond Head, Hawaii." (The hoist for Diamond Head AEWN).

In signalling by blinker light, what is the sign for end of message and how is it answered?

How many flags are in an International Code Flag hoist used between a vessel towing and the vessel she is towing? How are towing signals made at night?

What is the meaning of the letter "W" when sent by the receiving ship during a communication by blinker light?

In signalling by International Code Flags, what is the significance of signals consisting of:

- (a) Single-letter signals;
- (b) Two-letter signals;
- (c) Three-letter signals;
- (d) Four-letter signals?

Four-letter signals beginning with the letter "A" are used for what type signals?

How are the code flags used to signal the chronometer time?

Explain the use of amplifying phrases in International Code Signalling.

How would you acknowledge the receipt of a code group in a coded message sent you by blinker light?

If at sea you sighted an international orange buoy about three feet in diameter, what action should you take?

What is the space sign used in signalling by Morse Code and for what purposes is it used?

What is the meaning of the answering pennant over "G" in International Code Flag Signalling?

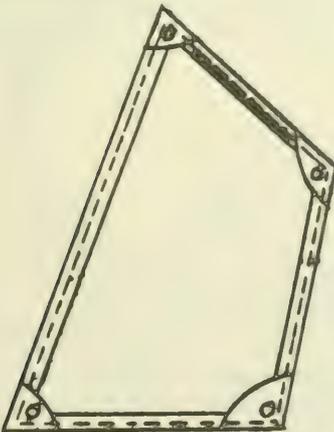
What is the break sign in blinker signalling?

How would you call a pilot by blinker light at night?

In sending a message by flashing light, how would you request the receiving ship to repeat back, word for word, the message?

#### 24. SEAMANSHIP.

Make a rough sketch of the standing lug lifeboat sail as shown; name the edges, and corners, and describe briefly its construction.



In anchoring a vessel in fog, how might you determine the vessel's way through the water in order to have the vessel dead in the water or with minimum way on her when the anchor is dropped?

What precaution, with respect to way of the vessel, is necessary in anchoring in a strong current or tidal stream?

In picking up the anchor, what information must the Mate on the foc'sle head relay to the bridge in order that the engines may be used to minimize the stress on the windlass and chain?

What is the purpose of the stream and kedge anchors, that are carried by sea going vessels?

Describe in detail how merchant ships prevent water from entering the chain locker.

In addition to flooding the chain locker, what damage may be caused a vessel by taking water through the chain pipes?

You are standing by the anchor windlass on the fore'sle head of a vessel proceeding in a channel. You receive an order to drop the anchor because the vessel has taken a sudden sheer toward another vessel or the shore. Describe how you would handle the anchor.

How would you embark passengers into a lifeboat when abandoning a vessel in rough weather?

What test is required by the Regulations each year where practicable in order to test the strength and efficiency of lifeboats and the gear for lowering them?

Where a lifeboat may be damaged in lowering by projecting obstructions or contact with the hull due to list, what provisions must be made to facilitate launching if the boat is 15 feet or more above the water when the vessel is light?

Name the anchors carried by a sea-going vessel.

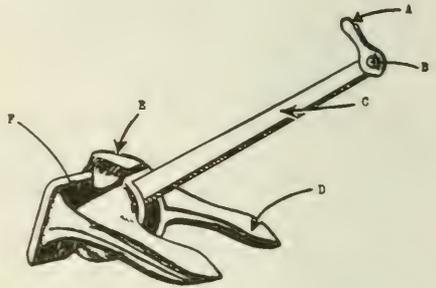
How is the required number and weight of anchors for a vessel determined?

Shown below is a sketch of a brake band assembly and compressor for a typical windlass.

(a) Describe the care and inspection you would make in seeing that this equipment is in good condition for its service.

(b) The steel bar "B," angled up into the central groove of the wildcat, has what function?

Name the parts indicated on the anchor sketched.



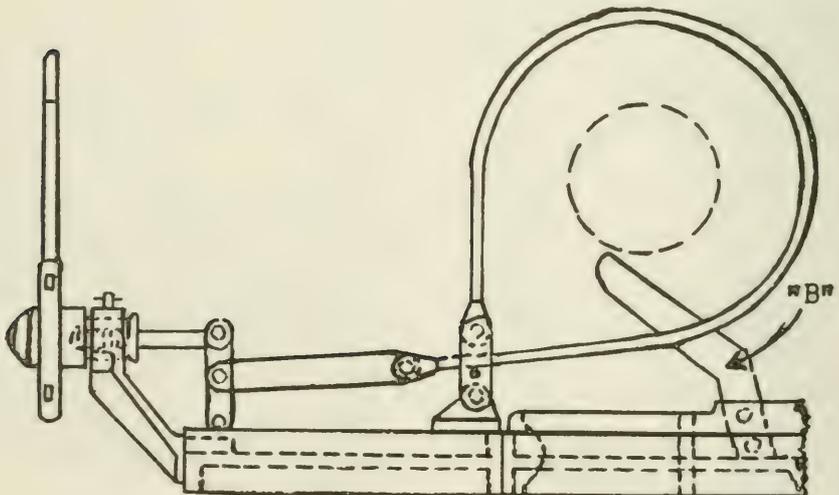
Describe the methods that may be employed to move an anchored vessel to avoid striking, or being struck by other vessels while swinging in a tide or wind shift.

With the wind and tide in opposite directions, what factors will determine the manner in which a vessel will ride to her anchor?

Describe briefly how a sailing vessel is able to sail in the direction from which the wind is blowing.

What equipment for sewing canvas is required in a lifeboat?

What is the purpose of canvas covers on lifeboat winches?



What color is required for lifeboat sails?

What care should be given canvas aboard ships?

How many tarpaulins are required for hatches of a merchant vessel in ocean service?

What is the minimum grade of material required for tarpaulins?

Where the shell of a lifeboat is liable to damage, wear, or corrosion from contact with chocks, how is the boat fitted to keep the possibility of such damage to a minimum?

Where the shell of a lifeboat is liable to damage, wear, or corrosion from contact with chocks, what maintenance care should be taken by the officers and crew of the vessel?

What protection is afforded aboard ships against flooding of compartments by water backing through scuppers, tank overflows, sanitary discharges, etc., below the freeboard deck?

What are the dangers that may be created by vent or sounding lines from a double bottom tank being damaged below the deck of a vessel in cargo holds or other spaces?

What precautions must be taken to avoid harbor pollution when taking fuel oil or petroleum cargoes?

Where vessels are fitted with cowl type ventilators, what means must be provided for closing them in the event of storm or fire?

What is the importance of freeing ports on a vessel with solid bulwarks operating in a heavy sea?

What speed must a fully loaded motor lifeboat be capable of attaining?

What quantity of fuel is required to be carried in a motor lifeboat?

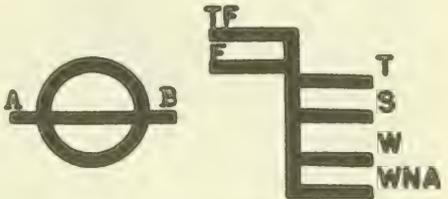
In shifting a vessel forward on a pier as illustrated, would off-shore headline "A," inshore headline "B," or inshore headline "C" provide the greatest pulling effect? Why?

Referring to the sketch:

(a) What is the name and purpose of the figure illustrated?

(b) Explain the meaning of the various lines and letters.

(c) How is the marking placed on vessels?



What is the required length of life boat falls?

If for any reason the boat falls were too short to enable a lifeboat to be lowered into the water, what might be done?

Are provision and special equipment lockers of a lifeboat required to be watertight?

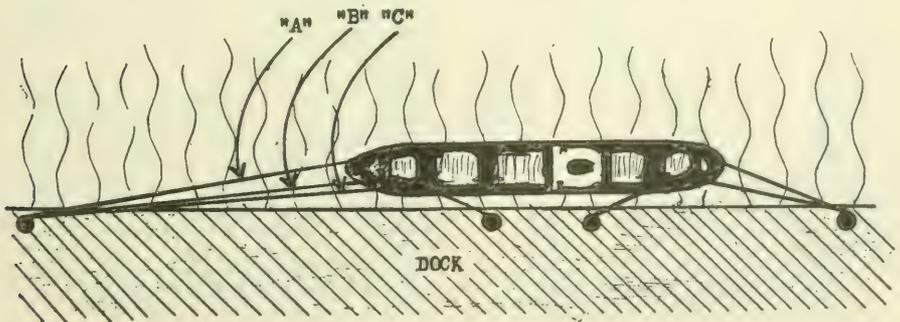
What color should running light screens be painted?

Describe the use of tricing lines on lifeboats suspended from gravity davits when the boat is swung into the embarkation deck for passengers to get into it. State why the frapping lines should be passed before releasing the tricing line pelican hooks.

When the vessel is moored to two anchors, does she require the same amount of cable on each of the two anchors as when laying to one anchor?

How are lifeboats required to be numbered and marked?

What is the purpose of the footings in a lifeboat?



Describe briefly the operation of an electro-hydraulic steering apparatus and the type of hand-operated emergency steering gear that may be provided with it.

If you were in charge of a lifeboat:

(a) How would you prevent it from swinging as the vessel rolled when the boat is at the embarkation deck?

(b) How would you prevent it from swaying if the ship is pitching?

Describe how a lifeboat should approach a wrecked vessel in rough weather to save passengers and crew and then return to her own vessel.

When moored to two anchors, how is a foul hawse prevented?

What scope of chain is used under normal conditions in anchoring?

What anchor is normally used in anchoring?

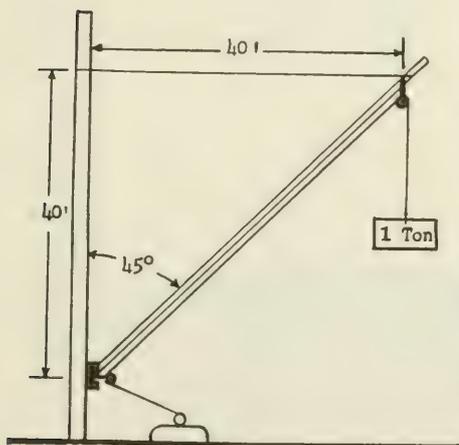
What precautions to avoid pollution of coastal waters should be taken by a vessel pumping bilges, ballast, or oil overboard at sea?

What precaution must be observed when taking on water ballast to avoid danger of oil pollution, cargo damage, and structural damage to the vessel?

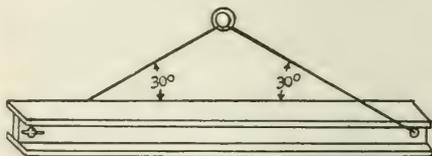
In the sketch shown:

(a) What is the tension on a topping lift when the height of the kingpost above the boom gooseneck is 40 feet, the length of the topping lift span is 40 feet, and the boom forms an angle of  $45^\circ$  with the kingpost?

(b) What is the thrust on the boom in the sketch when the weight of 1 ton is being lifted? Consider loss of efficiency due to friction as 10 percent at each block.



A beam weighing one ton is to be lifted by a bridle sling, each leg of which forms an angle with the beam of  $30^\circ$  as shown in the sketch below. What is the stress on each leg of the sling, when the weight of the beam is suspended from the sling?



What is the minimum number of tucks in an acceptable thimble or loop splice in wire rope for use on cargo gear?

What precaution must be taken in splicing nylon or other plastic type rope with a slippery surface and high elasticity?

A weight of 3 tons must be lifted using one-half inch diameter wire rope with a breaking strength of 9.4 tons. A factor of safety of 5 is required.

(a) Will doubling up the gear, that is, using a single sheave moving block, provide the necessary factor of safety, considering friction loss as 10 percent per sheave for each of two sheaves?

(b) What strength must the shackle for the upper block have, using a safety factor of 5?

A vessel is loading cargo in a forward hold when it is noticed that the pipe running along the bilge to the forepeak is leaking water badly. The forepeak tank is full of water. What would you do to prevent damage to the cargo?

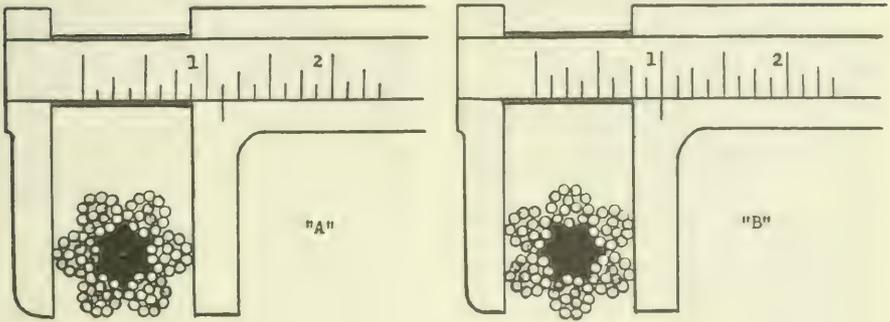
What care should be given mooring lines when ice and snow conditions are encountered?

What caution should be observed when navigating a power-driven vessel in shallow water?

What are the two functions which paint used on a vessel's bottom must perform; i.e., what are the two types of paint used on a ship's bottom, and what is the purpose of each type?

What precautions should be borne in mind by ship officers when maneuvering vessels powered with geared turbine drive?

In a limited space, why is it easier to turn a single right-handed screw ship to starboard than it is to port?



Would you measure wire rope as "A" or "B" in the sketch?

What minimum factor of safety should be used with wire rope?

Is the steering effect of a right handed propeller greater going ahead or astern? Why?

Describe the instructions required to be posted in the steering engine room.

Describe briefly the purpose of a main steam condenser, and the consideration that a deck officer may be obliged to give it.

Why do ships yaw badly in a following sea?

What methods are available to reduce yawing?

Describe the effect of wind on the steering and heading of a vessel underway.

What is the most likely damage that may occur to an ordinary merchant vessel when operating in floe-ice, or in areas where large logs or floating objects of like nature may be encountered?

In the sketch below the seamen are testing a rope to assure its safe working load. Each seaman exerts a force of 100 pounds. Is the stress on the line greater in case "A" or case "B"? Explain your answer, stating the total stress on the line in each case.

(A)



(B)



What is the purpose of loadlines on vessels?

How do you measure freeboard?

When must the steering gear be tested by a licensed officer?

Describe the devices used for the measuring of ullages.

How should guys be positioned for maximum efficiency in securing a boom?

How often must motors in motor-propelled lifeboats be operated?

What equipment must be provided on gasoline powered lifeboat motors to prevent fire caused by carburetor backfire, or danger because of gasoline dripping into the bilge?

How are motor-lifeboat gasoline tanks vented, i.e. what means are provided to prevent the gasoline becoming "air-bound" in the tanks and not flowing to the fuel lines?

Describe briefly the use of steam turbines as main propulsion units and the methods of connecting the engine to the shaft.

What precautions should be taken in order to prevent kinking when using manila mooring lines on a windlass gypsy-head or a capstan?

What is the purpose of the brake fitted on the steering gear of some vessels?

In what length of time should the steering engine be capable of putting the rudder hard over from one side to hard over to the other side?

Describe the factors affecting the steering effect of a right handed screw propeller, when going ahead.

What measures could you take to prevent a vessel pounding heavily in a head sea?

Approaching a dock starboard side to, in a right-hand single screw steamer with moderate headway, what precautions should be taken, before backing, in order to prevent the bow from swinging in toward the dock when the engine is reversed?

Can the guys of a boom be so positioned that they need not be slacked off or hove in when raising or lowering the boom?

Describe the method of rigging booms where two topping lifts are employed to eliminate guys.

What is the proper method of placing cable clamps on wire rope? Would you place the nuts used to fasten the "U" bolts all on the same part of the rope, or would you stagger the clamps alternately?

How would you turn the stern quickly to port in a twin-screw vessel with sternway and both engines going full astern?

In making a "hydro" report on the sighting of a derelict, what information would you endeavor to include?

If a guy is rigged as shown in the sketch, what is the effect?

A 3 inch line has a breaking stress of 9000 pounds. Using a safety factor of 5, what weight would you pick up with a threefold tackle, considering loss of efficiency due to friction as 10 percent at each sheave?

With a right-handed single screw backing, why is the stern forced to port?

How should hatch beam or pontoon slings be fitted for safety of personnel handling them?

If a hook be straightened out, is it safe to bend it back and then return it to use?

What is the deck line on ocean and coastwise vessels?

NOTE: This question refers to the loadline markings of a vessel.

What is the maximum weight per draft permitted when loading explosives in accordance with the Regulations?

Does a knot in a manila line increase or reduce the breaking strength of the line?

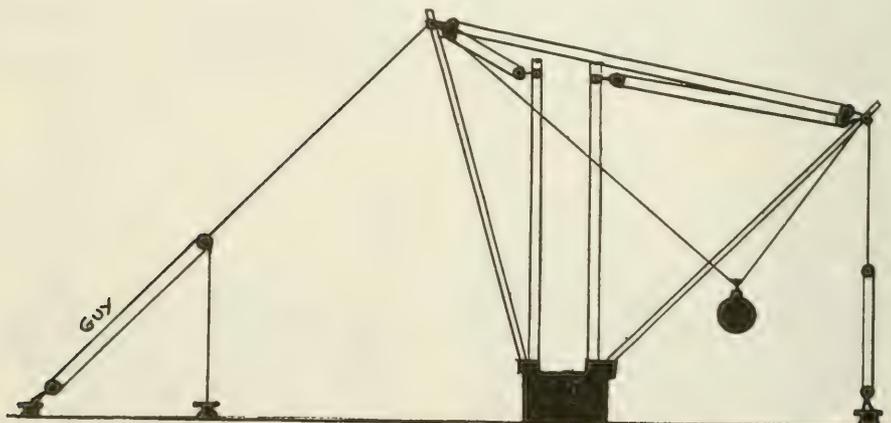
Using the rule of thumb  $B = \frac{C^2}{2.5}$ , where

"B" is the breaking stress in tons and "C" is the circumference, determine the breaking stress of a 3-inch manila line.

Using the rule of thumb formula  $B = \frac{C^2}{2.5}$ , where "B" is the breaking

stress in tons and "C" is the circumference, find the size of manila rope to use to lift a 1-ton weight, when a factor of safety of 7 is required.

What is the required factor of safety for lifeboat falls?

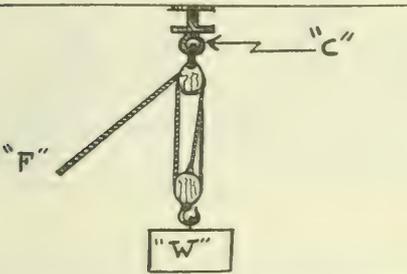


If a force of 50 pounds is applied at point "F" of the luff tackle shown:

(a) What is the weight that may be lifted at "W," allowing 10 percent friction loss at each sheave?

(b) If "W" is lifted one foot, how far must the line at "F" be pulled?

(c) What stress is put on the pad-eye at point "C" when lifting "W"?



A manufacturer states that the breaking strength of his 3-inch circumference manila rope is 9,000 pounds. If you use this rope as a single whip cargo fall, what is the safe working load, using a factor of safety of 7?

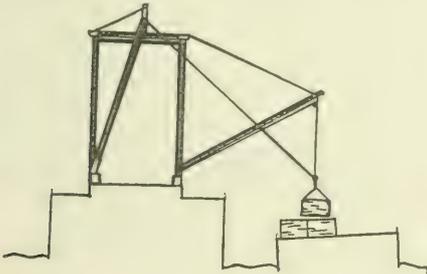
On merchant vessels when using booms to handle heavy weights or delicate objects, how do you reduce dynamic stresses; that is, stresses due to change of velocity of the load, such as taking up fast on a load at rest, increasing speed of hoisting, or suddenly stopping?

Why is the hauling part of a heavy lift purchase usually led to the mast rather than directly to the winch?

When is the tension of a topping lift at a maximum; i.e. at what angles with the mast is the heaviest stress put on the topping lift due to the weight of the boom and any weight being lifted?

## 25. CARGO STOWAGE AND HANDLING.

In discharging cargo into a lighter as shown, with only a small amount of drift on the boom, what care is necessary?



If 2,000 tons of iron ore with a stowage factor of 15 is stowed in a cargo hold of rectangular shape whose bottom is 50 feet long and 45 feet wide, what is the height of the center of gravity of the ore above the bottom of the hold?



What type of tools should be used for opening and closing oil tank hatch covers?

At what pressure should the oil discharge piping of tank vessels be tested?

You are required to load wet logs in No. 4 lower hold and cases of canned goods in No. 4 'tween decks. What precaution would you exercise to avoid sweat damage to the canned goods?

Describe the stowage of cement and the precautions necessary for protection of other cargo in the same hold with cement.

Define:

- (a) Explosive range.
- (b) Fire point.
- (c) Flash point.

Describe briefly how the amount of water below the oil in an oil tank may be determined.

Define:

- (a) Inflammable liquid.
- (b) Combustible liquid.

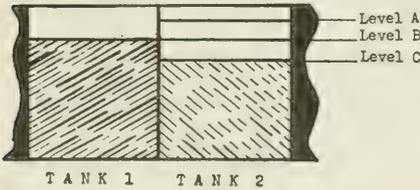
What precautions must be observed in the choice of wood for use as dunnage?

Describe the methods employed in the shipment of wet hides and the precautions necessary for good cargo turnout.

Describe the precautions necessary in the stowage of essential oils.

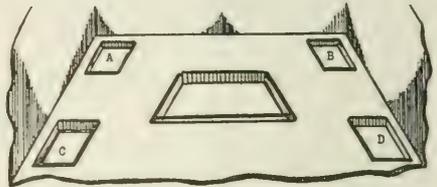
NOTE: "Essential Oils" is a term used to describe such oils as almond, attar of roses, clove, wintergreen, lavender, etc., which are used in perfumery and cooking.

In loading adjacent tanks with dissimilar products; would you top off your second tank at level "A," "B" or "C"? Why?



A vessel preparing to load grain has four small hatches installed as sketched at "A," "B," "C" and "D" in her 'tween deck. What is their purpose?

When a hold is completely filled with loose grain in bulk, what quantity must be contained in feeders for that hold?



How many gallons are there in a United States barrel?

Prior to loading Grades "A," "B," or "C" cargoes, what precautions are necessary with respect to boiler and galley fires?

With respect to the danger of fire and explosion of liquid petroleum cargoes, why are greater precautions usually necessary when loading than when discharging?

A locomotive weighing 32 tons is stowed on its 4 wheels, each of which has an area of one foot resting on the deck.

(a) What is the load per square foot on the deck if the locomotive's weight is equally distributed on the 4 wheels?

(b) If the deck capacity is 400 pounds per square foot, how could the weight be distributed?

What protection against fire is necessary where cowl deck ventilators feed directly into a magazine or a hold in which explosives are stowed?

On vessels carrying mail, is it permissible to break bulk prior to discharging of the mail in ports of the United States?

Would you consider the stowage of boxed cargo better at "A," making use of all possible space, or at "B" where the successive tiers are kept level? State your reason.

How many long tons are there in 100 metric tons if a metric ton is .98421 long tons?

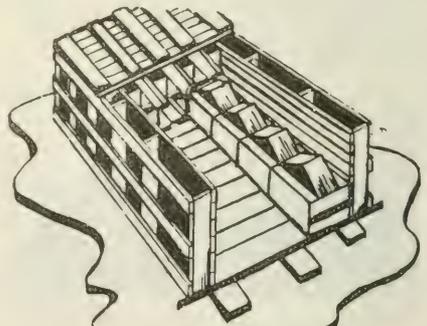
Explain what is meant by optional cargo and state the care necessary in the stowage of such cargo.

When trimmers are employed on bulk cargoes, what precautions should be taken to insure that none have been walled off by cargo in the hold?

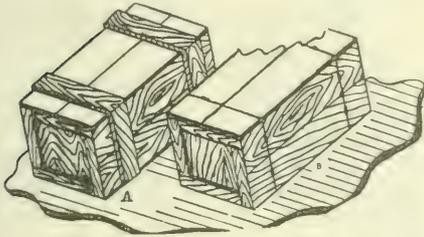
A vessel has a fresh water allowance of 8 inches. A hydrometer reading taken in a sample of water in which she is loading reads 1015. How far below her salt water draft may she load due to allowance for fresh water?

In stowing carboys of acid, which are not completely boxed, what is the maximum number of tiers permitted?

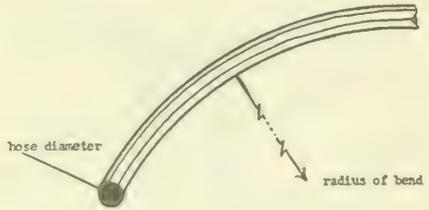
Why is the top planking of bins constructed for deck cargo required to be of sturdy construction?



You are required to supervise the stowage of two consignments of butter contained in cases as sketched. Describe the difference in the manner of stowage required for each lot.



An oil hose has an inside diameter of 8 inches. What is the minimum radius to which the hose should be bent?



Your reading of a combustible gas indicator showed that less than 0.1 percent petroleum vapor was present in a tank that had been used for sour crude (containing hydrogen sulfide,  $H_2S$ ). Would you consider the tank safe as far as toxicity and explosibility are concerned?

Describe the hazards that may be involved when working in tanks that have carried gasoline having a tetraethyl lead content.

Where shifting boards are rigged for a grain cargo:

(a) Would you regard wooden shores "A," "B," or "C" as most efficient?

(b) Why?

(c) What compensation is made for inefficient positioning of shores?

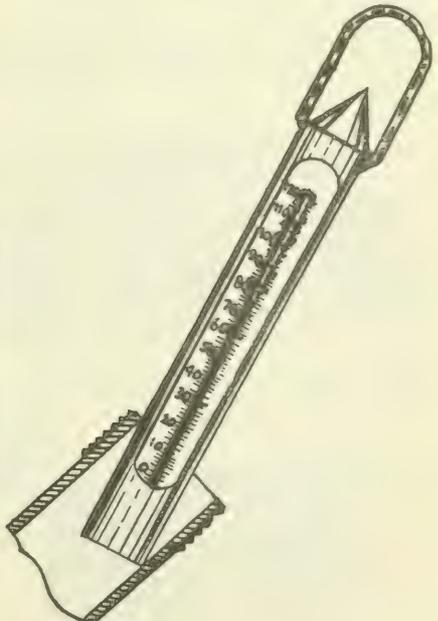
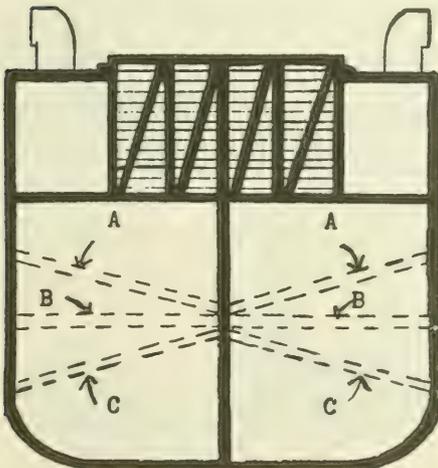
When gas-freeing a tank vessel, what precaution must be taken with respect to vent lines, heating coils, steam smothering lines, and loading and discharge piping?

When a centrifugal pump is operating with a suction lift:

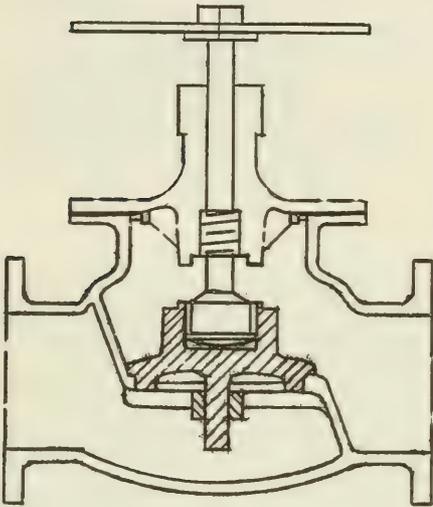
(a) what care is necessary?

(b) What is the maximum suction lift possible?

Describe the proper manner of reading the thermometer shown, when determining the temperature of a liquid cargo.



Why is a stop-check valve such as that sketched required to be fitted on a pump room bilge suction when the bilges are pumped by the cargo pumps or cargo stripping pump?



What means are required to evacuate the oil from a flooded pump room?

When a vessel has a gas-free certificate reading "safe for men-safe for hot work":

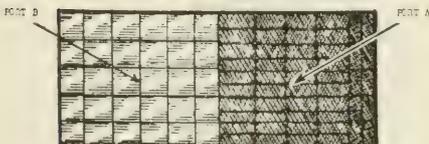
(a) What is the maximum vapor content in the tank's atmosphere?

(b) What residues may be present in the tank?

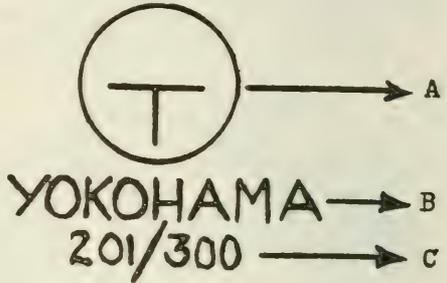
A vessel loads frozen ice cream which comes aboard packed in dry ice. What precautions would be necessary in stowing and discharging such cargo?

After the bales for port "A" had been discharged at that port, how would you protect the cartons for port "B" against damage from the rolling or pitching of the ship enroute to port "B", if shoring material was not at hand?

NOTE: The separation between "A" and "B" is thwartship.



If a case is marked as sketched, what is the meaning of "A," "B," and "C"?



What are the three necessary conditions that must be maintained in a refrigerated compartment in order to have good cargo turnout?

What are the duties of the senior deck officer during oil transfer operations?

Why is it important that the ventilation ducts in pump rooms extend below any floor plates so that air is circulated through the lowest part of the pump room?

A vessel is fitted with insulating mats which enable her to make a refrigerated space in the square of a 'tween deck whose wings and ends are refrigerated. In using such mats, would you consider the tightness of the bottom mats or the top mats of the space as being more important?

What inspection is required prior to making repairs involving riveting, welding, burning, etc., on a tank vessel?

What provisions are made in the bilge system of a vessel to protect the pipes from becoming clogged or the pumps being damaged?

How can the possibility of clogging the bilge suction be reduced when carrying granular cargo such as grain, coal, rock ballast, etc?

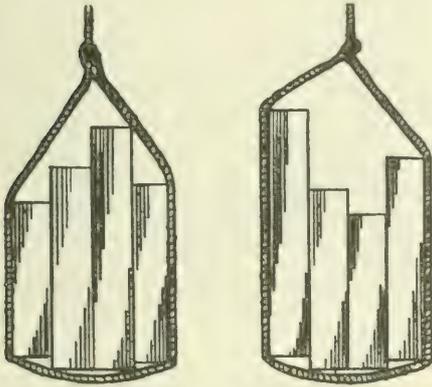
In supervising the stowage of bagged cargo in a hold:

(a) When would you stack the bags as in "A"?

(b) When as in "B"?



In supervising the discharge of delicate crates from a cargo hold, would you sling them as in "A" or "B"? Why?



The deep tanks of a vessel hold 500 tons of fresh water. How many tons of coconut oil with a specific gravity of 0.93 could be stowed in these deep tanks?

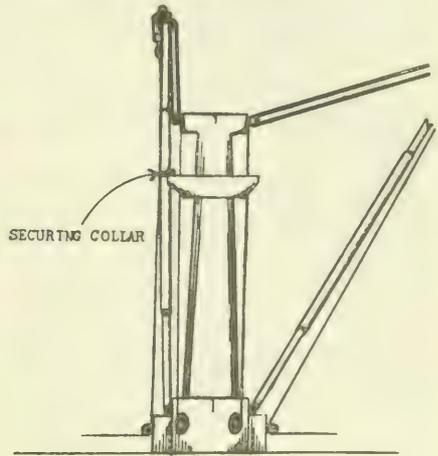
A vessel reserves 30' x 60' of the deck area of a hold for 300 tons of machinery parts stowing at 30 cubic feet per ton. How high will the consignment of machinery stow?

Referring to the sketch:

(a) When is shoring used in the 'tween deck of a vessel?

(b) What is the purpose of the carlings indicated by "B"?

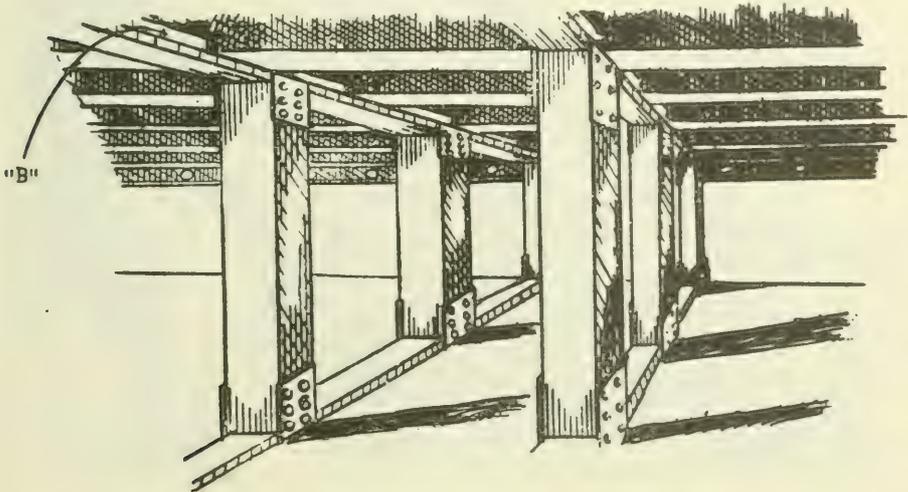
When the topping lift is up and down in the stowed position of the boom, how would you take the weight off the securing collar in order to release it? See illustration.



In carrying horses, many remote from the water barrel get an insufficient supply of water owing to the laziness of attendants; how can you detect this?

Would you stow cylinders containing compressed gases adjacent to the side of a ship?

When empty drums or barrels have been used to hold dangerous goods, what precautions must be taken in order to ship them empty, without restrictions?



How should plate or sheet glass be stowed?

How would you stow cargo parcels in order that the markings are readily found?

The bilge drain wells of a hold are located in the after end. Would it be preferable to stow drums of liquid latex in the forward or the after end of this hold?

What practice is frequently followed to eliminate danger of contamination or tainting by odorous or liquid commodities?

Oxidizing materials such as chlorates, nitrates, or peroxides must not be stowed in the same compartment with certain types of cargo. Name at least two such types.

In securing deck cargo as illustrated:

(a) What is the purpose of angle iron "A" and wooden capping "B"?

(b) How may the wedges used for tightening the braces as at "C" be prevented from working loose?

How may 'tween deck drains in a

cargo hold be checked to determine if they are functioning properly?

Why is it important that 'tween deck drains be in good condition?

How should bilges or drain well strainers be prepared for stowage of bulk cargoes?

How many board feet of dunnage would you estimate to be in a stack which is 5 feet high, 5 feet wide, and 12 feet long?

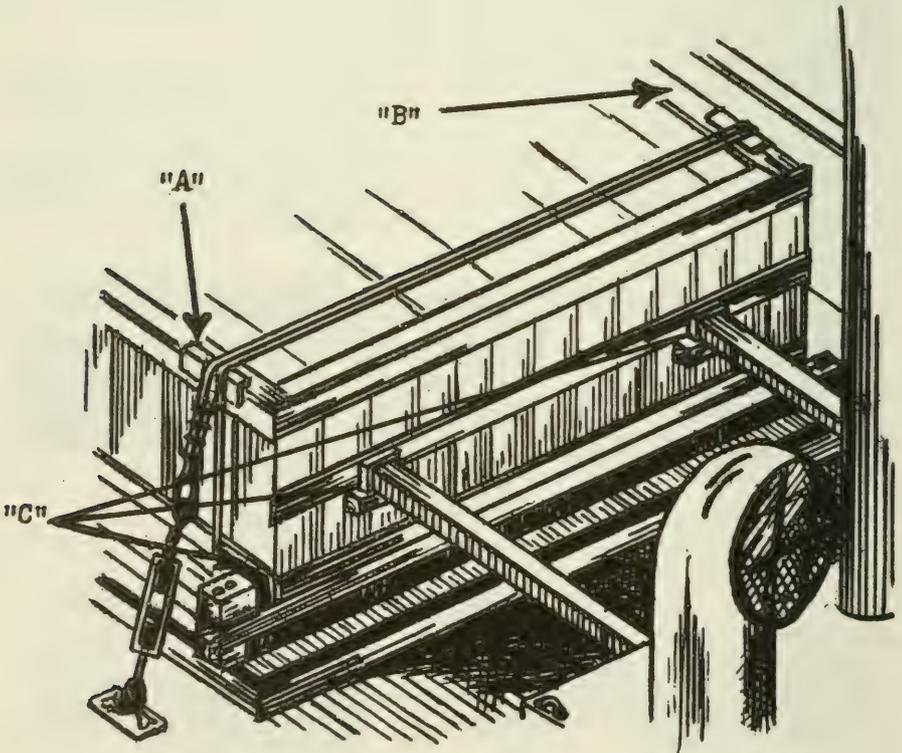
Before proceeding to the next port, what measures to prevent overcarriage should be taken upon completion of discharge of a partial cargo?

Describe the conditions that must be observed in the stowage of corrosive liquids.

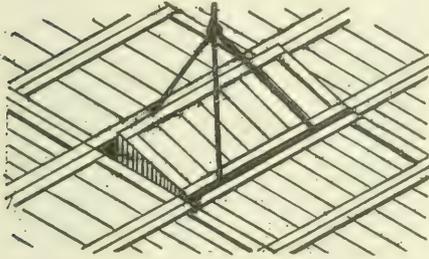
What type of nails are required for the inside sheathing of a magazine for explosives? Why?

*Define:*

- (a) Weight cargo.
- (b) Measurement cargo.
- (c) Ad valorem cargo.



When heavy crates or boxes of cargo are tightly stowed as illustrated, how may breaking out the first box be facilitated for the longshoremen in the port of discharge?



What precautions to prevent theft are usual at sea when carrying precious metals or bullion?

What stowage is required for motion picture films with a nitrocellulose base?

A hold of a vessel has a bale capacity of 60,000 cubic feet. Would it be feasible to stow 300 tons of baled kapok in this hold if 10 percent were allowed for broken stowage? The stowage factor of kapok is 188.

What type portable lights and lighting fixtures should be used in locations where an explosion or fire hazard may exist due to flammable gases or vapors, combustible dust, or easily ignitable fibers or materials producing combustible dusts?

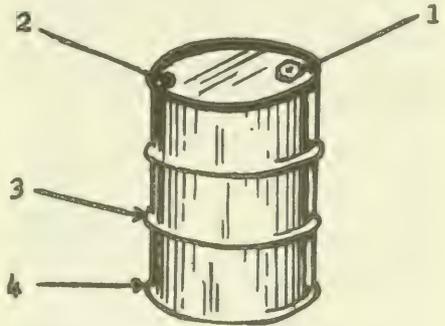
What is the minimum thickness of timber that may be used for grain shifting boards?

Describe the work performed by the National Cargo Bureau and its surveyors with regard to cargo stowage.

What precautions are necessary in the stowage of calcium carbide?

In securing deck cargo, why is tomming as shown at "B" preferable to shoring as shown at "A"?

Name the numbered parts of the drum illustrated.



How would you fight a calcium carbide fire?

What precautions are necessary for a cargo of cotton?

Describe the precautions necessary when a cargo hold is partially filled with loose grain in bulk.

When deck cargo is stowed above the bulwarks and closer than 8 inches to the side of the vessel, how would you eliminate the need for longshoremen hanging over the side to secure guys?

When cargo is being handled which is injurious or irritating to eyes, respiratory passages, or lungs, what precautions should be taken to safeguard personnel working in the area?

Describe the care required in order to carry a cargo of bagged sugar.

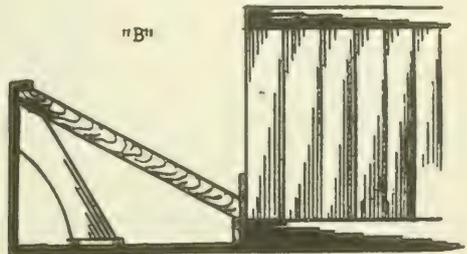
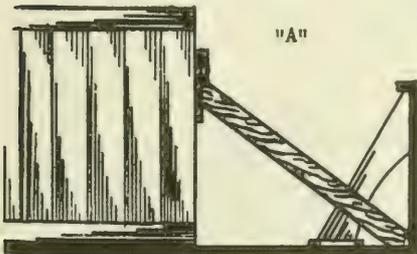
What precautions should be observed in stowing burlap bags or cargo packaged in burlap?

How would you load a cargo of iron ore?

Describe the precautions necessary in the carriage of vegetable oils in bulk.

When dangerous cargoes are loaded: (a) What disposition must be made of damaged or leaking packages?

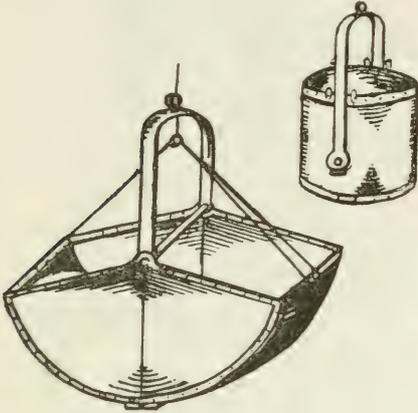
(b) Where should such damaged packages be repaired or recoopered?



When mechanical equipment, such as that sketched, is used to discharge bulk cargoes:

(a) What damage to ship's structure can be caused and how is it averted?

(b) In the event that damage is noted, what measures should be taken by the ship's officers?



How would you make a lee side for a lighter while lying at anchor?

How would you stow on deck carboys containing corrosive liquids?

What type of cargo can be handled by the method of single whip and skid, as illustrated?

In the event that leakage, occurred from carboys of corrosive liquids stowed on deck, what steps should be taken?

What is the meaning of the term "on deck protected" as applied to dangerous cargoes?

Given a dry bulb temperature of 75° and a wet bulb temperature of 62.5° find:

(a) Relative humidity.

(b) Dew point.

Define an "inflammable solid".

Define an "oxidizing material".

What care is necessary during the voyage when transporting a cargo of explosives or other dangerous articles?

Would you use dark or light colored tarpaulins or awnings to protect compressed gases in cylinders from direct rays of sun? Why?

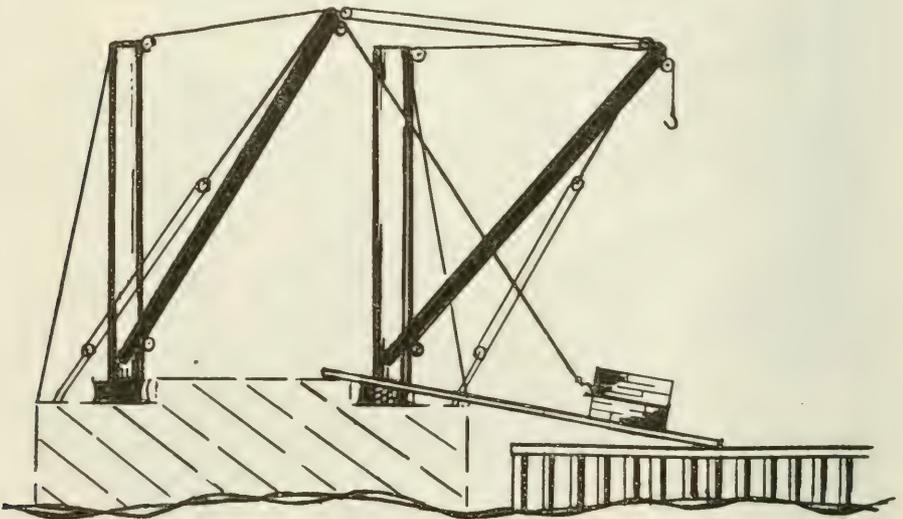
When a vessel is carrying inflammable liquid cargo on deck or in the holds, what precaution must be taken to warn of the danger?

What signals must be displayed by a tank vessel during transfer of bulk cargo?

When a tank vessel is fast to a dock during transfer of cargo, what warning must be given persons approaching the gangway?

What precautions must be taken against operation of the radio equipment when Grades "A," "B," or "C" liquids are being transferred?

Why are vessels engaged in the carriage of refrigerated cargoes usually painted white and provided with wooden decks over the refrigerated spaces?



If a ship drydocks while carrying refrigerated cargo, what steps must be taken if the refrigerating plant must be operated?

A vessel has two similar reefer spaces, one holding apples with a specific heat of .90, the other holding smoked bacon with a specific heat of .50. Both boxes are kept at 35° F. If the refrigeration machinery is shut down, which box will lose its temperature most rapidly? Which will require the longer time to cool down from a temperature of 70° F., using the same machinery and the same power?

Name at least two types of refrigerant gases used on merchant vessels and describe the hazards that they can create.

State the purpose of gratings in refrigerated compartments and describe in detail how you lay them.

Would you use the gratings for stowage of high density cargo of a general nature in a refrigerated compartment which is thoroughly insulated?

Show (by means of a sketch if desired) how you would determine the

maximum length of steel pipe that could be loaded.

A vessel loads 2000 tons of cargo using ten gangs of longshoremen, ten hours each:

(a) What is the rate of loading per gang hour?

(b) If each of the above gangs is composed of 15 men, what is the rate in tons per man hour?

Why should insufficiency of packing or use of poor packaging material be noted on an exception report?

When inflammable liquids are stowed on the deck of a vessel, what precautions are mandatory in order that fire-fighting equipment is immediately at hand?

What precautionary measure is usual on merchant vessels to warn longshoremen or other workmen against using the ship's booms to lift weights in excess of their safe working load?

In loading ore would you permit each hold to take its full complement before the others are started?

How is the stowage factor for a commodity determined from the measurement and weight?

## 27. DETERMINATION OF AREA AND VOLUME.

Find the volume of a cone 30 feet in height, whose base is 40 feet in diameter.

A hold is 25 feet wide and 12 feet deep. If you stow 165 tons of cargo against the forward bulkhead, how far aft will it extend, allowing 45 cubic feet to a ton?

The diameter of a smokestack is 10 feet and its height 40 feet.

(a) What is its surface area in square yards?

(b) Find how much it would cost

to give it one coat of paint if 1 gallon of mixed paint costs 3 dollars and covers 70 square yards.

Find the number of square yards of canvas required to make a trysail, the luff being 40 feet, the foot 30 feet. The foot is at right angles to the luff. How much would the canvas cost at 37 cents per linear yard, the width of sail canvas being 2 feet?

A rectangular plate is 24 feet 6 inches long and 8 feet 9 inches wide. What is the area of the plate?

## 28. LIFESAVING APPARATUS AND FIREFIGHTING EQUIPMENT.

Describe the stowage of the water which is required to be carried in lifeboats on ocean and coastwise passenger vessels.

May a lifeboat which is certified to carry 65 persons be fitted with an approved type of hand propelling gear?

How often are drills with the line-throwing appliance required to be held aboard ocean passenger vessels?

How often must fire and boat drills be held?

Describe the method of firing the mounted line-carrying gun.

Adrift in a motor lifeboat from an ocean passenger vessel, what equipment could you utilize to signal or attract an airplane or vessel?

How should lifeboat chocks on passenger vessels be fitted in order to facilitate the launching of the boats?

How often must fire and boat drills be held aboard ocean passenger vessels?

How often must life floats and buoyant apparatus be cleaned and thoroughly overhauled?

Describe the use of the mechanical firing attachment required for the line-carrying (Lyle) gun.

Describe the stowage and method of securing life floats and buoyant apparatus aboard ocean passenger vessels.

How must the emergency lights on a passenger vessel be marked?

When lifeboats are damaged and repairs are necessary, what is the procedure before making such repairs?

Describe the stowage of the following equipment in a lifeboat aboard an ocean passenger vessel:

- (a) Hatchets.
- (b) Oil, illuminating.
- (c) Oil, storm.

In lifeboats aboard ocean and coastwise passenger vessels:

(a) How many spare bulbs and batteries for the flashlight are required to be carried?

(b) How long may the batteries remain in the flashlight or be used as spares?

What license or certification must be held by persons appointed as first and second in command of each lifeboat and liferaft carried aboard ocean passenger vessels?

Who is charged with the appointment of persons to command lifeboats and liferafts?

May articles not required by the regulations be stowed in a lifeboat aboard ocean passenger vessels?

How many lifelines are required to be fitted on an ocean cargo vessel's lifeboat davit spans?

How many lifelines are required to be fitted to an ocean passenger vessel's davit spans?

How many lifelines are required to be fitted to an ocean passenger vessel's davit spans for the emergency boats?

How often must valves and other ap-

pliances necessary to make a compartment watertight be operated to meet the passenger vessel requirements?

Describe the provisions carried as liferaft equipment aboard ocean or coastwise passenger vessels and the stowage thereof.

What lifeboatage is required on ocean cargo vessels?

How many service lines are required as equipment for the line-throwing appliance carried aboard ocean cargo vessels?

What is the service use limit of the rockets carried as equipment for a line-throwing appliance?

When passenger vessels are fitted with watertight doors in the subdivision bulkheads, may these be kept open at sea?

State the type, number and location of fire extinguishers required to be provided for emergency power plants and emergency fuel tanks aboard ship.

Describe the combination letter and number symbol used to classify hand portable fire extinguishers carried aboard ocean passenger vessels.

Whenever a vessel, moored to a waterfront facility, is without power to operate its fire pumps, what measure should be taken to provide water for fire-fighting purposes?

State the three methods by which fire spreads and what should be done to prevent this in combating fires on board vessels.

What are the requirements governing the number and location of fire hydrants aboard ocean passenger vessels?

At annual inspections, what is done to the carbon dioxide (CO<sub>2</sub>) cylinders in a CO<sub>2</sub> fire-extinguishing system? When are the cylinders replaced and when must they be recharged?

Must a fire hose remain connected to its hydrant at all times? If not, under what conditions may it be disconnected and where must it be stowed?

### 30. RULES AND REGULATIONS FOR INSPECTION OF MERCHANT VESSELS.

What is a licensed officer's duty in assisting marine inspectors of the Coast Guard?

In the log book:

(a) When are entries to be made?

(b) What is required if an entry is not made on the same day as the occurrence?

(c) Can an entry be made more than 24 hours after arrival in port, of any occurrence previous to arrival in port?

If your vessel is equipped with life-saving apparatus over and above that required by the Merchant Marine Inspection, is it necessary to give the same care to the upkeep of this extra gear that you give to the required equipment? Give the reason for your answer.

What is the Oil Pollution Act and the penalty for its violation?

Name some of the records which may be required as evidence by a hearing board in the event of a marine casualty or accident.

What does the law state with regard to the rating of the man at the wheel in narrow and crowded waters or in low visibility?

What data does the certificate of inspection contain, by whom is it issued and how long is it issued for?

Name some of the information which may be found on a Certificate of Inspection.

What devices are required by the regulations to warn the passengers and crews of vessels in the event of emergency?

What stations on a vessel must be connected by voice tube or telephone?

What is the penalty for failure to promptly report a collision with aids to navigation to the Merchant Marine Inspectors?

How does the officer or lifeboatman in charge of a boat know if the men assigned report to the proper boat and are familiar with the duties assigned on the station bill?

If a vessel sights people in danger of being lost at sea, is the master legally obliged to assist them if he may do so without serious danger to his own vessel, crew, or passengers?

Where the crew of a vessel assists in saving life from a vessel in distress and are thereby unable to assist in saving property, are they entitled to salvage?

What are the emergency signals used for the following:

- (a) Fire alarm.
- (b) Dismissal from fire stations.
- (c) Boat station or boat drill.
- (d) To lower boats.
- (e) To stop lowering boats.
- (f) Dismissal from boat stations.

What information is required on a Notice of Casualty?

By whom must instruments, machines, and equipment connected with the safety of life be approved before they may be used on board ship?

What would you do in the matter of handling the crew and advising and handling the passengers in time of emergency?

How shall spaces or lockers containing equipment for the use of the emergency squad be marked?

Describe the method of electrical bonding mandatory for vessels trans-

ferring liquefied petroleum gases and which is usually employed for vessels transferring inflammable or combustible liquids.

What is the rule regarding unnecessary whistling within any harbor limits of the United States and what is the penalty for its violation?

What is the penalty for flashing, or causing to be flashed, the rays of the searchlight into the pilot house of a passing vessel?

How are fire and boat drills to be conducted?

What is the penalty for any licensed officer who shall authorize or permit the carrying of any light, electric or otherwise, not required by law, that will in any way interfere with distinguishing the signal lights?

When should the vessel's drafts be taken and entered in the log book?

What does the law state in regard to the rating of the lookouts?

When a vessel is in port and the power plant is to be shut down or made inoperative for a period, what precautions must be taken?

In port what information for use in emergency should be immediately available for duty officer, watchmen, and other operating personnel?

Define the term "flame arrester" as it is used in the Tanker Regulations.

Define the term "flame screen" as used in the Tanker Regulation.

How would you mark the manual control for automatic fire dampers in ducts passing through main vertical zone bulkheads of passenger vessels?

What is the purpose of a pressure vacuum valve required on many types of tank vessels and what care should it receive?

How must entries be made in the official log book?

How often shall the motor or hand-operated propelling gear of a lifeboat be operated and how long each time?

When a fire watchman fails to follow his prescribed route, or to record each station within the specified time, what action must be taken?

Why should fire extinguishers not be stowed in passenger and crew quarters when the extinguishing medium is kept under pressure?



## SPECIMEN EXAMINATION FOR CHIEF MATE

### 1. LATITUDE BY POLARIS.

On 1 September 1958, in D. R. Longitude  $51^{\circ}-06'$  West, Polaris was observed at evening twilight to have a sextant altitude of  $47^{\circ}-30'$  and a bearing of  $359^{\circ}.5$  by gyro-compass. The chronometer read 10h-45m-24s. The chronome-

ter was 1m25s fast. The sextant index error was 1'.5 off the arc. The height of eye was 25 feet.

*Required:*

The Latitude at time at sight.

The gyro-compass error.

### 3. FIX OR RUNNING FIX.

Enroute from Spain to Milwaukee, in D. R. Latitude  $46^{\circ}-10'$  North and Longitude  $26^{\circ}-05'$  West, three (3) celestial

bodies were observed. Given the following information on the celestial bodies, determine the ship's position.

<i>Body</i>	<i>Observed Altitude</i>	<i>Greenwich Hour Angle</i>	<i>Declination</i>
SATURN -----	19°-24'.9	60°-07'.8	17°-30'.5 S.
MOON (L.L.)-----	13°-19'.9	321°-49'.2	05°-45'.2 S.
ARCTURUS -----	37°-29'.4	441°-34'.9	19°-24'.6 N.

Candidates may use any method of solution.

The following 3 sextant altitudes of planets were obtained on 2 March 1958. The height of eye was 57 feet, the sex-

tant index error was 2'.0 on the arc in all observations. Given:

	<i>Venus</i> <i>Observation #1</i>	<i>Jupiter</i> <i>Observation #2</i>	<i>Mars</i> <i>Observation #3</i>
Planet sext. alt.-----	2°-09'.6	12°-47'.6	46°-13'.3
Bar. pressure-----	30.5 in.	1030 mb.	30.0 in.
Temperature -----	80° F.	28° Celsius (Centigrade)	52° F.

*Required:* The observed altitudes.

The following 3 sextant altitudes of stars were obtained. The height of eye was 64 feet; the sextant index error was

2'.5 off the arc in all observations.

*Given:*

	<i>Observation #1</i>	<i>Observation #2</i>	<i>Observation #3</i>
Star sext. alt.-----	3°-56'.7	15°-21'.6	60°-01'.3
Bar. pressure-----	30.5 in.	990 mb.	30.0 in.
Temperature -----	12° F.	(-) 15° Celsius (Centigrade)	63° F.

*Required:* The observed altitudes.

Given:

	No. 1 Mars	No. 2 Saturn	No. 3 Jupiter
Date -----	26 April 1958	7 September 1958	29 May 1958
GMT -----	05h-38m-27s	14h-08m-58s	22h-38m-17s
Long. -----	16°-23'.0 West	48°-56'.0 East	5°-57'.0 West

*Required:* The meridian angle and declination of the planet in each of the 3 cases. Indicate whether the planet

is east or west of the meridian in each case.

#### 4. STAR IDENTIFICATION (any method).

On 20 January 1956, at Latitude 7°-09' South, Longitude 112°-15' West, a morning star observation is taken at 12h-48m-39s GMT of a star whose corrected altitude is 40°38'.2, and whose

azimuth is 118°.9 True.

*Required:* The name of the star. Candidates may use any method of solution. Show all work.

#### 5. CHART NAVIGATION.

How does a great circle course appear on a polyconic chart?

How are the latitude and longitude of a point found on a gnomonic chart?

How is the true bearing determined between any two points on a large scale polyconic chart?

How is the distance measured on a polyconic chart?

Describe the usual method for using a gnomonic chart to determine the great circle course for a ship.

Can any chart representation of the earth's surface preserve all of the following properties:

(a) The true shape of physical features.

(b) Correct angular relationships.

(c) Equal areas, or the representation of areas in their correct relative proportions.

(d) True scale values for measuring distances.

(e) The representation of great

circles as straight lines.

(f) The representation of rhumb lines as straight lines.

What is the principal feature of Mercator projection charts that makes them desirable for marine navigational use?

Does a Mercator projection chart correctly picture the shape of an area? Explain your answer.

Are all charts oriented so that north is shown at the top of the sheet? Explain your answer.

State in detail how you would make use of depth curves on nautical charts to assist you in fixing your position.

What is meant by the figures 1:200,000 on a chart?

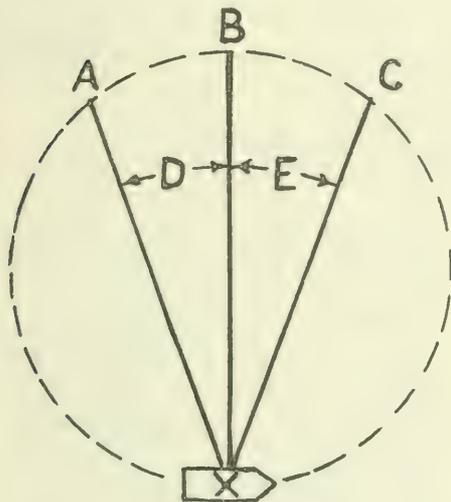
For what type navigation would a chart with 1:200,000 on it be suitable?

Convert 7½ meters into feet.

State the purpose and describe the use of hachures on charts.

What is the length of a nautical mile?

A ship "X" checks her position using a sextant to determine angles "D" and "E" between points "A" and "B," and "B" and "C" respectively. How accurate would you consider the position thus determined when plotted with a three arm protractor?



State three methods by which, without obtaining the precise position, the navigator may assure himself that he is clear of any particular danger.

How would you determine your position by a chain of soundings?

State what navigational aids are indicated by the symbols below.



-(a)



-(b)



-(c)



-(d)



-(e)



-(f)



-(g)



-(h)



-(i)

A vessel with a speed of 10 knots is proceeding through a current setting NE true with a drift of 6 knots.

(a) What course should be steered to make good a course of NW true?

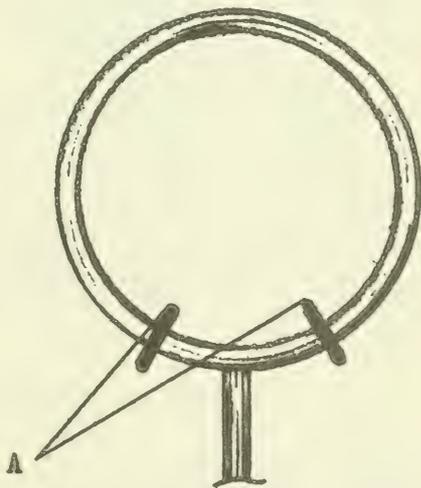
(b) What speed will the vessel make on this course?

Two vessels are in Latitude 50° North. They are 400 miles apart when they obtain radio direction finder bearings of each other.

(a) Would they bear east or west from each other precisely on the uncorrected radio bearing?

(b) Would the bearings of one differ from the other by precisely 180°?

Sketched is a marine type radio direction finder loop antenna. Why is it important that the insulator and gasket noted by "A" be kept in good condition and clean from paint and other material?



Would you use Mercator sailing or Middle Latitude Sailing for a distance of 600 miles or more? Explain your answer.

What accuracy can be expected normally with bearings furnished by shore radio direction finder stations?

How would you regard bearings by shore radio direction finder stations which were described, as doubtful, approximate or second class?

For courses near 090° or 270°, why is the use of the Mercator sailing formulas not normally desirable?

When is great circle sailing most advantageous?

**6. COMPASS DEVIATION.**

Enroute from Philadelphia to Liverpool, in D. R. Latitude  $42^{\circ}-00'$  North and Longitude  $50^{\circ}-00'$  West, an azimuth of the star  $\gamma$  (Gamma) Ursa

Minoris was observed. The following data was obtained at the time of observation:

<i>Compass Bearing Of Star</i>	<i>Greenwich Hour Angle</i>	<i>Declination Of Star</i>
$28^{\circ}-00'$ psc	$255^{\circ}-55'.6$	$71^{\circ}-59'.1$ N.

Variation for the locality was  $24^{\circ}-36'.0$  West

*Required:*

The true azimuth.

The deviation of the standard compass.

Candidates may use any method of solution.

**11. PILOTING.**

Your vessel is steering  $283^{\circ}$  True, a light is sighted bearing  $219^{\circ}$  p.s.c., variation  $23^{\circ}$  East, deviation  $1^{\circ}$  East. On what compass bearing must the light be again observed so that the run between bearings will equal the distance off when the light bears  $193^{\circ}$  True?

On course  $104^{\circ}$  p.g.c., gyro error  $1^{\circ}$  West, a light is sighted bearing  $113^{\circ}$  p.s.c., variation  $23^{\circ}$  East, deviation  $1^{\circ}$  West. On what gyro bearing must the light be observed so that the run between bearings will equal the distance off when the light bears  $194^{\circ}$  p.g.c.?

On course  $283^{\circ}$  True, a light is sighted bearing  $228^{\circ}$  p.s.c., variation  $23^{\circ}$  East, deviation  $3^{\circ}$  East. On what bearing must the light be observed so that the

run between bearings will equal the distance off when the light bears  $167^{\circ}$  p.s.c.?

A ship is steering  $101^{\circ}$  p.g.c., variation  $23^{\circ}$  East, deviation  $3^{\circ}$  West, which is  $82^{\circ}$  p.s.c. A light is sighted bearing  $129^{\circ}$  True. On what gyro bearing must the light be observed so that the run between bearings would equal the distance off when the light bears  $191^{\circ}$  gyro?

It is desired to avoid coming closer than within 0.8 miles of a light listed as 110 feet above high water level. Determine the proper vertical danger angle in this case and state how you would use it.

NOTE: Problems may be given pertaining to piloting which are under other titles in this book.

**12. AIDS TO NAVIGATION.**

How are arcs of visibility and limits of a light given in a light list?

From what reference point is the height of a light measured?

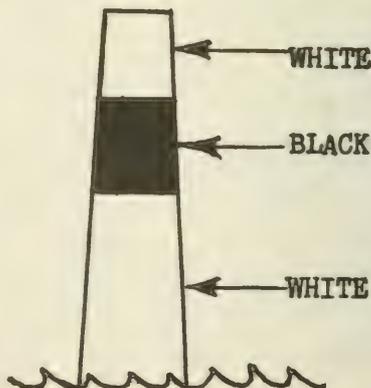
Describe how light phase characteristics are assigned to buoys in the lateral system of buoyage of the United States.

What action should be taken if a light is found to be extinguished or any other defect is noted in its operation?

How may the color of a light be affected by atmospheric conditions?

What is the purpose of international numbers assigned to major seacoast lights in the light list?

What is indicated by the white and black alternate horizontally banded buoy sketched?



Entering from seaward you sight the black and red horizontal band buoy shown.

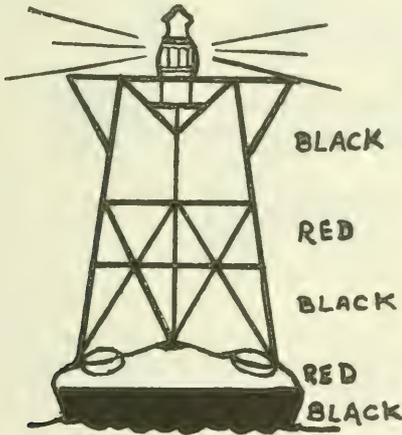
(a) Which side is best to leave it on in passing?

(b) What number would you expect it to have?

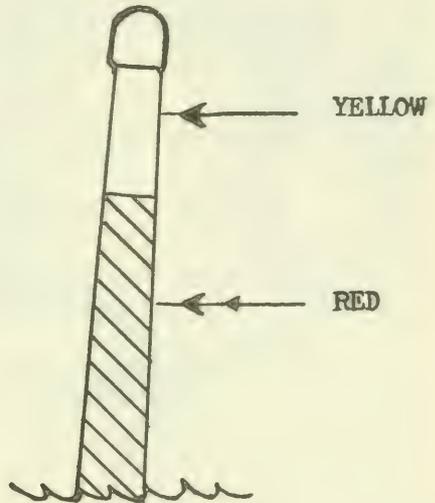
(c) What color light would you expect it to show?

(d) What light phase characteristic would it likely have?

(e) Sketch the chart symbol for the buoy.



A buoy painted yellow and red as illustrated is used in what system of navigational aids?



### 13. SPEED BY REVOLUTIONS.

Propeller pitch 17.7 feet, revolutions per day 81,630, calculate the day's run

allowing 6 percent slip.

### 15. INSTRUMENTS AND ACCESSORIES.

Do Loran sky wave corrections represent the exact amount of correction necessary or are they merely average correction values? Explain.

Are Loran sky waves as reliable and accurate for navigational purposes as ground waves?

What precautions must be borne in mind in celestial navigation or piloting, when the navigator uses lines of position that cross at small angles?

Where is the most unfavorable area

for obtaining a line of position from a pair of Loran transmitters?

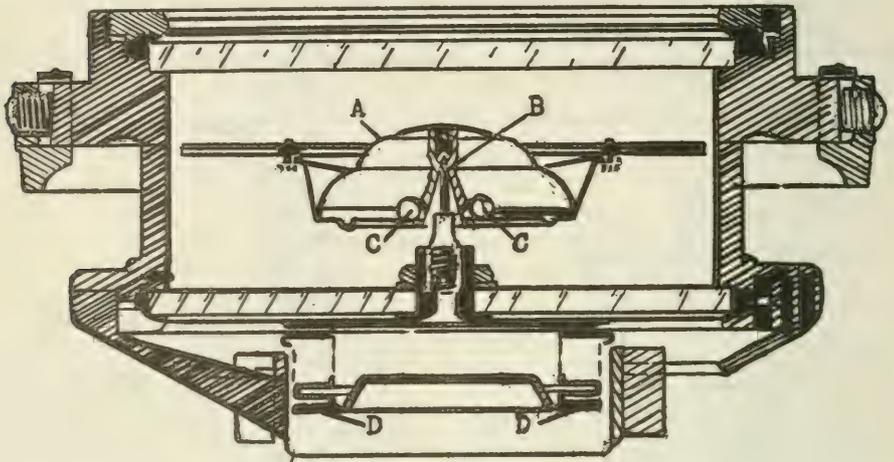
Describe the factors which influence the accuracy of a fix obtained by using Loran lines of position.

Explain briefly how the 180° ambiguity in radio direction finder bearings may be resolved.

If a ship's radio direction finder is fitted with a quadrantal error compensator, will it be affected by changes made in the set or its surroundings?

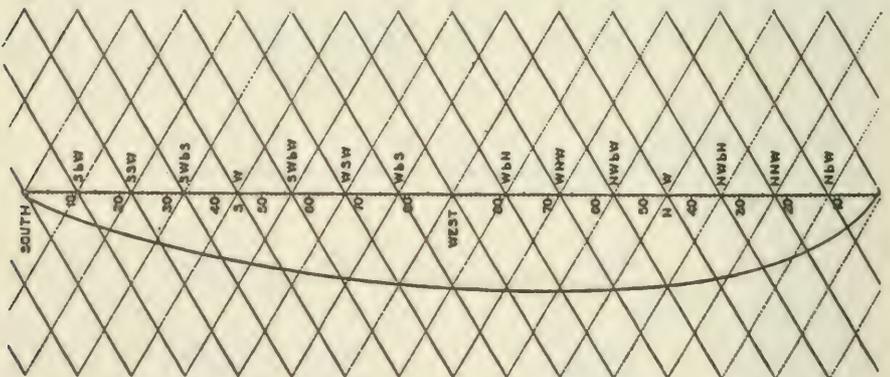
16. MAGNETISM, DEVIATION AND COMPASS COMPENSATION.

Name and describe the functions of "A," "B," "C" and "D" in the sketch shown.



Using the Napier diagram shown below:  
 (a) Determine the magnetic course when steering 271° by compass.

(b) Determine the compass course to steer to make a magnetic course of 260°.



At what point in a bar magnet is the attraction greatest?

If an unmagnetized soft iron bar is brought near a compass, how should it be held to exert the maximum effect?

What is meant by "dip" (also known as magnetic inclination, or magnetic latitude)?

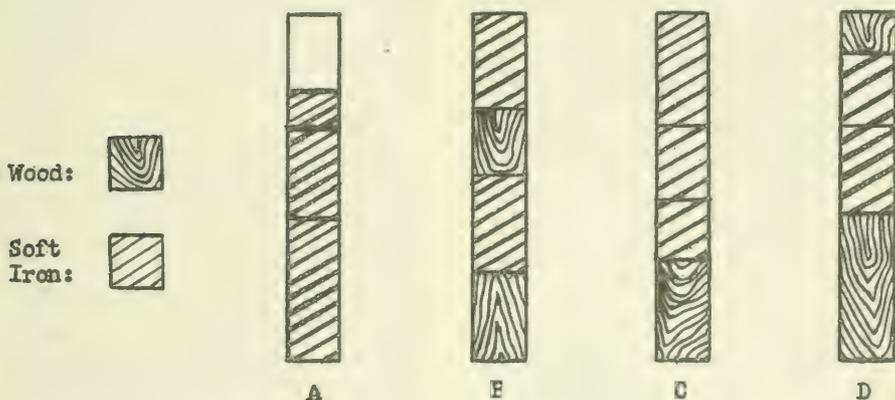
In adjusting the magnetic compass,

is it best to place fewer magnets very close to the compass or more magnets farther away from the compass? Explain your answer.

On what magnetic heading of the vessel is the maximum deviation caused by induced magnetism in vertical soft iron?

Would you regard "A" "B," "C" or "D" sketched below as representing cor-

rect placing of the iron in a Flinders bar holder? Why?



Where is there no induced magnetism in vertical soft iron?

What is the effect of a change of latitude on uncorrected deviation due to permanent magnetism?

Why is it desirable:

(a) To check a compass adjustment on opposite cardinal headings to that of initial placement of correctors;

(b) To check the quadrantal sphere positions at an adjacent intercardinal

heading from that of initial positioning;

(c) To "halve" any errors found in each instance?

How would you correct easterly quadrantal deviation on a SW heading?

If the westerly deviation increases on westerly headings as the vessel steams south, what adjustment should be made in the Flinder's bar?

How would you correct your compass for westerly error due to permanent magnetism?

## 18. TIDES AND CURRENTS.

What is meant by the term "vulgar establishment of a port"?

What is the diurnal range of the tides?

What causes the difference in height between two successive high waters of the tides?

How would you determine the time of high and low water for a locality not listed in the Tide Tables?

Define the term "lunitidal interval", and state the various types of lunitidal intervals that may occur.

At Longview, on the Columbia River (Lat. 46°-06' North and Long. 122°-58' West) on 21 October 1958:

(a) What is the time and velocity of the maximum PM ebb current?

(b) What is the direction and the average velocity of the ebb current at this point?

(c) Under what conditions would tabulated data of the Current Tables be inapplicable to this position?

At Newburg, New York (Lat. 41°-

30' North and Long. 74°-00' West) on 29 July 1958:

(a) What is the time and velocity of maximum PM ebb current?

(b) What is the average velocity of the ebb at this point?

(c) In what period of the year might you expect values other than those tabulated in the Hudson River?

At the Columbia River Entrance (N. Jetty) on 4 February 1958:

(a) What is the time and height of PM low water?

(b) What is the mean range of tides for this locality?

(c) What is the diurnal range of tides for this locality?

(d) What is the range of PM tides at this locality?

At Godthaab, Greenland on 4 July 1958:

(a) What is the time and height of AM low water?

(b) What is the range of AM tides for this date at this locality?

## 19. OCEAN WINDS, WEATHER AND CURRENTS.

What is the meaning of the term "dew point"?

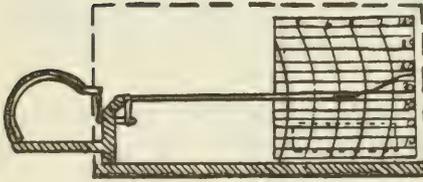
What is a hygrometer?

What is an "isotherm"?

Referring to the sketch:

(a) What is the name of the instrument, used to record temperature?

(b) State how the bimetallic element causes changes in temperature to be recorded.



What is "saturation"? Explain in full.

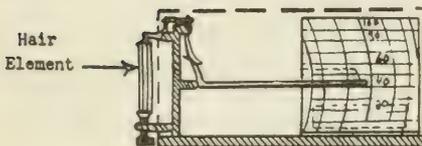
Convert (-) 15° Celsius (Centigrade) into the temperature Fahrenheit.

Describe the type of precipitation associated with the approach of a warm front and cold front.

How is the barometric pressure at sea level indicated on a weather map at sea and on a ship's report (the symbol PPP designates the pressure on the standard form for reports)?

How is atmospheric pressure expressed in meteorology; i.e., in what units is it measured?

Explain how the hair hygograph records the humidity.



Explain how the temperature, pressure, and volume of gas are related. State in words or in mathematical notation the gas laws.

How is the pressure affected by the passage of a front?

Define:

(a) A bar.

(b) A millibar.

What is a "gradient"?

What is "advection fog"?

What is an "air mass"?

How does a body of air acquire characteristic properties?

What are the phenomena, characteristic of the passage of a cold front, which are associated with wind shifts?

What is the "Wave period"?

How is the "Wave period" determined?

What is the name of the cloud type which gives rise to halos of the sun and moon?

How is altostratus distinguished from cirrostratus and nimbostratus?

Name six atmospheric processes which cause air to be cooled below its dew point, thus causing condensation and clouds.

What sequence of cloud types is characteristic of the approach of a warm front?

What are the signs that may indicate the proximity of ice?

What is a "lead" in ice?

What are the causes of packing of compact slush, or packing of hummocked-ice?

How should an ice field be entered?

Why is it standard procedure to rig for towing before reaching ice, when vessels are to proceed in an ice convoy?

How are ships moored to ice?

What precautions should be taken by a vessel which is drifting with engines stopped during the night or during a period of poor visibility in an area where icebergs are prevalent?

What influence has the earth's rotation on air currents moving from a position of high pressure to a position of relatively low pressure?

When a vessel transmits a radio message advising of a tropical storm, is the vessel liable for the cost of the message?

How are messages concerning storms preceded when transmitted by radiotelegraphy?

What information should be included in a message from a vessel warning of a tropical storm?

How may swells indicate the approach of a tropical storm?

How does the appearance of a tropical cyclone, as depicted by the isobars drawn on a weather map, differ from the appearance of an extratropical cyclone originating in the middle latitudes?

Can storms with gale winds occur under anti-cyclonic conditions with rising barometers? Explain your answer.

The maximum height of storm waves can be approximated by the formula:

$$H = 1.5 \sqrt{F} \text{ where } H \text{ is the height in feet and } F \text{ is the fetch in nautical miles}$$

Using this formula, determine the maximum height of storm waves that may be encountered when a gale is blowing from a direction in which the coastline is distant 64 miles.

In stormy weather at sea, is the direction in which the waves are moving always the same as the direction of the wind? State the reasons for your answer.

In which semicircle of a tropical cyclone would a vessel be if the wind shifted clockwise while she was hove to in the Northern-Hemisphere?

In the Southern Hemisphere, how should a steam vessel maneuver if she is on the storm track in front of the center of a tropical cyclone? Answer in full.

Hove to in the Northern Hemisphere, under tropical cyclone conditions the barometer is rising and the wind is shifting counter-clockwise. What is the vessel's probable position relative to the center of the storm and what action should be taken to leave the storm area as rapidly as possible?

Explain the value of synoptic charts of weather conditions for maneuvering of vessels in extra-tropical storms.

What are "foehn" and "chinook" winds?

State the three elements which compose the pressure tendency.

How is the pressure tendency determined:

- (a) With a barograph;
- (b) With a barometer?

A vessel discharging cargo at anchor observes an approaching thunderstorm. A flash of lightning is followed after 12 seconds by thunder. Six minutes later another flash of lightning is followed in 8 seconds by thunder after the second

flash of lightning. How much time does the vessel have to rig rain tents or cover the hatches before the storm reaches her?

What is the effect of the earth's rotation on the direction of current?

Under certain conditions in the Northern Hemisphere it may be assumed that the current sets  $30^\circ$  to the right of the direction in which it is driven by the wind, and its velocity is 2 percent of the wind velocity.

(a) Basing your answer on the foregoing statement, estimate the direction and velocity of the current that may be expected if the wind is from the east at 35 knots.

(b) Using the direction and velocity of the current estimated in (a), find the course to steer to make good a course of  $210^\circ$  if the speed of your vessel is 12 knots. To solve this problem, consider current only, disregarding any other factors that may be involved.

Give a general description of "Buys-Ballot's law".

What is a cold front?

The direction of the wind in a cyclone is South. State the probable bearing of its center from the ship in the Southern Hemisphere.

Describe cirro-stratus clouds.

What is an occlusion in an extra-tropical cyclone?

The three sketches below show the symbols used on printed weather maps to represent cold fronts, warm fronts, and occluded fronts at the surface.

(a) What type front is represented by sketch No. 1?

(b) What type front is represented by sketch No. 2?

(c) What type front is represented by sketch No. 3?



## 22. SIGNALING BY INTERNATIONAL CODE FLAGS, FLASHING LIGHT; LIFESAVING, STORM AND SPECIAL SIGNALS.

State precisely how you would express the following times using coded international code flag signals:

- (a) 3:18 a.m.
- (b) 7:56 p.m.
- (c) 11:01 a.m.
- (d) 11:01 p.m.

How many flag hoists should be shown at a time?

You are on a ship constructed with twin screws and have lost both propellers. The flag signal "TH" means "I have lost my propeller." In signalling another vessel, how could you assure that he understands you have lost both propellers?

When a vessel is in distress and has sent a radio telegraph message requesting assistance, what measure would be taken to insure that rescue craft can obtain her precise position and shortest course to take in order to assist her?

What radio distress signal is provided so that a vessel may obtain assistance from other vessels even though such vessels may not have a radio operator on watch at the time the distress signal is transmitted?

What pyrotechnic equipment must be provided on United States merchant vessels on the high seas for the purpose of indicating that they are in distress and require assistance from other vessels or the shore?

If you sighted a red flare at sea, suspended by a small parachute about 300

feet above the water, with no vessels or aircraft in the vicinity of the flare, what does the signal indicate, and what action would you take?

If an aircraft flies over your ship and circles, then crosses close ahead at a low altitude opening and closing the throttle, or changing the propeller pitch, and then heading away in a particular direction, what action would you take?

If, after a period the aircraft crosses the wake close astern at a low altitude, opening and closing the throttle, or changing the propeller pitch, what would this indicate?

What is the standard rate of signalling by semaphore?

What does "PRB" mean when it is received as the first group in the text of a message sent by flashing light?

State the function of the model verb "Glean."

If you are receiving a message in morse code, which is being transmitted by sound, what procedure should you follow when a word or group is missed?

If while at sea, you sighted a buoy 3 feet in diameter painted yellow, what action must you take?

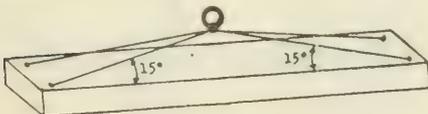
What are the warning signals displayed in inland waters of the United States by Coast Guard vessels while handling or servicing aids to navigation?

## 24. SEAMANSHIP.

Why is great care necessary in inspecting preformed type wire rope, when this is used for cargo falls, topping lifts, slings, guys, or other gear on a ship?

Describe in detail how you would attach a wire rope socket.

A pontoon weighing 2,000 pounds is to be lifted by a four-legged bridle sling, each leg of the sling forming an angle of 15 degrees with the top of the pontoon as indicated in the sketch below. What is the stress on each leg of the sling when the weight of the pontoon is suspended from it?



What would be the effect of a wire rope fall jamming in a sheave of the purchase of a jumbo boom when lowering a weight?

Why is extra care necessary when winding wire rope for the purchase and topping lift of a heavy lift boom on winch drums?

What circumference of manila line would be required for a lifeboat fall rove off through two triple blocks if the weight of the boat is 4,000 pounds, the gear of the boat 1,050 pounds, and the capacity 30 persons?

**HINT:** The weight of each person by regulations is considered 165 pounds. The factor of safety required by regulations is 6. Use the formula  $B = C^2 \times 900$  for computing strength of manila line, where "B" is breaking strength in pounds, "C" is circumference. Friction is considered at 10 percent loss per sheave.

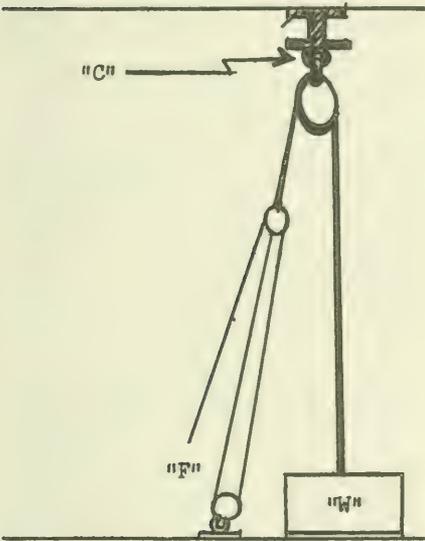
Referring to the sketch:

(a) With a gun tackle purchase made fast to the hauling part of a single whip as shown, how much weight at "W" may be lifted with a force at "F" of 100 pounds, allowing 10 percent friction loss at each sheath?

(b) To lift "W" 3 feet, how far must the line at "F" be pulled?

(c) What stress is put on the pad-eye at "C" when lifting the weight?

### Blocks and Tackles



In the selection of correct thickness of grain shifting boards, what is the governing factor?

In the selection of the correct rectangular cross section or diameter of timbers to be used as shores for grain shifting boards, what are the governing factors?

What size of wire rope and shackles is the minimum allowed to be used for staying grain shifting boards?

Where must shores used for bracing grain shifting boards be bridged?

What action must be taken if the drum of an electric winch rotates to pay out the wire under the stress of a load while the switch is in the "off" position?

What is the minimum thickness of wood to be used for hatch boards on weather deck hatches?

What is the minimum number of tarpaulins required for covering hatches, and what is the minimum grade of the material to be used?

In a steel lifeboat, what parts of the boat's structure give it longitudinal strength?

What care must be taken when aluminum fittings are used on steel vessels in salt water service?

How do you rig an anchor buoy and how should it be handled for safety and efficiency when dropping or raising a bower anchor?

Describe the construction of the detachable links used to join shots of chain and the procedure of connecting and disconnecting shots.

Within what length of time should a properly operating steering engine be able to put the rudder from hard over on one side to hard over on the other side with vessel going full speed ahead?

In the event of a fireroom fire, what provisions are available to shut off the fuel pumps?

In anchoring in deep water, what precaution should be taken?

Why must you avoid twists in the chain between the wild cat and the anchor, when the anchor is hove tight and in the hawse pipe?

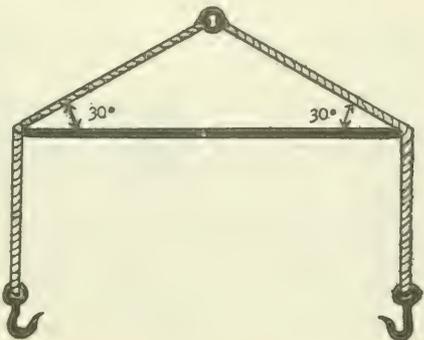
How is the wear on a shot of chain cable determined?

How should the bitter end of anchor cables be secured in the chain locker and why should it be so secured?

When a vessel is moored with two anchors down, how may she insure swinging the right way with the change of the tide?

What could be the result of swinging the wrong way on a vessel moored with two anchors in a tideway?

If a draft of 1,000 pounds of cargo be lifted with the sling sketched here, what is the compressive stress on the spreader shown?



A vessel displacing 8,000 tons making 5 knots brings up on her anchor in one hundred feet. The chain has a breaking strength of 320,000 pounds. Will the stress on the chain exceed the breaking strength?

NOTE: Use formula

$$F = \frac{W}{g} \times \frac{V^2}{2S}$$

where "F" = stress in pounds

"W" = displacement of the vessels in pounds

"G" = acceleration due to gravity, 32.16

"V" = speed in feet per second

"S" = distance in which the vessel is stopped.

Describe the effect of wind on a vessel backing.

Are there any rules which specify the size of mooring lines which a vessel must use?

If a man falls overboard 300 feet forward of the stern of a vessel making 15 knots:

(a) How long would it take for him to reach the stern (and the danger of the propeller striking him)?

(b) What orders would you give to prevent the propeller striking him?

Bringing up on her anchor chain at 3 knots, will a vessel exert a greater stress on her chain in light or loaded condition? Why?

Describe a fire warp and how it is used.

On a vessel where it is necessary to stow the chain in the locker, prescribe the precautions necessary to avoid injury to the men tiering the chain.

What care should be taken to prevent eye injury or other injuries to a man while handling the brake of a windlass in letting go the anchor?

A vessel is moored stern to a quay, bow anchored to two anchors with a slight spread. Both anchor cables and lines are taut. A strong wind comes up athwart the mooring as illustrated. How

may the leads of the lines and cables be improved?

How should a windlass be fitted to prevent injury to personnel while engaging or disengaging the wild cat, handling lines, etc.?

The after holds of many vessels are sounded from the shaft alley. Why are these sounding pipes fitted with spring loaded self-closing valves?

When a vessel is fitted with a gangway that does not have self-adjusting treads, how do you protect people from injury to their legs by slipping through the steps when the gangway is nearly horizontal?

What may be the result of permitting a centrifugal or rotary pump to run dry when pumping inflammable or combustible oils?

In washing the holds of a freight vessel the strainers become plugged and it is impossible to pump out the water by means of the bilge pump. A portable pump is rigged on deck, 35 feet above the tank top of the hold and hose lead both down the hold and over the side, but the pump fails to pump the water out of the hold. Under these circumstances, what would you do to pump out the water?

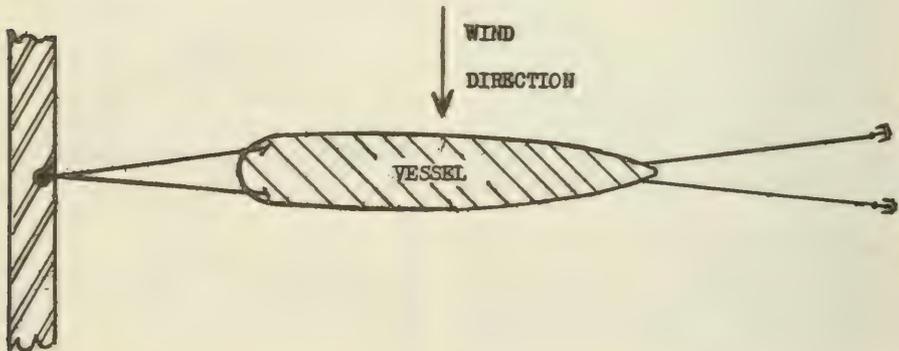
On a deeply loaded vessel in heavy weather taking green seas aboard, what prevents water going into the tanks through the gooseneck vents on deck?

What inspection and maintenance would you give gooseneck vents?

What is the purpose of equalizing valves fitted where tanks are divided by a longitudinal bulkhead? How would you maintain such valves and in what position should they be kept?

Describe the precautions which you would regard as necessary for personnel engaged in painting with spray guns.

Describe the precautions necessary in painting with red-lead or lead based paints.



Describe briefly the usual procedure followed in cleaning and gas-freeing oil tanks.

When seamen are working upon a mast near radio transmitting antennae, what precautions should be taken?

What precautions should be observed to prevent shock of personnel, when portable electric lights, or appliances are used?

In taking bunker oils, or loading or discharging oil cargo, what precautions should be taken to prevent harbor pollution in the event of a spill on deck?

If through an accident, oil is spilled into harbor waters, how can pollution be minimized?

What precautions are advisable when padeyes, cleats, lashings, or other fittings are so located on the decks that personnel may trip or stumble over them in the dark?

Why is a reciprocating or rotary type pump normally employed for stripping tanks of liquid?

Describe how planks used for staging should be tested in order to determine that they are strong enough to carry their load with an ample safety factor.

To determine if a tank is gas free:

(a) What instrument is used?

(b) In circumstances where a gas chemist is unavailable, what precautions must be observed in using such instruments?

What precautions should be observed when using carbon tetrachloride fire extinguishers, or when employing carbon tetrachloride for cleaning purposes?

What is the "carrier" bearing fitted on most modern vessels at the rudder?

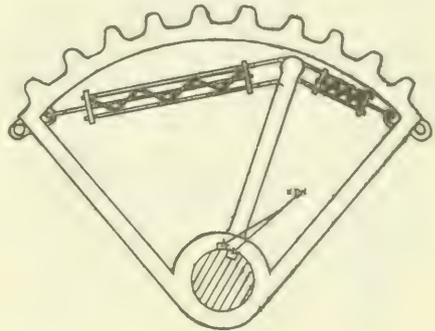
If a vessel is moored as sketched, with a camel well aft between the ship and dock, what would be the effect of heaving on the head lines with the stern line taut?

Referring to the sketch:

(a) When buffer springs are fitted on a quadrant type steering gear, why is it important that the quadrant be free to move on the rudder stock?

(b) Under what circumstances would you use a key in the keyways marked "B"?

NOTE: Tension and compression on springs exaggerated in sketch for clarity.



What materials are usually employed for rudder gudgeon bushings and how is the bushing clearance determined?

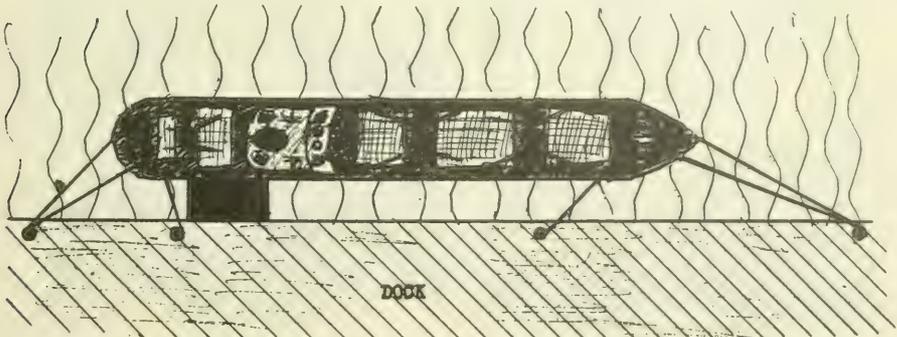
Describe the methods used to repair leaking rivets.

What precautions should be taken when personnel are obliged to traverse decks over the top of deck cargo?

How could you stop a leak caused by a rivet dropping out of the shell below the water line?

A crack appears on an internal bulkhead of a vessel at sea. What measure could you take to stop the crack from lengthening?

When oil is discovered in a vessel's bilge wells at the time soundings are taken, what steps should be taken to prevent oil pollution of coastal waters?



In replacing strainer plates for hold bilge suction, what is the amount of plate that must be perforated with holes for the water to pass through?

In washing out holds or in circumstances where it is feared the nature of the cargo will tend to clog the strainer plates should pumping water be necessary, what precautions might be taken to insure that the water will flow into the well?

What markings are required on the trick wheel in a vessel's steering engine room, in order that any possible misunderstanding of orders may be averted, should it be necessary to have a man steering from there directed by orders from outside?

Why must indiscriminate welding of padeyes or other fittings on a vessel's structure be avoided, even when no fire hazard is involved?

What precautions with respect to the bilge wells and strainers would you

take on a vessel prior to taking 3 feet of sand ballast in the lower hold?

When spray painting is being done in a compartment, what precautions must be taken against fire or explosion?

Describe the specifications for wedges to be used in battening hatches.

Describe the specifications for battening bars to be used on hatches.

What number of locking bars is required for hatches?

In painting decks, what precautions should be taken against creating a slipping hazard for personnel working about the deck?

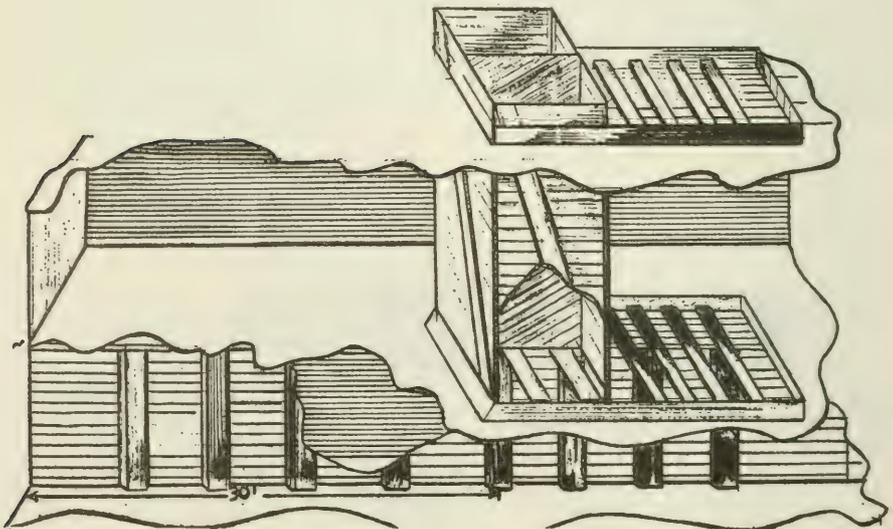
Where a vessel is fitted with a positive means for closing a nonreturn valve above the freeboard deck, what notice is required?

**NOTE:** Candidates for Chief Mate's Licenses may be asked questions on ship construction similar to those in the Master's Examination in connection with the subject of seamanship.

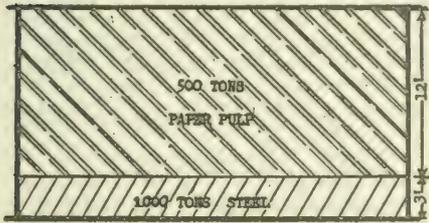
## 25. CARGO STOWAGE AND HANDLING.

A vessel loading grain has the feeder constructed in the square of the hatch. The distance from the feeder to a bulk-

head is 30 feet as sketched. What precaution is required by the grain regulations?



What is the height of the center of gravity of the hold shown? (The hold has rectangular form).



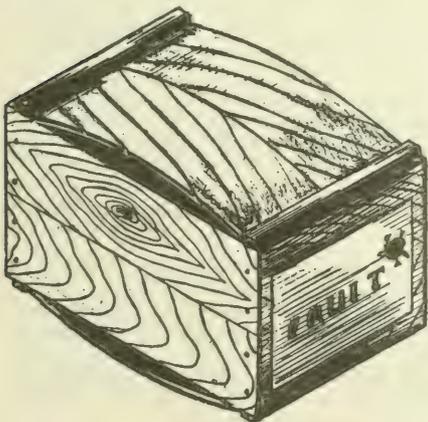
Three hundred tons of one-half inch steel plate with a stowage factor of 7 are stowed across the bottom of a cargo hold measuring 60 feet by 40 feet. At what height is the center of gravity of the parcel of cargo above the inner bottom? How could you raise the height of the center of gravity and facilitate discharge?

A vessel loads a bulk cargo which may shift under bad weather conditions. She is not required by regulations or accepted stowage rules to provide shifting boards. What precautions may be taken to minimize danger?

How can you estimate the tendency to shift of a bulk commodity? Discuss the factors that may influence the tendency of a cargo to shift.

Slabs of copper are to be loaded each of which is 12 inches wide, 12 inches long, and 4 inches high. Each slab weighs 110 pounds. How high might this commodity be stowed in a 'tween deck whose allowable load per square foot is 450 pounds?

How would you stow citrus fruit packed in the type crate illustrated?



A lot of special cargo on a pier is to be loaded. You examine one of the identical cartons of the lot which is marked as sketched.

a. What is the purpose of the marking?



b. What is the total cubic space the consignment will occupy?

NOTE: 22/25 on the carton sketched indicates this to be the 22nd piece of a total of 25 pieces or cartons of the lot.



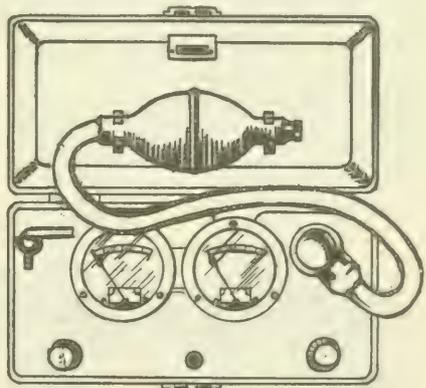
What are three *basic* methods of protecting personnel when stowing radioactive materials?

Why is cargo stowed in 'tween decks, on decks, and in the wings of the hold more likely to shift than cargo in the lower hold?

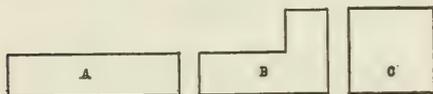
What precaution is advisable when bulk cargo is stowed in the 'tween decks?

What is the principle of operation of a combustible gas indicator?

What precautions would you observe in order to assure proper readings from a combustible gas indicator?



Three compartments of equal volume as sketched are available to carry a cargo of quick-frozen fruit on a long voyage. The only point that must be considered is the economy of refrigerating plant operation during the voyage. Which of the three would you select? Explain your answer.



A cargo of gasoline has a coefficient of expansion of .0006 per degree Fahrenheit. If this cargo is loaded at a temperature of 60° F., and cargo temperatures up to 74° F. are anticipated on the voyage, how many barrels would you leave out in a tank whose capacity is 10,000 barrels, in order to allow for expansion?

When a vessel which is fitted with heating coils in her tanks is carrying light fuel such as kerosene or gasoline, what precautions should be taken to eliminate any possibility of contaminating boiler feed, inspection tanks, heating pipe lines, etc.?

When carrying chilled beef suspended from hooks in the overhead of a refrigerated compartment, where is the center of gravity of the compartment?

What care is necessary in the successful carriage of chilled beef suspended from hooks? How should such beef be stowed?

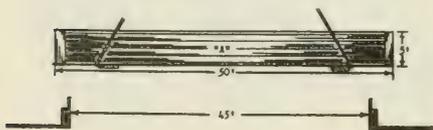
Describe briefly the automatic controls used in refrigerated compartments to regulate temperature and humidity.

What check is advisable by the cargo officer and/or refrigerating engineer on automatic temperature and humidity controls?

What shipping papers relating to the cargo are required on board a loaded tank vessel or vessel towing a loaded tank vessel and what information must be afforded by such papers?

Would you permit scaling of the deck or hull adjacent to a hold where cargo is being worked? Why?

How would you load "A," 50 feet long and 5 feet deep, into hatch "B" which is 45 feet long? Answer in detail.



Describe the precautions you would take to protect passengers from injury on vessels working cargo.

A vessel has a dead weight carrying capacity of 5,000 tons and a cubic capacity of 300,000 cubic feet. How much of each of the following commodities should she load to be full and down to her marks?

Lead . . . . Stowage Factor . . . . 18

Cotton .. Stowage Factor . . . . 80

Describe briefly the dangers that may arise when carrying goods of a hygroscopic nature.

What are the requirements for a general average?

What inspection of cargo equipment is required by the Master of a vessel prior to loading explosives?

Is the Master of a vessel empowered to reject the equipment for loading explosives furnished by a contracting stevedore?

A vessel has a dead weight carrying capacity at load displacement of 10,500 tons. Fuel, water, and stores require 1,500 tons. Her cubic capacity is 500,000 cubic feet. What is the average stowage factor of a cargo that she could carry that would put her "full and down"?

Describe at least two methods employed on vessels for determining the relative humidity in a cargo hold.

When stowing a commodity which is very dense, such as pigs of lead or flasks of mercury, what precautions should be taken to avoid structural damage to the ship?

How is a cargo vessel loaded in order that she may have quick dispatch at several ports of discharge?

Outside air has a dry bulb temperature of 70° and a relative humidity of 70 percent. Would there be any danger of condensation if a cargo with a surface temperature of 65 degrees is ventilated with outside air?

(a) Would you consider sweat likely on the side of a ship with a sea water temperature of 38°, an air temperature in hold of 54° drybulb, and 45° wet bulb?

(b) Would you ventilate if outside air was 60° dry bulb, 52° wet bulb?

A vessel with a beam of 50 feet has a freeboard of 10 feet on her high side and a list of 5°. What is her mean freeboard if the low side is not accessible to measure the freeboard?

What precautions would you take to avoid excessive strain on your vessel while loading bulk cargo?

**26. CHANGE IN DRAFT DUE TO DENSITY.**

A vessel loads a full cargo at a dock where the hydrometer floats at 1012. To what draft will she have to be loaded so as to draw 23 feet, 6 inches, when she gets to sea?

How would you determine the applicable load line for a port?

Determine the displacement in sea water of a vessel which has a loaded

draft of 24 feet, length along the load water line of 450 feet, beam at the load water line of 56 feet, and a block coefficient of .8.

How would you determine the load line in fresh water for a vessel loading to winter or Winter North Atlantic Load Line?

**28. LIFESAVING APPARATUS AND FIREFIGHTING EQUIPMENT.**

What precautions would you take in handling boats equipped with releasing gear which operates under tension (Rottmer gear)?

Where passenger vessels are fitted with loud speaker systems, how often do the Regulations require that the system be tested?

How often must the emergency lighting and power system be operated and inspected? State the test required for internal combustion engine driven generators and storage batteries on passenger vessels.

How often must watertight doors in subdivision bulkheads be operated on passenger vessels?

How often must watertight doors in subdivision bulkheads be inspected on passenger vessels?

Describe the lowering of lifeboats at the vessel's annual inspection.

What is the total weight used for weight-testing lifeboats and davits at annual inspection?

On cargo vessels of over 500 gross tons on international voyages, when the lifeboat deck is more than 30 feet above the light load line, what do the regulations require for launching a boat in the hours of darkness?

Sketched below are three typical fire alarm system thermostats.

(a) Describe briefly what causes such thermostats to actuate an alarm.

(b) When the system is de-energized or the power on it fails, how is the officer on watch alerted?

(c) How are such thermostats tested?

Do the Passenger Vessel Regulations permit the dismantling of lifeboats or rafts for maintenance work at sea or when passengers are aboard?

In ordering or purchasing equipment for lifesaving purposes aboard ship, how would you determine if they were approved by the Coast Guard?

What markings are required on passenger vessels to direct the passengers to their lifeboat embarkation stations?

Can life preservers be laundered or repaired, and if so, under what conditions?

A vessel has a beam of 60 feet. The distance from the davit span to the light water line is 40 feet. What is the required length of the lifelines fitted to the davit span?

How may you determine if cleaning oils, disinfectants, and waxes are approved for use aboard vessels?

How are persons in the engine or fire room warned of the release of carbon dioxide gas?

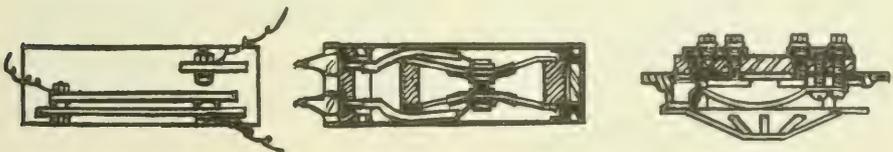
How are passenger vessels required to mark lifeboat stations on the embarkation deck?

What precautions do the Regulations for Passenger Vessels prescribe with respect to painting?

How often must the fuel tanks be emptied and the fuel changed in motor lifeboats carried aboard passenger vessels?

How often must all life floats be cleaned and thoroughly overhauled?

Is it permissible to use fire hose for washing down the decks?



On a vessel where passengers are carried who do not speak English, what precautions are required by the Regulations with respect to notices, directional signs, etc.?

What is the maximum temperature that should be permitted in the compartment where carbon dioxide cylinders are stowed?

What provisions against the danger of fire must be provided on vent outlets from oil tanks?

On passenger vessels, how frequently must the smoke inlet for the fire detecting system in the cargo hold be examined? How would you smoke test the system for fire detection in the hold?

Are galvanized nozzles and couplings acceptable for use on United States merchant vessels?

The Passenger Vessel Regulations state: "all parts of the fire main located on exposed decks shall either be protected against freezing or be fitted with cutout valves and drain valves so that the entire exposed part of such piping may be shut off and drained in freezing weather."

(a) Assume that you have the night duty on a passenger vessel in a northern port in freezing weather. A rubbish fire breaks out on the open fore deck. State in detail what steps you might have to take to make effective use of your fire hose.

(b) What precautions must be taken with respect to cut off valves in non-freezing weather?

On a vessel fitted with smoke detecting apparatus for the holds and deep tanks where liquid and dry cargo may be alternately carried, what precautions must be taken when liquids are carried?

How is the radio operator of a tanker warned against the use of his equipment while inflammable cargo is being transferred?

In discharging CO<sub>2</sub> into a paint locker of small size with a watertight door battened down and a mushroom ventilator screwed down tight, what pre-

cautions should be borne in mind?

What do the Regulations prescribe with respect to openings of spaces protected by a CO<sub>2</sub> fire extinguishing system? Why should a CO<sub>2</sub> system differ from a steam system with respect to such openings?

On a ventilation duct passing through a main vertical zone bulkhead of a passenger vessel, how could you determine in case of fire whether the automatic damper had functioned properly?

At what temperatures do automatic fire dampers operate to close passenger ship vent ducts? In locations such as the galley, what temperature is permitted?

How would you inspect the ventilation duct dampers for necessary maintenance and repairs?

How may a person unfamiliar with a passenger vessel find the location of fire-fighting equipment and means of ingress as quickly as possible if the vessel is over 1,000 gross tons or on international voyages?

What regulations govern making alterations, repairs, or operations involving riveting, welding, burning, etc., in or on the boundary of oil tanks, oil lines, or oil heating coils?

Describe the precautions against fire from electrical cables and lighting fixtures that you would take in cargo holds.

What publication sets forth the Regulations for transportation of explosives or other dangerous cargoes?

What is the duty of the master of a vessel carrying dangerous goods when the containers in which these goods are packed develop leaks during the voyage?

What amount of carbon dioxide is required aboard merchant vessels fitted with the CO<sub>2</sub> type of extinguishing system?

On vessels fitted with mechanical exhaust ventilation over galley ranges, what precautions should be taken to prevent fire in vent ducts? Explain your reasons.

## 29. SHIP'S SANITATION.

What measures should be taken to insure that men handling food are free from communicable disease, and take sanitary precautions while performing their duties?

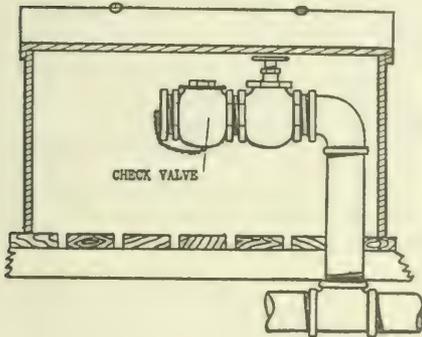
What type toilet seats must be provided for the use of the crew?

What provisions for the protection

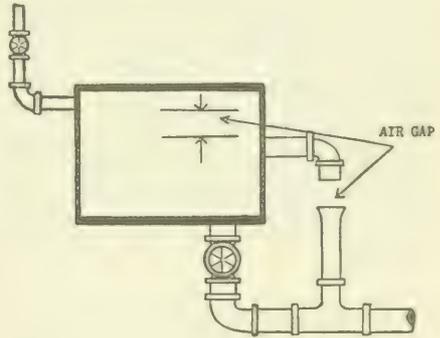
of the crew are required on vessels trading in areas where insects are a problem?

How should hose used for filling potable water tanks be stowed, and what care should be taken in handling such hose?

What is the purpose of the check valve shown on a pier's water connection used for connecting a ship's fire line to a shore supply of water pressure?



Why is an air gap, such as that illustrated, required in sinks, wash basins, tubs, trays, washing machines or other similar receptacles that may be connected to a potable water supply?



How should potable water piping be marked?

How would you detect the presence of rats on board your vessel?

Describe the four methods which may be employed to prevent rat infestation of a vessel.

### 30. RULES AND REGULATIONS FOR INSPECTION OF MERCHANT VESSELS.

How often must the lifeboat crew of a passenger vessel be exercised in their duties in the lifeboats, i.e., rowing, and operating hand propelling gear in the water?

How often must each lifeboat of a passenger vessel be lowered to the water?

What members of the crew, if any, are not required to exercise at the oars?

Where must copies be posted of the placard "Instructions for the Use of the Gun and Rocket Apparatus for Saving Life from Ship Wreck as Practised by the United States Coast Guard?"

What is the minimum standard for natural or artificial lighting in spaces where the crew is regularly employed or quartered?

What color paint must be used in crew spaces?

What persons are excluded from the pilot house and bridge of vessels under way? What persons may be allowed on

the bridge upon the responsibility of the Master?

Describe the signalling lights required on vessels over 150 gross tons both for new and existing vessels.

What certificate is accepted as prima facie evidence of compliance with the Rules and Regulations for Bulk Grain Cargo?

Must the station bill set forth the duties and duty stations of apprentices, beauty parlor operators, horse tenders, or workaways? Explain.

State in detail the requirements of the Regulations with respect to drills with line throwing appliances?

What vessels are required to have an emergency squad? Do the Regulations permit other than required vessels to have such a squad?

What are the duties of the emergency squad?

What is the signal for the assembling of the emergency squad?

**31. LAWS GOVERNING MARINE INSPECTION.**

Should the Master of a vessel fail to produce log books, advance sheets, slop chest invoices, or accounts requested by the shipping commissioner, is he liable to penalty? Would a mate or other member of the crew be liable for such a failure?

What is the law concerning time off duty for licensed officers before taking charge of a watch on sailing day?

In the event of any collision with a light ship, buoy or other aid to navigation, what is the duty of the person in charge of the colliding vessel?

What penalty is provided by the law for failure to maintain the crew quarters in a clean and sanitary condition and failure to provide and maintain the proper plumbing and mechanical appliances?

What is the duty of the Master of a vessel with respect to an alien stow-away and to what penalty is he liable for failure to perform such duty?

Whenever possible, who must sanction the engagement of a seaman in a foreign port?

Where must the tonnage and official number of every documented vessel be placed?

What ratings may be filled by a seaman holding a merchant mariner's document endorsed able seaman?

What is the penalty for maltreatment of crew?

What is the penalty for shipping a man not holding a Merchant Mariner's Document issued by the Coast Guard?

## SPECIMEN EXAMINATION FOR MASTER

### 1. LATITUDE BY POLARIS.

On 26 August 1958, in D. R. Longitude 36°-10' West, Polaris was observed at evening twilight to have a sextant altitude of 23°-25' and a bearing of 001° by gyro-compass. The chronometer read 9h-26m-40s. The chronometer was

1m-50s slow. The sextant error was 1'.0 on the arc. The height of eye was 30 feet.

*Required:*

The latitude at time of sight.  
The gyro-compass error.

### 3. FIX OR RUNNING FIX.

Enroute from Pago Pago, Samoa to San Francisco, in D. R. Latitude 2°-47' South and Longitude 161°-19' West, three celestial bodies were observed.

Given the following information on the celestial bodies, determine the ship's position.

<i>Body</i>	<i>Observed Altitude</i>	<i>Greenwich Hour Angle</i>	<i>Declination</i>
DENEbola	57°-54'.4	188°-30'.4	14°-48'.9 N.
VEGA	09°-48'.9	86°-25'.4	38°-44'.7 N.
SATURN (Planet)	56°-24'.9	130°-34'.2	17°-20'.3 S.

### 4. STAR IDENTIFICATION (any method).

On 17 April 1956 at Latitude 13°-16' North, Longitude 92°-38' East, a morning observation is taken at 22h-58m-28s-GMT of a star whose corrected

altitude is 41°-53'.2 and whose azimuth 187°.7 True.

*Required:* Identify the star.

<i>Given:</i>	<i>No. 1</i>	<i>No. 2</i>	<i>No. 3</i>
Date	7 January 1958	31 May 1958	23 September 1958
GMT	01h-17m-23s	11h-47m-02s	20h-02m-20s
Longitude	58°-20'.0 West	149°-49'.0 East	20°-39'.0 West

*Required:* The Meridian Angle, Horizontal Parallax, and Declination of the Moon in each of the three cases. In-

dicating whether the Moon is East or West of the Meridian in each case.

<i>Given:</i>	<i>No. 1 Venus</i>	<i>No. 2 Jupiter</i>	<i>No. 3 Saturn</i>
Date	2 January 1958	14 May 1958	15 August 1958
GMT	3h-47m-22s	9h-25m-45s	23h-02m-19s
Longitude	123°-47'.0 West	165°-23'.0 East	88°-38'.0 West

*Required:* The Meridian Angle and Declination of the Planet in each of the three cases. Indicate whether the planet

is East or West of the Meridian in each case.

The following 3 sextant altitudes of the moon were obtained. The height of eye was 61 feet and the sextant index

error was 2'.5 on the arc in all observations. Given:

	Observation No. 1	Observation No. 2	(Upper Limb) Observation No. 3
Moon sext. alt.-----	6°-17'.8	23°-26'.2	46°-42'.8
Bar. Pressure-----	29.2 in.	980 mb.	30.4 in.
Temperature -----	51° F.	0° Celsius (Centigrade)	80° F.
Hor. Parallax-----	55'.5	61'.2	57'.9

*Required:* The observed altitudes.

The following 3 sextant altitudes of planets were obtained on 6 February 1958. The height of eye was 18 feet, the

sextant index error was 2'.5 off the arc in all observations. Given:

	Saturn Observation No. 1	Jupiter Observation No. 2	Venus Observation No. 3
Planet sext. alt.-----	7°-56'.7	15°-37'.9	21°-17'.7
Bar. Pressure-----	29.0 in.	1000 mb.	30.0 in.
Temperature -----	(-) 5° F.	33° Celsius (Centigrade)	52° F.

*Required:* The observed altitudes.

## 5. CHART NAVIGATION.

What chart would you use to locate the earth's magnetic equator?

A vessel at 60° South Latitude is 300 miles due West of a radio beacon. Determine graphically, by use of the conversion angle formula:

conversion angle =  $\frac{1}{2}$  difference longitude X sine Middle Latitude or by table, the bearing that would be obtained by the use of a radio direction finder.

When a scale is given for a Mercator chart, to what part of the chart is it generally applicable?

How is distance measured on a polyconic chart?

Make a rough sketch showing how the charted island with contours indicated would appear at positions "A" and "B" in profile.

(contour interval—200 feet)



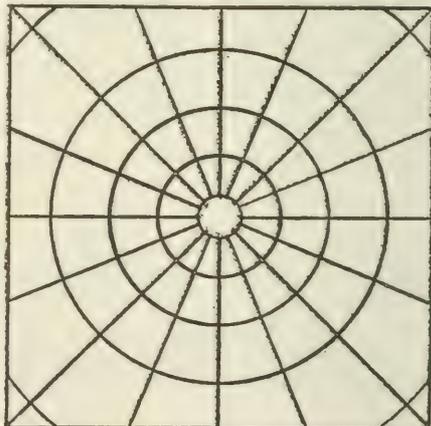
\* "B"

\* "A"

The distance between two points on a polyconic chart of the Great Lakes is 100 statute miles. How long would it take a vessel making 15 knots to traverse the distance?

Describe how you use a gnomonic chart to determine a composite Great Circle Track with a limiting latitude.

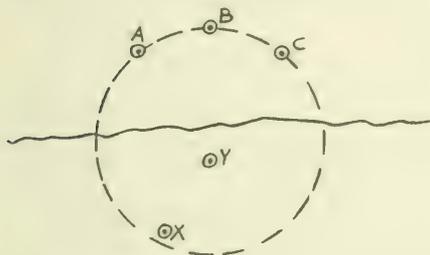
Name the type of Gnomonic Chart sketched.



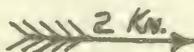
How does a rhumb line appear on a polyconic chart?

After laying down a straight line between two points on a polyconic chart, how would you determine the course?

Positions "X" and "Y" are determined by using the three arm protractor to plot the angles measured by the sextant between shore objects "A" and "B," and "B" and "C." Should position "X" or "Y" be considered more reliable? Why?



Give the meaning of the following symbols as shown on a chart:



## 6. COMPASS DEVIATION.

(Azimuth—Moon)

Enroute from Honolulu, Hawaii to Manila, Phillipine Islands, in D. R. Latitude  $22^{\circ}-27'$  North and Longitude

$175^{\circ}-20'$  East, an azimuth of the Moon was observed. The following data was obtained at the time of observation:

Compass Bearing Of Moon  
 $81^{\circ}-00'$  psc

Greenwich Hour Angle  
 $107^{\circ}-29'.8$

Declination Of Moon  
 $2^{\circ}-51'.3$  N.

Variation for the locality was  $9^{\circ}-00'.00$  East

Required: The true azimuth.

The deviation of the standard compass.

## 9. MERCATOR SAILING.

By Mercator sailing, find the true course and distance from a point in the proximity of Cape Race in Latitude  $46^{\circ}-18'$  North and Longitude  $52^{\circ}-35'$

West to Diamond Shoal Light Ship in Latitude  $35^{\circ}-05'.3$  North and Longitude  $75^{\circ}-19'.7$  West. Show all work.

**10. GREAT CIRCLE SAILING.**

Enroute from New London, Conn. to Sao Luiz, Brazil a vessel leaves point "A" at Latitude  $41^{\circ}-06'$  North, Longitude  $71^{\circ}-42'$  West for point "B" at Latitude  $01^{\circ}-17'$  South, Longitude  $44^{\circ}-55'$  West.

*Find:*

- Great Circle Distance.
- Great Circle Initial Course.
- Great Circle Final Course.
- Great Circle Latitude of Vertex.
- Great Circle Longitude of Vertex.
- Great Circle Longitude of Equator

Crossing.

- Great Circle Course at Equator.

From Farallon Island L. H., San Francisco, at Latitude  $37^{\circ}-42'$  North, Longitude  $123^{\circ}-00'$  West, to San Bernardino Island L. H., in the Phillipine Islands, at Latitude  $12^{\circ}-45'$  North, Longitude  $124^{\circ}-17'$  East. Find:

- Great Circle Distance.
- Great Circle Initial Course.
- Great Circle Final Course.
- Great Circle Latitude of Vertex.
- Great Circle Longitude of Vertex.
- The Latitude of Three Points Whose Longitudes Differ  $5^{\circ}$ ,  $10^{\circ}$ , and  $15^{\circ}$ , Respectively, from that of the Vertex.

**11. PILOTING.**

In piloting a vessel through a curved section of a tidal river, where would you find the deepest water and the most rapid current?

Name some of the factors you would consider in selecting a good anchorage site.

Describe a method of finding distance from an isolated object which is within a moderate distance, such as an islet or a vessel, over which the horizon may be seen.

Heading east on a dark night, you are a mile and a half north of a light which is located on the east end of a reef with no other aids to navigation visible. An outlying shoal lies two and a half miles to the eastward of the light. With no appreciable current and no range-finder

available, describe how you would round the light, passing between the reef and the outlying shoal and maintaining the same distance off the light, until on a course of southeast for open water.

How may the sextant be used in order to round a lighthouse in the daytime so as to maintain a constant distance off the lighthouse until on a desired change of course?

When making a landfall, if soundings should fail to agree in a general way with those shown on the chart and a marked departure from the characteristic bottom shown on the chart is noted, what should be done?

Describe the use of depth contours (curves of equal depth) in navigation.

NOTE: Problems may be given pertaining to piloting which are under other titles in this book.

**12. AIDS TO NAVIGATION.**

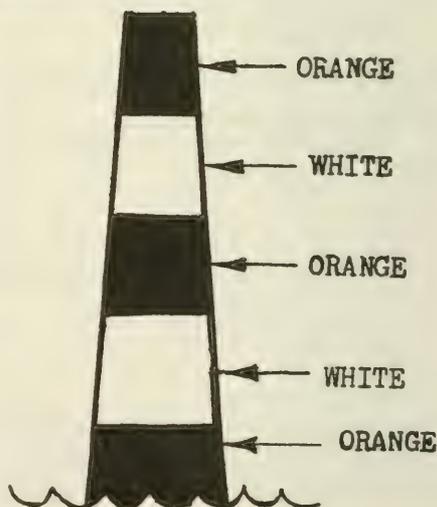
How would you estimate the power of a light whose candlepower is not given?

How do you obtain information about foreign buoyage?

Referring to the sketch:

(a) What type buoy is the orange and white horizontally banded buoy shown, and for what purpose would it be placed?

(b) How would such a buoy be indicated on a chart?



**13. SPEED BY REVOLUTIONS.**

If the engine speed necessary to reach port at a designated time is 12.6 knots and the pitch of the wheel is 13.6

feet, how many revolutions per minute would have to be turned up?

**14. FUEL CONSERVATION.**

While turning up 90 revolutions per minute, a steamer consumes 8 barrels of fuel oil per hour. If it is determined that only 7 barrels of fuel per hour is available to reach port, how many revolutions per minute shall the engines turn?

A vessel has sufficient fuel to steam 760 miles at her normal speed of 11 knots. If she has 915 miles yet to run on the same amount of fuel, what speed

must she reduce to?

A vessel has a trip 4,010 miles to make and leaves port with 1,010 tons of fuel. After running 2,500 miles at her normal speed of 14 knots, the engineer reports he has only 270 tons of fuel remaining. At what reduced speed must you steam in order to reach your destination with 20 tons of fuel remaining?

**15. INSTRUMENTS AND ACCESSORIES.**

Where, in the area covered by a pair of loran stations, may the most accurate lines of position be obtained?

Where, in the area covered by a pair of loran stations, are the least accurate lines of positions available?

Why is loran known as a "hyperbolic" system of navigation?

Within what distance from the transmitting station is the use of skywaves

not to be relied on for obtaining a loran line of position?

When a first sky wave and ground wave are matched, what precautions must be observed to obtain a line of position?

Describe how the deviation of a radio direction finder is determined and how it is compensated.

**16. MAGNETISM, DEVIATION AND COMPASS COMPENSATION.**

If the easterly deviation increases on westerly headings as the vessel steams north, what adjustment should be made in the Flinders Bar?

How would you correct westerly quadrantal deviation on a SW heading?

Does the heeling magnet, once adjusted, require change as the vessel sails from one magnetic latitude into another? Explain your answer.

If your compass card appears to be magnetically "frozen" on a heading of 090° on all headings of the vessel, how would you adjust to correct this condition?

How would you detect and correct retained magnetism in the soft iron spheres?

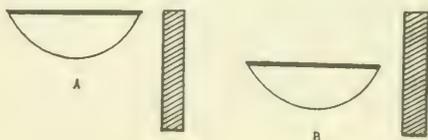
Discuss the effects on the deviation of a compass when a vessel stays on one course for several days, particularly in rough seas, or lays at a dock on one heading for a lengthy period, or fails to follow a reversal sequence in securing the degaussing equipment.

How would you test a magnetic compass for sensitivity?

How would you detect and correct retained magnetism in the Flinders Bar?

What sources of magnetism other than the vertical induction from the earth's field may influence the action of the Flinders Bar?

Given a compass and its Flinders Bar corrector arranged in alternate positions as sketched. In which position will the Flinders Bar exert the greatest effect on the compass. Why?



If a heeling adjuster or vertical force instrument is not available, how would you place the heeling magnet when adjusting the compass?

How would you correct your compass for an easterly error due to permanent magnetism when the vessel is on an easterly heading?

### 17. CHART CONSTRUCTION.

Construct a small area plotting sheet for 59 degrees to 61 degrees North Latitude, allowing 3 inches for each degree of latitude.

Construct a Mercator chart, or a small area plotting sheet, for Latitudes

35 degrees North to 37 degrees North and Longitudes 157 degrees 30 minutes East to 158 degrees 30 minutes East. Use a scale of  $2\frac{3}{8}$  inches to 1 degree of longitude and label latitude and longitude properly.

### 18. TIDES AND CURRENTS.

At South End Woods Hole, Vineyard Sound-Buzzards Bay, (Latitude 41°-31' North and Longitude 70°-40' West):

(a) What is the time and velocity of maximum AM flood current on 5 January 1958?

(b) In what direction does the flood current flow at this point and what is the average velocity?

At Grindstone Island, Petitcodiac River, New Brunswick, Bay of Fundy:

(a) What is the time and height of a.m. high water on 6 April 1958?

(b) What is the mean range of tides for this locality?

(c) What is the spring range of tides for this locality?

(d) What is the range of a.m. tides for this locality on 6 April 1958?

(e) What peculiar tidal phenomena may mariners encounter in this area?

East of the Statue of Liberty in Upper Bay of New York:

(a) Determine the time of a.m. slack high water on 10 April 1958.

(b) What is the duration of slack water when a current less than 0.1 knot can be expected?

State what is meant by the diurnal inequality of the tides, and describe the reasons why this phenomenon occurs.

Describe what is meant by a "bore."

What is meant by the term: "high water lunitidal interval," "establishment of the port," and "vulgar establishment"?

*Define:*

(a) The mean range of the tide.

(b) The spring range of the tide.

(c) The diurnal range of the tide.

Referring to the Current Diagram in the Atlantic Coast Current Tables, determine the time interval within which a 10 knot vessel should pass Overfalls L/V in order to go upstream with flood current to Chestnut Street, Philadelphia on the morning of 16 November 1958.

If, at the same time, a tidal current is setting north at 1.0 knot, and a wind driven current is setting east at 1.0 knot, what is the resultant direction and velocity of current that may be expected from the combination of the two currents?

### 19. OCEAN WINDS, WEATHER AND CURRENTS.

Can a wet bulb thermometer ever properly read higher than a dry bulb?

How may the wet bulb temperature be determined in freezing weather?

Convert 20° Celsius (Centigrade) into the temperature Fahrenheit.

Name three corrections that must be applied to readings of the mercurial barometer, and explain why each correction is required.

How should a barometer be installed?

Give the factors that should be considered in determining a proper location for this instrument.

What is an "isallobar"?

If a surface temperature is 90° F. and the wet adiabatic, or pseudo-adiabatic, lapse rate is 1° F. for each 300 feet, what is the temperature of cirrus-type clouds at 21,000 feet altitude? In what form would the water vapor be present in such clouds?

What are the factors that determine the stability characteristics of a body of air?

When is a body of air known as unstable?

When is a body of air known as stable?

Does the greatest vertical development of cumulonimbus clouds occur in the tropics or in high latitudes? Explain the reason for your answer.

Define the following types of New Ice:

- (a) Ice-crystals (Frazil crystals).
- (b) Slush (sludge).
- (c) Pancake ice.
- (d) Ice-rind.

When is the ice coverage at a minimum in Arctic waters?

A powered vessel can traverse ice covering up to what proportion of the sea surface without ice breaker assistance?

What consideration must be given to draft when a vessel is to operate in ice?

In operating in ice, what precautions must be observed with respect to speed? If necessary to strike the ice, what part of the ship should encounter the blow?

Operating a vessel in ice, where could extra lookouts be stationed to help avert propeller damage? Why is an immediate stop shaft order necessary when ice appears near the propeller?

What precautions must be observed when anchoring in ice?

When it is necessary to back down in ice, how should the rudder be handled for maximum protection from damage?

In order that other vessels may be apprised, what obligation is imposed by the 1948 Convention for the Safety of Life at Sea upon every shipmaster who encounters dangerous ice at sea?

What precaution, with respect to speed, is imposed by the 1948 Convention for Safety of Life at Sea upon the master of every ship when ice is reported on or near his course?

What duty is imposed by the International Convention for the Safety of Life at Sea, 1948, on the master of every vessel who encounters a tropical storm?

After a vessel has transmitted a

warning of a dangerous storm, what subsequent transmissions are desirable?

What publication, containing information of the storm advisory services from whom weather information may be obtained by radio, is required to be carried by U.S. Merchant Vessels?

Why does wind at 2,000 or 3,000 feet above sea level blow nearly parallel to the isobars, whereas the wind at sea level is inclined toward the low pressure area?

What is the effect of a decrease in the depth of the water on storm waves rolling in from the open sea?

Describe synoptic conditions that are associated with origin of tropical cyclones.

How may merchant vessels obtain an analysis of the weather map, showing pressure centers and fronts, when no facsimile equipment or teletype is aboard?

Explain how mountainous terrain adjacent to the seacoast can cause strong local winds of gale force.

How may the probability of encountering gales on an ocean passage for a given period of time be determined?

The maximum height of storm waves can be approximated by the formula:

$$H = 1.5 \sqrt{F} \text{ where:}$$

H is the height in feet and

F is fetch in nautical miles.

Using this formula, determine the maximum height of storm waves that may be encountered when a gale is blowing from a direction in which the coastline is distant 400 miles.

Swells from ocean waves generated by storms move at a velocity  $\frac{1}{2}$  that of the individual waves. If the individual waves move at a speed of 40 knots, how long would it take the swell to reach the observer 400 miles away?

In which semicircle of a tropical cyclone would a vessel be if the wind shifted clockwise while the vessel was hove to in the Southern Hemisphere?

In the Southern Hemisphere, how would a steam vessel maneuver in the dangerous semicircle of a tropical cyclone?

How may you:

(a) Estimate the bearing of the center of a tropical cyclone?

(b) Estimate the probable path of a storm?

Hove to in the Northern Hemisphere under tropical cyclone conditions, the barometer is falling and the wind shifting clockwise. What is the vessel's probable position relative to the center of the storm and what action should be taken if possible to avoid the center of the storm?

State the precautions that should be taken in the event it becomes necessary to ride out a tropical cyclone at an anchorage.

What is one method of predicting the probable area within which a tropical cyclone can be expected to move within 24 hours from the time at which it is reported?

What is the "intertropic convergence zone"?

Your vessel is proceeding toward a stationary thunderstorm at 15 knots. If you saw a flash of lightning and 10 seconds later heard thunder, how long would it take before you entered the storm?

How would you estimate the probability of encountering fog on an ocean passage?

How is the information concerning the direction and velocity of ocean currents obtained for Pilot Charts and Current Charts of the oceans?

In using information concerning current from a Pilot Chart or Current Chart, what consideration should be borne in mind with regard to possible differences between the actual current experienced and that shown on the chart?

Under certain conditions in the Northern Hemisphere it may be assumed that the current sets  $30^\circ$  to the right of the direction of which it is driven by the wind and its velocity is 2 percent of the wind velocity.

(a) Basing your answer on the foregoing statement, estimate the direction and the velocity of the current if the wind is from the west at 50 knots.

(b) Using direction and velocity of current estimated in (a), find the course to steer your vessel to make good a course of  $030^\circ$  if the speed of your vessel is 10 knots. To solve this problem, consider current only, disregarding any other factors that might be involved.

Currents shown on Pilot Charts and Current Atlases are "resultant" currents.

(a) What is the meaning of the term "resultant"?

(b) How would you assess the probability of your vessel encountering the particular conditions indicated by the current information on the chart?

The distance between two ports on the Great Circle track is 3,000 miles, but the track traverses areas where adverse currents whose average velocity is 1 knot can be anticipated. An alternate, mercator course of 3,400 miles in length between the ports traverses areas where a favorable current averaging 1 knot can be expected.

With the length of time required for the passage as the only consideration, determine which track is preferable for:

(a) A vessel whose speed is 10 knots.

(b) A vessel whose speed is 15 knots.

(c) A vessel whose speed is 20 knots.

## 20. NAUTICAL ASTRONOMY AND NAVIGATION DEFINITIONS.

The earth actually rotates  $366\frac{1}{4}$  times in a year, but the sun crosses the meridian only 365 times, making the year consist of  $365\frac{1}{4}$  solar days. What causes the apparent loss of one rotation?

At what rate per hour is Greenwich Observatory, in Latitude  $51^\circ-28'.6$  North, being carried around the earth's axis?

State two of the three factors which cause apparent time to differ from mean time.

How must the lines of position of bodies with altitude (Ho) from  $86^\circ$  to

$90^\circ$  be plotted? How are such position lines advanced?

Distinguish between superior and inferior planets.

Define precession of the equinoxes.

What is right ascension?

What is the ecliptic?

Define:

(a) Aphelion

(b) Perihelion

(c) Apogee

(d) Perigee

What is precession?

**22. SIGNALING BY INTERNATIONAL CODE FLAGS,  
FLASHING LIGHT;  
LIFESAVING, STORM, AND SPECIAL SIGNALS.**

What are the signals for vessels and aircraft in distress on the water which are provided by the International Rules of the Road?

Describe the care necessary when using the ship's whistle for sending Morse Code messages by sound.

Show precisely how you would signal the following:

- (a) Bearing due North.
- (b) Five minutes past midnight.
- (c) Latitude 3° North.
- (d) Longitude 86°-07' West.

What signals are provided by the International Rules of the Road for an aircraft to indicate that she is in distress and requires assistance?

What information should be included

in a distress message sent by radio?

Who is responsible for control of distress traffic over the airwaves when a distress message has been sent?

What are the signals used in radiotelegraphy and radiotelephony for distress, urgency, and safety traffic respectively; and what is the purpose of these types of signals?

What is the duty of a vessel's officers upon encountering any vessel or aircraft at sea displaying or transmitting any of the distress signals provided by the International Rules of the Road?

How is accurate reception assured when numbers are transmitted by flashing light?

**23. STABILITY AND SHIP CONSTRUCTION.**

Given the following data:

	Weight Tons	Vertical Center Of Gravity Feet	Longitudinal Center Of Gravity (from forward perpendicular) Feet
Light Ship (including crew and stores)-----	4,000	27	250
No. 1 hold-----	1,000	25	75
No. 2 hold-----	2,000	22	125
No. 3 hold-----	1,000	24	175
No. 4 hold-----	2,000	23	325
No. 5 hold-----	500	25	375
Fuel oil and water-----	500	15	200

Displacement: 11,000 Tons.

Vertical distance from keel to meta-center at displacement of 11,000 tons is 26 feet.

Moment to trim one inch at displacement of 11,000 tons is 1,000 ft/tons.

Mean draft at displacement of 11,000 tons is 25 feet.

Longitudinal Center of Buoyancy at displacement of 11,000 tons is 223.6 feet

from the forward perpendicular (at level trim).

Free surface correction is .7 foot.

*Required:* Metacentric height corrected for free surface.

The forward and after draft, (assuming the tipping center is located at the mid-length of the vessel).

How are double bottom tanks tested for tightness?

What is the total upward force on a double bottom manhole cover of 200 square inches of area when fresh water to a height of 20 feet above the tank top is standing in the sounding pipe?

*NOTE:* Fresh water weights 433 pounds for a column one foot high and one inch in area at the base.

A vessel concerned with her stability at departure checks it by lifting with her booms a total of 40 tons, with the boom heads 50 feet from the center line. The clinometer is then carefully read and shows a list of 5°. At the same time

the ship's displacement is 8,000 tons including the suspended weights.

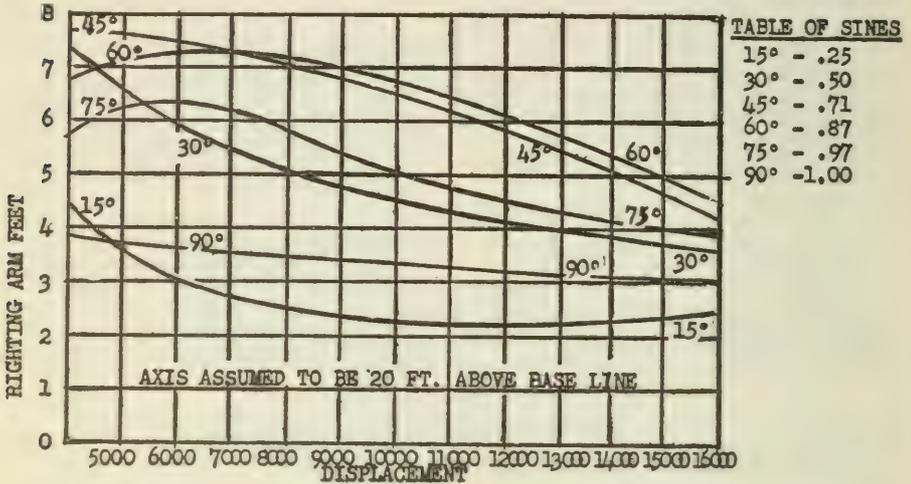
(a) What is her GM corresponding to this condition?

(b) If the 40 tons is stowed 25 feet below the boom heads, what will the GM be?

Why is it desirable that the valve operating rods on tank vessels be made of solid rod rather than of pipe or other hollow material?

How are the decks of tank vessels fitted to prevent leakage of gas or vapor where valve operating rods pass through?

With the cross curves shown below, a displacement of 10,000 tons and a KG of 19 feet. Show all work.



On a vessel at sea it is desired to check the metacentric height by employing the empirical formula:

$$T = \frac{.44 B}{\sqrt{GM}}$$

... where "B" is the vessel's beam of 50 feet and "T" is the full period of the vessel's roll which was carefully timed and an average value of 15 seconds obtained.

Required: The GM as given by using the formula.

Note: Full period means starboard to port then back to starboard (all included).

Shown below is a statical stability curve. Copy this curve and show the loss of righting arm due to the center of gravity being 2 feet off the center line. Indicate the angle to which the vessel

will list and the righting arm remaining at 45° angle of inclination.

A vessel of 6,000 tons displacement carries two slack tanks of carbon tetrachloride (sp. gr. 1.6). The tanks are each 40 feet long and 25 feet wide. What is the reduction in metacentric height due to free surface with vessel in sea water (sp. gr. 1.025)?

NOTE: The reduction in metacentric height due to free surface may be determined by the formula  $\frac{rlb^3}{12V}$  where:  $r$  is the ratio of the specific

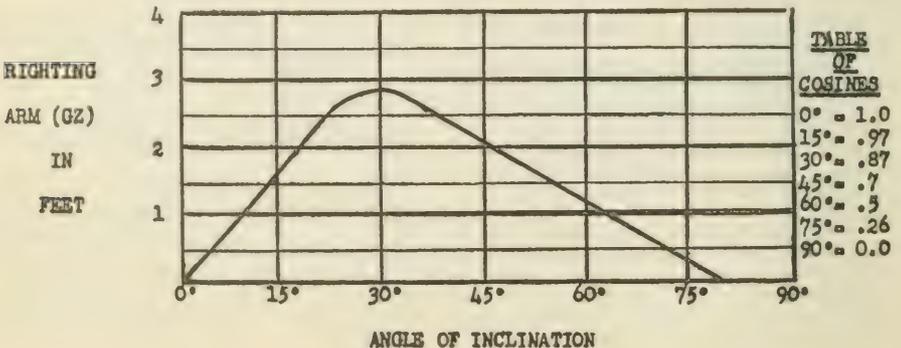
gravity of the liquid in the tank to the specific gravity of the liquid in which the vessel is floating.

$lb^3$  is the moment of inertia of the tank.

$\frac{12}{V}$

$V$  is the volume of displacement.

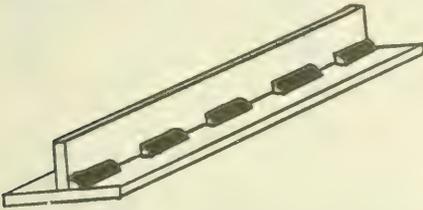
What is the purpose of "blow-out plugs" in the longitudinal bulkheads of refrigerated spaces on vessels?



What is meant by ceiling of a hold?  
 What are limber holes?  
 What are lightening holes?

What provisions are necessary for the local increase in stress on a deck at hatch corners and other openings?

Why are the center girders, side keelsons, or other internals of a similar type welded by intermittent welds as sketched, rather than continuous welds when they are not required to be oil or watertight?



What causes slight "ripples" between floors characteristic of the bottoms of welded vessels?



Referring to the sketch:

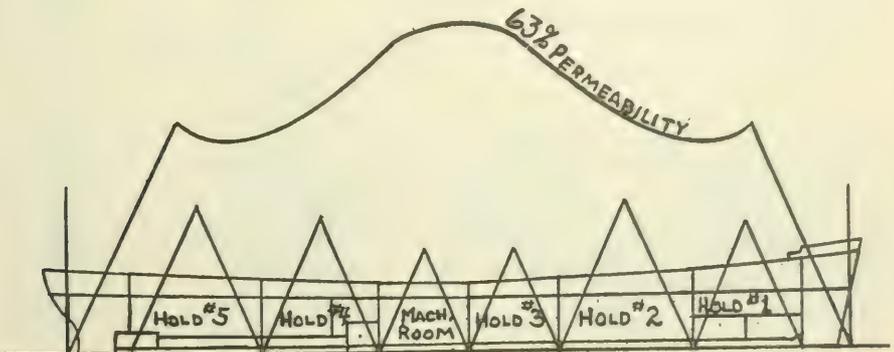
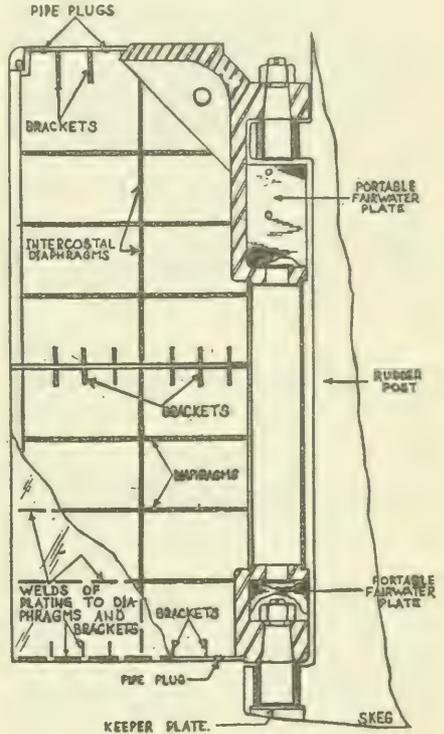
(a) With a vessel in loaded condition and level trim, use the floodable length curve corresponding to this condition and determine if the vessel will sink when No. 1 and No. 2 holds are flooded if their permeability is estimated to be 63 percent.

(b) Discuss briefly the effect of the trim by the head or stern, lighter displacement, and variation from given permeability when using the curve.

Referring to the sketch:

(a) Why are the fairwater plates for the rudder made portable?

(b) What materials are usually employed for rudder gudgeon bushings?



In checking a sliding watertight door for closeness of fit in the closed position, how would you make the check and what should be regarded as the maximum allowable clearance?

How should the wedges be adjusted on a watertight door?

When vessels are fitted with flat-plate keels, how are they fitted internally so that they have vertical rigidity in the keel structure?

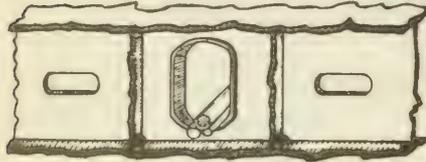
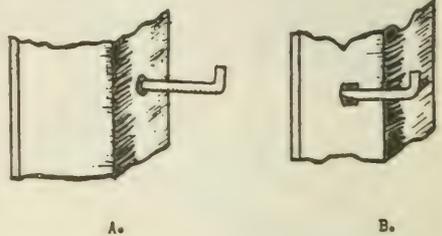
Describe briefly the causes of the stresses that frames must withstand.

What section of the Regulations contains the minimum strength requirements for a vessel's framing?

Where bilge piping of a passenger vessel runs through a box or a duct keel as illustrated, what provisions are required to prevent flooding of the holds in case of bottom damage?

What is the purpose of bilge keels? Do bilge keels affect a vessel's stability?

In repairing broken cleats for battens, what is the preferred method of attachments to frame, "A" or "B"?



When testing bottom on new construction or repairs, why must a slight leak or "weep" be regarded as more serious in a welded vessel than in a riveted vessel?

In drydocking a vessel not in level trim, what stability and local pressure problems may be encountered in:

- (a) a graving dock
- (b) a floating dock

What is meant by the "faying" flange of a frame in riveted construction?

How has welded construction changed the methods of constructing ship framing?

On the sketch shown, identify "A" and "B."

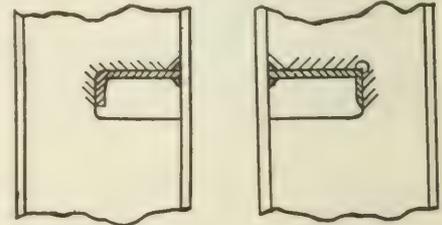
Why is it important that the dockmaster of a floating drydock be informed of a vessel's trim when the vessel is being drydocked?

What is the function of side keelsons or longitudinal intercostals in the double bottom of a vessel?

Why is longitudinal framing usually employed for tank vessels and transverse framing used on freighters?

Why are frames usually welded to shell plating with intermittent rather than continuous welds?

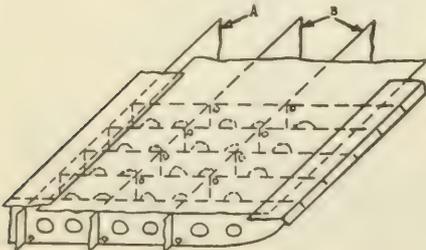
In the illustration below is a deep web frame with longitudinal frames passing through the slots. Why should the corners of the slot be rounded in one case and holes drilled in the other case?



How are the frames of a vessel numbered in usual practice?

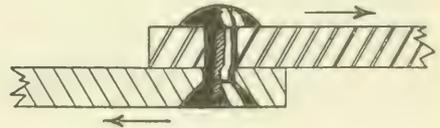
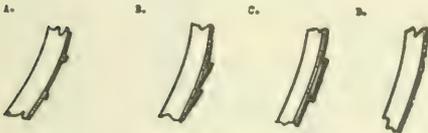
Where is the spacing between frames measured, i.e., does the distance along the shell plating between frames necessarily represent the frame spacing?

Describe the reasons why vessels constructed with welded frames are more susceptible to impact damage in docking, etc., than vessels of riveted frame construction.



Sketched below are various arrangements of the shell plating on the frames employed in ship's construction.

- (a) Name the arrangements.
- (b) Which arrangement is used most often in modern ship building?
- (c) Why?



What is the meaning of the term "sheer of a vessel" as applied to determination of a ship's load line?

How is the quality of steel regulated for use in the construction of merchant vessels?

Why is the flat keel plate normally the heaviest plate on a vessel's bottom?

What is the effect of rectangular openings such as hatches on deck stresses? Why should such areas be checked carefully by deck officers following heavy weather?

On passenger vessels, in what direction must the doors of public spaces, corridors, stairway enclosures, etc. open?

Why are certain longitudinal seams riveted on vessels which would otherwise be all welded in construction?

Why are most modern welded vessels built with flush butts and seams?

Name valves "A," "B," "C," and "D" and briefly state the purpose of each.

What precautions to detect leakage of steam coils should be taken when it is necessary to heat a liquid cargo in order to reduce its viscosity at discharge? What dangers could arise from coil leakage?

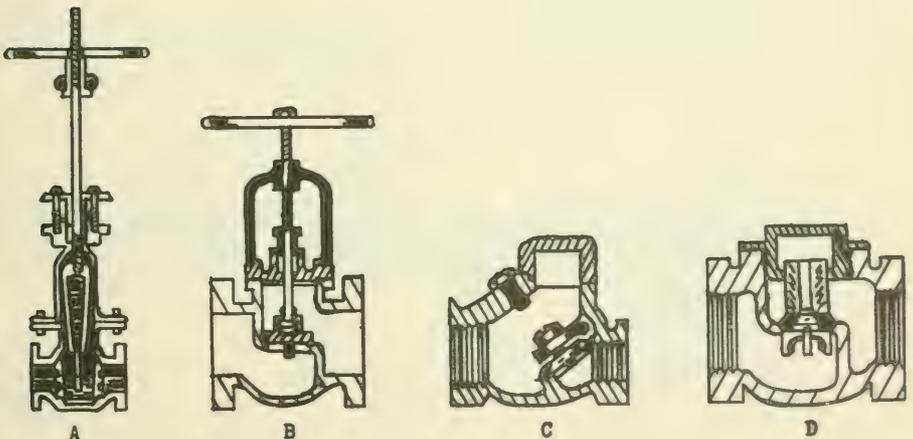
What is the maximum vapor pressure permitted on a tank, unless that tank has been constructed as an unfired pressure vessel?

What is the purpose of pressure-vacuum relief valves?

In dry docking a vessel, what precautions are usually taken to insure that the keel plate is properly painted in the way of the keel blocks?

Is the longitudinal center girder of a vessel's keel structure or are the floors normally built intercostal? Why?

Why is the longitudinal center girder of a vessel's keel structure usually built solid when fuel oil or water is carried in the double bottom?

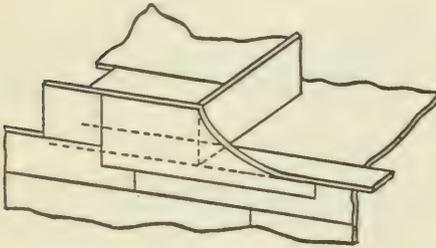


If it became necessary to put a hole in the beam in order to support a chain fall for lifting a weight, in what part of the beam would you place the hole?

What precautions should be taken with respect to shape if a hole is burned out with a cutting torch instead of being drilled?

Discuss briefly the stresses that may be put on a ship's structure by heating when steaming tanks or heating liquid cargoes to reduce their viscosity.

What local strength is usually added to a vessel in areas such as illustrated?



How must the edges of thick plates be prepared for welding? Why?

When a vessel is to be drydocked where the dock master is unfamiliar with the vessel, what information must be made available to him?

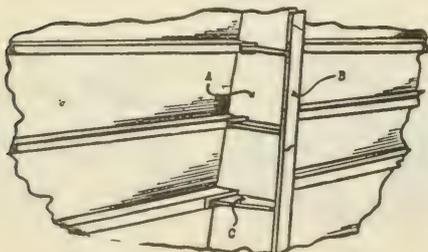
Describe briefly two or more methods employed to reduce the rolling of ships.

Describe "panting" stresses and name the structural features of vessels designed to resist these type stresses.

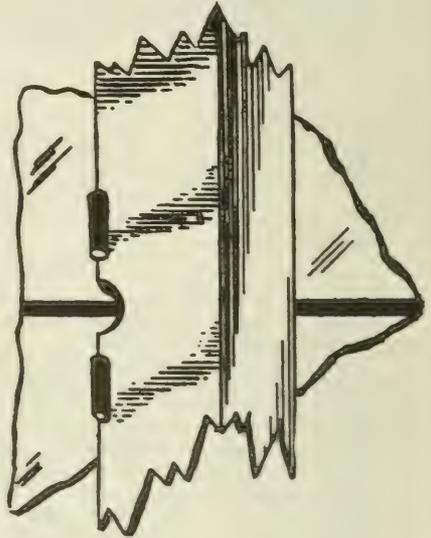
Where the bilge keels of vessels are welded directly to the bilge plating, what precaution must be taken at welded plate butts to eliminate notch effect and danger of cracks?

Why does the plating thickness of a vessel vary from one part of the vessel to another?

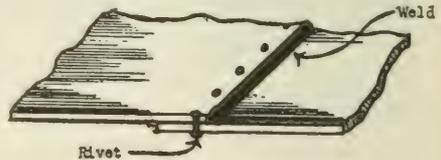
On the web frame illustrated, what is "A," "B" and "C"?



What is the purpose of the frame scallops illustrated, at joints in plating?



Why is the caulk welding of riveted seams as shown below usually avoided?



What circumstances or conditions might make a gas-free certificate invalid and make hot work or other repairs dangerous in or near a tank?

What is a stealer plate?

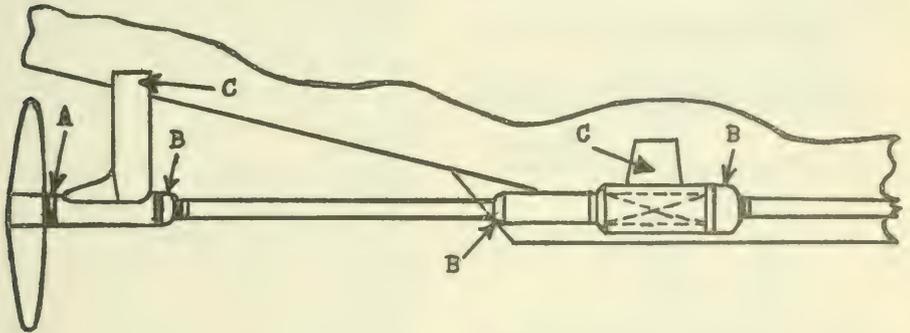
What is meant by an A-60 bulkhead?

Why are most seagoing vessels constructed with a smoke stack which has an outer casing and an inner smoke pipe?

Name the types of rivets sketched below.



On the drawing of one propeller and shaft of a twin screw vessel as shown, state the name and purpose of "A," "B," and "C."



How is leakage of petroleum or vapors prevented where valve stems must pass through a tank top?

When zinc, magnesium or iron anodes are fitted on a ship, should they be insulated or left in metallic contact with the steel of the hull? Why?

What strength requirements are put upon a vessel by deep draft?

What is meant by "floodable length" as applied to a vessel?

What three (3) strakes usually are the most highly stressed part of the ship's structure because of longitudinal bending moment?

What are cant frames and where are they used?

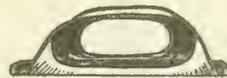
In making alterations or repairs; in assigning tasks in various areas of the vessel; and in stowing cargo or quartering passengers, what precautions required by the Regulations with respect to means of escape must be borne in mind?

Illustrated is the standard shipboard cable. What two functions are performed by the braided metal armor?

What are the requirements of the regulations with respect to rails of vessels?

What are the requirements of the regulations with respect to storm rails on vessels?

Compare the advantages of closed type chocks to open type chocks. See illustration below.



Closed Type Chock

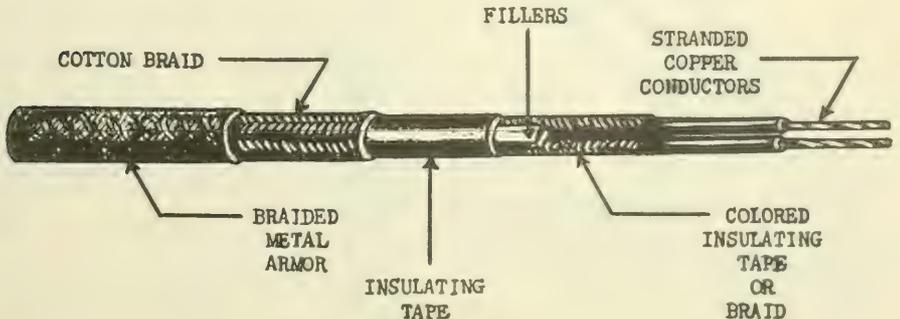


Open Type Chock

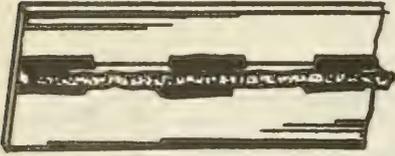
State why preparation of joints is essential to butt welds where the strength of the hull structure is involved.

How are joints prepared for butt welding?

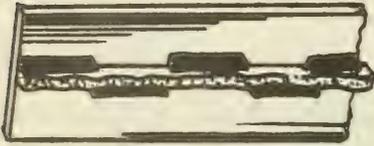
What provisions are made in the design and construction of pipe lines to allow for thermal expansion?



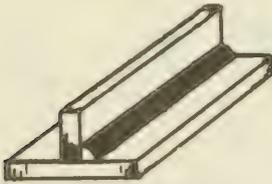
The weld illustrated is known as .....



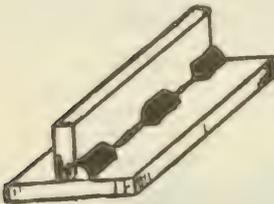
The weld illustrated is known as .....



The weld illustrated is known as a ..... type weld.



The weld illustrated is known as ..... welding.



How are pipes terminating at the shell plating constructed in order to minimize danger of the pipes being cracked by blows or stress on the skin plating?

Where should shut-off valves be located on piping to the shell?

What is the objection to cast iron for use in cocks and valves attached to a ship's side?

How is the stern bearing normally lubricated on an ocean going vessel?

What materials are used in fabricating stern tube bushings?

How may it be determined if welding electrodes (welding rod) are suitable for use in construction or repair of vessels?

Why may cracks spread rapidly once they have developed?

On a tank vessel constructed with twin longitudinal bulkheads, what advantage is gained by using the wing tanks rather than the center tanks for ballast?

Describe the advantages of welded ship construction with respect to repairs of shell damage.

What precautions must be taken with respect to radiators and other heating apparatus to avoid injury to persons occupying the space?

On passenger vessels, what are the general requirements for rails?

What are the advantages of a tank in a vessel independent of the skin for potable water storage?

How often must propeller tail shafts be withdrawn for examination?

At the stern post:

(a) What is the purpose of the zinc plates usually fitted to a vessel?

(b) When a ship is being painted, should such plates be painted?

How are hollow plated rudders usually treated to prevent internal corrosion?

When a vessel is drydocked, how may you detect small leaks, not readily apparent externally on a hollow plated rudder?

Do Coast Guard regulations cover the maximum allowable clearance between propeller tail shaft and stern bushings?

How is the clearance between tail shafts and bushings determined?

How is the bossing about the tail shaft of a ship usually fitted to prevent jamming of rope between the boss and the propeller?

What inspection is mandatory by regulation when alterations, repairs, or operations involving riveting, welding, burning, etc., are to be made in, or on the boundaries of oil tanks, oil lines, or oil heating coils?

What is the maximum angle of efficiency for a rudder?

What means must be provided to insure that the maximum angle of efficiency for the rudder is not exceeded when the wheel is put hard over?

Describe how the upper stock of the rudder passes through the hull of a vessel and the methods of lubrication employed at this point.

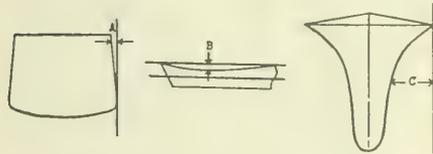
How is a rudder removed for repair?

How are the pintles and gudgeons constructed on a seagoing vessel?

What is the nature of the force that pintles and gudgeons are built to withstand?

How are pintles and gudgeons checked for wear?

What is the name usually applied to the constructional features of a vessel indicated at "A," "B," and "C"?



How are the pintle and gudgeon bearing surfaces on a seagoing vessel generally rebushed?

How is the vertical weight of a rudder sustained?

When heavy concentrated loads must be carried on deck, how could you distribute the load or increase the bearing capacity of the deck?

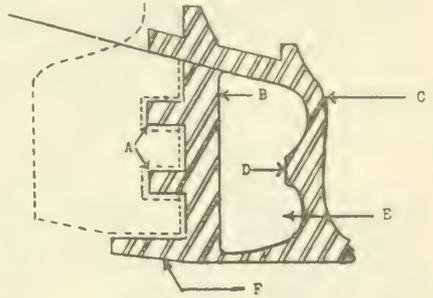
What materials are employed in the manufacture of stern frames?

When vessels are constructed with the stringer fastened to the sheer strake below the top of the sheer strake as shown at "A," why are scuppers preferably constructed as at "B" rather than "C"?

How are the sections of a cast steel stern frame joined together?

Describe how a stern frame is secured to a vessel's structure and plating.

Name the parts of the stern frame sketched below which are marked "A," "B," "C," "D," "E," and "F."



What is meant by camber?

What is the strength deck of a vessel?

State how decks are supported.

What are the functions of beams?

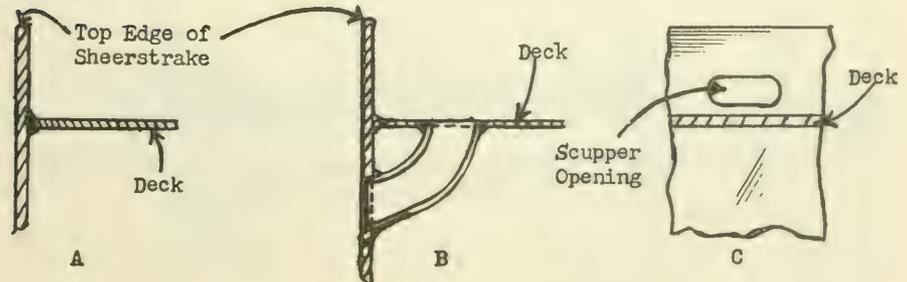
How is the upper stock joined to the rudder?

What is the skeg of a stern frame on a single screw vessel?

When riveting and welding are both used in fabricating a vessel's skin, which process is employed first? Why?

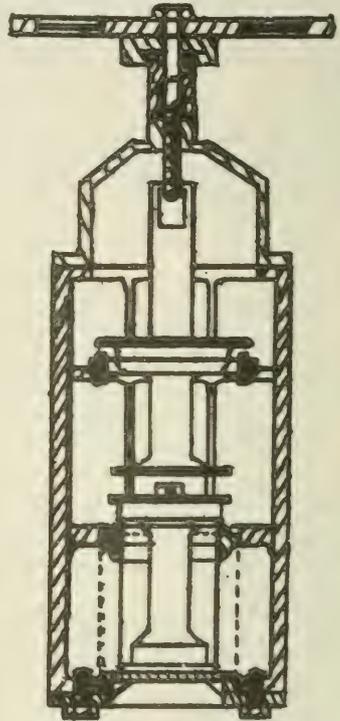
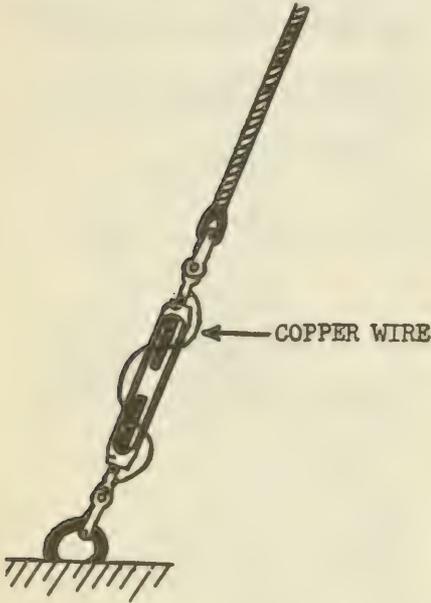
State the reason why freeing ports are important on a vessel fitted with bulwarks.

How should freeing ports be fitted for protection of personnel and where shutters are installed, what precautions are necessary to prevent jamming?



What is the purpose of the copper wire frequently fitted to stay turn-buckles?

Sketched is a pressure-vacuum valve such as is found on many tank vessels. Describe briefly the care and inspection such a valve requires.



What is the purpose of a thrust block?

What type bearings are usually employed for thrust blocks?

How are the foundations for thrust blocks constructed?

Would you expect "hogging" or "sagging" stresses to be more severe on a vessel with machinery aft in the full load condition?

Where wooden doors are permitted in a superstructure, how must the doors be constructed to meet the strength requirements?

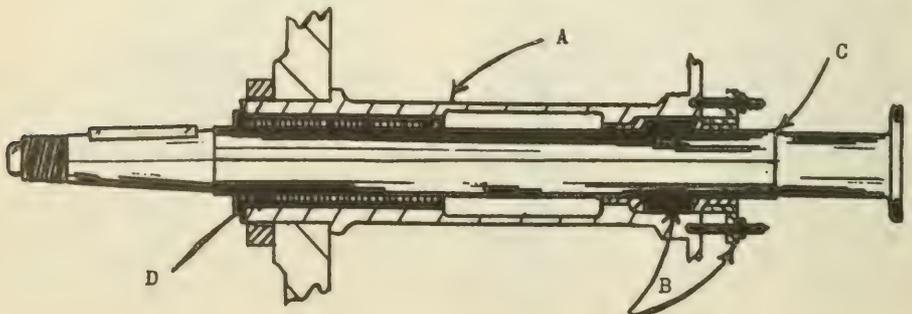
On the illustration shown, identify "A," "B," "C," and "D."

If, in heavy weather, you notice buckling in the midship deck plating of your vessel,

(a) what would it indicate?

(b) What measures could you take?

What type of stress do the deck beam brackets of a transversely framed vessel resist?



Why might the stress for which the deck beam brackets provide part of the resistance be strongest at the vessel's midlength than at bow and stern?

When scupper and sanitary discharge pipes lead through the ship's side below the freeboard deck, how must they be fitted to prevent water from passing aboard?

In the construction or the repair of gratings for use on the decks near a switchboard or resistor panel, would you use nails or wooden dowels? Why?

What basic considerations are followed in the design and maintenance of ships to ensure that they are rat proof?

In machinery spaces where sources of vapor ignition are normally present, why should at least one vent duct go as low as possible?

Describe briefly how heavy steel castings, forgings, etc., are examined by magnetic particle testing (magnifluxing) for cracks or flaws invisible to the eye.

In the construction of a vessel, how must fire hydrants be spaced and arranged?

What are:

- (a) Soft patches?
- (b) Hard patches?

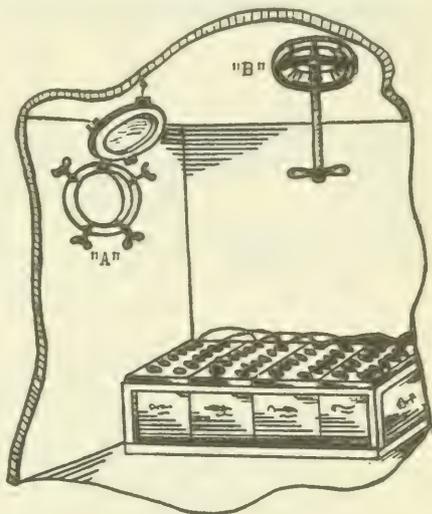
How are they fastened on and made watertight?

How is a B-15 bulkhead constructed to prevent the spread of fire?

Why is insulating material necessary on steel or aluminum bulkheads which are constructed to prevent an excessive rise of temperature on the unexposed side as well as prevent smoke and flame passing?

In freeing up a reach rod, would procedure "A" or "B" be preferable? Why?

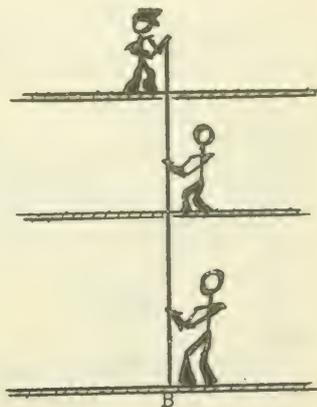
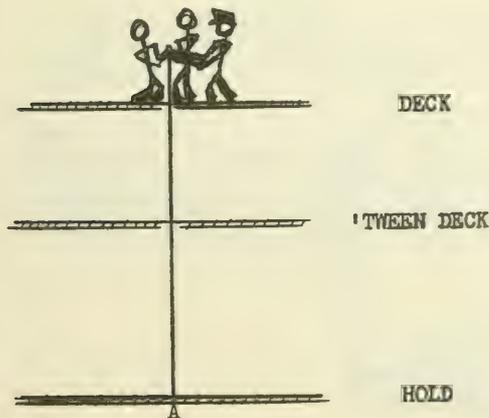
Is a mushroom vent as at "B" or a porthole as at "A" satisfactory for ventilation of a battery room? Why?



How must vessels of over 1600 gross tons be fitted in order that failure of the side, masthead, range, or stern lights is indicated at once to the officer on watch?

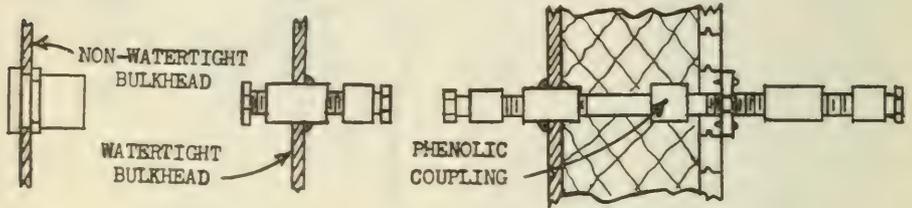
Why do chain falls hold a load in position usually without the necessity of securing the hauling part? Why do turnbuckles hold a weight without securing against turning or walking back?

What effects does vibration have upon such devices as chain falls or turnbuckles?



Shown is a bushing for use where an electrical cable passes through a non-watertight bulkhead of less than ¼ inch and a stuffing box for a watertight bulkhead. What is the purpose of the bush-

ing for the non-watertight bulkhead? Shown is a conduit where cable passes through an insulated bulkhead to a cold storage space. What is the purpose of the phenolic coupling?



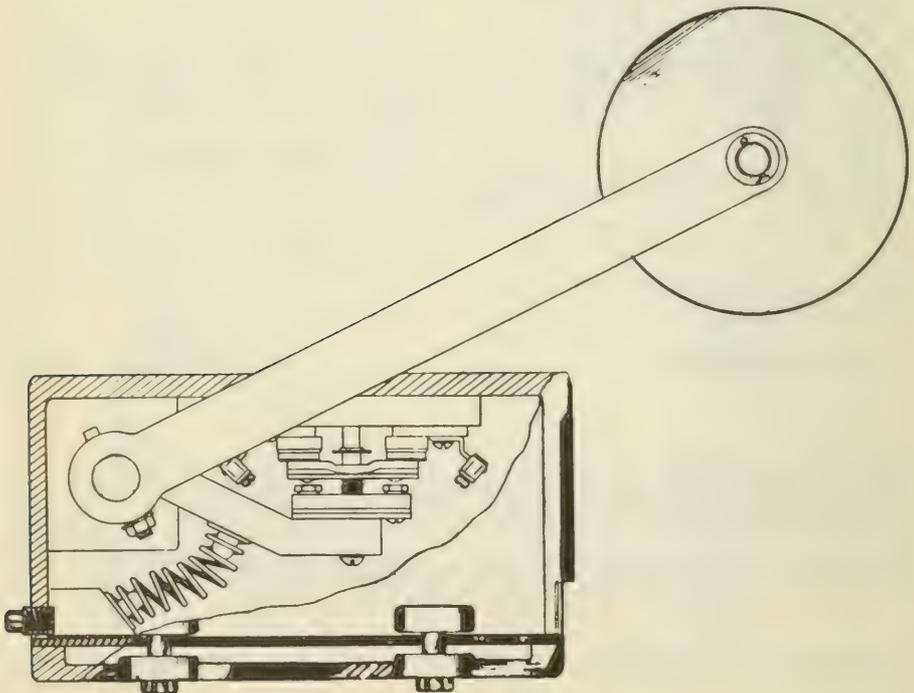
With regard to fire protection, why is special care necessary in the construction and maintenance of stairways and elevator enclosures?

What points should be carefully checked in examining lifeboat limit switches (see illustration)?

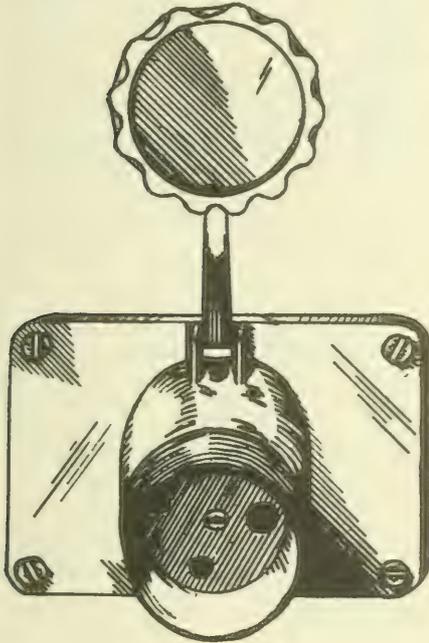
Can current flow to actuate the winch motor when the limit switch is in good condition and in the open contact position?

When damage to a ship's structure or fittings is occasioned by neglect, carelessness, or poor workmanship of a stevedore or his employees, what action on the part of the master is necessary to assure that the stevedore is held responsible for the cost of repairs?

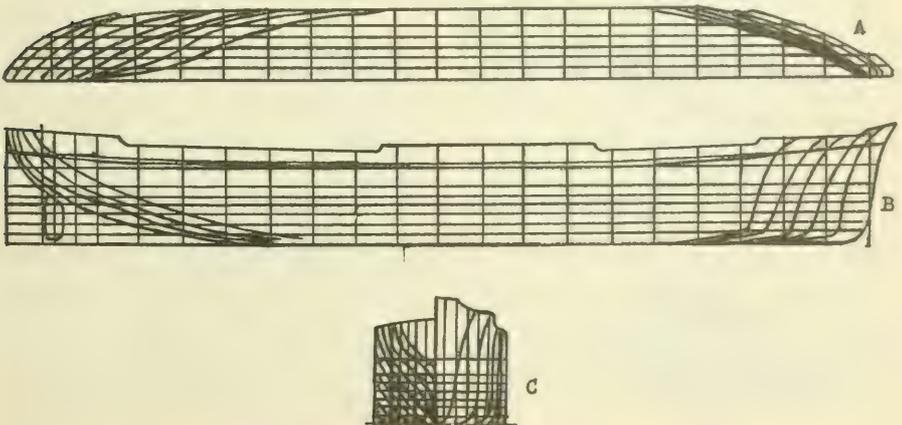
What are the advantages and disadvantages of cork as an insulating material? Under what conditions is its use forbidden on passenger vessels?



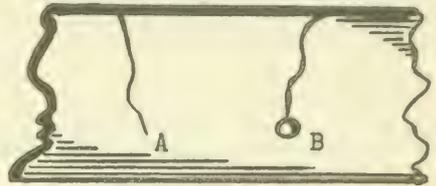
Illustrated below is the type of receptacle outlet which is currently approved for outside use. What advantage is provided by the use of a three-pronged plug required to fit this type outlet?



What name is given the three types of plans illustrated? Name "A," "B," "C."



Would end "A" or "B" be most likely to continue to propagate? Why?



On a ship fitted with smoke detecting apparatus and CO<sub>2</sub> fire extinguishing systems for the cargo holds, how is the extinguishing system piping for the holds checked?

In the carriage of refrigerated cargoes, such as fruit:

(a) Why are vessels normally painted white?

(b) Why are such vessels frequently fitted with a wooden deck?

What safety advantage is gained by the use of raked bows?

What two factors govern the rate at which water enters the hull of a damaged vessel?

What is meant by "slugging" a weld? How may "slugged" welds be detected?

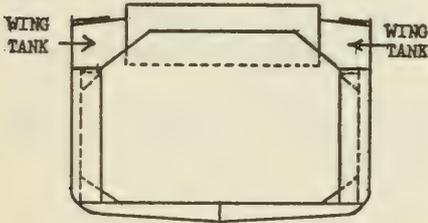
What is the block co-efficient of a vessel?

What are molded dimensions on a vessel—as molded beam, molded draft, etc.?

Describe the function of a deck stringer plate.

Why should heating coils in a tank be located as close to the bottom of the tank as possible?

Why are colliers built with wing tanks as illustrated; i.e., why does the inside bulkhead of the tank slope as shown? How is the strength of the vessel affected by the inclusion of these tanks in the construction?



Is the wind resistance encountered by a vessel greatest with the wind dead ahead or with wind ahead at an angle off the bow?

Why does a ship require less fuel and why does her speed increase normally when she is in the light condition rather than in the loaded condition?

What is the maximum amount of acetylene and oxygen a vessel is permitted to carry for the purpose of effecting her own repairs?

If a vessel is in level trim but sagging, where would the location of her maximum draft be located?

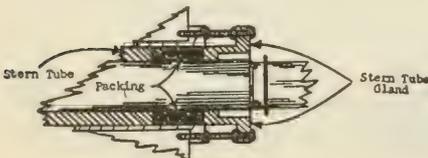
If a vessel's bottom has a pronounced sag amidships when she is on a drydock, how is that considered in painting the forward and after draft marks?

On the ship's length, where are the sheering forces on a ship's structure usually at their maximum?

Why is it mandatory for safety in oil tanks that such fittings as ladder bolts, heating coil clamps, pipe clamps, etc., be of strong and substantial material in a good state of preservation?

What is the function of the stern tube gland as illustrated below?

What procedure is usually followed when a stern tube gland is leaking excessively and requires repacking?



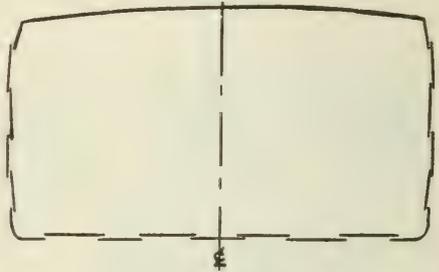
What type power supply is required for the general alarm system?

How must fuses in the general alarm system be protected against unauthorized tampering?

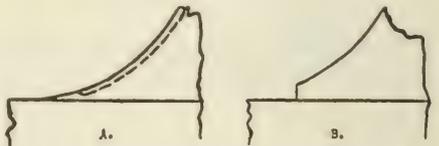
When compression members of a ship's structure such as longitudinal girders or frames have been badly buckled by collision or other cause, why is cropping out and renewal preferable to fairing in place?

What ship's plan may be used to determine the dimensions, and location of plating?

Make a rough copy of the sketch below and name the plates on it.



In construction or repair of a ship or her fittings would you regard the fashion plate at "A" or "B" most suitable? Why?



Steel plating used for ship construction and repair is commonly referred to by its weight.

(a) What thickness would 40.8 lb. plate be?

(b) What thickness would 30.6 lb. plate be?

What is the difference between a solid floor and an open floor?

What drainage and venting arrangements are made in solid floors?

What is the function of lightening holes in solid floors?

How are the tail shafts of vessels protected against corrosion where they pass through the stern tube?

What tests are given to riveted work? How is the length of rivets measured?

When passenger vessels are fitted with hinged watertight doors in the cargo spaces, what precautions are required by the regulations?

What advantage is gained by the use of a balanced rudder?

What is a stealer strake? State why it is necessary.

What is meant by the pitch of a rivet?

Describe how the propeller of a vessel is removed for repair or renewal.

Why are louvers or small screened openings desirable in bulkheads or doors between a passageway and a room for passengers or crew members?

Why must a vessel's stern tube be of sturdy construction?

What report is necessary when repairs or alterations affecting the safety of the vessel are to be made?

What is the difference between a "built-up" and a "solid" propeller?

What members of the ship's structure resist buckling of the plating when the vessel's plating is in compression?

In loading concentrated heavy weights, such as lead or pig iron billets in a vessel's 'tween decks, where would the decks load bearing capacity be greatest, i.e., could more weight be carried adjacent to shell and bulkheads or near hatch openings without danger of setting down the decks?

What is the purpose of the expansion joint fitted on the superstructure of some vessels?

Why must the deck plating above tanks be capable of withstanding forces acting upward as well as down?

How do you determine the thickness of plating, sizes of beams, girders, etc., that may be used in constructing or repairing a vessel?

Where is zinc or magnesium anode protection most useful on the outer hull of vessels? Why?

In addition to the compartmentation and the watertight division which bulkheads afford, what strength elements do they give the vessel?

Are vessels designed to withstand abnormally severe stresses which may be set up by poor distribution of weight?

When passenger vessels are fitted with portholes below the bulkhead deck, what method is prescribed by the Regulations to prevent their being opened by unauthorized persons?

How are drain wells for holds constructed in order that damage to the outer bottom on a vessel fitted with a double bottom will not cause water to be admitted into the cargo spaces?

When sounding pipes terminate below the freeboard or bulkhead deck, what provisions are required to prevent flooding of the compartment in which the sounding pipe terminates, should there be a head on the double bottom tank?

What provision is usually made to prevent damage to a vessel's shell plating where the sounding rods strike?

Where breaks in the continuity of a vessel's shell structure are created by sideports, gangway apertures, etc., what structural compensations are made?

Why is it, in general, the procedure to weld butts before seams in the repair or construction of vessels with electric welding?

What protection must be afforded double bottom tanks against pressures in excess of that for which they are designed?

What is the dead rise of a vessel?

What are garboard strakes?

What protection must be afforded manholes to double bottoms?

What are intercostals?

What are margin plates?

Why are hinge pins usually made with a loose fit or an elongated hole made for the hinge bolt or pin on hinged watertight doors and portholes?

Describe how you would check a hinged watertight door for tightness, and state the adjustments that may be made if necessary under operating conditions at sea.

Why are the bulkhead stiffeners of freight vessels normally vertical while those of tank vessels are horizontal?

How are bulkheads in cargo holds tested for watertightness?

How are galleys, living quarters, navigation spaces, general cargo, boiler rooms, and enclosed spaces containing machinery, where sources of vapor ignition are normally present, segregated from cargo spaces carrying grades "A," "B," "C," or "D" liquids?

Why does the plating of a bulkhead as well as its stiffeners decrease in size and strength from the lower to the upper part?

Why must shaft alleys be of watertight construction?

Where double bottom tanks are filled with fuel or water, how could you check suspected bottom damage that may have opened the outer bottom to the sea?

In the event of damage to a vessel's bow and flooding of the forepeak, what factors would influence the amount of water pressure on the collision bulkhead?

When a passenger vessel is fitted with watertight doors of sliding type, against what list must the power or manually actuated closing mechanism be effective?

Why must watertight doors which may be opened at sea below the subdivision load line of a passenger vessel be of the sliding type rather than of the hinged type?

What provisions to maintain watertightness must be taken when electric cables penetrate a watertight bulkhead?

What provisions to maintain watertightness are necessary on passenger vessels bilge piping when the piping is located in a duct keel or within  $\frac{1}{5}$  of the beam from the side of the vessel?

In case of damage resulting in flooding:

(a) What may be the effect of watertight longitudinal divisions?

(b) What provisions may be made in longitudinal bulkheads to partly overcome this factor?

What is a stepped bulkhead and what precautions are necessary where one is installed?

State the usual minimum bulkhead requirements for a seagoing freight vessel of the United States.

How could you check inner or outer bottom plating for deflection due to grounding, severe buckling or compressive strains, pounding, etc.?

What precaution is usual to prevent contamination of fresh water double bottom tanks by fuel oil and vice versa?

What is the name of the first bulkhead aft of the stem and what is its purpose?

What vessels are required by law to have effective double bottoms?

For deep tank bulkheads and tank tops:

(a) What tests are required?

(b) What other test is sometimes employed to check tightness?

Where are panting beams or stringers fitted and what is meant by panting?

What are the functions of partial bulkheads fitted in the cargo spaces of a vessel?

What are the functions of pillars or stanchions in a vessel's hold?

In what part of the vessel may you expect to find deep floors, and floors increased in size or thickness to increase their strength?

When vessels have tanks for the carriage of bulk liquids, what measures are taken to minimize the dynamic effect of the liquid as the vessel rolls?

What are the functions of a hold-stringer?

Why are many modern vessels built without such stringers?

State why the stringer plate is normally a very important structural part of a vessel's deck which must resist the greatest stresses to the deck structure.

Why are deep tank bulkheads normally built with the stiffeners inside the tank?

What are the three primary functions of bulkheads?

What advantage is gained through the use of watertight longitudinal divisions in the double bottom tanks?

How may fire alarm thermostats be tested?

How often should such fire alarm thermostats be tested?

What are the primary functions of the deck or decks of a vessel?

What protection against damage by cargo or cargo gear should be provided to hatch coamings?

State what is meant by propeller cavitation. What are the effects of cavitation?

Where vessels have little or no sheer, what compensation is made to provide extra buoyancy?

Define boss plate, intercostal floor, margin strake, gusset, and cant frame.

Why are bilge drain wells located as far outboard as practical?

What is the purpose of peening the successive beads of weld deposited after each pass when making a weld in heavy plating?

What is the purpose of preheating heavy sections of steel prior to welding?

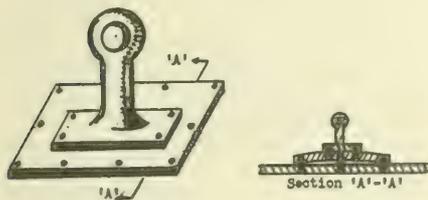
Describe in detail the construction of a portable magazine chest for the carriage of rockets, flares, lyle gun black powder, and other ship's stores of an explosive nature.

When vessels are provided with forced-air ventilation for quarters, what provisions are usually made to prevent air-ducts, diffusers, etc., becoming filled with dust?

If a clinometer in the wheelhouse is used to determine the number of degrees a vessel is rolling, why might it show a greater than actual figure?

## 24. SEAMANSHIP.

In the sketch below is shown the method employed for fastening a grab rail to the shell plating of a lifeboat. Why are more rivets employed for attaching the small plate to the shell than for attaching the bracket to the small plate?



Describe the various methods employed to absorb rudder shocks and prevent their being transmitted to the steering machinery.

Discuss briefly the effect of list, speed, and rough weather on the draft of vessels operating in shallow water.

A weight of 12 tons is being lifted with a three-fold purchase. Find the tension on the hauling part, considering loss of efficiency due to friction as 10 percent at each sheave.

Describe briefly the possible effects of hugging the bank in a vessel proceeding in a narrow channel.

You are proceeding upstream in a loaded vessel, with an easy flood tide, and you have orders to dock starboard side to a dock lying on your own port-hand. The face of the dock lies parallel with the stream. How would you maneuver your vessel to make the landing, assuming that no towboat is available?

In construing the load line regulations, within what zone should a port be regarded as lying when load line regulations indicate that it lies on a boundary between two zones?

In determining whether a ship is loaded below her load line:

(a) What allowance for fuel consumption may be made?

(b) Is an allowance for fuel consumption permitted for passenger vessels?

Taking a right-handed propeller steamer from wharves, buoys, docks, etc., how would you get your ship away when lying head to tide, either side to the wharf, and heading the right direction?

What is meant by the "pivoting point" of a vessel?

Where will the "pivoting point" usually be found in a vessel?

Knowing the location of a vessel's "pivoting point," state why experienced ship handlers will observe the stern while turning in constricted waters.

Where machinery such as gears or piston cranks, is exposed, what safety measures are required by the Regulations?

Explain the effect of "bank cushion" and "bank suction" on a vessel steaming in a narrow channel. State how a steamer should be handled when proceeding through a narrow channel in order to avoid these effects.

If your vessel's engine became disabled in heavy weather, what steps might you take to avoid rolling in the trough of the sea?

How would you turn a right-hand screw vessel alongside a dock under her own power? Vessel is lying starboard side to dock and is to be turned port side to dock, no wind or tide.

Why is a vessel fitted with twin screws turning outboard easier to maneuver than a vessel with twin screws turning inboard?

In maneuvering ahead at low speed is the rudder of a single screw vessel or a single rudder on a vessel fitted with twin screws more effective for turning the vessel? Why?

With a right hand single screw ship, is it more advantageous to dock port or starboard side to, no tide? Why?

What entries are required in the official log book with respect to the load line and draft?

A wire rope rove through two single blocks with two parts at the moving block is used for a lifeboat fall. The weight of the boat and its equipment is 5 tons, and the boat has a capacity of 100 persons. Compute the required breaking strength for the wire rope falls using the following factors. Show all work.

A safety factor of 6 is required for boat falls by regulations.

The weight of each person is considered 165 pounds by regulations.

Friction loss of 10 percent at each of the two sheaves.

State the formula used to obtain the tons per inch immersion (T. P. I.) of a vessel in sea water.

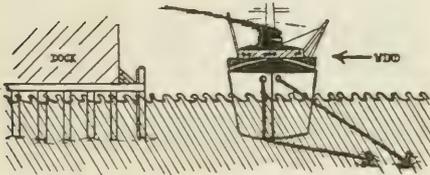
Where is the information concerning the tons per inch immersion of a vessel usually found?

What consideration may make the tons per inch immersion value in error unless a correction is applied?

A vessel docking in an onshore wind decides to use her bower anchor to check the bow momentum towards the dock.

(a) Noting the sketch below, would you regard the inshore or off shore anchor as most effective?

(b) What disadvantages might have to be considered in using an inshore anchor?



What duty does the regulations place on the master of vessels equipped with emergency lighting systems and emergency generators?

What duty does the regulations place upon a master with respect to electric power operated lifeboat winches and their control apparatus?

If your ship goes aground in a inshore gale, what should be the first measure to save the vessel, if the crew, etc. are in no immediate danger?

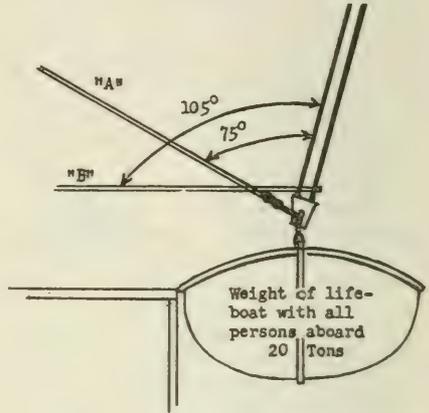
State what is meant by the term "fleet angle" in placing a lead block with relation to the axis of a drum or niggerhead for heaving on wire rope, or illustrate the meaning of the term by a rough sketch.

A vessel is docked as shown, with her stern projecting from the pier into the current. What lines in addition to those shown would you consider necessary? (Illustrate if you wish by rough sketch).

Referring to the sketch:

(a) Determine the stress on the tricing line "A" when a lifeboat is lowered to the embarkation deck.

(b) Determine the stress on the frapping line "B" when the tricing line pelican hook is released.



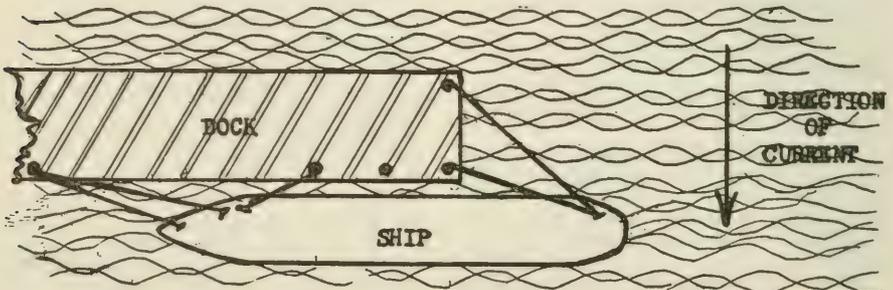
How do you place a block for the most effective lead to a drum or niggerhead when using wire rope?

What precautions are necessary to insure that lifeboat winches and hand propelling gear in lifeboats operate properly in cold weather?

Taking a right-handed propeller steamer from wharves, docks, etc., how would you get your ship away under the following conditions; lying port side to, heading in the right direction, no tide?

How would you dock a ship in a slip, coming in on the flood with the tide running across the slip entrance?

In docking a vessel against a pier with a solid pier facing (that is, one not built on pilings), what is the advantage in going astern on the engine prior to landing the vessel broadside to?



**28. LIFESAVING APPARATUS AND FIREFIGHTING EQUIPMENT.**

What factor of safety is required for blocks, falls, fairleads, padeyes, shackles, links, fastenings, etc. used in connection with lifeboat gear?

A lifeboat davit block with a maximum working load of 3000 lbs. requires renewal. What breaking load would you specify for the new block?

On vessels equipped with winches for lowering lifeboats, what speed of lowering the loaded boat should be regarded as satisfactory when the winch is fitted with a governor brake?

A vessel has a beam of 70 feet. The distance from the davit head to the light load line is 50 feet. The boat falls have 6 parts at the moving block. 25 feet are required to lead to the cruciform bitt and for turns on the bitt. What length of fall is required?

What equipment is required on motor lifeboats using gasoline for fuel to prevent fires from carburetor backfire, and to prevent the accumulation of gasoline in the bilges of the boat?

What precautions must be taken on

vessels fitted with lifeboat winches where possible icing conditions may occur?

You suspect a fire watchman has taken all his keys to the messroom and is "punching his clock" while sitting there. How would you determine if he was guilty of this practice?

On passenger vessels fitted with magnetic controls on doors, is it permissible to install holdback hooks or other devices to keep the door permanently open?

On firescreen doors and other doors which are not normally locked on passenger vessels, what is the maximum list that the door is required to close against? If you were obliged to adjust the spring tension on such a door what other considerations should be borne in mind?

How would you embark passengers in lifeboats suspended from gravity davits? Describe precautions in the use of tricing lines in particular.

**29. SHIP SANITATION.**

What is the average maximum consumption of fresh water per day per person required in the interest of adequate personal hygiene?

What chemical is used to treat water in order to insure its safety for drinking?

How should taps be marked when wash water of doubtful purity is used?

Describe the responsibility of the master with respect to narcotic drugs placed on a vessel for medicinal purposes?

What particular care should be exerted when procuring the following for shipboard consumption:

- (a) Milk;
- (b) Shellfish?

For what period is a deratization certificate or deratization exemption certificate issued?

What conditions must exist for a deratization exemption certificate to be issued?

What is the duty of the Master of a vessel with respect to sanitation?

What penalties is the Master of a vessel liable to for failure to maintain his vessel in a sanitary condition?

What is the purpose of a quarantine inspection?

What persons are allowed aboard a

vessel subject to quarantine inspection?

What sanitary measures must be taken to bring cats, dogs, or monkeys into the United States on a ship?

Describe briefly the facilities available for obtaining medical and quarantine advice by radio.

What precautions must be observed in obtaining drinking water in port?

What provisions are required by regulation on new vessels for the crew to wash and dry their clothing?

What recreational facilities for the crew are required on late construction vessels by regulation?

Why is screening desirable on the vents for potable water tanks?

What chemical is recommended for disinfection after contagious disease has been present in quarters?

What measures should be taken after washing dishes to insure that they are in a sanitary condition?

If a drinking fountain is not available, what facilities should be provided to furnish drinking water?

What is a certificate of provisional pratique?

What is radio pratique?

What precautions would you take in a port infected or suspected of being infected with plague?

**30. RULES AND REGULATIONS FOR INSPECTION OF MERCHANT VESSELS.**

List the duties that must be shown in the station bill.

Describe in detail the manner of making an entry in the official log book for an offense by a crew member. State the steps which must be taken to insure that the offender has been informed of the charge against him, and the possible result of failure to follow the procedure detailed by law.

Under what conditions may a shipping commissioner act as an arbitrator of a dispute between Master and seaman and what is the effect of his decision?

In docking, a seaman is caught in the bight of a hawser and his leg is broken. What reports must be made by the owner, agent, or Master of the vessel to the Coast Guard?

After his ship has been involved in a casualty, under what circumstances is the Master permitted to omit reporting in person to the Officer in Charge,

Marine Inspection, at the port in which the casualty occurred or nearest the port of first arrival?

What quantity of gasoline may be carried when necessary for an emergency generator aboard a passenger vessel and how must it be carried?

What type emergency generator engines are required for all new construction and replacements?

On passenger vessels, is it permissible to use the emergency loudspeaker system for the distribution of music?

How often must the emergency loudspeaker system be tested and who must make the test?

Describe the equipment required by the regulations to prevent ship's personnel from being locked in the refrigeration compartment.

What is the minimum flash point of paints and enamels permitted to be used aboard U. S. Merchant Vessels by regulations?

**31. LAWS GOVERNING MARINE INSPECTION.**

Prior to paying off or discharging a seaman, what does the law require that the master furnish a seaman in order that he may examine his accounts?

What vessels are required to be provided with a slop chest?

What are the stores which the slop chest is required by law to provide?

Shortly after signing articles on a seagoing merchant vessel, the Boat-swain requests that you discharge a seaman because he has heard a rumor the man has a reputation for failing to work diligently. What obligation might be placed upon the vessel if the Boat-swain's request was carried out?

What is the duty of the Master of a vessel in the event of the death of a seaman during the voyage?

How often are the seamen on a American vessel entitled to receive an advance on their wages and what is the penalty for failing to comply with the provisions of this law?

How must sea stores, ship's stores, and bunker fuel be shown on a vessel's arriving in a U. S. Port from a foreign port or place?

In order to land any item of ship's stores from a vessel arriving from a foreign port or place, what steps must be taken?

When the Master of a registered vessel is changed, what action of the new Master or of the owner is required by law?

What notice and reports are required and to whom are they made in the event that your vessel is involved in a marine casualty which results in one of the following:

(a) Material damage to property in excess of \$1500;

(b) Material damage affecting the seaworthiness or efficiency of a vessel;

(c) Stranding or grounding;

(d) Loss of life;

(e) Injury causing any person to remain incapacitated for a period in excess of 72 hours?

What is the duty imposed by law upon the master when repairs are made in foreign port?

What responsibility does the vessel, and therefore the master have toward the clothing and personal effects of crew members?

When a preferred mortgage is outstanding against a ship, what means must be taken to inform people who might have business with the vessel of the existence of the mortgage?

When a master of a vessel has been obliged to use his own funds in order to secure the conviction and punishment of an offending seaman, can a court reimburse him at the offender's expense when holding proceedings relating to the wages?

In order to prove a seaman a deserter in the eyes of the law, what must be shown?

What disposition must be made of the clothes, effects, and wages of a deserting seaman?

To whom may a seaman make a lawful allotment?

What entry is required in the official log in the event of illness or injury aboard?

What entry is required in the official

log book in the event a crew member is paid off by mutual consent in a foreign port?

What is the penalty for omitting required entries in the official log book?

A case of assault occurs aboard a merchant vessel of the United States on the high seas. The identity of the offender and facts and evidence concerning the offense became known to the Master. What steps must the Master take to bring the offender to justice?

### 32. SHIP'S BUSINESS.

What is particular average?

What is meant by the term "dispatch money"?

State whether a shipowner is liable to a passenger injured in each of the following ways:

(a) By an assault committed in the cabin class accommodations by a third class steward.

(b) By a large wave shipped on deck during heavy weather, the officers having failed to warn the passenger of the danger of appearing on deck at such a time.

(c) By a collision due to the joint fault of the vessel on which he is traveling and the other vessel.

Suppose a master abandons a vessel with crew and afterwards some of the crew return and rescue the vessel. Can the crew claim salvage?

Suppose a ship finds another ship 1,000 miles at sea and tows her within a mile from shore and then, by reason of an accident, loses her. Is the salvaging ship entitled to salvage?

If you are master of a vessel belonging to the same company as another vessel and render aid in salvaging her, does the fact that the owner is common to both vessels bar you or members of your crew from a salvage claim?

State what action taken by a seaman, in case of wreck or loss of the vessel on which he was employed, would bar his claim to wages earned.

When does a person appointed to command a vessel become legally responsible as master?

Suppose you have been appointed as Master of an ocean going vessel, what are the important details that must receive your immediate attention as regards to vessel, your equipment, business matters and the crew? What are your further duties?

Before sailing for a foreign port, what document must you get?

If the crew refuse to go to sea through the alleged unseaworthiness of the ship, what should be done?

Suppose you had incurred losses during the voyage which are proper subject for a general average:

(a) What would you do on your arrival at your port of destination?

(b) Have you any lien on the cargo for the shipper's share of the loss?

Suppose a merchant had stipulated to supply a full cargo, but finds he cannot, what would you do?

Although in most trades it is the practice to place the loading, stowage, and discharge of cargo under direct charge of the First officer, does this relieve the Master of responsibility? If not, what responsibility is he charged with?

What would you do before signing a Bill of Lading?

Should a bill of lading list more cargo than is aboard, what would you do?

If any cargo is carried on deck without the consent of the shipper or without being shown by the Bill of Lading as being "on deck," will the vessel be rendered liable for loss or damage sustained thereby from an excepted peril?

What vessels are required to take a pilot under State laws?

What vessels are not subject to compulsory pilotage?

In the event that a pilot offers his services to a vessel subject to compulsory pilotage and is refused, is the vessel liable for any pilotage charge and if so, how much?

What report is required to be made by the master within 24 hours after the arrival of his vessel from a foreign port? To whom is it made? When is this report dispensed with?

A crew has demanded their discharge from a vessel, claiming that the Master has refused them a draw of one half their wages at a port, when the vessel loaded bunkers only. Admitting that a refusal of a draw in port when and where due is basis for the crew to demand their discharge from the vessel, in this case should the master accede to the demand or not? State your reason.

Where do you go to enter a ship upon arrival in the United States from a foreign port and what papers are you required to deposit?

What business would you transact at the United States Consulate in a foreign port?

You arrive in a foreign port and have reason to believe that your cargo has been damaged. What action would you take?

In regard to merchant vessels and all other private vessels of the United States under what jurisdiction are crimes committed aboard while on the territorial coastal waters of a state?

You have bound yourself in the Charter contract to take the shortest route to your port of discharge; may you deviate from your course?

Explain briefly the distinction between jurisdiction In Rem and jurisdiction in Personam.

State what rights, if any, an American seaman employed on an American ship will have against the owner if, while on the high seas, he contracts pneumonia.

What is a ship's register?

What is general average?

What is a ship's enrollment?

## INTERNATIONAL AND INLAND RULES OF THE ROAD

### 21. INTERNATIONAL.

When is a vessel to be considered under way by these rules?

At what moment are you "under way" from an anchorage; when your anchor is aweigh, or when it ceases to hold?

Does the fact of your having or not having way upon your ship have any bearing on whether you are "under way" according to the Rules?

At what intervals is a sailing pilot vessel required to show a flareup light or lights?

What is the range of visibility for the white light required to be carried by a sailing pilot vessel?

At what point does a vessel cease to be privileged in a crossing or overtaking situation?

In a crossing situation, assuming that your vessel and the other steamer both hold course and speed, state how you could make use of the range of his masthead and after range light to determine:

(a) Whether he will cross ahead of you.

(b) Whether you will cross ahead of him.

(c) Whether risk of collision exists.

Under the International Rules, are vessels showing "not under command" lights in distress? Explain.

When are side lights exhibited on:

(a) Ocean steamers;

(b) Sailing vessels;

(c) Cable vessels;

(d) Fishing vessels?

What is meant by the term "burdened vessel"?

Give the definition of the word "visible" when applied to lights, according to the International Rules.

How can risk of collision be determined?

What are the day and night signals for a vessel aground?

What shall be deemed to be the length of a vessel?

The International Rules prescribe that a foremast light shall be at a height above the hull of not less than 20 feet, etc. If you were checking the height of a light, where would you take your measurements from?

What signal should a vessel give to attract attention, if necessary?

What lights are required for vessels being pushed ahead?

In addition to the lights and flares required for sailing pilot vessels, what light does a power-driven pilot vessel carry when on station and not at anchor?

What may a power-driven pilot vessel use in place of a flare?

Is there any provision made in the Rules for the use of additional whistle signals between ships of war or vessels sailing under convoy? Explain.

The Rules require that a power-driven vessel be provided with an efficient whistle. Does the siren meet this requirement? State your reason.

What lights are vessels forbidden to exhibit by the Rules?

What are the lights required on sail pilot vessels when on station?

Describe the lights and day signals displayed by Coast and Geodetic Survey vessels underway and actually engaged in hydrographic surveying.

At sea, on what occasion would you display two red lights at night or two black balls during the day?

A fishing vessel is underway with all sails set and a gasoline engine running. Under the Rules, is she a power-driven or sailing vessel?

What is meant by "privileged vessel"?

What are the characteristics, range of visibility, and location for the anchor light of a vessel less than 150 feet in length?

Which of two crossing power-driven vessels has the right of way in a fog?

What are the signals for a vessel whose fishing gear becomes fast to a rock or other obstruction by day, by night, and in fog?

What are the fog signals for fishing vessels?

What are the fog signals for towing vessels?

What are the fog signals for a vessel engaged in laying or in picking up a navigation mark?

What lights should a vessel carry when in tow of another vessel?

Describe the stern light which is carried by a vessel underway.

What is the day signal for vessels at anchor?

When is a power-driven vessel engaged in towing in International waters required to carry three masthead lights?

What are the requirements of the Rules with respect to anchor lights for a vessel 150 feet or upward in length?

What lights and signals are required for vessels fishing with lines or nets extending horizontally into the seaway more than 500 feet?

May signals other than fog signals be given when vessels are unable to see each other because of fog, mist, snow or rain? If so, state them.

What action shall a power-driven vessel take on hearing apparently forward of her beam, the fog signal of a vessel whose position is not ascertained?

Describe the lights and shapes required to be exhibited by a vessel engaged in laying or picking up a submarine cable by night and by day.

Describe the arcs of visibility of the masthead light and stern light of an ocean steamer.

When a small vessel is being overtaken by another, what lights is she required to show if unable to carry the fixed stern light because of bad weather?

What power-driven sea going vessels over 40 tons are not required to carry a range light?

What are the requirements of the Rules with respect to the lights for a power-driven vessel towing or pushing another vessel?

What vessels display a tricolored lantern in the same position as the masthead light?

You are proceeding toward a wide channel and sight a vessel showing an all-around white light on the bow and on the stern, together with two red all-around lights in a vertical line amidships. What do her lights indicate?

What is the rule regarding two power-driven vessels meeting end on or nearly end on so as to involve risk of collision?

How are orders to wheelmen to be given?

When should whistle signals be sounded for course alteration?

Name the distress signals.

Do vessels not under command and vessels laying or picking up telegraph cable carry side lights on the high seas?

When are the signals for course alterations sounded?

Quote Rule 27, the General Prudential Rule.

What is the meaning of two short blasts when sounded by one of two power-driven vessels which are meeting so as to involve risk of collision?

What do three short blasts denote when sounded by one of two power-

driven vessels which are meeting or crossing so as to involve risk of collision?

State the duties of the "privileged" vessel as outlined in the Rules. In other words, where by these Rules, one of two vessels is to keep out of the way, what shall the other vessel do? Answer in full.

Are naval vessels required to carry lights as prescribed in Rules of the Road in peacetime?

Are squadrons and convoys prevented from carrying special lights?

May vessels exhibit any lights in order to attract attention?

May a power-driven vessel use the five or more short blast signal in fog when she is not visible to other vessels?

What vessels may use the ship's bell to sound fog signals while underway?

Has a vessel towing another vessel any right of way not usually allowed to other vessels?

Which has the right of way, a sailing vessel or a vessel fishing? State your reasons.

What is the meaning of one short blast when sounded by one of two power-driven vessels which are meeting so as to involve risk of collision?

What is the rule governing two power-driven vessels crossing so as to involve risk of collision?

What is the rule for a power-driven vessel and a sailing vessel proceeding so as to involve risk of collision?

A towing vessel is required to make a fog signal. State that signal and the intervals at which it is made.

A vessel being towed is required to make a signal. State the signal for a vessel being towed, the interval at which it is sounded, and how it is to be sounded with respect to the signal of the towing vessel.

You are watch officer at anchor on an 8000 ton vessel, 400 feet long. The weather becomes foggy. State in detail the precautions you would take.

Under what conditions other than fog are fog signals used?

In foggy weather what signals may be used when vessels can see one another?

Of what duration are the following when used as fog signals:

- (a) Prolonged blast;
- (b) Short blast;
- (c) Ship's bell?

Would a vessel be required to sound signals during the fog if she was moored at the end of a pier in such a manner that she projected beyond the pier into the channel? Explain.

On hearing the fog signal of another vessel close ahead, what signal should be sounded by a power-driven vessel which has reversed her engines and actually has sternway?

In fog, would you sound signals indicating an alteration of course?

What are the fog signals for a vessel being towed and on what are they to be sounded?

Two vessels are meeting in the crossing situation. The vessel which has the other on her starboard bow blows two short blasts of her whistle and this signal is answered by a similar signal from the other vessel. Which is the burdened vessel and which the privileged vessel?

What signal should be made by an overtaken vessel in answer to a one or two blast signal from a vessel which is overtaking her?

May a power-driven vessel in sight of another alter course without blowing the whistle?

Are both the burdened vessel and the privileged vessel obliged to sound whistle signals? Explain your answer in detail.

If a whistle signal is sounded by a vessel indicating a change of course, is she obliged to change course in accordance with her signal?

Assume that you are the officer in charge of the watch and you observe on your port hand a crossing vessel whose course appears to be  $090^\circ$  to the right of your own. Her bearing does not ap-

preciably change and she has apparently made no change in course or speed since you first observed her. Is there any signal which you can make which will indicate to the vessel the presence of your ship?

What is the fog signal for a power-driven vessel underway, but stopped, and having no way upon her?

What is the duty of the Officer in Charge of a power-driven vessel upon hearing a fog signal apparently forward of the vessel's beam?

When a vessel is skirting a fog bank but is not herself in the fog, should she sound fog signals? Why?

What lights and signals are shown by a vessel fishing with nets or lines extending horizontally not more than 500 feet into the seaway?

What lights, in addition to the required lights, may fishing vessels and fishing boats use at any time when engaged in their occupation?

What are the lights to be displayed by a sailing vessel engaged in trawling?

What is the signal of a vessel of 400 feet length which is aground in fog?

What is the rule regarding day signals to be displayed by a fishing vessel at anchor with her gear out?

How does a fishing vessel indicate to an approaching vessel that she has nets, lines, or trawls out in the daytime?

What fog signal is required to be sounded by a power-driven vessel having way upon her?

## INTERNATIONAL AND INLAND RULES.

What do towed vessels use to make fog signals in International waters?

What do towed vessels use to make fog signals in Inland waters?

What is positive evidence that risk of collision is present in a crossing situation?

When shall the Rules concerning lights be complied with?

When navigating in a large vessel, have you any special privileges over yachts and other small craft?

Where specific lines of demarcation are not prescribed, how would you determine whether International or Inland Rules would govern at entrances from seaward to bays, sounds, or other estuaries?

Name the lights required for sailing vessels.

What is the rule regarding speed in fog?

What is the difference in the location

requirements of the masthead light of a power-driven vessel on the high seas and on Inland waters of the United States?

Under what circumstances is the privileged vessel required to hold her course and speed?

At what point in a crossing situation is the privileged vessel bound to alter course or speed?

What is the only case in which a starboard to starboard passing would be proper for two steam vessels meeting end on or nearly end on?

In what two situations at sea may a privileged vessel use 5 or more short and rapid blasts provided by the Rules to call the attention of the burdened vessel to its obligation to keep clear?

What precautions are required by the Rules for vessels nearing a bend in a channel where approaching vessels may not be visible?

Do the Rules give any specific or special privilege to naval vessels to take the right of way over a commercial vessel at any time during the crossing situation?

What are the lights required for rowing boats whether under oar or sail?

What is the rule governing narrow channels?

What is the meaning of the one blast signal:

- (a) In international waters;
- (b) In inland waters?

If two sailing vessels are running free, with the wind on the port side of both, and approaching one another so as to involve risk of collision, which must keep out of the other's way?

What shall a power-driven vessel, which is directed by the Rules to keep out of the way of another vessel, do, if necessary, on approaching the other vessel?

When sail vessels are close hauled on different tacks, which must keep clear?

How can risk of collision be determined?

State the steering and sailing rules for two sailing vessels approaching one another so as to involve risk of collision.

When one sail vessel is running free and the other is close hauled, which must keep clear?

When two sailing vessels are running free, one with the wind on its starboard side and the other with the wind on its port side, and they are approaching one another so as to involve risk of collision, which vessel must keep out of the way?

Under what conditions does the General Prudential Rule, or Rule of Special Circumstances, Article 27, apply? State several situations where it must be applied.

Does the rule for an overtaking vessel apply to a sailing vessel overtaking a power-driven vessel?

Quote Rule (or article) 29, the "Precaution Rule".

Name 5 situations which could be classed as special circumstances.

In what respects do the International and Inland Rules regarding fog signals differ?

In thick weather, the wind is North-east and you hear a schooner blowing one blast of her fog horn; about how would she be heading?

If you observe a vessel's green light bearing NNE, how may that vessel be heading?

#### INLAND RULES.

What are the lights required to be carried by double-end ferryboats in inland waters?

State Article No. 3 of the Inland Rules relating to the special requirements with respect to lights for steam vessels towing or pushing another vessel.

What signal is required by the Pilot Rules when steam vessels are moved from their docks or berths and other boats are liable to pass from any direction toward them?

Describe the lights for rowing boats, under oars and sail.

What are the fog signals for steam vessels under way and also steam vessels under way but stopped and having no way upon them?

Under what circumstances should the inland danger signal be used in fog?

Your steamer is being overtaken by another steamer which blows one short blast. You regard it dangerous to comply with the overtaking steamer's request but are willing to allow him to pass you on your port side. What sig-

nals would you sound to indicate this?

Describe the day and night signals for self-propelling dredges underway with suction on the bottom.

What lights are required to be shown by all fishing vessels and fishing boats, of 10 gross tons or upwards, when underway and when not having their nets, trawls, dredges or lines in the water?

If, when nearing a short bend or curve in the channel, you blew the signal of one long blast on the whistle and it was answered by a similar whistle signal from another steamer on the other side of the bend, what action would you take?

State Article No. 18 Rule 8 of the Inland Rules which governs the overtaking situation.

What warning signals for day and night are displayed by Coast Guard vessels while handling or servicing aids to navigations?

State the day signal required for vessels at anchor with fishing gear out.

When a vessel is backing (that is, proceeding stern first) what rule governs its meeting with another vessel?

What precautions are required by the Rules for vessels nearing a bend in a channel where approaching vessels may not be visible?

What would you do if cross signals had been sounded in answer to your passing signal?

How are dredge or floating plant moorings marked and, at night, how is their location shown to an approaching vessel?

What is the rule regarding the speed of vessels passing floating plants working in a channel?

What lights and day signals are required to be displayed by inland steam-vessels, derrick boats, lighters, or other types of vessels made fast alongside a wreck, or moored over a wreck which is on the bottom, or partly submerged, or which may be drifting?

What is the inland rule danger signal?

When should the Inland Rule danger signal be used?

Do the Rules give any specific or special privileges to naval vessels to take the right of way over a commercial vessel at any time during the crossing situation?

How would you know on which side it would be clear to pass a dredge working in a channel, by day and by night?

Describe the lights to be displayed on pipelines attached to dredges and either floating or supported on trestles.

In the crossing situation, should either vessel fail to understand the course or intention of the other, what shall she immediately do and what action must then be taken by both vessels?

What are the rules for sound signals in a fog for:

- (a) A steam vessel;
- (b) A sailing vessel;
- (c) A vessel at anchor;
- (d) A steam vessel when towing or a vessel being towed;
- (e) Rafts or other water craft?

What is indicated by a vessel which displays a day signal consisting of 2 red balls, 2 feet in diameter and 3 to 6 feet apart vertically, 15 feet above the deck house?

What is indicated by a vessel which displays a day signal consisting of 2 balls, 2 feet in diameter, 3 to 6 feet apart vertically, about 20 feet above the deck house if the upper ball is painted in alternate black and white vertical

stripes and the lower ball is a solid bright red?

State the Pilot Rule governing the action required when vessels are approaching each other at right angles or obliquely, so as to involve risk of collision, other than when one vessel is overtaking another.

How do the whistle signals under Inland Rules for the overtaking situation differ from the whistle signals under International Rules?

You are overtaking another steamer and without altering your course, will pass him a quarter mile off to port when abeam. Would it be necessary to sound a passing signal? Why?

When two vessels are meeting in a crossing situation, which vessel should blow a passing signal first?

Describe the lights required in United States Harbors (except the Hudson River, etc.) for barges and canal boats towed astern of steam vessels, when towed singly, or what is known as tandem towing.

Describe the lights required in United States Harbors (except the Hudson River, etc.) for barges and canal boats towed astern of steam vessels, when two or more boats are abreast.

Describe the lights required in United States Harbors (except the Hudson River, etc.) for barges, canal boats or scows, when being pushed ahead of a steam vessel.

When two vessels are approaching each other at right angles or obliquely, what signal signifies the intention of the steam vessel which is to starboard of the other to hold course and speed?

What is the rule regarding obstruction of a channel by a floating plant?

What is the rule for the protection of marks placed for the guidance of dredges or floating plants?

What is the rule regarding clearing of channel by dredges or floating plants, where regulations have not been prescribed?

What is signified by a steamer displaying a day signal consisting of two shapes in the form of a double frustum of a cone, base to base, both shapes painted a solid bright red?

State the rule governing the bunching of tows.

Under what circumstances must passing signals be given and answered?

State what action you would take if a vessel on your port bow and crossing your course so as to involve risk of collision fails to answer your passing signal of one short blast.

Do the special signals prescribed for surveying vessels give such vessels the right of way or obviate the necessity for strict observance of the rules for preventing collision of vessels?

Are Coast Guard cutters or war ships of the United States permitted to operate without running lights?

State the rules relating to the carrying of unauthorized lights on vessels.

What lights shall be carried by any raft being propelled by hand power, or by the power of the river, or when being towed, or which are anchored, or moored in or near a channel, or fairway?

Describe the lights required where a stringout of moored vessels or barges is engaged in the operation of vessels moored or anchored and engaged in laying cables, pipes, or submarine construction, etc.

What navigation light (or lights) is/are required for a vessel propelled by hand power, horsepower, or by the current of the river; except rafts and rowboats?

What information can be determined about the heading of a vessel by observing her colored sidelights?

Describe the lights required in United States Harbors (except the Hudson River, etc.) for barges, canal boats, or scows towing alongside a steam vessel if the deck, deckhouses, cargo of the barge or canal boat be so high above water as to obscure the side lights of the towing steamer.

In thick weather, the wind is north-east and you hear a schooner blowing one blast of her fog horn; about how would she be heading?

What is the rule for light draft vessels passing floating plants?

How should all orders to helmsmen be given?

What is the permissible length of a tow of seagoing barges within inland waters?

What is the maximum length of hawser permitted between vessels in a tow on inland waters?

What is the length of a "long blast" as this term is used in the Inland and Pilot Rules?

What does the term "floating plant" as used in the Rules include?

State the distress signals for vessels in inland waters.

When is the sound signal of one long blast used by vessels in inland waters of the United States?

What signal is given by a steamer nearing a bend or curve in a channel if, because of height of the banks or other cause, a steam vessel approaching from

the opposite direction cannot be seen for a distance of a half mile?

Describe the day and night signals for vessels moored or anchored and engaged in laying cables or pipe, submarine construction, excavation, mat sinking, bank grading, dike construction, revetment, or other bank protection operations.

What are the day and night signals for dredges held in stationary positions by moorings or spuds?

What is the penalty for any licensed officer not observing the provisions of the Inland Rules?

What is the penalty for any vessel navigated without complying with the provisions of the Inland Rules?

Describe the anchor lights required by steamers.

What is the day signal for a vessel at anchor in a channel or fairway?

Describe the running lights of a steam vessel under the Inland Rules—other than seagoing vessels and ferry-boats.

Describe the signals to be made by a vessel intending to pass dredges or other types of floating plant working in navigable channels.

An ocean steamer 550 feet long is being shifted at night from one dock to another in New York harbor by three tugs. One tug is on a hawser 100 feet ahead of the steamer and one tug is alongside on each quarter. What lights are required to be shown by each of the four vessels?

What lights and day signals are carried by a vessel of the Coast and Geodetic Survey when at anchor in a fairway on surveying operations?

Describe the lights carried by a Pilot vessel engaged in pilotage duty in United States waters and at anchor.

A sailing pilot vessel 150 feet in length anchors at night on the way out to her station, but not on it. What light or lights must she display?

Where must the two anchor lights be shown in vessels of 150 feet and upwards?

What day signal must be displayed in the forward part of the vessel where it can best be seen from other vessels when a vessel more than 65 feet in length is moored or anchored in a fairway or channel between sunrise and sunset?

Why is an inland steam vessel, not required to show a stern light, when her lights are fitted in accordance with the inland rules?

What lights are shown by vessels not under command in inland waters?

What lights are shown by vessels aground in inland water?

What are the lights for seagoing steam vessels in inland waters?

Where do the Pilot Rules apply?

What is meant by the "danger" signal?

What lights and day signals are displayed in inland waters by a surveying vessel of the Coast and Geodetic Survey at anchor in a fairway on surveying operations?

What is the fog signal for a steam vessel underway?

Of what duration are the blasts of the whistle which are used as passing signals?

What signal shall be given by steam vessels when moving from their docks or berths and other vessels are liable to pass from any direction toward them?

What is the rule in regard to sailing in a narrow channel?

Describe the lights and day signals required to be shown by a fishing vessel underway with her nets or lines in the water.

What are the day and night signals to be carried by a steamer when towing a submerged, or partly submerged, object when no signals are displayed upon the object towed?

What signal must a steamer give in addition to the one long blast when

backing out of her berth with other vessels in sight?

What is the rule governing lights for barges, canal boats, scows, and other nondescript vessels temporarily operating on waters requiring different lights from those of their customary route?

What navigation lights are required by motorboats when propelled by sail and machinery or by sail alone?

What lights are required by fishing vessels of less than ten gross tons when underway and when not having their nets, trawls, dredges or lines in the water?

Under what circumstances should the inland danger signal be used in fog?

Your steamer is being overtaken by another steamer which blows one short blast. You regard it as dangerous to comply with the overtaking steamer's request but are willing to allow him to pass you on your port side. What signals would you sound to indicate this?

Describe the day and night signals for self-propelled dredges under way with suction on the bottom.

What are the whistle signals for a vessel moving from her dock or berth when other vessels are liable to pass toward her?

What navigating lights would be required on self-propelled dredges which are proceeding to or from a dredging site?

#### RADAR OBSERVER

*Define* and state the cause of:

- (a) Super-Refraction
- (b) Sub-Refraction

How may radar be used for short range weather predictions?

What weather phenomena are detectable by radar?

State the precautions necessary when using the sea-return suppressor or anti-clutter device.

How can heavy rolling influence detection of targets by radar?

Is the relative bearing or the true bearing presentation best for clarity of presentation on the PPI scope? State reasons for your answer.

How can radar blind spots be located?

What measures may be taken to minimize dangers from blind spots?

How was the name "radar" derived?

Explain briefly in non-technical terms the principle upon which radar is based.

What are the elements of a radar installation that affect its range?

Name the principal components of a marine radar installation and briefly in non-technical terms, describe their functions.

In basic terms, what is radar?

What is meant by the term "bearing resolution" when applied to radar? On what does bearing resolution depend?

What is resolution in range? On what does resolution in range depend?

What are relative bearings as seen on a radar PPI scope?

What are true bearings as seen on a PPI scope? How is the course of the vessel usually indicated when using true bearings?

What range scale would you use in the open sea? What scale would you use to make a landfall? What scale would you use in a crowded channel?

What precautions should be observed during poor visibility if the radar scope shows heavy sea return?

What effect does the material composing an object have on its being detected by radar?

How could you identify low flying aircraft appearing on the radar scope?

What limits the effective range of radar?

Describe briefly the essential parts of a radar set.

What is the effect of a radar reflector on a buoy?

Is a bearing obtained through use of radar or visually preferable? Why?

In using radar to obtain navigational positions, which should be more accurate:

(a) A fix obtained by cross-bearing of two objects.

(b) The intersection of the arcs obtained using the ranges from the objects as radii.

Explain your answer.

Do atmospheric conditions affect the range at which objects may be discerned by radar? State the reasons for your answer.

What safety precautions must be taken when examining or working on the interior of a radar set?

Navigating in ice, how may areas of clear water be distinguished on the PPI scope? What are the limitations on the effectiveness of radar in detecting ice bergs and growlers?

Define:

- (a) Relative movement;
- (b) Relative speed;
- (c) Relative distance.

In each of the following cases, give the approximate direction and rate at which the pip would move on your PPI scope:

(a) If your vessel, while proceeding North at 15 knots, observed by radar a stationary object.

(b) If your vessel, while proceeding East at 10 knots, observed by radar a vessel proceeding West at 10 knots.

(c) If your vessel, while proceeding South at 10 knots, observed by radar a vessel proceeding South at 10 knots.

What does a sudden increase or decrease of the signal strength of another vessel's pip on the PPI scope usually denote when the vessel observed on the PPI scope is close to your vessel?

What factors aboard ship would cause blind sectors on the PPI scope?

Explain in your own words how the course and speed of another vessel is determined by ranges and bearing taken by an observer on a moving vessel.

Your vessel is on course 230° True at a speed of 8 knots.

At 0800, a vessel is observed on the PPI scope bearing 290° True at a distance of 7.6 miles.

At 0815, the vessel is observed bearing 283° at a distance of 6.0 miles.

At 0830, the vessel is observed bearing 273° at a distance of 4.6 miles.

(a) Assuming that both your vessel and the vessel observed maintain course and speed, determine the distance between your vessel and the vessel observed at their closest point of approach.

(b) Determine the course and speed of the vessel observed.

(c) Determine the time of the closest point of approach.

Your vessel is on course 135° True at a speed of 9 knots.

At 0028, a vessel is observed on the PPI scope bearing 110° True at a distance of 10 miles.

At 0032, the vessel is observed bearing 109° at a distance of 9 miles.

At 0036, the vessel is observed bearing 107°.5 at a distance of 8 miles.

(a) Assuming that both your vessel and the vessel observed maintain course and speed, determine the distance between your vessel and the vessel observed at their closest point of approach.

(b) Determine the course and speed of the vessel observed.

(c) Determine the time of closest point of approach.

Your vessel is on course 060° True at a speed of 8 knots.

At 1500, a vessel is observed on the PPI scope bearing 080° True at a distance of 7 miles.

At 1508, the vessel is observed bearing 080° True at a distance of 6 miles.

(a) Determine the course and speed of the vessel observed.

(b) Determine that course to which to alter at 1512 which will enable you to pass the observed vessel at a distance of 3 miles on your port side.

Your vessel is on course 140° True at a speed of 6 knots.

At 1200, a vessel is observed on the PPI scope bearing 200° True at a distance of 5 miles.

At 1206, the vessel is observed bearing 200° True at a distance of 4 miles.

At 1212, the vessel is observed bearing 200° True at a distance of 3 miles.

(a) What would be the effect of altering your course to 080°? Explain in full.

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## COAST GUARD DISTRICT COMMANDERS AND MERCHANT MARINE ACTIVITIES

District	Title	City	State	Address
1st	Commander, 1st Coast Guard District	Boston	Mass.	1400 Customhouse.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	447 Commercial St.
	do	Portland	Maine	P.O. Box 108, Pearl St. Sta.
	do	Providence	R.I.	409 Federal Bldg.
2d	Commander, 2d Coast Guard District	St. Louis	Mo.	Federal Bldg., 1520 Market St.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Cairo	Ill.	P.O. Box 391.
	do	Dubuque	Iowa	Box 695.
	do	Cincinnati	Ohio	512 Gwynne Bldg., 6th and Main Sts.
	do	Louisville	Ky.	254 Francis Bldg., 4th and Chestnut Sts.
	do	Memphis	Tenn.	426 Falls Bldg.
	do	Nashville	do	670 U.S. Courthouse, 801 Broadway.
	do	Pittsburgh	Pa.	1215 Park Bldg.
do	Huntington	W. Va.	328 Post Office and Federal Courthouse Bldg., 5th Ave. and 9th St.	
3d	Commander, 3d Coast Guard District	New York	N.Y.	Customhouse.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	New London	Conn.	302 Post Office Bldg.
	do	Albany	N.Y.	313 Federal Bldg.
	do	Philadelphia	Pa.	Customhouse.
5th	Commander, 5th Coast Guard District	Portsmouth	Va.	Federal Bldg., 301 Crawford St.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Baltimore	Md.	Customhouse.
7th	Commander, 7th Coast Guard District	Miami	Fla.	150 SE. 3d Ave.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	410 Calumet Bldg., 10 NE. 3d Ave.
	do	Tampa	do	316 Franklin St., P.O. Box 3172.
	do	Charleston	S.C.	32 U.S. Customhouse.
	do	Savannah	Ga.	P.O. Box 191.
	do	Jacksonville	Fla.	210 Federal Bldg., P.O. Box 4968.
	do	San Juan	P.R.	P.O. Box 3666, 302 Federal Bldg.

## COAST GUARD DISTRICT COMMANDERS AND MERCHANT MARINE ACTIVITIES—Continued

District	Title	City	State	Address
8th	Commander, 8th Coast Guard District	New Orleans	La	332B Customhouse, 423 Canal St.
	Chief, Merchant Marine Safety Division.	do	do	309 Customhouse, 423 Canal St.
	Officer in Charge, Marine Inspection	do	do	310 Customhouse, 423 Canal St.
	do	Mobile	Ala	563 Federal Bldg.
	do	Port Arthur	Tex	General Delivery.
	do	Galveston	do	Do.
	do	Corpus Christi	do	101 Federal Bldg.
	do	Houston	do	7300 Wingate Ave.
9th	Commander, 9th Coast Guard District	Cleveland	Ohio	Main Post Office Bldg., West 3d & Prospect Sts.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	1055 E. Ninth St.
	do	Buffalo	N. Y.	440 Federal Bldg.
	do	Oswego	do	205 Federal Bldg.
	do	Detroit	Mich	428 Federal Bldg.
	do	Duluth	Minn	311 Federal Bldg.
	do	Toledo	Ohio	Room 307 Had Bldg., 429 Summit St.
	do	Saint Ignace	Mich	Municipal Bldg.
	do	Chicago	Ill.	10101 So. Ewing Ave.
do	Ludington	Mich	National Bank Bldg.	
do	Milwaukee	Wis	Room 400, 135 W. Wells St.	
11th	Commander, 11th Coast Guard District	Long Beach	Calif.	706 Times Bldg.
	Chief, Merchant Marine Safety Division.	do	do	1102 Times Bldg.
	Officer in Charge, Marine Inspection	do	do	1105 Times Bldg.
	do	San Diego	do	P. O. Box 1389.
12th	Commander, 12th Coast Guard District	San Francisco	Calif.	630 Sansome St.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Station B, Box 2029.
13th	Commander, 13th Coast Guard District	Seattle	Wash.	618 2d Ave.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Portland	Oreg.	202 Lincoln Bldg., 208 SW. 5th Ave.
14th	Commander, 14th Coast Guard District	Honolulu	Hawaii	1347 Kapiolani Blvd.
	Chief, Merchant Marine Safety Division.	do	do	610 Fort St.
	Officer in Charge, Marine Inspection	do	do	Do.
17th	Commander, 17th Coast Guard District	Juneau	Alaska	P. O. Box 2631.
	Chief, Merchant Marine Safety Division.	do	do	Do.
	Officer in Charge, Marine Inspection	do	do	Do.
	do	Anchorage	do	P. O. Box 67.









