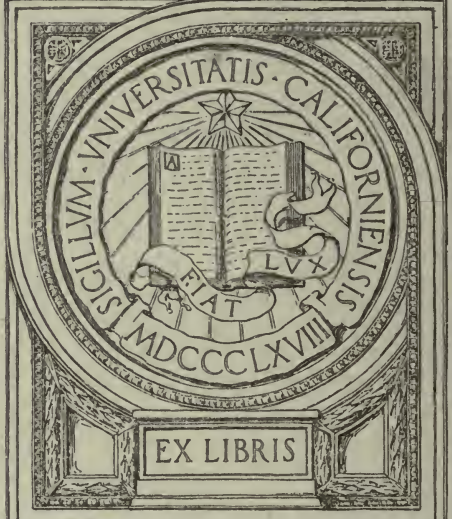

# Suggestive Lessons in Numbering

## Arranged for Individual Work

## FIFTH GRADE

BY

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Los Angeles

1922
HARR WAGNER PUBLISHING CO.
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## PREFACE.

These lessons are planned to use with the California State Series, and so are not complete in themselves, but they show possibilities of securing material from other divisions of the curricula. So close is the relation between arithmetic and the other branches of knowledge, that it might be said that only the mastery of the fundamental processes should be designated arithmetic, for the application belongs wherever quantitative thinking is desirable. The importance of finding favorable opportunities for this kind of thinking cannot be over-emphasized, and nowhere are they more auspicious than along the lines of the pupils' present interests and needs.

In consideration of the pupils' individual abilities and differences, the arrangement as well as the graded steps, both in the separate lessons and the series as a whole, is such that they may progress, each at his own rate of speed and with his own degree of doing. The essential points are, that each pupil feels an inner urge to do, and that he develops his own power by such activity.

M. M. C.

February 15, 1922.

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# SUGGESTIVE LESSONS IN NUMBERING

## ARRANGED FOR INDIVIDUAL WORK.

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## FIFTH GRADE.

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### LESSON I.

1. (a) Draw a line that you think is one inch long. Measure with a ruler. (b) Draw another line that you think is one inch long. Use your ruler to draw an inch line just below this. (c) Practice drawing inch lines without the ruler until you can make them look as though they had been drawn with a ruler.

2. (a) Draw a two-inch line without the ruler. Measure it. Is it too short or too long? Can you make another that is about right? (b) Make two points on your paper that are three inches apart. Do this by guess. Now measure the distance between them to see if you are right. Just below these points draw a three-inch line.

3. (a) How long is your paper? Measure it to see if you made a good guess. How wide is it? Measure its width. How many inches were you "off" in your guess? (b) How long is your book? How wide is it? How many inches did you miss in the length? How many in the width?

4. (a) How far is it from the end of your first finger

to the second joint? Measure to see if you are a good guesser. How far is it from the end of your first finger to the knuckle? (b) How much longer is your second finger than your first? What is the length of your thumb?

5. (a) Measure the distance from the end of your thumb to the end of your first finger when your hand is opened out wide; from the end of your thumb to the end of your second finger; from the end of your thumb to the end of your little finger.

6. (a) Measure the width of your hand. (b) Measure the distance from the end of your second finger to your elbow. (c) Stretch your hands out wide and place the ends of the thumbs together. Now make points with the ends of the little fingers. Measure the distance between these points. (d) Who in your class can stretch their little fingers farther apart than you can? How much farther? (e) Who cannot stretch as far? How much less?

7. (a) Draw a line nine inches long. One-half inch below this draw another of the same length. Join the ends. (b) What is the length of this rectangle? What is its width?

8. (a) Mark off quarter inches at the top and bottom of this rectangle. (b) Connect these points, making as many little rectangles as you can. How many did you make? (c) In the middle of the big rectangle draw a line from side to side. How many squares have you made? What is the size of each square?

9. You have made this so as to keep a record of your lessons. After you have finished it, fasten it to your book in some way so that you will not lose it. (a) In the upper row of squares number from 1 to 40. (b) Each time you have handed your teacher a lesson, mark off the square

under the number of the lesson, thus |/|. When you have corrected your mistakes in the lessons, mark it |X|.

10. Get a piece of heavy cardboard, 20 inches long. (a) Leave a two-inch space at the left. (b) Mark off half-inches along the rest of the top. (c) After leaving a two-inch space at the left, mark off half-inches along the rest of the bottom line. (d) How many pupils are there in your class? Mark off one more than that many half-inches along both sides. (e) Now draw all the lines to make the little squares. (f) In the top row write numbers 1 to 40. (g) On the lines in the two-inch space write the names of the pupils in your class. The teacher will select the best chart for the class record. Keep this up on the wall where everyone can see it.

## LESSON II.

An easy way of keeping a record of your work.

1. (a) Make a three-inch square. (b) Mark off each half-inch with a little dot in both the top and bottom lines. (c) Draw a line from the dot in the top line to the one just below it in the bottom line. (d) Mark off the sides of the square into quarter inches. (e) Draw a line from the dot in the left side to the one just across from it in the right side. (f) Make double lines around the big square by drawing lines one-sixteenth of an inch below each of the outside lines. (g) In the little boxes at the top of the square, write the abbreviations for the days of the week, beginning with the second one from the left. (Write Mon. for Monday, Tues. for Tuesday, etc.) (h) Use the boxes at the left of the square for numbers. In the one at the bottom write "o"; in the one above, "10"; the next one, "20," and so on, counting by 10s until you have reached 100.

2. (a) The first inside line at the bottom is the 10 line. Which is the 40 line? The 90 line? The 30 line? The 70 line? (b) Where would you show 75? 45? 95? 25? 85?

3. These were John's grades for a week in his arithmetic drill: Monday, 60; Tuesday, 50; Wednesday, 80; Thursday, 75; Friday, 90. (a) Put the grade for Monday on the 60 line in the middle of the column marked **Mon.** (b) Show with your finger where you will put the grade for Tuesday. Put a point there. (c) Find the place for Wednesday's grade. Make a point. (d) Where should Thursday's grade be placed? Mark it. (e) On which line shall you place the grade for Friday? Locate this point. (f) Now draw a line through all these points, beginning with the first one located, then the second, third, etc.

Such a line is called a **graph.** It shows at a glance the progress that is made in a week.

4. The next week John made these grades in his arithmetic drill: Monday, 90; Tuesday, 75; Wednesday, 80; Thursday, 60; Friday, 85. (a) Where shall you place Monday's grade? Locate the point. (b) Show where Tuesday's grade is to be placed; Wednesday's; Thursday's; Friday's. Connect these points with a broken line like this: — — — — — —.

5. John's record for the third week in the same work was as follows: Monday, 65; Tuesday, 75; Wednesday, 90; Thursday, 85; Friday, 100. (a) Locate the point for Monday; for Tuesday; for Wednesday; for Thursday; for Friday. (b) Use either a colored pencil or pen and ink to connect these points. (c) Why did you make the graph different each time?

6. Make another square as you did in Example 1.

7. Make a graph showing Mary's attendance at school: Monday she was there all day (100); Tuesday, came 10

minutes late (95); Wednesday, all day; Thursday, left 20 minutes early; and Friday, was present a half-day.

## LESSON III.

1. Mary made these grades in her arithmetic drill: Monday, 40; Tuesday, 25; Wednesday, 55; Thursday, 70; Friday, 0. Make a graph showing the result of the week's work.

2. Mary's grades the second week were as follows: Monday, 35; Tuesday, 50; Wednesday, 45; Thursday, 60; Friday, 75. Make a graph of this record. (Be careful to make the two graphs for Mary so that both records will be clear.)

3. Make another square as you did in Example 1 of last lesson.

4. The fifth-grade spelling was having a review the entire week. Each day they had twenty words. Here are the records for eight in the class: (The figures show words missed.)

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|---|
| Rae | 0 | 5 | 2 | 1 | 4 |
| Philip | 5 | 8 | 3 | 2 | 2 |
| George | 10 | 5 | 5 | 3 | 1 |
| Frank | 5 | 2 | 1 | 3 | 0 |
| Paul | 4 | 2 | 5 | 1 | 1 |
| Julia | 3 | 0 | 2 | 0 | 0 |
| Elizabeth | 5 | 2 | 3 | 1 | 2 |
| Vivian | 2 | 4 | 1 | 2 | 3 |

(a) If there are 20 words in the lesson, how much should be taken off for each word? (b) What is Rae's grade for Monday? How much was taken off on Tuesday? What was her grade for Tuesday? for Wednesday? for Thurs-

day? for Friday? (b) Find Philip's grade for each day in the week. (c) What are George's grades for the week? (d) How much did Frank make each day? (e) What were Paul's grades for the week? (f) Find Julia's grades. (g) Elizabeth's grades. (h) Vivian's.

5. (a) What is the sum of all the grades that were made on Monday? (b) Divide this sum by **8.** The answer is the **average** for the class that day. (c) Find the sum of all the grades for Tuesday. (d) What shall you divide by to get the average? Why? What is the average for Tuesday? (e) Find average for Wednesday. (f) What is the average for Thursday? (g) Find average for Friday.

6. Make a graph of the class averages for a week; graphs for two of the pupils.

7. (a) Make a graph of your attendance at school last week. (b) Make a graph of your work in arithmetic for a week. (c) Make a graph of your spelling grades for a week.

8. (a) If you were to make a graph showing the temperature in your schoolroom for each hour from 9 a. m. till 3 p. m., how many columns would you need? (b) How many boxes on the left-hand side would you need? (When it is the coldest, what is the temperature of your room? What is the temperature when it is the warmest? The difference in these two will tell you how many boxes are needed. Each box represents one degree of temperature.)

9. Make a graph so as to keep the temperature of your room each hour in the day for five days.

## LESSON IV.

Make yourself a checkerboard and join the checker club.

1. Draw an 8-inch square. (b) Mark off inch-spaces on all four sides. (c) Make as many inch-squares in the big

square as you can. (d) How many inch-squares are there in one row? How many rows are there? (e) How many inch-squares are there?

2. (a) In the first row at the bottom shade the one to the left. (b) Now shade every other one in this row. (c) In the second row from the bottom, shade the second from the left. (d) Then shade every other one in this row.

3. (a) In the third row from the bottom shade the first one to the left, and then shade every other one. (b) In the fourth row shade the second one from the left, and then shade every other one. (c) In the fifth row shade the first one, omit the second, shade the next, and then shade every other one. (d) Which one shall you shade first in the sixth row? Omit the third, shade the fourth, omit the fifth, shade the sixth, omit the seventh, shade the eighth.

4. (a) In the seventh row, shade the first one to the left, omit the second, shade the third, omit the fourth, and then shade every other one. (b) In the top row shade the second one from the left, and then every other one.

5. (a) Name the even-numbered rows. Is the first or second shaded in these rows? (b) Name the odd-numbered rows. Is the first or second shaded in these rows? (c) How many are shaded in the whole square? (d) How many are not shaded? (e) How many are shaded from one corner to the one opposite it?

6. (a) In making your checkerboard, if you wanted your squares to measure $1\frac{1}{2}$ inches, how long should you make your big square? How wide? (b) If you wanted to make each square $1\frac{1}{4}$ inches, how long should you make it? (c) If the small squares measured $1\frac{1}{8}$ inches, what would be the length of the big square? (d) If they measured $1\frac{7}{8}$ inches, how long would the big square be?

7. (a) If your paper measured 16 inches, how large could you make your small squares? (b) If it measured 14 inches, the small squares would measure.....inches. (c) If it measured 13 inches, the small square would be.....inches long. (d) If it measured 17 inches, the small square would be.....long.

8. (a) How large a checkerboard could you make from a piece of cardboard that was 18 inches long and 15 inches wide? What would be the size of the small squares? (b) How large a checkerboard could you make from a piece that measured 18 inches by 20 inches? (That means a piece 20 inches long and 18 inches wide.) How large would each of the squares be in this checkerboard?

9. A good size for a checkerboard is a 14-inch square. Each small square would measure.....inches. (a) Get a good piece of cardboard a little larger than this. (b) Draw the big square. (c) How many points shall you make in each side? How far apart will they be? (d) Draw the small squares. (e) If you do not remember, it will tell you in problems 2, 3 and 4 which squares to shade.

10. Your men can be made from empty spools. Saw off the flat parts. You will need 24 of these parts. Twelve of them should be painted with ink.

## LESSON V.

1. (a) Draw a line six inches long. A half-inch below this line draw another the same length. (b) Continue to draw such lines until you have eight of them.

2. (a) Divide the top line into two equal parts. (b) Each part is....., and is.....inches long.

3. (a) Divide the second line into three equal parts. (b) Each part is....., and is.....inches long.

4. (a) Divide the third line into four equal parts. (b) Each part is....., and is.....and.....inches long.

5. (a) Divide the fourth line into five equal parts. (b) Each part is....., and is.....and.....inches long.

6. (a) Divide the fifth line into six equal parts. (b) (b) Each part is....., and is.....inch long.

7. (a) Divide the sixth line into eight equal parts. (b) Each part is....., and is.....inch long.

8. (a) Divide the seventh line into ten equal parts. (b) Each part is....., and is.....inch long.

9. (a) Divide the eighth line into twelve equal parts. (b) Each part is....., and is.....inch long.

10. Write each of the fractions that you have made in the above problems with figures (½, ⅓, etc.).

11. (a) How many fourths are the same as one-half? (b) How many sixths? (c) How many eighths? (d) How many tenths? (e) How many twelfths?

12. (a) How many sixths are the same as one-third? (b) How many twelfths? (c) How many tenths are the same as one-fifth?

13. (a) How many eighths are the same as one-fourth? (b) How many twelfths are the same as one-fourth?

14. (a) How many eighths are the same as three-fourths? (b) How many twelfths are the same as three-fourths?

15. (a) How many sixths are the same as two-thirds? (b) How many twelfths are the same as two-thirds?

16. (a) How many tenths are the same as two-fifths? (b) How many tenths are the same as three-fifths?

17. One-half equals.....sixths; one-third equals..... sixths. Which is the greater, one-half or one-third? How much greater?

18. One-third equals.....twelfths; one-fourth equals

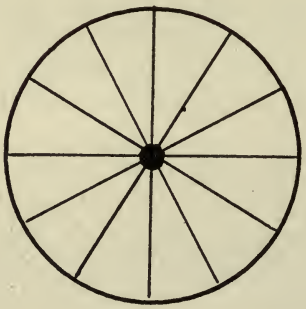
.....twelfths. Which is the greater, one-third or one-fourth? How much greater?

19. Two-thirds equals.....twelfths; three-fourths equals.....twelfths. Which is the greater, two-thirds or three-fourths? How much greater?

20. (a) What is the sum of ½ and ⅓? ½ and ⅓=
(b) What is the sum of ⅓ and ¼? ⅓+¼=
(c) What is the sum of ½ and ¾? ½+¾=
or.....and..... .....

21. (a) What is the sum of ⅔ and ¾? ⅔+¾=.....; or .....
(b) What is the sum of ⅜ and ¾? ⅜+¾=.....; or .....
(c) What is the sum of ⅔ and ⅚? ⅔+⅚=.....; or .....
(d) What is the sum of ¾ and ⅞? ¾+⅞=.....; or .....
(e) What is the sum of ½, ¼ and ⅝? ½+¼+⅝=.....; or.....
(f) What is the sum of ⅓, ¼ and ⅙? ⅓+¼+⅙=.....; or.....

## LESSON VI.



1. (a) This circle is divided into how many parts? (b) Each part is called..... ..... It may also be written.....

2. (a) How many twelfths in $\frac{1}{3}$ of the circle? In $\frac{1}{4}$? In $\frac{2}{3}$? In $\frac{3}{4}$? In $\frac{5}{6}$?

3. (a) How many fourths of the circle in nine of those parts? (b) How many halves in six parts? (c) How many thirds in eight parts? (d) How many sixths in ten parts? (e) How many fourths in three parts? (f) How many thirds in one part? (g) How many twelfths in eleven parts?

4. (a) One-half is the same as.....fourths, .....eighths, .....sixths, .....tenths, .....twelfths. (b) One-third is the same as.....sixths, .....ninths, .....twelfths. (c) One-fourth is the same as.....eighths, .....twelfths.

5. (a) Two-thirds is the same as.....sixths,.....twelfths, .....ninths. (b) Three-fourths is the same as.....eighths, .....twelfths, .....sixteenths.

6. (a) Draw a 2-inch square. (b) Divide this square into four equal squares. (c) Divide each of these smaller squares into four squares.

7. (a) One of these smallest squares is what part of the big square? (b) Two of these little squares is what part of the big square? What other way could you say it?

8. (a) Four of the little squares is what part of the big square? (b) Ten of the little squares is what part of the big square? (c) Sixteen of the little squares equals $\frac{1}{32}$, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, of the big square.

9. (a) Add $\frac{3}{8}$ inch to a line $\frac{1}{2}$ inch long. What is the length of the line? (b) Add $\frac{5}{8}$ inch to a line $\frac{3}{4}$ inch long. length of the line? (b) Add $\frac{5}{8}$ inch to a line $\frac{3}{4}$ long. What is the length of the line? (c) Add $\frac{5}{16}$ inch to a line $\frac{7}{8}$ inch long. What is the length of the line? (d) Add $\frac{3}{16}$ inch to a line $\frac{3}{4}$ inch long. What is the length of the line?

10. (a) Erase $\frac{1}{8}$ inch from a line $\frac{1}{2}$ inch long. What is the length of the line? (b) Erase $\frac{5}{16}$ inch from a line

$1\frac{1}{4}$ inches long. What is the length of the line? (c) Erase $\frac{7}{16}$ inch from a line $1\frac{1}{2}$ inches long. What is the length of the line? (d) Erase $\frac{5}{8}$ inch from a line $2\frac{1}{4}$ inches long. What is the length of the line? (e) Erase $\frac{7}{8}$ inch from a line $1\frac{3}{16}$ inches long. What is the length of the line?

11. (a) What length of line equals the sum of $2\frac{1}{4}$ inches and $1\frac{7}{8}$ inches? (b) What length of line equals the difference between $2\frac{1}{4}$ inches and $1\frac{7}{8}$ inches?

12. (a) What length of line equals the sum of $3\frac{1}{8}$ inches and $1\frac{3}{4}$ inches? (b) What length of line equals the difference between $3\frac{1}{8}$ inches and $1\frac{7}{8}$ inches?

13. (a) How many hours are there in a day? (b) How many hours in $\frac{1}{4}$ of a day? $\frac{1}{3}$ of a day? (c) How many hours in $\frac{3}{4}$ of a day? In $\frac{2}{3}$ of a day? (d) How many hours in $\frac{1}{6}$ of a day? $\frac{1}{12}$ of a day? In $\frac{5}{6}$ of a day? In $\frac{7}{12}$ of a day?

14.

| | | |
|---|---|---|
| $1\frac{1}{4}+\frac{1}{4}=$ | $1\frac{3}{4}-\frac{1}{8}=$ | $2\frac{1}{2}-\frac{3}{4}=$ |
| $\frac{7}{8}-\frac{1}{8}=$ | $1\frac{1}{2}-\frac{7}{8}=$ | $2\frac{3}{4}+\frac{7}{8}=$ |
| $2\frac{5}{8}-\frac{3}{8}=$ | $1\frac{1}{4}-\frac{5}{8}=$ | $1\frac{1}{4}+2\frac{3}{8}=$ |
| $1\frac{7}{8}+\frac{5}{8}=$ | $1\frac{1}{2}+\frac{1}{8}=$ | $1\frac{1}{2}+\frac{5}{8}=$ |

## LESSON VII.

### FRACTIONS

### DRILL SHEET—ADDITION I.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{2}{3}$ | $\frac{3}{4}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{7}{8}$ | $\frac{7}{10}$ |
| $\frac{1}{4}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{4}$ | $\frac{3}{4}$ | $\frac{1}{3}$ | $\frac{5}{8}$ | $\frac{3}{4}$ | $\frac{3}{5}$ |
| — | — | — | — | — | $\frac{1}{2}$ | — | — | — | — |
| | | | | | — | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 7/8 | 1/2 | 3/4 | 7/8 | 1/2 | 1/2 | 1/3 | 5/8 | 2/3 |
| 2/3 | 1/2 | 3/8 | 1/2 | 1/8 | 3/10 | 1/8 | 5/6 | 3/4 | 5/6 |
| — | — | — | 3/8 | — | — | — | — | — | — |
| | | | | — | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 9/10 | 2/3 |
| 5/8 | 3/10 | 1/3 | 1/6 | 1/4 | 3/5 | 3/4 |
| 3/4 | 1/2 | 5/6 | — | 5/8 | 1/2 | — |
| — | — | — | | — | — | |

## DRILL SHEET—ADDITION II.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 1/2 | 1/3 | 7/10 | 1/2 | 1/2 | 1/2 | 1/2 | 1/3 |
| 1/4 | 3/4 | 1/4 | 1/2 | 1/5 | 1/3 | 1/2 | 1/8 | 1/4 | 1/3 |
| 1/2 | 1/2 | 3/4 | 2/3 | 1/2 | 3/4 | 1/2 | 3/4 | 1/4 | 2/3 |
| — | — | — | — | — | — | 1/2 | — | 1/2 | 1/6 |
| | | | | | | 1/2 | | — | — |
| | | | | | | — | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 2/3 | 1/2 | 1/2 | 1/2 | 1/2 | 1/3 | 5/6 | 4/5 | 3/4 |
| 2/3 | 1/2 | 1/4 | 1/3 | 3/4 | 1/2 | 1/2 | 2/3 | 3/10 | 1/2 |
| 1/2 | 2/3 | 3/8 | 1/4 | — | — | — | — | — | — |
| 1/4 | 1/6 | 3/4 | — | | | | | | |
| — | — | — | | | | | | | |

## DRILL SHEET—ADDITION III.

| | | | | | | |
|---|---|---|---|---|---|---|
| $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{1}{5}$ | $\frac{3}{4}$ | $\frac{3}{5}$ | $\frac{1}{2}$ | $\frac{3}{8}$ |
| $\frac{3}{4}$ | $\frac{1}{6}$ | $\frac{3}{10}$ | $\frac{1}{8}$ | $\frac{1}{5}$ | $\frac{1}{3}$ | $\frac{3}{4}$ |
| $\frac{1}{2}$ | $\frac{2}{3}$ | $\frac{4}{5}$ | $\frac{1}{4}$ | $\frac{3}{10}$ | $\frac{1}{4}$ | $\frac{1}{2}$ |
| $\frac{1}{2}$ | $\frac{5}{6}$ | $\frac{7}{10}$ | $\frac{5}{8}$ | $\frac{1}{2}$ | — | — |
| $\frac{1}{4}$ | $\frac{2}{3}$ | — | $\frac{1}{2}$ | — | | |
| $\frac{1}{2}$ | — | | $\frac{3}{8}$ | | | |
| $\frac{3}{4}$ | | | — | | | |
| — | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\frac{4}{5}$ | $\frac{1}{2}$ | $\frac{2}{3}$ | $\frac{3}{4}$ | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{5}{6}$ | $\frac{3}{4}$ |
| $\frac{3}{10}$ | $\frac{3}{8}$ | $\frac{3}{4}$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{2}{3}$ |
| $\frac{1}{5}$ | $\frac{1}{8}$ | — | $\frac{1}{4}$ | — | $\frac{2}{3}$ | $\frac{2}{3}$ | $\frac{1}{4}$ |
| $\frac{7}{10}$ | $\frac{1}{2}$ | | — | | $\frac{1}{3}$ | $\frac{1}{6}$ | $\frac{1}{2}$ |
| $\frac{3}{5}$ | — | | | | — | — | — |
| — | | | | | | | |

## DRILL SHEET—ADDITION IV.

| | | | | | | |
|---|---|---|---|---|---|---|
| $6\frac{2}{3}$ | $9\frac{1}{2}$ | $7\frac{1}{2}$ | $5\frac{1}{4}$ | $9\frac{1}{2}$ | $8\frac{3}{4}$ | $9\frac{1}{5}$ |
| $7\frac{1}{3}$ | $8\frac{3}{4}$ | $8\frac{2}{3}$ | $9\frac{3}{4}$ | $7\frac{3}{4}$ | $5\frac{2}{3}$ | $3\frac{2}{5}$ |
| — | — | — | — | $6\frac{1}{2}$ | — | $4\frac{3}{10}$ |
| | | | | — | | — |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3¼ | 5¾ | 9⅔ | 8½ | 3⅚ | 4⅔ | 6⅞ |
| 8⅔ | 7½ | 8½ | 7¼ | 9⅓ | 9 | 9½ |
| — | — | — | 6½ | — | 8⅙ | — |
| | | | — | | — | |
| 4⅝ | 5 | 8⅙ | 9⅚ | 7⅞ | 9⅔ | 4⅞ |
| 9½ | 8½ | 7⅔ | 8⅓ | 9¾ | 9⅙ | 5½ |
| — | 7¾ | — | — | — | — | 6¼ |
| | — | | | | | — |

DRILL SHEET—ADDITION VI.

| | | | | |
|---|---|---|---|---|
| 18¾ | 28½ | 16⅝ | 72⅗ | 39⅚ |
| 9⅔ | 54¾ | 18¾ | 18⁷⁄₁₀ | 48⅔ |
| — | — | 9½ | 16³⁄₁₀ | — |
| | | — | — | |
| 76⅚ | 58⅔ | 75¾ | 15⅜ | 23⅚ |
| 18⅔ | 30¼ | 18⅔ | 16¾ | 48½ |
| 3½ | 18⅓ | — | 19½ | 17⅔ |
| — | — | | — | — |
| 86⅔ | 57⅓ | 6½ | 16½ | 273⅝ |
| 75¾ | 83½ | 3⅛ | 9 | 406¾ |
| — | 96⅔ | 4¾ | 8⅚ | — |
| | — | 5⅜ | — | |
| | | — | | |

## LESSON VII.

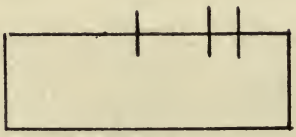


FIG. 1

1. (a) Use your ruler to find the length of the bottom line. (b) Measure the four parts of the top line. (c) Find their sum. (d) How can you tell if the answer is right? This is called "checking the answer."

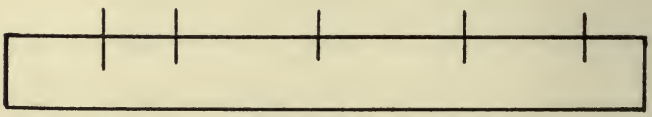


FIG. 2.

2. (a) What is the length of the bottom line in Fig. 2? (b) Measure the parts of the top line. (c) Find the sum, but be sure your answer is correct.

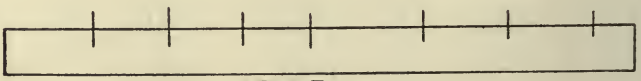


FIG. 3

3. (a) What is the length of the bottom line in Fig. 3? (b) Measure all the parts of the top line. (c) Find their sum. Is your work correct?

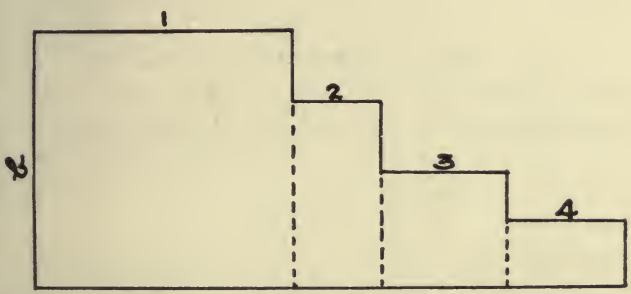



FIG. 4

4. (a) Measure the bottom line in Fig. 4. Measure the lines marked 1, 2, 3. (c) Could you find the length of line marked 4 without measuring it? How? (d) Find the sum of the lines marked 1, 2, 3. (e) Subtract this sum from the length of the bottom line. (f) Measure line marked 4 to see if your answer is correct. (g) Measure the three broken lines. (h) Find their sum. (i) Measure the line marked *b*. (j) How much greater is the answer in (h) than the answer in (i)?

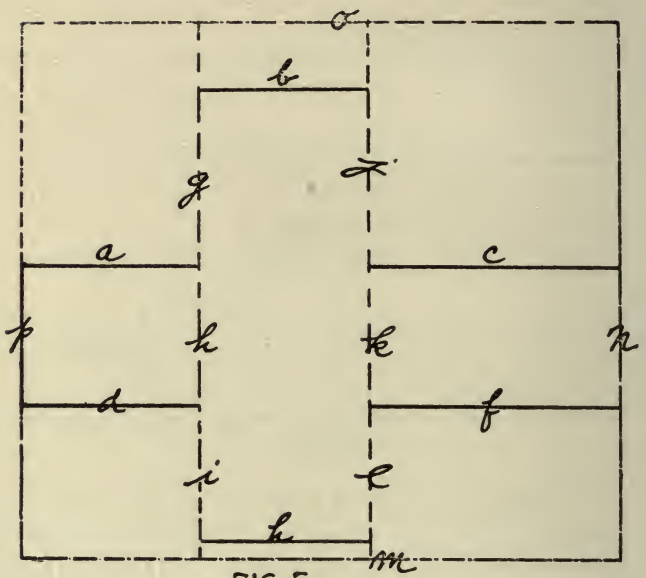



FIG. 5

5. (a) Measure lines *a*, *b* and *c* in Fig. 6. Find the sum of these numbers. (b) What line can you measure to check your answer? Is your work correct? (c) How much longer are *a* and *c* together than *b*?

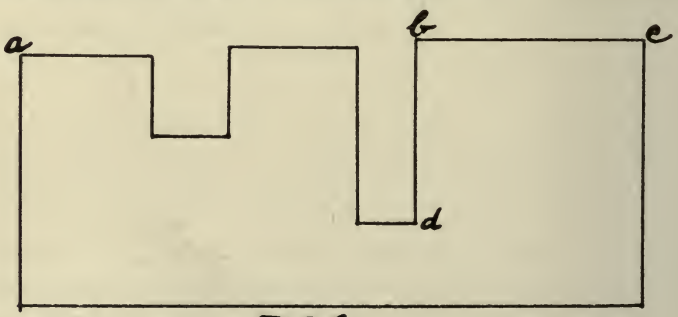



FIG. 6.

6. (a) Measure lines *g*, *h* and *i*. What is the sum of the three? (b) Which line can you measure to check this answer? Find out if your answer is correct. (c) How much greater is the sum of *a*, *b* and *c* than the sum of *g*, *h* and *i*?

7. (a) Measure the five parts of the top line. (b) Find the sum of these lengths. (c) Which line can you measure to check the answer? Measure it. (d) How much farther is it from *a* to *b* than it is from *b* to *c*? What measurements have you that you can use to find the distance from *a* to *b*? (c) How much longer must you make the line *bd* to reach the bottom line? (f) If this part were added on to *bd*, how long would the line be then? (g) Which is the longest line in this figure? Which is the shortest? How much longer is the longest line than the shortest? (h) Find the sum of the three short lines.

## LESSON VIII.

1. What is the easiest way of finding how many seats there are in your schoolroom? How many seats are there in a row? How many rows? There are.....seats in this room.

2. (a) What would be an easy way of finding how many trees could be planted on a rectangular piece of ground? (b) How could we easily find out how many boy scouts there are in a group in regular formation? (c) What is the best way to get the number of squares on a checkerboard?

3. Secure two pieces of pasteboard of different sizes. (a) Take one of these, and measure its length in inches; its width in inches. (b) Put dots one inch apart on all of the edges of this pasteboard. (c) Draw lines one inch

apart (1) from top to bottom, (2) from side to side. (d) How many squares are there in the first row? (e) How many rows are there? (f) How many **square inches** are there on this pasteboard? (g) Name two ways that you had of answering this last question.

4. (a) Take the second piece of pasteboard. Find the number of square inches in the first row. (b) Find the number of rows. (c) Find the number of square inches on this pasteboard.

5. Exchange pieces of pasteboard with two of your friends, trying to get some that look different from yours. (a) Using the clean side of one of these, show how many square inches there are in the first row. (b) Show how many rows. (c) How many square inches are there in the whole pasteboard? (d) Did you add, subtract, multiply or divide to find out?

6. (a) Find the number of square inches in the first row on the second piece of pasteboard. (b) Find the number of rows. (c) Find the number of square inches on this pasteboard.

7. (a) Measure the top of your desk, using only inches and half inches. (b) If you do not see immediately how many square inches there are in the first row, use chalk to make one row of one-inch squares at the top of the desk. (c) Then use lines to mark off the number of rows. (d) Find the number of square inches on the top of your desk.

8. (a) Find the number of square inches on the top of your book. (b) Find the number of square inches on one sheet of your tablet paper.

9. (a) Measure one section of the blackboard in feet. (b) At the bottom make one row of foot squares. (c) How many rows of these squares are there? (d) How many square feet are there in a section of the blackboard?

10. (a) At one end of the floor, make one row of foot squares. (b) How many rows are there? (c) Find number of square feet in the floor.

11. (a) Find the number of square feet on the top of the table. (b) Find the number of square feet on the door; (c) in one-half of the window.

DRILL SHEET—SUBTRACTION I.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| ½ | ¼ | ¾ | ⅓ | ⅔ | ⅕ | ⅖ | ⅗ | ⅘ | ⅙ | ⅚ |
| — | — | — | — | — | — | — | — | — | — | — |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| ⅛ | ⅜ | ⅝ | ⅞ | ¼ | 1/10 | 3/10 | 7/10 | 9/10 | 6/6 | 5/12 | 7/12 |
| — | — | — | — | — | — | — | — | — | — | — | — |
| ½ | ¾ | ⅜ | ⅞ | ⅝ | ¾ | ⅞ | ½ | ⅔ | 3/10 | 7/10 |
| ¼ | ¼ | ¼ | ¾ | ½ | ½ | ½ | ⅙ | ⅙ | ⅕ | ⅗ |
| — | — | — | — | — | — | — | — | — | — | — |
| ⅘ | ⅗ | ½ | ⅓ | ¾ | ⅚ | ¾ | ⅔ | ⅘ | ⅞ | ⅚ | ¾ | ¾ |
| 3/10 | 1/10 | ⅓ | ¼ | ⅔ | ⅔ | ⅛ | ½ | 1/10 | ⅛ | ⅓ | ⅝ | ⅓ |
| — | — | — | — | — | — | — | — | — | — | — | — | — |

DRILL SHEET—SUBTRACTION II.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1½ | 1⅓ | 1⅕ | 1½ | 1¼ | 1⅙ | 1⅕ | 1⅕ | 1⅙ | 1⅙ |
| ¾ | ⅔ | ⅘ | ½ | ¾ | ⅚ | ⅗ | ⅘ | ⅚ | ⅔ |
| — | — | — | — | — | — | — | — | — | — |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $1\frac{1}{8}$ | $1\frac{1}{6}$ | $1\frac{1}{6}$ | $1\frac{1}{8}$ | $1\frac{1}{8}$ | $1\frac{1}{3}$ | $1\frac{1}{3}$ | $1\frac{1}{2}$ | $1\frac{1}{2}$ | $1\frac{1}{5}$ |
| $\frac{3}{8}$ | $\frac{1}{2}$ | $\frac{1}{3}$ | $\frac{5}{8}$ | $\frac{7}{8}$ | $\frac{1}{4}$ | $\frac{3}{4}$ | $\frac{1}{3}$ | $\frac{3}{8}$ | $\frac{1}{10}$ |
| | | | | | | | | | |
| $1\frac{1}{2}$ | $1\frac{1}{5}$ | $1\frac{1}{2}$ | $1\frac{1}{5}$ | $1\frac{1}{4}$ | $1\frac{1}{10}$ | $1\frac{1}{3}$ | $1\frac{1}{8}$ | | |
| $\frac{5}{8}$ | $\frac{3}{10}$ | $\frac{7}{8}$ | $\frac{7}{10}$ | $\frac{2}{3}$ | $\frac{1}{5}$ | $\frac{1}{6}$ | $\frac{3}{8}$ | | |
| | | | | | | | | | |
| $1\frac{1}{10}$ | $1\frac{1}{3}$ | $1\frac{1}{10}$ | $1\frac{1}{3}$ | $1\frac{1}{4}$ | $1\frac{1}{2}$ | $1\frac{1}{4}$ | $1\frac{1}{2}$ | | |
| $\frac{4}{5}$ | $\frac{5}{6}$ | $\frac{3}{5}$ | $\frac{4}{6}$ | $\frac{5}{8}$ | $\frac{5}{6}$ | $\frac{7}{8}$ | $\frac{2}{3}$ | | |
| | | | | | | | | | |
| $1\frac{1}{4}$ | $1\frac{1}{2}$ | $1\frac{1}{4}$ | $1\frac{1}{2}$ | $1\frac{1}{2}$ | $1\frac{1}{2}$ | $1\frac{1}{2}$ | $1\frac{1}{3}$ | | |
| $\frac{1}{6}$ | $\frac{3}{10}$ | $\frac{5}{6}$ | $\frac{7}{10}$ | $\frac{4}{8}$ | $\frac{9}{10}$ | $\frac{2}{3}$ | $\frac{3}{4}$ | | |
| | | | | | | | | | |
| $1\frac{1}{2}$ | $1\frac{1}{3}$ | $1\frac{1}{8}$ | $1\frac{1}{3}$ | $1\frac{1}{6}$ | $1\frac{1}{4}$ | | | | |
| $\frac{3}{6}$ | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{5}{6}$ | | | | |
| | | | | | | | | | |

DRILL SHEET—SUBTRACTION III.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $6\frac{1}{4}$ | $7\frac{1}{8}$ | $8\frac{1}{2}$ | $5\frac{3}{8}$ | $9\frac{5}{8}$ | $7\frac{1}{4}$ | $6\frac{1}{8}$ | $9\frac{1}{4}$ | $8\frac{1}{4}$ | $7\frac{3}{4}$ | $9\frac{3}{4}$ |
| $3\frac{1}{2}$ | $4\frac{1}{4}$ | $3\frac{3}{4}$ | $2\frac{1}{2}$ | $4\frac{3}{4}$ | $3\frac{5}{8}$ | $5\frac{3}{4}$ | $5\frac{1}{2}$ | $3\frac{7}{8}$ | $3\frac{1}{2}$ | $4\frac{7}{8}$ |
| | | | | | | | | | | |
| $8\frac{1}{3}$ | $7\frac{1}{6}$ | $9\frac{1}{2}$ | $7\frac{1}{3}$ | $8\frac{1}{6}$ | $7\frac{1}{3}$ | $9\frac{1}{3}$ | 13 | $9\frac{2}{3}$ | $15\frac{1}{2}$ | $11\frac{1}{2}$ |
| $5\frac{2}{3}$ | $3\frac{1}{3}$ | $4\frac{2}{3}$ | $4\frac{1}{2}$ | $4\frac{2}{3}$ | $5\frac{2}{3}$ | $2\frac{5}{6}$ | $8\frac{1}{3}$ | $5\frac{1}{2}$ | $9\frac{1}{3}$ | $7\frac{5}{6}$ |
| | | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $12\frac{1}{4}$ | $9\frac{5}{8}$ | $8\frac{1}{10}$ | $7\frac{3}{5}$ | $9\frac{1}{5}$ | $7\frac{3}{5}$ | $11\frac{2}{5}$ | $8\frac{1}{2}$ | $13\frac{3}{4}$ | $11\frac{1}{6}$ | $12\frac{1}{3}$ |
| $4\frac{5}{8}$ | $3\frac{7}{8}$ | $3\frac{2}{5}$ | $5\frac{4}{5}$ | $4\frac{3}{10}$ | $5\frac{7}{10}$ | $5\frac{1}{2}$ | $4\frac{3}{5}$ | $7\frac{7}{8}$ | $9\frac{1}{4}$ | $8\frac{3}{4}$ |
| | | | | | | | | | | |
| $11\frac{1}{4}$ | $7\frac{5}{6}$ | $9\frac{1}{6}$ | $12\frac{3}{8}$ | $5\frac{1}{16}$ | $9\frac{7}{12}$ | $12\frac{5}{8}$ | $13\frac{1}{6}$ | $9\frac{2}{3}$ | $10\frac{3}{4}$ | $12\frac{5}{8}$ |
| $8\frac{1}{3}$ | $7\frac{1}{2}$ | $3\frac{1}{4}$ | $6\frac{1}{3}$ | $2\frac{3}{4}$ | $6\frac{3}{4}$ | $5\frac{2}{3}$ | $8\frac{3}{4}$ | $4\frac{3}{4}$ | $7\frac{2}{3}$ | $6\frac{2}{3}$ |

## DRILL SHEET—SUBTRACTION IV.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $25\frac{1}{4}$ | $34\frac{1}{3}$ | $41\frac{1}{2}$ | $62\frac{1}{4}$ | $28\frac{1}{6}$ | $76\frac{1}{2}$ | $40\frac{1}{3}$ | $54\frac{1}{4}$ | $27\frac{1}{3}$ |
| $19\frac{1}{2}$ | $26\frac{2}{3}$ | $27\frac{3}{4}$ | $38\frac{3}{8}$ | $19\frac{2}{3}$ | $47\frac{5}{8}$ | $25\frac{5}{6}$ | $36\frac{5}{8}$ | $19\frac{2}{3}$ |
| | | | | | | | | |
| $36\frac{5}{8}$ | $49\frac{1}{10}$ | $64\frac{1}{2}$ | $98\frac{3}{4}$ | $45\frac{3}{4}$ | $26\frac{1}{6}$ | $71\frac{1}{4}$ | $63\frac{7}{12}$ | $34\frac{1}{4}$ |
| $21\frac{7}{8}$ | $26\frac{3}{5}$ | $45\frac{2}{3}$ | $37\frac{7}{8}$ | $39\frac{2}{3}$ | $19\frac{1}{4}$ | $36\frac{1}{3}$ | $36\frac{3}{4}$ | $16\frac{7}{8}$ |
| | | | | | | | | |
| $52\frac{1}{3}$ | $52\frac{1}{6}$ | $31\frac{3}{8}$ | $16\frac{3}{5}$ | $42\frac{7}{12}$ | $89\frac{1}{8}$ | $51\frac{5}{8}$ | $89\frac{1}{16}$ | $63\frac{1}{2}$ |
| $29\frac{3}{4}$ | $37\frac{3}{4}$ | $16\frac{1}{3}$ | $9\frac{4}{5}$ | $26\frac{3}{4}$ | $52\frac{1}{4}$ | $37\frac{2}{3}$ | $16\frac{3}{4}$ | $48\frac{3}{5}$ |
| | | | | | | | | |
| $21\frac{3}{4}$ | 40 | | $74\frac{2}{5}$ | $109\frac{1}{3}$ | | $62\frac{5}{12}$ | | $121\frac{3}{5}$ |
| $19\frac{7}{8}$ | $13\frac{3}{4}$ | | $39\frac{1}{2}$ | $76\frac{5}{6}$ | | $38\frac{3}{4}$ | | $87\frac{4}{5}$ |
| | | | | | | | | |
| $78\frac{2}{3}$ | $66\frac{3}{4}$ | | $90\frac{1}{3}$ | $74\frac{1}{2}$ | | 36 | | $142\frac{1}{5}$ |
| $49\frac{3}{4}$ | $29\frac{2}{3}$ | | $36\frac{1}{4}$ | $19\frac{5}{8}$ | | $11\frac{3}{4}$ | | $101\frac{3}{5}$ |

## LESSON IX.

1. (a) How many hours are there in a day? (b) In drawing a line to represent a day, if you let ½ inch stand for an hour, how long should the line be? (c) If ¼ inch stands for an hour, how long should the line be?

2. (a) John goes to bed at 8 p. m. and gets up at 7 a. m. How many hours does he sleep? (b) Mary goes to bed at 9 p. m. and gets up at 6:30 a. m. How long does she have for sleep? (c) How many hours does their father spend in bed if he retires at 10:30 p. m. and arises at 6:15 a. m.?

3. (a) What time do you go to bed? What time do you get up? How many hours of sleep do you have? (b) What time do you usually have your breakfast? What time do you have lunch? How long is it between these two meals? (c) How long is it between your lunch and your dinner? (d) How long after you have eaten your dinner is it till bedtime?

4. (a) What time does your school take up in the morning? At what time do you have recess? How long must you be in school before recess time? (b) How long is it from recess until noon? How long is school in session in the forenoon? (c) What time does school take up in the afternoon? What time does it close? How long is the afternoon session? (f) Which is the longer, the morning session or the afternoon session? How much longer? (e) What is the length of your school day?

5. (a) Our school begins at 8:35 a. m. At 10 a. m. we have our arithmetic. How long are we in school before we have our arithmetic? (b) The boys work in the shop from 10:45 a. m. till 12:20 p. m. How much time do they

spend in the shop? (c) The girls have cooking from 1:40 p. m. till 2:23 p. m. How long does their cooking period last?

6. (a) How long is it from the time school opens in the morning till the end of your geography recitation? (b) How long is it from the beginning of your arithmetic recitation until you have physical education? (c) What is your favorite class during the day? How long is it from the time school opens until this recitation begins? How long is it from the time this recitation ends until school closes at night?

7. What is your longest recitation during the day? Which is the shortest? How much longer is the first one? This is what part of an hour?

## LESSON X.

1. (a) How long does it take you to get washed and dressed in the morning? This is what part of an hour? (b) Do you help your mother in the morning? For how long? This is what part of an hour? (c) What time do you leave home to come to school? What time do you reach school? This is what part of an hour? (d) How long is it from the time you get up until you are at school?

2. (a) What time do you get home from school in the evening? How long do you have for play before dinner time? (b) Do you take any kind of lesson after school? How long does it take you to go for your lesson, have the lesson, and to come home afterwards? (c) If a line ½ inch represents 1 hour, how long would a line be that represented the time you spent on a lesson that was taken outside of school?

3. Do you study or practice any of the time you are

home? How long? This is what part of an hour?

4. (a) Draw a line to represent a day. If ¼ inch represents 1 hour, how long should this line be? (b) Use this line to make a rectangle 1 inch wide. How long will the two end lines be? The other side line?

5. (a) How much time do you spend in sleep? Mark off a box in this rectangle that just represents this time. (b) How long is it from the time you get up until school opens? Make another box to represent this length of time. (c) How many hours do you stay at school? Show this on the rectangle you have made. (d) How long is it from the time you leave school until you go to bed? If ¼ inch represents 1 hour, how long should the line be that represents this time? (e) Measure the part of the rectangle that you have not used to see if it is this length. If so, you have made no mistake in your work.

6. (a) Draw a circle 2 inches in diameter. (b) How can you find one-half of this circle? One-fourth of it? One-third of it? One-eighth of it? Three-eighths of it?

7. (a) Shade in the part of this circle that would show how much time you spend in sleep. (b) Use fine lines to show the part of the day you spend at school. (c) Show in some other way the part of the remaining time that you spend in play? (d) What part of the circle has not been used?

## LESSON XI.

Some boys and girls were talking about things they would like to buy. The question of saving money came up. They asked how they could find out how long it would take them to save certain amounts of money. In answering their questions this lesson was worked out.

1. (a) How many months are there in a year? (b) How many weeks in a year? (c) How many days in a year?

SAVINGS.

| Amount | Each month | Each week | Each day |
|---|---|---|---|
| $ 50.00 | $4.17 | $0.96 | $0.14 |
| 60.00 | | | |
| 75.00 | | | |
| 80.00 | | | |
| 85.00 | | | |
| 87.50 | | | |
| 90.00 | | | |
| 100.00 | | | |
| 105.00 | | | |
| 115.00 | | | |
| 125.00 | | | |
| 135.00 | | | |
| 140.00 | | | |
| 150.00 | | | |
| 160.00 | | | |
| 175.00 | | | |
| 200.00 | | | |

2. (a) To save $50.00 a year, one should save.....of it each month: that is $50.00÷.....equals.....
(b) $50.00÷.....shows how much should be saved each week. $50.00÷.....equals..... (c) $50.00÷365 equals....., or the amount that should be saved each day.

3. Write answers in the table given above.

4. If Mary saves 5 cents a day, how much can she save in the month of January? February? March? April? May? June? July? August? September? October? November? December? How much is saved for the entire year?

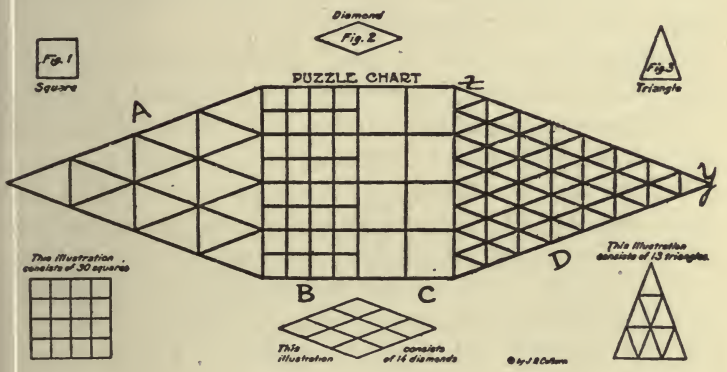
5. (a) If George saves a penny a day, how much will he have in a week? In a year? (b) If John can manage to save 15 cents a week, how much will he have at the end of a year?

6. Mary and Jean are paid for helping at home. They receive 20 cents for doing the dinner dishes on school days. Whenever one does the work alone, she receives all the money. Jean failed to help two evenings. How much did Mary receive for that week? How much did Jean receive?

7. (a) The one who is ready first helps with the breakfast, for which she receives 10 cents on school mornings. Jean helped three mornings, and Mary the rest of the time. How much did each receive? (b) How much did Mary make for the week? Jean? How much did it cost their mother?

## LESSON XII.

This is a copy of a puzzle printed by a Los Angeles newspaper.




1. How many sides to a triangle? How many corners in it? TRIangle means THREE CORNERS.

2. How many sides to a diamond? How is it different from a square?

3. (a) In the part marked B, how many small squares in a row? How many rows? How many small squares in all? (b) How many middle-sized squares in a row? How many rows? How many of these squares in all? (c) How many of the large squares in a row? How many rows? How many of the large squares? (d) How many squares have you counted?

4. In the part marked C, how many of the middle-sized squares in a row? How many rows? How many of these squares?

5. (a) In part marked D, count the small triangles in

each row. Find the sum. (b) Why can't we find the number of triangles by finding the number in each row, and then counting the rows as we did with the squares?

6. (a) Can you see the middle-sized triangles that are formed by using two rows of the small triangles? How many of these are there? (b) How many that are formed with three rows of small ones?

7. Now look for the triangles that are formed by using four rows of the small ones. How many of these are there? How many of the still larger ones are formed by using five rows of the small ones? Six rows? Seven rows?

8. How many triangles in the part marked A? Look for the small, middle-sized and large. How many triangles have you found of all kinds?

9. (a) Look for the diamonds that touch the line marked X—Y. How many are there? How many in the row next to this? In the third row? Fourth? Fifth? Sixth? Seventh?

10. Now take two rows together and count the diamonds that you find in them? How many are there in the first and second rows? In the third and fourth rows? In the fifth and sixth rows?

11. Can you find any diamonds if you look at three rows at a time? How many? If you look at four rows at a time? How many diamonds of all kinds were you able to find?

## LESSON XIII.

### HOW TO READ THE TIME TABLE.

Read down — **Los Angeles and San Diego** — Read up

| 78 Daily | 76 Daily | 74 Daily | 72 Daily | Miles | Table 31 | 79 Daily | 71 Daily | 73 Daily | 75 Daily |
|---|---|---|---|---|---|---|---|---|---|
| AM | PM | AM | AM | | | AM | AM | PM | PM |
| 1.30 | 3.00 | 9.45 | 8.05 | 0 | Lv. Los Angeles 18,84 Ar | 6.00 | 11.20 | 4.45 | 6.30 |
| ..... | ..w.. | ..u.. | ...v.. | 3.4 | " Hobart " | ..... | ..... | ..... | ..... |
| f 1.46 | ..w.. | ..u.. | ...v.. | 7.5 | " Bandini " | ..... | ..... | ..... | ..... |
| f 1.51 | ..w.. | ..u.. | ...v.. | 10.0 | " Rivera " | f 5.35 | ..... | ..... | ..... |
| f 1.55 | ..w.. | ..u.. | ...v.. | 12.0 | " Los Nietos " | f 5.27 | ..... | ..... | ..... |
| ..... | ..w.. | ..u.. | ...v.. | 13.3 | " Santa Fe Spg's " | f 5.22 | ..... | ..... | ..... |
| f 2.03 | ..w.. | ..u.. | ...v.. | 17.5 | " La Mirada " | f 5.12 | ..... | ..... | ..... |
| f 2.06 | ..w.. | ..u.. | ...v.. | 19.4 | " Northam " | f 5.06 | ..... | ..... | ..... |
| ..... | ..w.. | ..u.. | ...v.. | 21.4 | " Basta " | ..... | ..... | ..... | ..... |
| 2.15 | 3.35 | 10.20 | 8.46 | 23.8 | Ar } Fullerton 34 { Lv | 4.55 | 10.40 | 4.10 | 5.50 |
| 2.20 | 3.38 | 10.23 | 8.47 | 23.8 | Lv } Fullerton 34 { Ar | 4.45 | 10.35 | 4.05 | 5.45 |
| 2.26 | 3.43 | 10.30 | 8.52 | 24.6 | " Anaheim " | 4.39 | 10.30 | 4.00 | 5.43 |
| 2.36 | 3.50 | 10.40 | 9.02 | 26.4 | " Orange 34 " | 4.28 | 10.20 | 3.50 | 5.34 |
| 2.45 | 4.00 | 10.48 | 9.10 | 28.8 | Ar. Santa Ana Lv | 4.20 | 10.10 | 3.40 | 5.27 |
| ..... | ..w.. | ..u.. | f 9.19 | 30.8 | Lv. Alisо Ar | f 4.14 | f 10.01 | ..... | ..... |
| f 3.00 | ..w.. | ..u.. | 9.22 | 41.1 | " Irvine " | f 4.00 | 9.54 | ..... | ..... |
| f 3.10 | ..w.. | ..u.. | 9.31 | 46.9 | " El Toro " | f 3.50 | 9.46 | ..... | ..... |
| f 3.18 | ..w.. | ..u.. | f 9.39 | 50.9 | " Galivan " | f 3.40 | f 9.39 | ..... | ..... |
| f 3.28 | ..wa.. | f11.22 | 9.46 | 56.0 | " San Juan Capistrano " | f 3.28 | 9.31 | ..... | f 4.50 |
| f 3.35 | ..w.. | ..u.. | f 9.51 | 58.6 | " Serra " | f 3.10 | f 9.27 | ..... | ..... |
| f 3.44 | ..w.. | ..u.. | f 9.57 | 62.7 | " Mateo " | f 2.56 | f 9.21 | ..... | ..... |
| f 3.54 | ..w.. | ..u.. | f10.05 | 67.5 | " San Onofre " | f 2.45 | f 9.14 | ..... | ..... |
| f 4.05 | ..w.. | ..u.. | f10.12 | 72.4 | " Agra " | ..... | f 9.06 | ..... | ..... |
| f 4.16 | ..w.. | ..u.. | f10.20 | 77.5 | " Las Flores " | f 2.20 | f 8.58 | ..... | ..... |
| 4.35 | 5.20 | 12.05 | 10.37 | 85.0 | " Oceanside 36, 37 " | 1.52 | 8.41 | 2.11 | 4.07 |
| f 4.42 | ..w.. | ..u.. | 10.42 | 88.1 | " Carl " | f 1.45 | 8.36 | 2.06 | ..... |
| ..... | ..w.. | ..u.. | f10.49 | 92.8 | " Ponto " | ..... | f 8.28 | ..... | ..... |
| f 5.02 | ..w.. | ..u.. | 10.57 | 96.9 | " Encinitas " | f 1.22 | 8.21 | ..... | ..... |
| f 5.06 | ..w.. | ..u.. | f11.00 | 98.7 | " Cardiff " | f 1.18 | f 8.17 | ..... | ..... |
| f 5.15 | f 5.43 | f12.30 | 11.08 | 102.8 | " Del Mar " | f 1.09 | 8.10 | f 1.40 | f 3.38 |
| f 5.24 | ..w.. | ..u.. | f11.18 | 107.9 | " Sorrento " | f 12.55 | f 8.02 | ..... | ..... |
| 5.32 | ..w.. | ..u.. | 11.33 | 111.8 | " Linda Vista 32 " | 12.45 | 7.55 | ..... | ..... |
| ..... | ..w.. | ..u.. | f11.36 | 113.3 | " Selwyn " | ..... | ..... | ..... | ..... |
| f 5.40 | ..w.. | ..u.. | f11.40 | 115.9 | " Elvira " | f 12.26 | f 7.47 | ..... | ..... |
| ..... | ..w.. | ..u.. | f11.44 | 118.1 | " Ladrillo " | f 12.21 | f 7.44 | ..... | ..... |
| 6.00 | 6.30 | 1.20 | 11.59 | 126.4 | Ar. San Diego Lv | 12.01 | 7.30 | 1.00 | 3.00 |
| 6.00 | 6.30 | ..... | ..... | 126.4 | Lv. San Diego Ar | 11.40 | 6.57 | ..... | ..... |
| ..... | ..w.. | ..... | ..... | 128.2 | Ar. 22d Street Lv | ..... | ..... | ..... | ..... |
| 6.20 | 6.50 | ..... | ..... | 131.9 | Ar. National City Lv | 11.20 | 6.40 | ..... | ..... |
| AM | PM | PM | AM | | | PM | AM | PM | PM |

NOTE—Pullman Standard Sleepers on trains 71, 73, 75 and 79. Tourist Sleepers on trains 71, 73, 75 and 79. Pullman Standard and Tourist Sleepers on trains 72, 74, 76 and 78. Tourist Sleepers on trains 78 and 79. Pullman Standard Sleepers may be occupied after 9.00 p. m., at either Los Angeles or San Diego.

1. How many trains a day are there from Los Angeles to San Diego? (Left side.) From San Diego to Los Angeles? (Right side.) How many leave Los Angeles in the forenoon? How many arrive at Los Angeles in the afternoon?

2. What time does Number 76 leave? Number 72? What time does Number 71 arrive? Number 73?

3. How long does it take Number 74 to run from Los Angeles to Fullerton? To run from Santa Ana to Oceanside? From Oceanside to San Diego?

4. How long does it take No. 78 to run from San Diego to Cardiff? From San Juan Capistrano to Anaheim? From La Mirada to Los Angeles?

5. What time does No. 72 arrive at Orange? No. 78? No. 74? No. 76? No. 79?

6. If you lived in Los Angeles and wanted to spend the day in Santa Ana, which train would be a good one for you to take? Upon which one would you return? This would give you how many hours in Santa Ana? How long would it be from the time you left Los Angeles until you returned?

7. If you lived in Fullerton, which train should you take to come into Los Angeles in the morning? Which one to return to Fullerton in the afternoon? How much time could you spend in Los Angeles if you took these two trains?

8. How far is it from Los Angeles to Orange by the Santa Fe? How far from Los Angeles to Oceanside? How far from Los Angeles to Del Mar? From Los Angeles to San Diego?

9. How far is it from Santa Fe Springs to La Mirada? Do you add or subtract to find this distance? How far is it from Mateo to Las Flores? From Ponto to Sorrento?

## LESSON XIV.

Children's Book Week. November 13th to 19th, 1921. "Thomas Bailey Aldrich, as told in 'The Story of a Bad Boy,' had a book case over his bed at the old house in Portsmouth." One like it can be made for any boy's or girl's own room. It should be stained or painted to match the wood work in the room. This book case is 26 inches long and is 26 inches high. It consists of three shelves

and the two side pieces. It has no back and is hung by cords passing through holes at the top of sides. Two of the shelves are seven inches wide, and the other is five inches.

1. (a) How long must each shelf be? (b) What is the length and what is the width of the bottom shelf? Of the middle shelf? Of the top shelf?

2. (a) If you should draw a copy of the bottom shelf, how long would your paper need to be? How wide? (b) If your copy were only half as large as the real shelf, what would be the length and the width of the pattern? (c) If ¼ inch on your copy stood for one whole inch of the shelf, how long and how wide would your drawing be? (d) If you made your drawing ⅛ of the real size, how long and how wide would your drawing be? (e) We call this "scale drawing." Which one of the above scales do you think it would be better to use? Why?

3. (a) Use the same scale that you selected for the bottom shelf in making a picture of the middle shelf. (b) What is true of the two drawings? Why?

4. (a) If you make a picture of the top shelf, will it look just like the other two? Can you explain this?

5. (a) How long must the side pieces be? How wide? (b) Make a rough sketch of the way you think the side pieces will look. (c) Does this drawing look like your drawing of one of the shelves? Why not?

6. (a) Shall you use a board with both edges straight for the side pieces? Why not? (b) In drawing this side piece to the same scale that you used for the shelves, how long must your drawing be? (c) How wide shall you have it at one end? Why? (d) How wide at about the middle? Why? (e) How wide at a short distance from the other end? Why? (f) Now make a rough sketch showing how

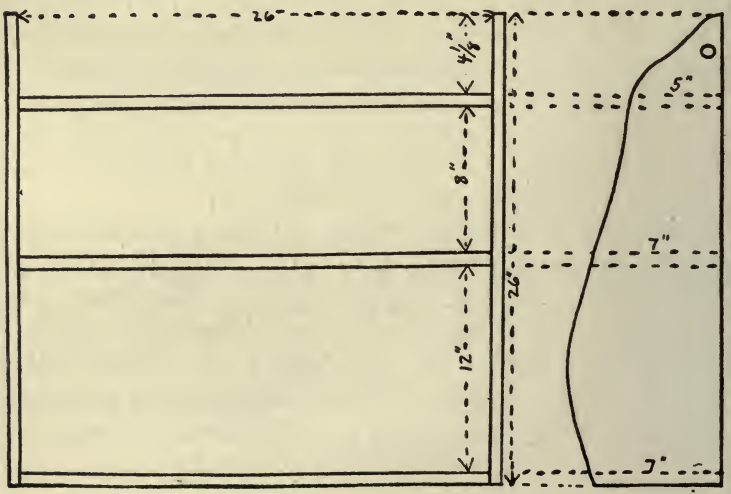
the front part of the side pieces will look. (g) Make a scale drawing for one of the side pieces.

7. (a) How far apart shall you have your bottom and middle shelves? (b) What will be the distance between the middle and top shelves? (c) With this arrangement how far will the top shelf be from the top of the bookcase? (d) Shall you be able to use the top shelf for books if you place it where you first said? (e) Should you have the same distance between the bottom and middle shelves as there is between the middle and top shelves? Why?

8. How far did you place the bottom shelf from the middle shelf? The middle shelf from the top shelf? The top shelf from the top of the bookcase? What is the sum of these three distances? If the bookcase is made the right size, what must this sum be?

LESSON XV.

# The Thomas Bailey Aldrich Book Case



Get a nice, strong pasteboard box, and make a "model" of the Thomas Bailey Aldrich Book Case. Cut the box carefully at the corners so that you will have flat pieces to work with.

1. Now decide whether you will make your model the same size as the bookcase or one-half as large, one-fourth as large, or one-eighth as large. Why did you choose the one you did?

2. (a) Using the scale you have chosen, see how long each shelf should be. (b) How wide should each be? (c) On your paper draw a pattern for each of these shelves. (d) Find out how long and how wide the side pieces should be. (e) Make a scale drawing of a side piece. (f) Now decide how you want the front part of the side piece shaped.

3. (a) Cut out the patterns you have made, being careful to follow the lines so as to make the patterns true. (b) How can you make both side pieces exactly alike? (c) Make the two side pieces.

4. Place patterns on pasteboard so that you can decide which will be the most saving and also the best way to cut each piece.

5. Which do you think would be better to use, the patterns in cutting the pieces for the "model," or to make drawings of them on the pasteboard? Why?

6. (a) What shall you need to measure in making these drawings on the pasteboard? (b) Make a drawing of the bottom shelf. (c) When you cut it out be careful to use a sharp knife or large scissors. (d) Draw and cut out the other two shelves.

7. (a) Draw the lines that represent the back and bottom of the side pieces. (b) What will be the best way to get the front of the side pieces to look as you want them

to? (c) Be careful to place your pattern so that the parts representing the bottom and back fall on the lines you have just made. (d) Now shape the front like the pattern. (e) Cut out the side pieces. (f) Decide where the holes are to be placed, and use a punch to put them in.

8. How shall you fasten the shelves to the side pieces? These can either be glued, or, if pasteboard is heavy enough, small grooves may be made in the side pieces, or the shelves can be fastened in with pins. (g) Tint bookcase the color you want, and fix cord to hang it up.

DRILL SHEET—MULTIPLICATION I.

| | | | | | |
|---|---|---|---|---|---|
| $4\times\frac{1}{2}=$ | $6\times\frac{1}{4}=$ | $8\times\frac{1}{6}=$ | $8\times\frac{2}{3}=$ | $2\times\frac{7}{10}=$ | $11\times\frac{1}{2}=$ |
| $5\times\frac{1}{8}=$ | $6\times\frac{3}{4}=$ | $8\times\frac{5}{6}=$ | $9\times\frac{3}{4}=$ | $3\times\frac{4}{5}=$ | $21\times\frac{1}{4}=$ |
| $3\times\frac{1}{4}=$ | $7\times\frac{1}{3}=$ | $3\times\frac{2}{3}=$ | $6\times\frac{4}{5}=$ | $4\times\frac{5}{6}=$ | $16\times\frac{1}{3}=$ |
| $7\times\frac{1}{3}=$ | $7\times\frac{2}{3}=$ | $7\times\frac{3}{4}=$ | $7\times\frac{5}{6}=$ | $7\times\frac{2}{3}=$ | $7\times\frac{3}{5}=$ |
| $8\times\frac{1}{5}=$ | $4\times\frac{1}{5}=$ | $9\times\frac{4}{5}=$ | $3\times\frac{1}{10}=$ | $5\times\frac{3}{4}=$ | $9\times\frac{2}{3}=$ |
| $9\times\frac{1}{6}=$ | $4\times\frac{2}{5}=$ | $5\times\frac{2}{3}=$ | $4\times\frac{9}{10}=$ | $8\times\frac{5}{6}=$ | $7\times\frac{1}{6}=$ |
| $5\times\frac{1}{4}=$ | $4\times\frac{3}{5}=$ | $6\times\frac{3}{5}=$ | $5\times\frac{7}{10}=$ | $6\times\frac{3}{5}=$ | $9\times\frac{5}{6}=$ |
| $7\times\frac{1}{2}=$ | $4\times\frac{4}{5}=$ | $2\times\frac{4}{5}=$ | $8\times\frac{3}{10}=$ | $9\times\frac{2}{5}=$ | $6\times\frac{7}{8}=$ |

DRILL SHEET—MULTIPLICATION II.

| | | | |
|---|---|---|---|
| $\frac{1}{3}$ of 6= | $\frac{2}{3}$ of 9= | $\frac{4}{5}$ of 30= | $\frac{2}{3}$ of 16= |
| $\frac{1}{4}$ of 8= | $\frac{3}{4}$ of 12= | $\frac{2}{3}$ of 18= | $\frac{3}{4}$ of 15= |
| $\frac{1}{5}$ of 10= | $\frac{2}{5}$ of 10= | $\frac{5}{6}$ of 24= | $\frac{5}{6}$ of 19= |
| $\frac{1}{6}$ of 18= | $\frac{3}{5}$ of 15= | $\frac{3}{8}$ of 16= | $\frac{3}{8}$ of 12= |
| $\frac{1}{9}$ of 27= | $\frac{4}{5}$ of 10= | $\frac{5}{8}$ of 24= | $\frac{5}{8}$ of 20= |

$\frac{1}{4}$ of 9= $\frac{5}{6}$ of 18= $\frac{7}{8}$ of 32= $\frac{7}{8}$ of 16=

$\frac{1}{3}$ of 7= $\frac{2}{3}$ of 27= $\frac{1}{2}$ of 49= $\frac{2}{5}$ of 13=

$\frac{1}{6}$ of 13= $\frac{3}{4}$ of 32= $\frac{1}{3}$ of 26= $\frac{3}{5}$ of 16=

$\frac{1}{10}$ of 18= $\frac{4}{9}$ of 27=

$\frac{3}{10}$ of 15= $\frac{2}{3}$ of 21=

$\frac{7}{10}$ of 15= $\frac{3}{4}$ of 28=

$\frac{9}{10}$ of 22= $\frac{5}{8}$ of 40=

$\frac{4}{5}$ of 18= $\frac{2}{3}$ of 36=

$\frac{5}{8}$ of 48= $\frac{1}{2}$ of 126=

$\frac{7}{8}$ of 64= $\frac{1}{3}$ of 98=

$\frac{1}{9}$ of 36= $\frac{2}{3}$ of 42=

## DRILL SHEET—MULTIPLICATION III.

$\frac{1}{2}\times\frac{1}{4}$— $\frac{3}{4}\times\frac{2}{3}$— $\frac{4}{5}\times\frac{2}{3}$ = $\frac{3}{4}\times\frac{7}{8}$=

$\frac{1}{2}\times\frac{3}{4}$— $\frac{1}{4}\times\frac{1}{5}$= $\frac{5}{6}\times\frac{2}{3}$ = $\frac{4}{5}$ of $\frac{3}{8}$=

$\frac{1}{3}\times\frac{1}{4}$= $\frac{1}{4}\times\frac{3}{5}$= $\frac{3}{5}\times\frac{5}{8}$ = $\frac{2}{3}\times\frac{5}{6}$=

$\frac{2}{3}\times\frac{1}{4}$= $\frac{1}{4}\times\frac{4}{5}$= $\frac{4}{5}\times\frac{3}{4}$ = $\frac{1}{4}\times\frac{7}{8}$=

$\frac{2}{3}\times\frac{3}{4}$= $\frac{1}{2}\times\frac{1}{6}$= $\frac{5}{6}\times\frac{7}{8}$ = $\frac{1}{5}$ of $\frac{2}{3}$=

$\frac{1}{2}\times\frac{4}{5}$= $\frac{1}{2}\times\frac{5}{6}$= $\frac{3}{4}\times\frac{5}{12}$= $\frac{3}{8}\times\frac{5}{6}$=

$\frac{1}{3}\times\frac{3}{4}$= $\frac{3}{2}\times\frac{3}{4}$= $\frac{2}{3}\times\frac{5}{8}$ = $\frac{2}{5}\times\frac{2}{3}$=

$\frac{4}{5}\times\frac{1}{2}$= $\frac{1}{2}\times\frac{1}{4}\times\frac{1}{2}$=

$\frac{1}{2}$ of $\frac{1}{8}$= $\frac{3}{4}\times\frac{2}{3}\times\frac{1}{2}$=

$\frac{1}{3}$ of $1\frac{1}{2}$= $\frac{5}{8}\times\frac{2}{3}\times\frac{1}{2}$=

$\frac{3}{4}$ of $\frac{3}{4}$= $\frac{1}{2}\times\frac{3}{4}\times\frac{1}{3}$=

$\frac{5}{8}\times\frac{2}{3}$= $\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}$=

$\frac{1}{2}\times\frac{6}{5}$= $\frac{2}{3}\times\frac{3}{4}\times\frac{1}{4}$=

$\frac{2}{5}\times\frac{1}{8}$= $\frac{5}{8}\times\frac{4}{5}\times\frac{1}{2}$=

## DRILL SHEET—MULTIPLICATION IV.

| | | | |
|---|---|---|---|
| $2\frac{2}{3}\times3\frac{3}{4}$= | $1\frac{1}{3}\times\frac{5}{8}$= | $3\frac{1}{2}\times1\frac{3}{4}$= | $1\frac{1}{2}\times16$ = |
| $\frac{5}{8}\times2\frac{1}{5}$= | $3\frac{1}{3}\times1\frac{1}{5}$= | $1\frac{1}{6}\times2\frac{2}{5}$= | $3\frac{1}{3}\times9$ = |
| $3\frac{1}{2}\times4\frac{3}{4}$= | $10\frac{1}{2}\times8\frac{2}{3}$= | $2\frac{2}{5}\times3\frac{1}{8}$= | $6\times12\frac{1}{2}$= |
| $1\frac{1}{4}\times3\frac{1}{2}$= | $2\frac{2}{3}\times1\frac{5}{8}$= | $2\frac{1}{4}\times5\frac{1}{3}$= | $5\times1\frac{1}{4}$= |
| $3\frac{1}{8}\times\frac{4}{5}$= | $2\frac{5}{8}\times2\frac{2}{3}$= | $5\times1\frac{1}{2}$= | $3\frac{1}{2}\times2\frac{1}{3}$= |
| $1\frac{1}{3}\times1\frac{1}{4}$= | $3\frac{2}{3}\times2\frac{1}{2}$= | $1\frac{1}{2}\times1\frac{3}{4}$= | $2\frac{1}{2}\times1\frac{3}{4}$= |
| $2\frac{1}{2}\times1\frac{1}{6}$= | $4\frac{1}{2}\times3\frac{1}{3}$= | $5\times12\frac{1}{2}$= | $7\frac{1}{4}\times6$ = |
| $1\frac{1}{2}\times2\frac{1}{4}$= | $2\frac{1}{4}\times2\frac{3}{4}$= | $8\times1\frac{1}{4}$= | $1\frac{1}{2}\times1\frac{1}{2}\times4$= |

## DRILL SHEET—MULTIPLICATION V.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 16 | 9 | $16\frac{2}{3}$ | $48\frac{1}{2}$ | $13\frac{3}{4}$ | $16\frac{2}{3}$ | 27 | $17\frac{1}{5}$ |
| $8\frac{1}{2}$ | $3\frac{1}{3}$ | 15 | 7 | 8 | 12 | $9\frac{2}{3}$ | 9 |
| $13\frac{2}{3}$ | 28 | 19 | $26\frac{1}{3}$ | 45 | 25 | 36 | 40 |
| 10 | $6\frac{1}{4}$ | $8\frac{1}{4}$ | 18 | $13\frac{1}{5}$ | $8\frac{2}{5}$ | $9\frac{3}{4}$ | $16\frac{3}{5}$ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 48 | 24⅔ | 15⅕ | 36 | 21½ | 19 | 21 | 45 |
| 16⅜ | 9 | 8 | 17⅚ | 9 | 9⅓ | 14⅔ | 12⅘ |
| 40½ | 42 | 64 | 24 | 49 | 35 | 31⅓ | 24 |
| 24 | 18⅔ | ⅝ | 14½ | 16⅓ | 15⅖ | 24 | 11⅞ |

## LESSON XVI.

### LEARN TO READ A SCALE DRAWING.

1. In this drawing of "The Thomas Bailey Aldrich Book Case," what scale has been used? Where does it tell this?

2. What is the length of the bottom line in the big drawing? (b) If this line were just 3 inches long, how long should the bookcase itself be? (c) How long must we make the real bookcase if this is a true drawing of it?

3. (a) How long is the line that stands for the height of the bookcase? (b) Is this correct? How do you know?

4. What is the length of the line that represents the back part of the side piece? What is the length of this part in the bookcase?

5. (a) What is the length of the line in the bottom part of the side piece? (b) If ⅛ inch of the drawing equals one inch of the real bookcase, ⅞ inch in the drawing equals.....inches in the bookcase.

6. Measure the dotted line near the top of the side piece. This stands for how many inches in the bookcase? Why?

7. (a) What is the distance between the bottom and middle shelves in the drawing? In the bookcase? (b) Is the scale right? Prove it.

8. What is the distance between the middle and top shelves in the drawing? With this scale what should be this distance in the bookcase?

9. What is the length of the line from the top shelf to the top of the bookcase?

10. (a) What is the distance in the drawing from the bottom shelf to the top of the bookcase? (b) What is the distance from the bottom shelf to the top of the case in the bookcase? (c) Show by this that the scale in the drawing is $\frac{1}{8}''$ to $1''$.

11. (a) How far is the hole in the side piece from the top in the drawing? (b) How far should it be in the real bookcase?

12. (a) How wide is the side piece at the center of the hole? (b) What is the measurement from the center of the hole to the back of the side piece? (c) What is the measurement from the center of the hole to the front of the side part? (d) The answer in (b) is what part of the answer in (c)?

13. (a) How wide should the bookcase be at the center of the hole? (b) Where should the hole be placed in the bookcase? (c) How far from the top? (d) How far from the back? (e) How far from the front?

## LESSON XVII.

1. Lumber is measured by a piece that is 12 inches long, 12 inches wide and one inch or less thick. This is called a "board foot." Why was it so named?

2. (a) Make a drawing that represents a "board foot." (b) If this board were cut in strips each one inch wide, how many strips would there be? (c) Show this on your drawing. (d) Now if these strips were placed end to end, how far would they extend? Why? (e) How wide would

this long piece be? How thick? (f) Then what is another measure for a "board foot"? It is usually written 12 ft. × 1 in. × 1 in., or 12′×1″×1″.

3. If 12′× 1″×1″=1 foot of lumber, then
12′× 2″×1″=.....feet of lumber;
12′× 3″×1″=..... " " "
12′× 4″×1″=..... " " "
12′× 6″×1″=..... " " "
12′× 7″×1″=..... " " "
12′× 8″×1″=..... " " "
12′×10″×1″=..... " " "
12′× 2″×2″=..... " " "
12′× 4″×2″=..... " " "
12′× 6″×2″=..... " " "
12′×12″×2″=..... " " "
12′× 4″×4″=..... " " "

4. If 12′×12″×1″=1 board foot, then
12″× 6″×1″=.....board foot;
12″× 4″×1″=..... " "
12″× 3″×1″=..... " "
12″× 5″×1″=..... " "
12″× 7″×1″=..... " "
24″× 6″×1″=..... " "

$$\frac{24''\times 8''\times 1''}{12''\times 12''\times 1''} = \text{.....board feet;}$$

$$\frac{24''\times 9''\times 1''}{12''\times 12''\times 1''} = \text{.....board feet.}$$

5. Find out how much lumber would be needed to

make this bookcase. (a) How many pieces are necessary? (b) How long is each piece? (c) What is the width of each piece?

$$\frac{4''\times26''\times7''\times1''}{12''\times12''\times1''} = \text{.....board feet;}$$

$$\frac{1''\times26''\times5''\times1''}{12''\times12''\times1''} = \text{.....board feet.}$$

Total = .....board feet.

6. White pine costs 30 cents a board foot, and bass 35 cents a board foot. (a) Find the cost of the lumber if the bookcase is made of white pine. (b) If made of bass wood.

7. If the bookcase is to be finished up, you will need 5 cents for stain, 15 cents for shellac, 5 cents for nails and 5 cents for cord. What would be the entire cost of such a bookcase?

## LESSON XVIII.

The Public Library of Los Angeles suggested this list of books for Children's Book Week:

"Little Women." L. M. Alcott. Little. $1.75; $3.00.

"Hans Andersen's Fairy Tales." Illus. by Louis Rhead. Harper. $1.75.

"Old Mother West Wind." T. W. Burgess. Little. $1.20.

"Alice's Adventures in Wonderland" and "Through the Looking Glass." Lewis Carroll. MacMillan. $1.75.

"The Brownies; Their Book." Palmer Cox. Century. $1.75.

"Cinderella's Granddaughter." B. B. Gilchrist. Century. $1.75.

"The Mutineers." C. B. Hawes. Atlantic Monthly Press. $2.00.

"High Benton." William Heyhger. Appleton. $1.75.

"Nelly's Silver Mine." Mrs. H. H. Jackson. Little. $1.75.

"Toby Tyler." J. O. Kaler. Harper. $1.60.

"The Jungle Book." Rudyard Kipling. Doubleday. $2.00.

"Dr. Dolittle." Hugh Lofting. Stokes. $2.25.

"Pinocchio." Carlo Lorenzini. LeRoy Phillips. $2.25; Ginn, 75 cents.

"The Boys' Life of Edison." W. H. Meadowcroft. Harper. $1.75.

"The Dutch Twins." L. F. Perkins. Houghton. $1.75.

"The Tale of Peter Rabbit." Beatrix Potter. Warne. 75 cents.

"The Merry Adventures of Robin Hood." Howard Pyle. Scribner. $3.50.

"The Real Mother Goose." Illus. by Blanche Fisher Wright. Rand, McNally. $2.50.

"The James Whitcomb Riley Reader." Bobbs-Merrill. $1.00.

"The Children's Book." H. E. Scudder. Houghton. $5.00.

"Heidi." Johanna Spyri. Lippincott. $1.50.

"The Home Book of Verse for Young Folk." B. E. Stevenson. Holt. $2.75.

"The Child's Garden of Verses." R. L. Stevenson. Scribner. $1.00.

"Tom Sawyer." Mark Twain. Harper. $1.75.

"A Short History of Discovery." H. W. Van Loon. McKay. $3.00.

1. How many of these books have you already read? If you had to buy them, how much would they cost?

2. Make a list of the books that you would like to read. How much money would you need to buy them?

3. Name the books that you would like to own. What would be the cost of these books?

4. Select two of these books that you would like to give to two of your friends. (a) If you bought them, how much would they cost you? (b) If you could save 25 cents a week, how long would it take you to get money enough to buy them? (c) How long would it take you with what you do save to buy them?

5. If you had five dollars to buy some of these books, which ones would you choose? What would they cost?

6. (a) Suggest a number of books that would cost about $10.00; about $15.00.

7. Write a letter ordering two or three books that can be bought from the same firm. In your letter, be careful that you name the books, their authors and the price of each; also, the whole cost.

8. Get blanks, "Application for Money Orders," from your nearest postoffice, and fill them out for $3.50; $4.75; $5.25.

10. How far is it from San Diego to Linda Vista? From Irvine to Anaheim? From Santa Ana to Los Nietos? From Anaheim to Rivera? From Aliso to Los Angeles?

11. How long does it take No. 76 to run from Los Angeles to Orange? What is the distance between these two places? About how far does this train run in one minute? At this rate, how far would it travel in one hour?

12. How long does it take No. 74 to run from Los Angeles to San Diego? How far apart are these two cities? About how many miles does this train go in one hour? In fifteen minutes?

## LESSON XIX.

### FOOTBALL.

"Rule I, Section I. The game shall be played on a rectangular field, 360 feet in length and 160 feet in width. The lines at the ends of the field shall be termed 'End Lines.' Those at the sides shall be termed 'Side Lines' and shall extend indefinitely beyond their points of intersection with the goal lines."

1. (a) The length of a football field is how many times its width? (b) Its width is what part of its length?

2. (a) If in drawing a football field you made its width 2 inches, what should you make its length? (b) If the width were 4 inches, what should the length be? (c) If the width is 6 inches, the length will be.....inches. (d) If the length is 18 inches, the width will be.....inches.

3. (a) If 1 inch in your drawing equals 1 foot in the length of the field, how many inches long should you make your drawing? (b) If ½ inch equals 1 foot, the drawing should be how long? (c) If ⅛ inch = 1 foot, the drawing will measure how many inches? (d) If $\frac{1}{16}$ inch = 1 foot, how many inches wide will your drawing be?

4. (a) If 1 inch in the drawing equals 10 feet of the field, how long should the drawing be? How wide? (b) Let 1 inch equal 20 feet. What is the length of the drawing? What is the width? (c) Let 1 inch equal 40 feet. Find the length and width of the drawing. (d) If 1 inch equals 60 feet, the length of the drawing is.....inches and the width is.....inches.

5. Draw the football field to the scale of 1 inch equals 40 feet. Remember to let the side lines extend beyond the end lines.

6. "Section 1. The 'Goal Lines' shall be established in

the field of play ten yards from and parallel to the end lines. The space bounded by the goal lines and the side lines shall be termed the 'Field of Play.' The spaces bounded by the goal lines, the end lines, and the side lines shall be termed the 'End Zones.' (a) Ten yards equal how many feet? (b) How far are the goal lines from the end lines? (c) 30 feet are what part of 40 feet? (d) If 1 inch equals 40 feet, what part of an inch equals 30 feet? (e) How far should you measure from the end lines to show where the goal lines should be placed? (f) How many points should be located? (g) Draw the goal lines in your drawing.

7. How long is the Field of Play? How wide is it? Find the number of square feet in it.

8. How long is an End Zone? How wide is it? How many square feet are there in an End Zone? How many in both of them?

9. How does an End Zone compare in size with a Field of Play? How many times as large is the Field of Play? (Do you add, subtract, multiply or divide to find out?)

## LESSON XX.

"Section 2. The Field of Play shall be marked at intervals of five yards with white lines parallel to the goal lines."

1. (a) Five yards equals how many feet? (b) 15 feet is what part of 40 feet? (c) What part of an inch shall you measure off to show five yards in your drawing? (d) Locate all the five-yard lines that cross the Field of Play.

"Section 3. The goal posts shall be placed in the middle

of each goal line, shall exceed 20 feet in height and be placed 18 feet 6 inches apart."

2. (a) Twenty feet is what part of forty feet? (b) What part of an inch represents 20 feet in your drawing? (c) About how long shall you make the line that stands for 18 feet 6 inches? This lacks how much of being 20 feet? (d) How can you find the middle of the goal line? (e) If the goal posts are ½ inch apart in your drawing, how far is each from the middle point of the goal line? What is ½ of one-half inch? (f) How far are the goal posts from the side lines? (g) How far apart should they be on your drawing? Measure your drawing to see if it is right.

"Rule V. The game shall be decided by the final score at the end of the four periods. The following shall be the value of the plays in scoring:

| | |
|---|---|
| Touch down | 6 points |
| Goal from touch down | 1 point |
| Goal from the field | 3 points |
| Safety by opponents | 2 points" |

3. Find the final scores for these games:

(a) Fullerton (Cal.) High School
5 Touch downs
2 Goals from touch downs
Covina 0.

(b) Fullerton
7 Touch downs
1 Goal from touch down
1 Goal from the field
1 Safety by opponents
Riverside 0.

(c) Fullerton 0

San Diego
3 Touch downs
3 Goals from touch downs.

(d) Fullerton and Santa Ana each had
1 Touch down
1 Goal from a touch down.

(e) Manual Art High School, Los Angeles,
2 Touch downs
1 Safety by opponents
Pasadena 0.

(f) Manual Art
4 Touch downs
4 Goals from touch downs
Whittier High School.
1 Touch down
1 Goal from touch down.

(g) University of California, Berkeley,
2 Touch downs
1 Goal from touch down
1 Goal from the field
Oregon Agriculture
1 Touch down
1 Goal from touch down.

(h) University of California
4 Touch downs
4 Goals from touch downs
Ohio State University 0.

## LESSON XXI.

### HOW TO READ THE TABLE.

**HEIGHT and WEIGHT TABLE for BOYS**

| Height Inches | 5 Yrs. | 6 Yrs. | 7 Yrs. | 8 Yrs. | 9 Yrs. | 10 Yrs. | 11 Yrs. | 12 Yrs. | 13 Yrs. | 14 Yrs. | 15 Yrs. | 16 Yrs. | 17 Yrs. | 18 Yrs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | 35 | 36 | 37 | | | | | | | | | | | |
| 40 | 37 | 38 | 39 | | | | | | | | | | | |
| 41 | 39 | 40 | 41 | | | | | | | | | | | |
| 42 | 41 | 42 | 43 | 44 | | | | | | | | | | |
| 43 | 43 | 44 | 45 | 46 | | | | | | | | | | |
| 44 | 45 | 46 | 46 | 47 | | | | | | | | | | |
| 45 | 47 | 47 | 48 | 48 | 49 | | | | | | | | | |
| 46 | 48 | 49 | 50 | 50 | 51 | | | | | | | | | |
| 47 | ..... | 51 | 52 | 52 | 53 | 54 | | | | | | | | |
| 48 | ..... | 53 | 54 | 55 | 55 | 56 | 57 | | | | | | | |
| 49 | ..... | 55 | 56 | 57 | 58 | 58 | 59 | | | | | | | |
| 50 | ..... | ..... | 58 | 59 | 60 | 60 | 61 | 62 | | | | | | |
| 51 | ..... | ..... | 60 | 61 | 62 | 63 | 64 | 65 | | | | | | |
| 52 | ..... | ..... | 62 | 63 | 64 | 65 | 67 | 68 | | | | | | |
| 53 | ..... | ..... | ..... | 66 | 67 | 68 | 69 | 70 | 71 | | | | | |
| 54 | ..... | ..... | ..... | 69 | 70 | 71 | 72 | 73 | 74 | | | | | |
| 55 | ..... | ..... | ..... | ..... | 73 | 74 | 75 | 76 | 77 | 78 | | | | |
| 56 | ..... | ..... | ..... | ..... | 77 | 78 | 79 | 80 | 81 | 82 | | | | |
| 57 | ..... | ..... | ..... | ..... | ..... | 81 | 82 | 83 | 84 | 85 | 86 | | | |
| 58 | ..... | ..... | ..... | ..... | ..... | 84 | 85 | 86 | 87 | 88 | 90 | 91 | | |
| 59 | ..... | ..... | ..... | ..... | ..... | 87 | 88 | 89 | 90 | 92 | 94 | 96 | 97 | |
| 60 | ..... | ..... | ..... | ..... | ..... | 91 | 92 | 93 | 94 | 97 | 99 | 101 | 102 | |
| 61 | ..... | ..... | ..... | ..... | ..... | ..... | 95 | 97 | 99 | 102 | 104 | 106 | 108 | 110 |
| 62 | ..... | ..... | ..... | ..... | ..... | ..... | 100 | 102 | 104 | 106 | 109 | 111 | 113 | 116 |
| 63 | ..... | ..... | ..... | ..... | ..... | ..... | 105 | 107 | 109 | 111 | 114 | 115 | 117 | 119 |
| 64 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 113 | 115 | 117 | 118 | 119 | 120 | 122 |
| 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 120 | 122 | 123 | 124 | 125 | 126 |
| 66 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 125 | 126 | 127 | 128 | 129 | 130 |
| 67 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 130 | 131 | 132 | 133 | 134 | 135 |
| 68 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 134 | 135 | 136 | 137 | 138 | 139 |
| 69 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 138 | 139 | 140 | 141 | 142 | 143 |
| 70 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 142 | 144 | 145 | 146 | 147 |
| 71 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 147 | 149 | 150 | 151 | 153 |
| 72 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 152 | 154 | 155 | 156 | 157 |
| 73 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 157 | 159 | 160 | 161 | 162 |
| 74 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 162 | 164 | 165 | 166 | 167 |
| 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 169 | 170 | 171 | 172 |
| 76 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 174 | 175 | 176 | 177 |

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1. What should a 5-year-old boy who is 39 inches tall weigh? A boy of six years? One of seven years? Why

doesn't the table give weights for 8, 9 and 10 years for children who are 39 inches tall?

2. (a) Find the weight for a boy 42 inches tall who is 7 years of age. (b) For one who is 46 inches tall and 9 years of age. (c) For a boy who is 57 inches tall and 11 years of age.

## HEIGHT and WEIGHT TABLE for GIRLS

| Height Inches | 5 Yrs. | 6 Yrs. | 7 Yrs. | 8 Yrs. | 9 Yrs. | 10 Yrs. | 11 Yrs. | 12 Yrs. | 13 Yrs. | 14 Yrs. | 15 Yrs. | 16 Yrs. | 17 Yrs. | 18 Yrs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | 34 | 35 | 36 | | | | | | | | | | | |
| 40 | 36 | 37 | 38 | | | | | | | | | | | |
| 41 | 38 | 39 | 40 | | | | | | | | | | | |
| 42 | 40 | 41 | 42 | 43 | | | | | | | | | | |
| 43 | 42 | 42 | 43 | 44 | | | | | | | | | | |
| 44 | 44 | 45 | 45 | 46 | | | | | | | | | | |
| 45 | 46 | 47 | 47 | 48 | 49 | | | | | | | | | |
| 46 | 48 | 48 | 49 | 50 | 51 | | | | | | | | | |
| 47 | ..... | 49 | 50 | 51 | 52 | 53 | | | | | | | | |
| 48 | ..... | 51 | 52 | 53 | 54 | 55 | 56 | | | | | | | |
| 49 | ..... | 53 | 54 | 55 | 56 | 57 | 58 | | | | | | | |
| 50 | ..... | ..... | 56 | 57 | 58 | 59 | 60 | 61 | | | | | | |
| 51 | ..... | ..... | 59 | 60 | 61 | 62 | 63 | 64 | | | | | | |
| 52 | ..... | ..... | 62 | 63 | 64 | 65 | 66 | 67 | | | | | | |
| 53 | ..... | ..... | ..... | 66 | 67 | 68 | 68 | 69 | 70 | | | | | |
| 54 | ..... | ..... | ..... | 68 | 69 | 70 | 71 | 72 | 73 | | | | | |
| 55 | ..... | ..... | ..... | ..... | 72 | 73 | 74 | 75 | 76 | 77 | | | | |
| 56 | ..... | ..... | ..... | ..... | 76 | 77 | 78 | 79 | 80 | 81 | | | | |
| 57 | ..... | ..... | ..... | ..... | ..... | 81 | 82 | 83 | 84 | 85 | 86 | | | |
| 58 | ..... | ..... | ..... | ..... | ..... | 85 | 86 | 87 | 88 | 89 | 90 | 91 | | |
| 59 | ..... | ..... | ..... | ..... | ..... | 89 | 90 | 91 | 93 | 94 | 95 | 96 | 98 | |
| 60 | ..... | ..... | ..... | ..... | ..... | ..... | 94 | 95 | 97 | 99 | 100 | 102 | 104 | 106 |
| 61 | ..... | ..... | ..... | ..... | ..... | ..... | 99 | 101 | 102 | 104 | 106 | 108 | 109 | 111 |
| 62 | ..... | ..... | ..... | ..... | ..... | ..... | 104 | 106 | 107 | 109 | 111 | 113 | 114 | 115 |
| 63 | ..... | ..... | ..... | ..... | ..... | ..... | 109 | 111 | 112 | 113 | 115 | 117 | 118 | 119 |
| 64 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 115 | 117 | 118 | 119 | 120 | 121 | 123 |
| 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 117 | 119 | 120 | 122 | 123 | 124 | 125 |
| 66 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 119 | 121 | 122 | 124 | 126 | 127 | 128 |
| 67 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 124 | 126 | 127 | 128 | 129 | 130 |
| 68 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 126 | 128 | 130 | 132 | 133 | 134 |
| 69 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 129 | 131 | 133 | 135 | 136 | 137 |
| 70 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 134 | 136 | 138 | 139 | 140 |
| 71 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 138 | 140 | 142 | 143 | 144 |
| 72 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 145 | 147 | 148 | 149 |

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3. Read the table for a height of 61 inches, putting it down in this way:

| | age. | weight. |
|---|---|---|
| 61 | | |

4. (a) Find the weight of a boy 65 inches tall and 15 years of age. (b) 52 inches tall and 9 years of age. (c) 48 inches tall and 8 years of age. (d) 59 inches tall and 10 years of age. (e) 43 inches tall and 7 years of age.

5. (a) How old and how tall should a boy be who weighs 68 pounds? (b) One who weighs 56 pounds? (c) One who weighs 70 pounds? (d) One who weighs 46 pounds.

6. (a) What is the weight of a 7-year-old girl whose height is 42 inches? What is the weight of a 10-year-old girl whose height is 48 inches? (c) Of a girl who is 9 years old and 47 inches in height?

7. (a) Find the weight of a girl who is 11 years old and 50 inches tall. (b) Of one who is 8 years old and 48 inches in height. (c) Of one who is 12 years of age and 57 inches tall.

8. (a) Find the height and the age for a girl who weighs 51 pounds. (b) For one who weighs 54 pounds. (c) For one who weighs 58 pounds. (d) For one who weighs 74 pounds.

9. (a) How much does the table show that a boy 51 inches in height and 10 years of age should weigh? (b) A girl of the same height and weight? (c) What weight does the table give for a girl 54 inches in height and 12 years of age? (d) For a boy of the same height and age?

10. (a) How much taller is a boy who weighs 100 pounds than a girl who weighs 100 pounds? (b) What is

the difference in their ages? (c) How much taller is a boy who weighs 123 pounds than a girl of the same weight? (d) What is the difference in their ages?

11. (a) What is the height and age of a girl who weighs 144 pounds? (b) Of a boy? (c) What is the difference in their heights?

## LESSON XXII.

| ABOUT WHAT A GIRL SHOULD GAIN EACH MONTH. | | ABOUT WHAT A BOY SHOULD GAIN EACH MONTH. | |
|---|---|---|---|
| 5 to 8 | 6 oz. | 5 to 8 | 6 oz. |
| 8 to 11 | 8 oz. | 8 to 12 | 8 oz. |
| 11 to 14 | 12 oz. | 12 to 14 | 12 oz. |
| 14 to 16 | 8 oz. | 14 to 16 | 16 oz. |
| 16 to 18 | 4 oz. | 16 to 18 | 8 oz. |

Try to do as much better than the average as you can.

1. (a) If a child from 5 to 8 should gain 6 ounces a month, how many ounces would such a child gain in a year? (b) How many ounces in a pound? (c) 6 ounces is what part of a pound? (d) How many pounds in a year?

2. (a) A child 8 to 12 will gain how many ounces in 3 months? (b) This equals how many pounds? (c) What part of a pound does such a child gain in one month? (d) How much more does a boy 8 to 12 gain in one month than a child 5 to 8? (e) This is what part of a pound?

3. (a) A boy 12 to 14 gains how many ounces in 4 months? Hoy many pounds? (b) 12 ounces is what part of a pound? (c) What part of a pound more does a boy 12 to 14 gain in one month than a child of 5 or 8?

4. (a) How many months will it take a boy 16 to 18 to gain one pound? To gain 3 pounds? to gain 6 pounds?

(b) How many months will it take a girl 16 to 18 to gain one pound? To gain 4 pounds? To gain one-half pound? To gain 5 pounds? Is this more or less than one year? How much?

5. (a) How much should a girl 5½ years of age who is 39 inches in height weigh? (b) How much should a boy whose age is 7 years 6 months and who is 42 inches tall weigh? (c) Find the weight of a girl whose age is 8 years and 4 months and whose height is 46 inches. (d) Find the weight of a boy who is 10 years and 9 months old and who is 50 inches tall.

6. (a) How many months are there in a year? (b) Six months is what part of a year? (c) How many months equal one-third of a year? (d) Three months is what part of a year? (e) Which is the more, one-half of a year or one-third of a year? How much more? (f) 8 months is what part of a year? (g) Nine months is what part of a year? (h) How many months is the same as one-sixth of a year?

7. (a) About how much should a boy 8 to 12 gain in one week? In two weeks? (b) How much should a boy 14 to 16 gain in 2 weeks? In 3 weeks? (c) How much should a girl 11 to 14 gain in 3 weeks? In one week? (d) How much more will a boy 14 to 16 gain in one month than a girl 14 to 16?

8. (a) How much should a boy 8 to 12 gain from the first of January to the last of May? (b) About how much should a girl 11 to 14 gain from the Fourth of July till Christmas? (c) About how much should you gain from January 1 till your birthday? (d) How much should your best friend gain from January 1 till his birthday?

## LESSON XXIII.

1. How many inches in a foot? 39 inches equals how many feet? How many inches remaining? 3 inches is what part of a foot?

39 inches = .....feet, .....inches, or 3¼ ft.

2. 40 inches equals how many feet? How many inches remaining? 5 inches is what part of a foot? How do you write it?

40 inches = .....feet, .....inches, or.....ft.

3. 41 inches = .....feet, .....inches, or.....ft.
42 inches = .....feet, .....inches, or.....ft.
43 inches = .....feet, .....inches, or.....ft.
44 inches = .....feet, .....inches, or.....ft.
45 inches = .....feet, .....inches, or.....ft.
46 inches = .....feet, .....inches, or.....ft.
47 inches = .....feet, .....inches, or.....ft.
48 inches = .....feet.

4. 49 inches = .....feet, .....inches, or.....ft.
50 inches = .....feet, .....inches, or.....ft.
51 inches = .....feet, .....inches, or.....ft.
52 inches = .....feet, ..... inches, or.....ft.
53 inches = .....feet, .....inches, or.....ft.
54 inches = .....feet, .....inches, or.....ft.
59 inches = .....feet, .....inches, or.....ft.
60 inches = .....feet, .....inches, or.....ft.

5. 61 inches = .....feet, .....inches, or.....ft.
62 inches = .....feet, .....inches, or.....ft.
63 inches = .....feet, .....inches, or.....ft.
64 inches = .....feet, .....inches, or.....ft.
65 inches = .....feet, .....inches, or.....ft.
66 inches = .....feet, .....inches, or.....ft.

67 inches = .....feet, .....inches, or.....ft.
68 inches = .....feet, .....inches, or.....ft.
69 inches = .....feet, .....inches, or.....ft.
70 inches = .....feet, .....inches, or.....ft.
72 inches = .....feet, .....inches, or.....ft.

6. (a) If one boy measures 44 inches and another measures 48 inches, how many inches taller is the second boy than the first? This is what part of a foot? (b) If one girl's height is 63 inches and another's is 71 inches, what is the difference in their heights? This number of inches is what part of a foot?

7. (a) Find the height of the oldest girl that weighs 120 pounds. (b) Find the height of the youngest boy that weighs 120 pounds. Write the difference in their heights as a part of a foot.

8. (a) Look for 130 pounds as a weight for a boy. What age and what height are given for this weight? (b) See how many times you can find this weight for either a boy or a girl. Get the heights and ages for each one of these.

9. How old and how tall is a girl who weighs 149 pounds? What is the age and what is the height of a boy who weighs this same amount?

10. What is your weight? How tall are you? What is your age? What does the table say that you should weigh at your age? Do you weigh more or less? How much?

11. Are you tall enough for your age? Are you too tall? Do you weigh enough for your age? How can you tell by comparing your height, age and weight with this table?

## LESSON XXIV.

How to make a Height and Weight Table for the Boys in your room:

1. (a) Draw an oblong 4 inches by 5 inches. The 4-inch side is the top. (b) Draw a line one-half inch below the top line of this oblong. (c) In this space print neatly "Height and Weight Table for Boys." (d) Draw another line one-sixteenth of an inch below the line you have already made.

2. (a) Make another line which is one-half inch below the line made for (b) in problem 1. (b) How many sixteenths of an inch are there between this line and the one made for (d) in problem 1? (c) Divide the first inside line into eight equal parts. (d) How wide should each of these parts be? (e) What is the easiest way of locating these points?

3. (a) Make points on the bottom line which are the same distance apart as those you have made above. (b) Connect the top and bottom points with straight lines. (c) How many places have you made? How many lines are there?

4. (a) In the first little box to the left print the word, "Height." (b) From the school register get the ages in years, using the nearest birthday, for all the boys in the room. (c) Arrange their ages in a column, beginning with the youngest and ending with the oldest. (d) Now place these ages in the remaining little boxes, putting the youngest in the box next to the one with the word, "Height."

5. (a) Measure all the boys (without shoes) in the room. (b) Find the height in inches of each boy. (c) Arrange these heights in a column, being careful to begin

with the lowest number and ending with the highest. (d) See that you have as many numbers as you have boys. (e) Now place these heights in this order in the first column to the left. Make as nice, neat figures as you can.

6. (a) If possible, have all the class go to the scales where you can take turns in weighing each other without shoes. It might be well to have your teacher or some one who has used scales to check up each weight. (c) Take down the weight in pounds or pounds and half-pounds, being careful that you get the right weight for the right boy.

7. (a) Fill in the table by putting the right weight opposite the right height and under the right age. (b) If this table does not show your best work, make another.

8. Make a table in this same way for the girls in the room.

9. (a) How many boys are there in the room whose weights are below normal? How many above? (b) How many girls are there whose weights are below normal? How many above? (c) What can these boys and girls do to make their weights about right?

10. (a) Which boy lacks the most of being the right weight? (b) About how much must he gain each month to have the normal weight for the next year? (c) Which girl is farthest below normal? (d) How much should she gain each month to get her weight up?

## LESSON XXV.

1. (a) Make a card upon which to keep your own height and weight for each month of the year. (b) How many spaces shall you need for the weights? (c) How many for the heights? (d) How wide a space should you

have for each? (e) What would be a convenient size for the card?

2. (a) Upon heavy paper make a six and one-half inch square. (b) Why is this a convenient size? (c) Draw a line one-half inch below the top line. (d) From the top line draw a line to the bottom; that is, one-half inch from the left side.

3. (a) Divide the rest of the top line into twelve equal parts. (b) Do the same with the bottom line. (c) Connect these points with lines extending from top to bottom. (d) How far apart are these lines?

4. (a) Put the name of the present month in the first space. In the second space place the name of next month; the next in the third space, and so on until all twelve months have been named. Practice printing so that you can space your letters well. (b) Try to get your height and weight on the same day each month, and record measurements and weights in proper place.

5. How to make a Classroom Weight Record: (a) Secure a sheet of drawing paper that is 16 inches by 14 inches. Draw a line that is ½ inch from each edge. (b) Inside of these lines you have just made, draw others at a distance of ⅜ inch. (c) Inside of these lines draw still another at a distance of $\frac{1}{16}$ inch. (d) Either shade or ink the space between the first and second lines. These three lines form the border, and none of the inside lines cross them.

6. One of the 14-inch sides forms the top. (a) Measure down 2¼ inches from the top. Place points on either side. Connect these points by a heavy line. (b) ¾ inch below this, draw another heavy line. (c) Measure up from the bottom 1¼ inches. (d) What space at the top was used up in the border? At the bottom? At both top and

bottom? (e) What is the sum of the space that has been measured off at both top and bottom? (f) How much space is left?

7. (a) Locate points on both sides ¼ inch apart. How many will there be on one side? (b) Connect points that are opposite by drawing light lines. (c) How many spaces are there?

8. (a) 2¾ inches from the left side, draw a heavy line that extends from the first heavy line at the top (below the border) to the heavy line at the bottom. (b) Measure off three spaces at the right of the line you have just made, each ¾ inch wide. Draw light lines for the first two, and a heavy line for the third. (c) What is the sum of all the space you have used in this problem? (d) How much space is used in the border on both sides? (e) How much space is used in the border on both sides? (e) How much is used all together (from side to side)? (f) How much should be left? Use your ruler to see if this is correct.

9. (a) What is ½ of ¾ inch? (b) In the remaining space between the two heavy lines, draw a light line ⅜ inch from the top line. Let this line extend to the border on the right side.

10. (a) Beginning at the left, measure off ten ⅝-inch spaces along this line you have just drawn. (b) Measure off the same distance at the bottom. (c) Connect with a light line the points that are opposites.

11. Put these headings on your drawing:

CLASSROOM WEIGHT RECORD.

| NAME | Age | Hght. | Normal Wt. | Year | Actual Weight | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June |

### DRILL SHEET—DIVISION I.

| | | | | |
|---|---|---|---|---|
| $\frac{2}{3} \div 2 =$ | $\frac{9}{10} \div 3 =$ | $\frac{5}{10} \div 5 =$ | $\frac{2}{5} \div 4 =$ | $\frac{3}{8} \div 6 =$ |
| $\frac{4}{5} \div 4 =$ | $\frac{5}{6} \div 5 =$ | $\frac{3}{10} \div 3 =$ | $\frac{3}{5} \div 6 =$ | $\frac{3}{4} \div 4 =$ |
| $\frac{3}{5} \div 3 =$ | $\frac{7}{8} \div 7 =$ | $\frac{7}{10} \div 7 =$ | $\frac{2}{3} \div 4 =$ | $\frac{2}{3} \div 6 =$ |
| $\frac{4}{5} \div 2 =$ | $\frac{2}{5} \div 2 =$ | $\frac{1}{2} \div 4 =$ | $\frac{3}{4} \div 6 =$ | $\frac{5}{6} \div 2 =$ |
| $\frac{5}{8} \div 5 =$ | $\frac{4}{5} \div 2 =$ | $\frac{1}{3} \div 2 =$ | $\frac{2}{8} \div 4 =$ | $\frac{5}{8} \div 10 =$ |
| $\frac{3}{4} \div 3 =$ | $\frac{4}{6} \div 2 =$ | $\frac{5}{7} \div 5 =$ | $\frac{3}{4} \div 2 =$ | $\frac{3}{5} \div 4 =$ |
| $\frac{8}{9} \div 4 =$ | $\frac{6}{8} \div 3 =$ | $\frac{1}{8} \div 4 =$ | $\frac{1}{5} \div 3 =$ | $\frac{1}{6} \div 2 =$ |
| $\frac{6}{7} \div 3 =$ | $\frac{2}{8} \div 2 =$ | $\frac{1}{4} \div 2 =$ | $\frac{2}{5} \div 3 =$ | $\frac{5}{8} \div 4 =$ |

### DRILL SHEET—DIVISION II.

| | | | | |
|---|---|---|---|---|
| $1 \div \frac{1}{2} =$ | $3 \div \frac{1}{2} =$ | $3 \div \frac{2}{3} =$ | $4 \div \frac{2}{5} =$ | $6 \div \frac{3}{8} =$ |
| $2 \div \frac{1}{2} =$ | $4 \div \frac{1}{3} =$ | $2 \div \frac{2}{3} =$ | $3 \div \frac{3}{5} =$ | $9 \div \frac{3}{8} =$ |
| $4 \div \frac{1}{2} =$ | $4 \div \frac{1}{4} =$ | $2 \div \frac{3}{4} =$ | $6 \div \frac{3}{5} =$ | $8 \div \frac{4}{5} =$ |
| $1 \div \frac{1}{3} =$ | $5 \div \frac{1}{2} =$ | $3 \div \frac{3}{4} =$ | $12 \div \frac{2}{3} =$ | $5 \div \frac{5}{8} =$ |
| $2 \div \frac{1}{3} =$ | $6 \div \frac{1}{3} =$ | $4 \div \frac{2}{3} =$ | $9 \div \frac{3}{4} =$ | $10 \div \frac{2}{3} =$ |
| $3 \div \frac{1}{3} =$ | $8 \div \frac{1}{2} =$ | $4 \div \frac{3}{4} \div$ | $10 \div \frac{5}{6} =$ | $15 \div \frac{3}{5} =$ |
| $1 \div \frac{1}{4} =$ | $6 \div \frac{1}{2} =$ | $1 \div \frac{1}{5} =$ | $10 \div \frac{5}{8} =$ | $14 \div \frac{2}{3} =$ |
| $3 \div \frac{1}{4} =$ | $8 \div \frac{1}{4} =$ | $3 \div \frac{1}{5} =$ | $12 \div \frac{3}{8} =$ | $18 \div \frac{9}{10} =$ |

### DRILL SHEET—DIVISION III.

| | | | | |
|---|---|---|---|---|
| $\frac{1}{2} \div \frac{1}{2} =$ | $\frac{3}{4} \div \frac{1}{3} =$ | $\frac{4}{5} \div \frac{1}{4} =$ | $\frac{3}{8} \div \frac{1}{4} =$ | $\frac{7}{8} \div \frac{1}{2} =$ |
| $\frac{1}{4} \div \frac{1}{2} =$ | $\frac{2}{4} \div \frac{1}{2} =$ | $\frac{4}{5} \div \frac{1}{5} =$ | $\frac{3}{8} \div \frac{2}{3} =$ | $\frac{7}{8} \div \frac{1}{3} =$ |

| | | | | |
|---|---|---|---|---|
| $\frac{1}{3} \div \frac{1}{2} =$ | $\frac{1}{3} \div \frac{3}{4} =$ | $\frac{5}{6} \div \frac{1}{2} =$ | $\frac{5}{8} \div \frac{1}{2} =$ | $\frac{7}{8} \div \frac{1}{4} =$ |
| $\frac{1}{2} \div \frac{1}{4} =$ | $\frac{2}{3} \div \frac{1}{4} =$ | $\frac{5}{6} \div \frac{1}{3} =$ | $\frac{5}{8} \div \frac{1}{3} =$ | $\frac{7}{8} \div \frac{2}{3} =$ |
| $\frac{1}{2} \div \frac{1}{3} =$ | $\frac{1}{4} \div \frac{2}{3} =$ | $\frac{5}{6} \div \frac{1}{4} =$ | $\frac{5}{8} \div \frac{1}{4} =$ | $\frac{7}{8} \div \frac{3}{4} =$ |
| $\frac{1}{4} \div \frac{1}{3} =$ | $\frac{1}{6} \div \frac{1}{2} =$ | $\frac{5}{6} \div \frac{2}{3} =$ | $\frac{5}{8} \div \frac{1}{3} =$ | $\frac{1}{2} \div \frac{3}{16} =$ |
| $\frac{1}{3} \div \frac{1}{4} =$ | $\frac{1}{2} \div \frac{1}{6} =$ | $\frac{5}{6} \div \frac{3}{4} =$ | $\frac{5}{8} \div \frac{2}{3} =$ | $\frac{1}{3} \div \frac{1}{12} =$ |
| $\frac{1}{5} \div \frac{1}{2} =$ | $\frac{2}{3} \div \frac{1}{3} =$ | $\frac{3}{8} \div \frac{1}{2} =$ | $\frac{5}{8} \div \frac{3}{4} =$ | $2\frac{2}{3} \div 2 =$ |
| $\frac{1}{2} \div \frac{1}{5} =$ | $\frac{1}{3} \div \frac{2}{3} =$ | $\frac{3}{8} \div \frac{1}{3} =$ | $\frac{5}{8} \div \frac{3}{8} =$ | $\frac{3}{4} \div \frac{5}{4} =$ |

DRILL SHEET—DIVISION IV.

| | | | |
|---|---|---|---|
| $1\frac{1}{2} \div \frac{3}{5} =$ | $1\frac{1}{2} \div 1\frac{1}{3} =$ | $3\frac{1}{3} \div \frac{5}{6} =$ | $2\frac{2}{3} \div \frac{4}{5} =$ |
| $2\frac{1}{2} \div \frac{2}{3} =$ | $2\frac{1}{4} \div \frac{2}{3} =$ | $1\frac{4}{5} \div \frac{2}{3} =$ | $4\frac{1}{4} \div 8 =$ |
| $3\frac{1}{3} \div \frac{2}{5} =$ | $1\frac{1}{4} \div \frac{3}{5} =$ | $2\frac{2}{3} \div 1\frac{1}{2} =$ | $4\frac{1}{4} \div \frac{1}{8} =$ |
| $7\frac{1}{2} \div \frac{2}{3} =$ | $1\frac{1}{4} \div 1\frac{1}{2} =$ | $1\frac{3}{5} \div \frac{2}{3} =$ | $1\frac{1}{2} \div \frac{3}{16} =$ |
| $2\frac{1}{3} \div \frac{1}{2} =$ | $1\frac{1}{2} \div 1\frac{1}{4} =$ | $1\frac{2}{3} \div \frac{5}{8} =$ | $5\frac{1}{6} \div \frac{2}{3} =$ |
| $\frac{4}{5} \div 1\frac{1}{2} =$ | $3\frac{1}{2} \div \frac{7}{8} =$ | $1\frac{2}{3} \div \frac{1}{6} =$ | $6\frac{2}{3} \div \frac{4}{5} =$ |
| $\frac{2}{3} \div 2\frac{1}{2} =$ | $6\frac{1}{4} \div \frac{5}{6} =$ | $2\frac{2}{3} \div \frac{3}{4} =$ | $4\frac{2}{10} \div 1\frac{1}{5} =$ |
| $3\frac{1}{2} \div \frac{2}{3} =$ | $12\frac{1}{2} \div \frac{5}{8} =$ | $2\frac{2}{3} \div \frac{1}{2} =$ | $3\frac{1}{4} \div 1\frac{1}{12} =$ |
| $5\frac{1}{4} \div \frac{3}{4} =$ | $3\frac{1}{3} \div \frac{1}{2} =$ | $2\frac{3}{4} \div \frac{11}{12} =$ | $5\frac{2}{5} \div 1\frac{1}{8} =$ |
| $4 \div 1\frac{1}{2} =$ | $12\frac{1}{2} \div 6\frac{1}{4} =$ | $1\frac{3}{4} \div 5\frac{1}{4} =$ | $3\frac{1}{3} \div 1\frac{1}{4} =$ |

## LESSON XXVI.

### I.

Imagine yourself as checker at our cafeteria. As these trays pass you, be able to place the correct check on each.

TABLE OF PRICES.

| | | | |
|---|---|---|---|
| Meats— | | Salads | 7¢ |
| Beef | 15¢ | Soup | 5¢ |
| Ham | 15¢ | Fruit | 7¢ |
| Sausage | 15¢ | Pie | 7¢ |
| Vegetables | 7¢ | Cake and Pudding | 5¢ |
| Potatoes | 5¢ | Coffee, Tea, Cocoa | 5¢ |
| Bread and Butter | 3¢ | Ice cream | 5¢ |

1st. Ham, bread and butter, pie.
2nd. Beef, mashed potatoes, salad, cake.
3rd. Soup, beans, pie.
4th. Sausage, cabbage, bread and butter, fruit.
5th. Carrots, lettuce, salad, pudding.
6th. Peas, bread and butter, pie with ice cream.
7th. Spinach, egg salad, cake, tea.
8th. Soup, bread and butter, fruit, pie.
9th. Beef, potatoes, cake, ice cream.
10th. Bread and butter, salad, fruit, cocoa.
11th. Ham, beans, bread and butter, pudding.
12th. Beef, potatoes, carrots, pie, coffee.
13th. Bread and butter, fruit, cake.
14th. Salad, bread and butter, pie.
15th. Sausage, potatoes, pie with ice cream.
16th. Ham, potato salad, cake, fruit.

Now try each one again to see if you can check as fast as our checker does.

II.

Now this time you are cashier. What change will you give if you receive these pieces of money?

1st. Fifty-cent piece.
2nd. A quarter and a dime.
3rd. Quarter.

4th. Half dollar.
5th. Two dimes and a nickel.
6th. Quarter.
7th. Quarter.
8th. Three dimes.
9th. A quarter and a dime.
10th. Half dollar.
11th. A five-dollar bill.
12th. A silver dollar.
13th. Two dimes.
14th. Half dollar.
15th. Two quarters.
16th. A two-dollar bill.

III.

If you are given 25 cents a day for your lunch, select a menu for each day of the week. Try to get something you like which is also nourishing.

## LESSON XXVII.

If you want to grow and be strong, you must choose the food that will do these things for you. This table shows food values for boys and girls 8 to 13 years of age.

| FOODS. | Positive Score. | Negative Score. |
|---|---|---|
| Milk | 11½ | .... |
| Eggs | 9½ | .... |
| Fried egg | .... | 9½ |
| Bread and butter | 7½ | .... |
| Hot breads | .... | 13½ |
| Orange | 8¼ | .... |
| Apple | 7½ | .... |

| FOODS. | Positive Score. | Negative Score. |
|---|---|---|
| Pear | 6¾ | .... |
| Raisins | 8 | .... |
| Dates | 7 | .... |
| Figs | 9 | .... |
| Prunes | 8½ | .... |
| Plums | 4 | .... |
| Strawberries | 2½ | .... |
| Banana | 8¾ | .... |
| Breakfast foods (hot) | 6 | .... |
| Jelly | 3½ | .... |
| Preserves | .... | 5½ |
| Bacon | 4 | .... |
| Chicken | 7 | .... |
| Fish | 5½ | .... |
| Lamb | 6 | .... |
| Lean beef | 7½ | .... |
| Pork | .... | 11½ |
| Fried meats | .... | 17½ |
| Soups | 13½ | .... |
| Potatoes | 6½ | .... |
| Peas | 4¾ | .... |
| Carrots | 4¾ | .... |
| Beans | 5 | .... |
| Rice | 12½ | .... |
| Custard | 11¾ | .... |
| Ice cream | 12½ | 14½* |
| Candy | 7½ | 12* |
| Plain cake | 8 | .... |
| Fancy cake | .... | 11¼ |
| Pie | .... | 10½ |
| Plain puddings | .... | 6½ |
| Pickles (large) | .... | 9 |

| | | |
|---|---|---|
| Coffee (cup) | .... | 8½ |
| Tea (cup) | .... | 8 |
| Cocoa (cup) | 8½ | .... |

*Eaten between meals.

1. (a) Name five of the best foods for boys and girls of this age. (b) Name six that should not be eaten.

2. When should ice cream and candy be eaten? Why? Should they come at the beginning or end of a meal? Why is this better?

3. Think of a good reason why people should learn to eat at regular times and not be "piecing" all the time.

4. How much does Frank score for himself when he eats a breakfast of milk, hot breakfast food with dates, bread, butter and jelly? (The positive scores are to be added.)

5. What is Mary's score for this luncheon: soup, baked potato, plain cake and an apple?

6. Which one of these dinners makes the better score? How much better? (a) Egg, rice, carrots, bread and butter, pudding, milk. (b) Lamb, baked potato, peas, bread and butter, custard, cocoa.

7. (a) What is the score for this meal: Chicken, potato, biscuits, pear salad, ice cream, half cup of coffee? (All negative scores are to be subtracted.) (b) Why doesn't this have as high a score as the other meals? (c) How could you change it so that it would make a higher score?

8. How much did your breakfast this morning score?

9. What was the score for your dinner yesterday?

## LESSON XXVIII.

1. Select a breakfast of fruit, cereal (breakfast food), toast or bread and butter and milk. What is the score for such a breakfast?

2. Select a luncheon of soup, one vegetable, bread, butter and jelly, one dessert and milk. What is the score for this meal? What would have been the score had you added a large pickle?

3. If you eat your breakfast at 7:30 a. m. and your luncheon at 12 m., how long is it between the two meals?

4. Do you like ice cream? When do you like best to eat it? Does this score for you or against you?

5. Select a breakfast of not more than five things, one of which is a drink, that will make the highest score. What is the score?

6. (a) From the list choose seven things that you would like to have for dinner today. Find the score. (b) Can you raise the score by making any changes? How much?

7. Do you like to have the same things to eat every day? Make a list of three different luncheons that you would like, and find the score of each.

8. Select from this list five things that you like best. What would be the score for these five things?

9. From this list, name one meat, one vegetable, one fruit, one dessert and one drink. Count up the score for the things you have just named.

10. (a) How much higher is the score for lean beef than for fish? (b) Potatoes than carrots? (c) Apple than pear? (d) How much higher is plain cake than strawberries? (e) How much higher is the score for milk

than for an orange? (f) How much higher is the score for custard than for a banana?

11. (a) How much higher is the score for an orange than for peas? (b) How much higher is the score for bread, butter and jelly than it is for potato? (c) Which has the higher score, milk or cocoa? How much higher?

12. (a) What is the sum of the first two negative scores? (b) What is the sum of the third and fourth negative scores? (c) What is the sum of the first four negative scores? (d) What is the sum of the fifth and sixth negative scores? (e) What is the sum of the seventh and eighth negative scores? (f) What is the sum of the ninth and tenth negative scores? (g) What is the sum of the last two negative scores? (h) What is the sum of all the negative scores?

## LESSON XXIX.

Using the time table for a fireless cooker:

1. Beef is to cook " 7 minutes to the lb." with gas and
"40 minutes to the lb." without gas.

How long will it take a 4-pound piece to cook? (a) How long will it cook with gas? (b) How long without heat? (c) How many minutes for both? (d) This equals how many hours?

2. Pork cooks "9 minutes to a lb." with heat and
"45 minutes to a lb." without heat.

What time must be allowed for 6 pounds? (a) How many minutes with gas? (b) How many minutes without heat? (c) How many minutes for both? (d) How many hours and minutes?

3. Turkey should cook " 6 minutes to a lb." with gas and
"35 minutes to a lb." without heat.

Find the time required for a 9-pound turkey. (a) How many minutes with gas? (b) How many minutes without gas? (c) The total time is.....minutes. (d) This equals .....hours and.....minutes.

4. The time for mutton is " 8 minutes to a lb." with gas and "40 minutes to a lb." without.

How long should be allowed for a 7-pound piece? (a) How many minutes with gas? (b) How many minutes without? (c) What is the sum of these two? (d) What is the time in hours and minutes?

5. Chicken cooks " 6 minutes to a lb." with gas and "40 minutes to a lb." without heat.

How long will it take 4½-pound chicken to cook? (a) How many minutes with gas? (b) How many minutes without? (c) How many minutes for both? (d) How many hours and minutes?

6. Veal should cook " 9 minutes to a lb." with gas and "50 minutes to a lb." without.

How much time should be allowed for a 6½-pound roast? (a) How many minutes with gas?

(a) Find the time that these roasts should be cooked with the gas on. (b) Find the time that each should be cooked with the gas turned off. (c) Find the number of minutes required for both. (d) Change the number of minutes into hours and minutes.

7. 5¾ pounds of mutton.
8. 8½ pounds of veal.
9. 14½-pound turkey.
10. 6¾ pounds of pork.
11. 3¼-pound chicken.
12. (a) A layer cake should bake 10 minutes with gas and 15 minutes with gas turned off. How long will it take to bake this kind of cake? (b) A loaf cake should

bake 25 minutes with gas and 30 minutes without gas turned on. What time is required to bake a cake of this kind? (c) A fruit cake requires 50 minutes with gas and 3½ hours with gas turned off. How much time should be allowed to bake a fruit cake?

13. (a) How much more time is needed to bake a loaf cake than a layer cake? (b) How much more for a fruit cake than a loaf cake? (c) How much more for a fruit cake than a layer cake?

14. A smoked ham, 12 to 16 pounds, should cook with gas 1½ to 2 hours without gas. (a) How many minutes to the pound is this? It should cook 4 to 6 hours with the gas turned off. (b) How many minutes to the pound is this?

## LESSON XXX.

1. On September 15, 1921, the School Branch of the Bank of Italy received the following pieces of money from its depositors: 8 quarters, 4 dimes, 2 nickels, 4 pennies. How much money was deposited on that day?

2. The money received September 22, 1921, was as follows: 2 silver dollars, 15 half dollars, 14 quarters, 25 dimes, 29 nickels and 7 pennies. How much money was deposited?

3. When the tellers got ready to count the change on September 29, they had: 1 one-dollar bill, 13 half dollars, 15 quarters, 14 dimes, 3 nickels and 12 pennies. How much money did they send to the bank that day?

4. On October 6th, the four tellers of the bank took in this money: 1 check for $2.50, another for $3.25, 1 five-dollar bill, 6 one-dollar bills, 9 half dollars, 21 quarters, 18 dimes, 25 nickels and 38 pennies. What was the deposit for the day?

5. The bank received the following money on October 13: 2 silver dollars, 10 half dollars, 23 quarters, 4 dimes, 4 nickels and 15 pennies. What was the sum of all their deposit slips for that day?

6. October 20th the tellers received this money: 1 five-dollar bill, 8 one-dollar bills, 2 silver dollars, 7 half dollars, 11 quarters, 14 dimes, 12 nickels and 14 pennies. What was the amount deposited?

7. On October 27th the bank took in $8.34 and there were 34 depositors. How many dollars, half dollars, quarters, dimes, nickels and pennies would be needed to make this amount?

8. (a) How much money was deposited in the month of September? (b) How much in October? (c) How much in both months?

9. November 3rd was a big day at the bank, and there was much money to count at the close of the banking hour. It was as follows: two checks, one for $3.50, the other for $4.75; 1 five-dollar bill, 4 two-dollar bills and 6 one-dollar bills; 8 silver dollars, 24 half dollars, 27 quarters, 35 dimes, 34 nickels and 30 pennies. How much money was deposited that day?

10. (a) The deposit for November 10th was $6.28; for November 17th, $1.45; for November 23rd, $4.67. How much money was deposited in the three weeks? (b) How much money was deposited in the month of November? (c) How much did that average a week?

11. (a) What was the total deposit for the three months? (b) What was the average deposit a month?

## LESSON XXXI.

Some of the girls who sell ribbon have problems like these to work. Can you solve them?

I.

| Number of yards | Cost per yard | Cost of piece | Money given by customer | Change given | | | | | | | | Amt. of change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1c | 2c | 10c | 25c | 50c | $1 | $2 | $5 | |
| 4½ | $0.20 | $0.90 | $ 1.00 | .... | 2 | .... | .... | .... | .... | .... | .... | $0.10 |
| 5¼ | .45 | ..... | 5.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 6⅔ | .90 | ..... | 10.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 8¾ | .75 | ..... | 7.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 12½ | .60 | ..... | 10.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 6¼ | .85 | ..... | 5.50 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 9⅙ | .48 | ..... | 4.50 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 3⅝ | 1.50 | ..... | 10.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 7¾ | .15 | ..... | 2.01 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 1⅔ | 3.60 | ..... | 20.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 2⅛ | 2.70 | ..... | 6.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 8½ | .65 | ..... | 10.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 3⅔ | 1.00 | ..... | 4.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 7½ | .35 | ..... | 5.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 9 | .46 | ..... | 5.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 6¾ | .28 | ..... | 2.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 7⅔ | .42 | ..... | 3.50 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 5½ | .25 | ..... | 1.50 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 9⅓ | .18 | ..... | 2.02 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |
| 9⅞ | .27 | ..... | 01.00 | .... | .... | .... | .... | .... | .... | .... | .... | ..... |

(a) Find the cost of each piece of ribbon. (b) Find how much change should be given to each customer. (c) Name the pieces of money that the cashier would be

likely to give to the customer. See if you write the answers for each problem without making a single mistake. Rule your paper so that it will look like this, and then put your answers in the right place.

II.

Fill these blanks:

$\frac{1}{2}$ yard equals.....inches.
$\frac{1}{4}$ yard equals.....inches.
$\frac{1}{3}$ yard equals.....inches.
$\frac{2}{3}$ yard equals.....inches.
$\frac{3}{4}$ yard equals.....inches.
$\frac{1}{6}$ yard equals.....inches.
$\frac{5}{6}$ yard equals.....inches.
$\frac{1}{9}$ yard equals.....inches.
$\frac{2}{9}$ yard equals.....inches.
$\frac{4}{9}$ yard equals.....inches.
$\frac{5}{9}$ yard equals.....inches.
$\frac{7}{9}$ yard equals.....inches.
$\frac{8}{9}$ yard equals.....inches.
$\frac{1}{12}$ yard equals.....inhces.
$1\frac{1}{12}$ yard equals.....inches.

## LESSON XXXII.

1. The Fifth Grade Sewing Class decided to make some of their Christmas presents at school. Mary knew her mother needed dishtowels. Their old ones were three-fourths of a yard long. (a) How much material should she get for six? (b) At 22 cents a yard, how much will the material for her mother's present cost?

2. (a) Josephine wanted to make holders for her mother. Her teacher told her they should measure 10

inches by 6 inches. She would need a small roll of cotton which cost her 18 cents, and one-half yard of heavy muslin at 19 cents a yard. How much did both cost? (b) Draw a picture of the holder that is just half as large as the holder itself. (c) The muslin is to be used for the top and bottom. How long do you think it should be? (d) If it were cut a half inch larger on all four sides, what would be its length? Its width? (e) Draw a picture that is half the size of the cover.

3. (a) Fairfax decided to make curtains for the kitchen. There were two 30-inch windows. She wanted the curtains to come 3 inches below the windows, so this would make them how long? (b) If there is to be a 2-inch hem at the bottom and a 4-inch one at the top, how much must she add to the length of the curtains for the two hems? This would make them how long? (c) Two curtains are needed at each window. How many inches of material would it take for one window? (d) How many for two windows? (e) How many yards should she buy? (f) There is a 24-inch glass in the door. She wants a 4-inch hem at both the top and bottom on these. How long should these curtains be cut? (g) How many inches will be needed for two of them? How many yards? (h) How many yards will it take for both the windows and the doors? (i) How much will it cost at 35 cents a yard?

4. Belle is going to make a white apron for her mother. She bought $1\frac{1}{4}$ yards of dimity at 30 cents a yard. How much did it cost? (b) She thought a lace edge would be nice on it and wanted to know how much lace to buy. Her teacher told her to measure the outside edge of the apron so she could get $1\frac{1}{3}$ times as much lace. The apron measured 52 inches. (c) How much lace should she buy?

(d) At 8 cents a yard, what should this lace cost? (e) How much did Belle pay for all the material for the apron?

## LESSON XXXIII.

1. George and Frank each decided to make sail boats for their little brothers. In the woodshop they found a piece of wood that was $2\frac{3}{4}$ feet long. This would give each how long a piece?

2. (a) This piece of lumber was 8 inches wide and 2 inches thick. If the sail boat is to be made 6 inches wide, how much will be taken off each side? (b) They want to begin whittling out the center $\frac{1}{2}$ inch from the edge. Draw a picture of the upper side showing where the whittling is to begin. (c) What is the scale of your drawing?

3. (a) The sides of the bottom are to be rounded off. Draw a picture of one of these sides showing how you would have it look. (b) If the middle part of this bottom is $1\frac{3}{4}$ inches shorter at each end than the top part, what is its length?

4. (a) The boys hunted for a narrow strip of wood to make the masts and booms. Each mast was to be $1\frac{1}{3}$ feet long. How many inches of this wood shall they need for the two masts? The mast is to be placed so that $\frac{3}{8}$ of the length of the ship is in front of it and $\frac{5}{8}$ back of it. How many inches in front of it? (c) How many inches back of it? (d) The boom is $\frac{3}{4}$ of the length of the mast. What is its length? (e) How many inches of lumber is required for both booms? (f) How many feet of lumber will both boys need for their masts and booms?

5. (a) Each boat required two supports of wire. Each support should have $1\frac{3}{4}$ feet. How many feet of wire needed for a boat? (b) Find the amount needed for both boats.

6. (a) They intended to use a heavy cord to fasten the sails. It measured 1⅞ feet from the top of the mast to the end of the bow. How many inches is this? (b) They figured on allowing ⅓ foot of cord for the knots. How long should the piece be? (c) They needed 1¾ feet of cord in another place. How much was required for one boat? (d) How much should they buy for the two boats? (e) What would it cost at 2 cents a foot?

7. (a) George's mother had some cloth which they thought would do for the sails. In the piece there were 1½ yards. For one boat they would need ⅓ of a yard. (b) How much would be required for both? (d) What part of a yard would the mother have left? (e) How many inches in the piece? (f) If they had had to pay 24 cents a yard for their cloth, how much would the sails have cost?

8. (a) Their hardware cost them 15 cents. They bought little flags which were 10 cents apiece. How much did the materials for their boats cost? (b) How much was this apiece?

9. (a) In hollowing out the wood, a man used a machine to help them. He worked 20 minutes. How much was his time worth at 60 cents an hour? (b) The boys have shop from 10:55 till 12:15 a. m. They spent 4 periods working on these boats. How many minutes did they spend? How many hours?

## LESSON XXXIV.

1. Some of the fifth grade class decided they would make envelopes of different sizes, for they could be used for stamps, seeds or clippings. After trying several different sizes, they finally decided upon this pattern for the first one. (a) Use your scratch paper to make a similar

pattern. (You will need a piece eight or ten inches long for this.) An inch or two below the top of your paper, draw an oblong that measures 3⅛ inches from top to bottom and 2⅞ inches from side to side. Make heavy lines for the sides, but only light lines for the top and bottom. (b) Make a light line that is just ⅜ of an inch from each of the side lines. (c) This new oblong you have made is how wide? How long?

2. Just below (using the bottom line of the first for the top line of the second) draw another oblong exactly the same size, as the first drawing. (a) Seven-eighths of an inch above the top line of the first oblong draw a light line that is just 2⅛ inches long. (It is directly above the oblong you made in 1 (b). (b) This is to make the flap of the envelope, so round off the corners, trying to make the two sides as nearly alike as you can.

3. (a) Why was the first oblong made wider than the second? How much wider was it? (b) Cut out the pattern, being careful to cut straight by keeping on the lines. (c) Fold over to the inside both oblongs that measure 3⅛ inches in length and ⅜ inch in width. (d) Fold the bottom oblong up over these two. (e) Fold down the flap of the envelope. (f) Are the sides of the envelope even and true? If so, put library paste on the little oblongs that are folded on the inside, and paste the sides of the bottom oblong to them.

4. (a) Now decide where you are going to put the word, "Stamps." Shall you have it at the top, the middle or at the bottom? Or should you rather letter it as the Japanese do, with the letters under one another? Whichever way you choose, you must decide on the size of the letters. How many are there in this word? What is the length of the space where you intend to put them?

How large can you make each letter? (c) Draw two light lines the right distance apart, and make little blocks where you will put each letter. (d) See if your letters will fit in these spaces.

5. (a) Are there any corrections you would like to make in your pattern? What are they? (b) Draw another pattern on scratch paper, keeping these corrections in mind.

6. (a) You are ready now to make the real envelope out of manila paper. How long should this paper be? How wide? (b) Put in your drawings as you did on the scratch paper. (c) Cut out the envelope very carefully. (d) Paste sides together. (e) Letter it neatly. (f) These envelopes should contain several pieces of waxed paper to prevent the stamps from sticking together. How large should one of these pieces be? (g) How much waxed paper is necessary to make six of these pieces?

7. Some other members of the class decided to make cases for postal cards. (a) What are the measurements of a postal card? (b) About how long then should they make such a case? How wide? Why make it larger each way?

8. (a) To make this pattern, get a piece of paper that is about 14 inches long and 6 or 7 inches wide. (b) About 4 inches from the top, draw an oblong that is 5⅞ inches long and 4⅛ inches wide. Make heavy lines on the side, but light lines at the top and bottom. (The heavy lines always show where to cut, and the light ones where to fold.)

9. (a) At the bottom of this oblong, draw another that is 4⅝ inches long, and the same width as the other, using a heavy line only at the bottom. (b) Measure ⅜ inch from either side of this oblong. At this distance

draw a heavy line that is $\frac{1}{8}$ inch shorter at each end than the side of the bottom oblong. (c) Connect the ends of this line with the top and bottom of the bottom oblong.

10. (a) Find the center of the top line of the first oblong. (b) Make a point that is $3\frac{3}{8}$ inches directly above this. (c) Extend the sides of the top oblong each 2 inches. (d) Draw lines from the point you have made to the ends of the two lines. This makes the flap of the envelope.

## LESSON XXXV.

1. (a) Cut out pattern you have made and fold sides. (b) Fold over flap. (c) Paste it together. (d) Do all the parts fit exactly? (e) What changes would make the next one a little better?

2. (a) Draw a heavy line that is $\frac{7}{16}$ of an inch from the side edges of the envelope. (b) Make three points so as to draw this line around the flap. For the first one measure $\frac{7}{16}$ of an inch from the point of the flap. (e) Place your ruler as though you were going to draw a line from the point where the flap begins to narrow to the other side where the flap folds over. Hold the ruler in this position while you measure $\frac{7}{16}$ of an inch from the point where the flap narrows. (d) Mark this point. (e) In the same way mark a point on the opposite side. (f) Draw straight lines $\frac{7}{16}$ of an inch from the edge and extending from the place where the flap turns over to the points you have just made. (g) Connect the ends of these lines with the point you made first.

3. Show another way in which you could decorate such an envelope. In order to do this, draw the front and back of the envelope as it would look after it was decorated.

4. This is the pattern of another envelope that opens at the side instead of the end. This could be used for kodak films or pictures. For the pattern a piece of paper about 9 inches by 12 inches is necessary. (a) The first oblong should be placed about 3 inches from the top of the paper. The long way is from side to side, and it measures 7⅞ inches. The other way it measures 4⅛ inches. The short lines are heavy. Draw this oblong. (b) Measure ⅜ of an inch from the lines that are 4⅛ inches long, and draw light lines at these distances. (c) What are the measurements of the rectangle you have just made? (d) The rectangle below this is exactly the same size, and three of its sides will have heavy lines. Draw this rectangle.

5. (a) Find the middle of the top line of the first oblong. What is ½ of 7 inches? ½ of ⅛ of an inch? Find the sum of these two. This will be the distance from the dotted line to the middle point. (b) How far will it be from this point to the outside line of this oblong? (c) Extend the dotted lines, with heavy lines, 1⅜ inches. (d) From the ends of these lines to the point made in (a), draw a part of a circle so that both sides will be rounded alike.

6. (a) Cut out the pattern. (b) Fold over the little oblongs that are 3 inches wide. (c) Fold the bottom oblong over these. (d) Fold the top down. (e) Put the paste on the little oblong and stick sides together by folding squarely and keeping edges straight. (f) Draw some kind of decoration on the flap.

7. Make one of these large envelopes out of manila paper, water-color paper or of heavy colored paper and decorate it in the way you like best.

## LESSON XXXVI.

### HOW TO MAKE A PATTERN FOR A TOY PIG.

1. (a) Draw a rectangle that is 8½ inches long and 3½ inches wide. (b) Mark off half inches in both sides and both ends. (c) Draw the lines that divide this rectangle into half-inch squares. (d) How many squares are there in the first row? (e) How many rows? (f) How many half-inch squares are there?

2. (a) Find the third row from the top and the first square to the left. In the lower left-hand corner of this square, make a point. (b) In the top row, fourth square from the left, near the upper right-hand corner, make a point. (c) In the upper row, sixth square from the right, in the upper left-hand corner, make another point. (d) Locate a point in the lower right-hand corner of the fourth square from the right, top row.

3. (a) Find the square in the third row from the top and third square from the right. Put a point in the middle of the right-hand side of this square. (b) In the fourth row, first square to the right, place a point in the center of this square. Place another point about an eighth of an inch above this and just a little to the right. Place a third point in the upper left-hand corner of the square below this one.

4. (a) In the second row from the bottom and the second square from the right, place a point in the middle of the left-hand side. (b) In the third square of this same row, place a point that is below the middle of the left-hand side. (c) Make a point in the middle of the left-hand side of the sixth square from the right, second row from the bottom. (d) In the ninth square of this same

row, make a point in the lower left-hand corner. (e) Bottom row, fifth square from the left, make a point in the middle of the right-hand side.

5. (a) Bottom row, second square from the left, make a point in the upper right-hand corner. (b) Third row from the bottom, first square to the left, make a point in the lower right-hand corner. (c) Connect all these points you have made with slightly curved lines. Practice putting in these lines until the drawing looks like a pig.

6. (a) Place the eye below and to the right of the center of the fourth square from the right and second row from the top. (b) The place where the front leg is attached is a point in the middle of the left side of the sixth square from the right, third row from the bottom. (c) In the same row, third square from the left, bottom line near the lower right-hand corner, make the point for the attachment of the other leg.

## LESSON XXXVII.

Making the patterns for the legs and ears of the toy pig:

1. (a) Make a rectangle 6 inches by 3 inches. (b) Divide this rectangle in ¼-inch squares. (c) How many squares are there in the first row? (d) How many rows? (e) How many small squares are there in the rectangle? (The long way is at the top.)

2. (a) Just above the top line, beginning at the left-hand side, number the squares 1, 2, 3, 4, etc. (b) Along the left side, beginning at the top, letter each row a, b, c, d, e, f, etc. (c) The first square in the upper left-hand corner is 1a. Find 3 a, 10 a, 24 a, 2 d, 8 c, 7 b, 13 l, 19 k.

3. (a) Find 1 e; place a point near the lower, left-hand corner. (b) Find 6 e; place a point near the lower, right-

hand corner. (c) Find 3 b; place a point near the upper, right-hand corner. (d) Connect these three points with a curved line.

4. (a) Find 3 j; place a point near the upper, right-hand corner. (b) Find 4 k; place a point near the lower, left-hand corner. (c) In 3 l, place a point in the lower, right-hand corner. (d) In 8 l, place a point in lower, right corner; in upper, right corner. (e) In 5 j, place a point near upper, left corner. (f) Connect the points you have made. There is a sharp turn at 4 k. The place for attachment is upper right of 3 e.

5. Place points at these places: (a) Upper, right corner 12 g; (b) near lower, left corner, 11 c; (c) near upper, right, 14 a; (d) upper, right, 17 d; (e) upper, left, 17 i; (f) lower, right corner, 18 j; (g) upper, left corner, 19 l; (h) lower, left corner, 19 l; (l) lower, right corner, 15 l; (m) center, 15 i. (n) Connect points you have made. (o) The place for attachment is just above center 14 d.

6. Place points at: (a) Upper, right corner, 24 a; (d) upper, left corner, 24 g; (c) upper, center, 23 h; (d) upper, left corner, 22 f; (e) upper, right corner, 22 c; (f) upper, right corner, 23 a. (g) Connect points you have made. (h) The point for attachment is center 23 f.

7. When you are satisfied with your outlines, cut to shape with sharp scissors. You will need one body, two front legs, two hind legs and two ears.

8. These pigs may be made from heavy pasteboard or wood. Lay your pattern on either material and trace carefully around it. If the pig is made from pasteboard or cardboard, the parts can be fastened together with pins; if wood is used, round head screws are better to fasten ears and legs to the body. These pigs should be colored or painted to suit your own ideas. The tail is put on

with color or paint. Use washers between all movable parts, as they will operate more easily.

9. Mount the toy pig on a cart. (a) Use squared paper (as you did in the other patterns) to lay out the wheels. Be careful they are the same distance from side to side and top to bottom. Why? (b) What else must be true of them? (c) How can you make them perfectly round? Always measure from the center to the outer edge to get location of points for outside of wheel. Make your pattern exactly true. (If you have a pair of compasses or dividers, the circles can be easily made.)

## LESSON XXXVIII.

How to get the right size in sketching a person: The human figure is about eight times its own head length (not counting the hair). Distance between finger tips, with arms outstretched, is equal to the height. (Measure one of your friends to see if this is true. Have some one measure you.) Make a plate to show human proportions.

1. (a) Near the middle of the paper make eight dotted lines about three inches in length that are just one inch apart. (b) One inch below the last dotted line make a heavy line that is the same length as the others. (c) Beginning with the bottom, number the spaces 1, 2, 3, 4, etc.

2. (a) Beginning at the middle of the dotted line between the fourth and fifth spaces, draw a heavy line that crosses the fifth, sixth and seventh spaces. (b) In the eighth space draw a flattened-out circle to represent the head. (c) Divide this head into four equal divisions (use short dotted lines). (d) Find one-third of the width

of the seventh space, two-thirds. Put a little mark in the ⅓ down in space 7 to show the neck. (d) Mark the second third with a large point. From this point draw lines both to the right and to the left, each ⅝ inch in length. Put small circles at the outer ends, and use heavy points to join the lines and the circles. These form the shoulder line.

3. (a) Make small circles on the dotted line at the bottom of the sixth space that are ¾ inch from the main body line that you drew first. These circles are the elbows and come just at the waist line. (b) Connect these circles with those at the end of the shoulder line. (Always use the large points for this purpose.)

4. (a) The pelvis line is just ½ way up and down. Find the dotted line upon which it is drawn. (b) It is 1½ times the length of the head. What is its length? How long is it on either side of the body line? Use circles to end these lines. (c) The circles for the wrists are a little below the pelvis line (¼ inch) and are 1¼ inches apart. How far would each be from the center of the figure? Join wrists and elbow circles.

5. (a) The knees are just half way between the pelvis and the ground. Make these circles ⅜ inch apart. Join these circles with those at the end of the pelvis line. (b) Measure up ⅓ of bottom space for the ankle circles. They are a quarter of an inch apart. (c) Draw lines from these circles that come together on the ground line. (d) Draw other lines from these circles that meet the ground line ⅜ inch from the point made in (c). The finger tips end at ¾ of the distance across space 4. Make a point at this place which is directly under the wrist circle. Draw the line (d). (Complete the hand by making other two sides of a triangle—short sides toward body.

6. Use this description to make pattern for a paper doll. (a) Sketch in the neck and shoulders. (b) Show how wide you will make the trunk; the arms; the legs. (c) Cut out paper doll.

## LESSON XXXIX.

In sketching people, it is well to know this table:

| | | |
|---|---|---|
| 18-year-old (adult) | 8 | head lengths |
| 14-year-old | 7½ | head lengths |
| 10-year-old | 6¾ | head lengths |
| 6-year-old | 5¾ | head lengths |
| 2-year-old | 5 | head lengths |

1. (a) Measure the length of the head of an adult. His height is how many times this length? (b) Find his height. Measure his height to see if your answer is about right. (c) Measure the length of the head of a 10-year-old boy. His height is how many times this length? Find his height. Measure his height to show how nearly correct your answer is.

2. (a) Measure the length of the head of a 14-year-old girl. Her height is how many times this length? (b) Find her height. Find her height by measuring. (c) Measure the length of the head of a six-year-old girl. What shall you multiply by to find her height? (d) What is 5¾ times the length of her head? Measure this girl to see how tall she really is.

3. (a) If an adult measured 6 feet in height, what part of a foot would his head length be? (b) This would equal how many inches? (c) If you were drawing this person to the scale of 1 in. = 1 ft., how long would the drawing be? (d) How long would the head in the drawing be?

4. If a two-year-old child measures 2½ feet, what should be the length of his head? (b) 2½ feet equal how many half feet? (b) The height of a two-year-old child is how many times its head length? (c) What is ⅕ of 5 half feet? One-half foot equals how many inches? (d) The length of a two-year-old child's head is.....inches. (e) If you were drawing this child to the scale of 1 in. = 1 ft., how long should your drawing be? (f) What would be the length of the head in this drawing?

How to make a picture of all five of these ages on the same paper:

5. (a) Take a sheet of paper 8″ by 10″. Measure up from the bottom ¾ inch on each side of the paper. Draw a heavy line across the paper at this place, but stop within ¼ inch of each side. (b) Measure off a distance of 1¼ inches from the left-hand side of the paper. Place your ruler this distance from the edge and, beginning at the heavy line, draw a light line that is 8 inches long. (c) Mark this last line off into inch length. (d) Follow the instructions given in last lesson, and use this line to construct the figure of a full-grown person. How large is the head? Across which spaces do you draw the trunk line? Where is the neck located? The shoulder line? (e) How long is the shoulder line? (f) How far apart are the elbows in your drawing?

## LESSON XL.

1. (a) Measure off a distance of 1¼ inches from the right-hand side of the paper. Place your ruler this distance from the edge and, beginning at the heavy line near the paper, draw a light line 3⅛ inches long. (b) 3⅛ inches equal how many eighth inches? (c) What is ⅕ of this

number? (d) In making five equal spaces on a line 3⅛ inches long, each space is.....inch wide. (e) Divide this line 3⅛ inches into five spaces, each ⅝ inch wide.

2. On this line make the figure of a two-year-old child by following the directions given in Lesson XXXVIII. Make the shoulder lines ⅜ inch long on each side of the trunk line, and the pelvis line is ¼ inch on each side of the trunk line.

3. (a) Place your ruler so that the edge will come at the very top (in the middle) of the head of the adult and also at the very top (in the middle) of the head of the two-year-old child. (b) Now hold it steady while you draw a broken line (light) from one of these points to the other. (c) Now place your ruler so that it will come at the bottom of the head of the adult and at the bottom of the head of the two-year-old child. Sketch lightly another broken line at this place. (d) Place your ruler so that it comes at the point where the shoulder line crosses the trunk line of the adult and also of the child. Draw a broken line in between these points. (e) Connect the circles that represent the left-hand shoulders with a broken line. (f) Those that represent the left elbows. (g) The left wrists. (h) The left knees. (i) The ankles.

4. (a) Measure the distance from the point between the feet of the adult to the point between the feet of the child. (b) What is one-half of this number? (c) Show on the heavy line at the bottom of the paper where this point would be. (d) Place your ruler so that it makes a square corner at this point, draw a broken line from this point to the broken line drawn from the tops of the heads. (e) Draw a head for another figure on this line. (It will come between the line drawn at the top of the head and the one at the bottom of the head.) (f) Draw a broken

line from the right shoulder of the adult to the right shoulder of the child. This locates the right shoulder of this figure. The line already drawn from the left shoulder of the one to the left shoulder of the other, locates the left shoulder of this figure. (g) Do you see how to locate the right elbow? The left elbow? The right hip? The left hip? Complete the figure. It will represent a 10-year-old child.

5. (a) Find the middle of the space on the heavy line at the bottom between the adult and the 10-year-old. (b) Draw a broken line from this point to the top head-line. (c) On this line draw the figure of a 14-year-old.

6. (a) Find the middle of the space (on the heavy line at the bottom) between the 10-year-old and the 2-year-old. (b) Draw a line from this point to the top head-line. (c) On this line draw the figure of a 6-year-old. (d) Under the heavy line at the bottom name each one "2 yrs.," "6 yrs.," "10 yrs.," 14 yrs.," "18 yrs."

7. (a) On another sheet of paper draw any one of these figures dressed in a clown suit. (b) Color to suit yourself.

8. (a) Select one of these to make a pattern for a Jumping Jack. (b) Cut out a body. (c) Cut arms and legs. (d) Fasten them to the body with pins.