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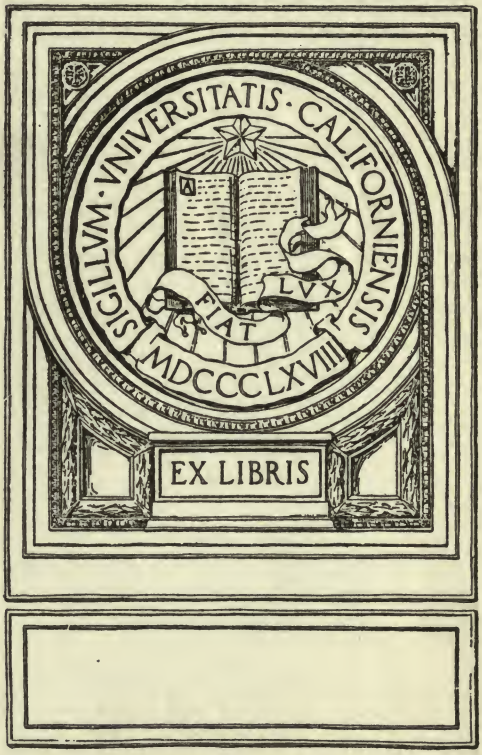

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ARITHMETIC BY PRACTICE

BY

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PREFACE

THE aim in this book is threefold:

1. To provide for the use of pupils in the seventh and eighth grades a great variety of practical problems that are full of *content* and that involve the *carrying-through* process and *continuity of thought.*

2. To train pupils to solve problems, not by the blind application of rules, but by the application of common sense to the conditions of the problem; and also to lead the pupils to appreciate the fact that the essential operations of arithmetic are not many and complex but few and simple.

3. To train pupils to such simple and orderly ways of setting down their work as will make for clearness in thinking and economy in figuring.

Fully seventy-five per cent of the problems in this text have been tried out by the author while Principal of a ward school The problems serve to carry out the aim set forth in this preface.

It is hoped that this text may also be found helpful in the Schools of Education of our Universities, and in the Normal Schools, where it is difficult to find proper material for a twelve weeks' course in arithmetic. It has been the author's experience that a certain amount of problem work is indispensable in such classes, and he has found the problems in this text very helpful, since *continuity of thought* is, as a rule, a thing unheard of by beginning teachers.

D. W. W.

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CONTENTS

Chapter		Page
I.	Expressions to be simplified	1
II.	Problems involving Common Fractions	10
III.	Problems involving Decimal Fractions	27
IV.	Problems in Applications of Percentage	41
V.	Problems in Measurement and Mensuration	66

ARITHMETIC BY PRACTICE

CHAPTER I

Expressions to be Simplified

The problems in this chapter are intended to illustrate and to fix the rules concerning the precedence of signs and the symbols of aggregation. These rules are as follows: If only plus and minus signs are involved, or if only multiplication and division signs are involved, the operations are performed in the order in which they occur; e.g., $8 + 6 - 2 = 14 - 2 = 12$; $8 - 2 + 6 = 6 + 6 = 12$; $24 \div 8 \times 6 = 3 \times 6 = 18$; $24 \times 6 \div 8 = 144 \div 8 = 18$.

If plus and minus signs are used with either the multiplication sign or the division sign, or both, the operations of multiplication and division are always performed in the order in which they occur, but they always take precedence over addition and subtraction; e.g., $6 + 18 \div 2 - 24 \div 6 \times 3 = 6 + 9 - 12 = 15 - 12 = 3$.

When symbols of aggregation are used, the expression or expressions in such symbols are always simplified first; e.g., $24 - [18 + 2 - (15 \div 5 \times 4)] = 24 - [18 + 2 - 12] = 24 - [20 - 12] = 24 - 8 = 16$.

The principal symbols of aggregation are the parentheses ( ), the brackets [ ], the vinculum ———, and

the braces { }. The innermost symbol is usually removed first, then the next, and so on, until all are removed.

Furthermore, the following problems are intended to serve as a drill on the four fundamental operations. Many of them are arranged so that the different terms in the problems can be simplified by inspection. This will encourage the pupil to be on the alert to simplify expressions without the use of pencil wherever possible. Even in the more complex problems towards the end of the list, the pupil should avail himself of any scheme or short-cut that will give him a quick solution. If these points are kept in mind the simplifying of such expressions will prove a valuable exercise.

In the simplifying of expressions it is recommended that the *carrying-through* process be used; i.e., simplify the most complex parts of the expression first, either by inspection or otherwise, but always by inspection if possible. Then write the simplified form in the place of the more complex form. Any reasonable number of steps in the simplifying of the whole expression may be taken. The number of steps depends upon the pupil's ability. The pupil should see that the different expressions in the several steps employed are all the same in *value;* they are merely different in *form,* e.g., simplify:

$$\tfrac{2}{3} + \tfrac{5}{6} - \tfrac{7}{8} + \tfrac{17}{81} \times \tfrac{9}{51} \div \tfrac{11}{9} - \tfrac{5}{9} \times \tfrac{3}{25} \times \tfrac{15}{20}.$$

Solution:

$$\tfrac{2}{3} + \tfrac{5}{6} - \tfrac{7}{8} + \tfrac{17}{81} \times \tfrac{9}{51} \div \tfrac{11}{9} - \tfrac{5}{9} \times \tfrac{3}{25} \times \tfrac{15}{20} =$$

$$\tfrac{2}{3} + \tfrac{5}{6} - \tfrac{7}{8} + \tfrac{\cancel{17}}{\cancel{81}} \times \tfrac{\cancel{9}}{\cancel{51}_{3}} \times \tfrac{\cancel{9}}{11} - \tfrac{\cancel{5}}{\cancel{9}} \times \tfrac{\cancel{3}}{\cancel{25}_{5}} \times \tfrac{\cancel{15}^{6}}{\cancel{20}} =$$

$\frac{2}{3} + \frac{5}{6} - \frac{7}{8} + \frac{1}{33} - \frac{1}{20} = \frac{16 + 20 - 21}{24} + \frac{1}{33} - \frac{1}{20} =$

$\frac{5}{8} + \frac{1}{33} - \frac{1}{20} = \frac{825 + 40 - 66}{1320} = \frac{865 - 66}{1320} = \frac{799}{1320}.$

Again, simplify: $\frac{4\frac{1}{7}}{5\frac{1}{9}} \times \frac{8\frac{1}{6}}{10\frac{1}{5}} \div \frac{9\frac{2}{3} \text{ of } 7\frac{1}{2}}{5\frac{1}{10} \text{ of } 2\frac{7}{8}}$

Solution:

$\frac{4\frac{1}{7}}{5\frac{1}{9}} \times \frac{8\frac{1}{6}}{10\frac{1}{5}} \div \frac{9\frac{2}{3} \text{ of } 7\frac{1}{2}}{5\frac{1}{10} \text{ of } 2\frac{7}{8}} = \frac{29}{7} \times \frac{\overset{3}{\cancel{9}}}{\underset{2}{\cancel{46}}} \times \frac{\overset{7}{\cancel{49}}}{\underset{2}{\cancel{6}}} \times \frac{5}{\cancel{51}} \times \frac{\cancel{3}}{\cancel{29}} \times \frac{\cancel{2}}{\cancel{15}} \times \frac{5}{10} \times \frac{23}{8} = \frac{21}{160}.$

Note. — When a factor occurs in a divisor an *odd* number of times it is inverted. If it occurs an *even* number of times it is not inverted. The *carrying-through* process has many advantages over the method of breaking up the expression into several distinct problems, and then operating with the several results.

Simplify the following expressions:

1. $4 + 4 \times 4 - 4 \div 4.$
2. $4 \times 6 - 96 \div 24 + 56 \div 4 \div 7 - 24 \div 8 \times 2.$
3. $(48 \times 6 \div 12 - 10 \div 2) \times 6 - 86 \times 2 \div 4.$
4. $384 \times 16 \div 24 \div 48 \times 480 \div 56.$
5. $\overline{1024 \div 16 - 34} \times 6 \div 4 + 18 + 28 \div 2.$
6. $[(416 - 216) \div 50 \times 90 - 1000 \div 4] \div 11 + 70 - 40 + 80 - 59.$
7. $46 \times 16 \div 54 \times 9 \div 36 \times 280 \div 24.$
8. $750 \div 25 \div 30 \times 6 + 4 \times 8 \div 2 + 65 \div 13 \times 9.$
9. $56 + 16 - 24 \div 3 + 15 \times 4 + 6 - 75 \div 15.$
10. $16 \times 4 \div 8 - (75 \div 5 \times 4 \div 20) + 17 \times 3 \times 2 \div 34 - 7.$

11. $108 \div 9 + 20 - 81 \times 3 \div 9 + 18 \times 5 - 16 - 25.$
12. $65 \div 13 \times 9 - 40 - 2 + 27 \div 3 + 16 \div 4.$
13. $17 + 9 \div 3 - 15 \div 5 + 11 - 16 + 45 \div (7 \times 9 \div 3 + 1\frac{1}{2}).$
14. $(14 \times 7 - 50) \div (19 \times 4 \div 38 \times 6) + 18 + 9 + 5 \div (7 \times 7 \times 2 \div 14 + 2).$
15. $4 \times 18 \div 12 \times 9 - 48 + 30 + 9 - (18 \div 2 \times 5).$
16. $59 \times 2 - (17 \times 6 - 12) + 54 - 96 \div 8 + 125 \div 5 - 115 \div 23.$
17. $3 \times 48 \div 24 - 110 \div 22 + 98 \div 2 - 65 \div 13.$
18. $8 \times 4 \times 6 \div (9 \times 5 \div 15 \times 16) + 68 \div 17 \times 9 - 25 \times 25 \div 125 - 64 \div 16 \div 2.$
19. $96 \div 16 \times 9 + 72 - 80 + \overline{24 + 36 - 48} + 100 \times 30 \div (60 \div 15 - 2).$
20. $(16 + 18 + 19 - 13) \div 12 \times 8 - 76 \div 4 + 15 + 18 \div (86 \times 3 \div 43).$
21. $6 \times 7 \div 14 + 5 \times 4 \times 6 - 8 \times 7 \div 4 - 3 \times 9 \times 4 \div 2 - 7 \times 6 \div 2 - 9 \times 6 \div 2 - 8 \times 4 \div 16.$
22. $(1024 + 2156 - 1560) \div 45 + (3864 - 668) \div 80 - 2000 \div 80 + 75 - 270 \div 3.$
23. $384 \div 16 \div 8 \times 25 + 9 \times 15 - 30 \times 4 - 16 \times 5 + 2 \times 7 \times 8 - 7 \times 16 + 5 \times 6.$
24. $(15 \times 25 - 12 \times 16 - 9 \times 12) \times 4 - 1200 \div 25 - 3600 \div 90 - 560 \div 14 + 94 + 6 + 525 \div 105.$
25. $[(320 + 640 - 560) \times 20 - 6750 - 625] \div 25 \times 5 \times 4 \div 20.$
26. $(18 \times 7 - 19 \times 6 + 8 \times 12 - 108 \div 3 - 240 \div 16) \div 19 \times 7 - 63 \div 3.$
27. $96 \times 2 \div 8 + 56 \times 4 - 75 \times 3 + 18 \times 4 - 17 \times 5 + 15 \times 6 - 60 - 25 + 7 \times 8 + 9 \div 3.$

28. $(78 + 86 - 56 \div 14 + 87 \div 29 - 156 \div 39 + 102 \div 17) \div 33 \times 9 - 8 \times 5 + 7 \times 8 + 14 \times 3 - 72 \div 24 - 86 + 56 - 48.$
29. $384 \div 16 \times (420 \div 15 \times 3 \div 12) + 196 \div 4 - 2160 \div 80.$
30. $960 - 1024 \div 8 \times 7 + 800 \div 20 - 128 \div 32 - 600 \div 8.$
31. $2860 \div 2 - 3500 \div 5 + 87 \div 29 - 56 \div 7 - (625 \div 25 \times 25).$
32. $975 \div 25 \times 4 - 650 \div 50 \div (99 \div 11 + 2).$
33. $1600 \div 40 \times 3 + 784 \div 8 - 5600 \div 50 - 48 \times 2 + 91 \div 13.$
34. $112 \times 4 \div 16 - 140 \div 7 + 51 \div 17 \div (187 \div 11 - 6) \div 1.$
35. $1845 \div 5 \div 9 + (1675 \div 25 - 17) - 1460 \div 4 \div 73 + 14.$
36. $2240 \div 20 + 360 - 400 + 136 \div 4 \times 3.$
37. $16 \times 2 + 24 \div 6 - 12 + 7.$
38. $4 + 7 \times 4 - 60 \div 20.$
39. $425 \times 13 \div 35 + 6 \times 175 - 240 \div 6.$
40. $(107 - 7) \div 20 \times 60 - 25 \times 8 + 9.$
41. $108 \div 3 - 576 \div 24 \times 9 \div 18 + 70 - 18.$
42. $(176{,}004 + 114{,}876) \div (328 + 756 + 89).$
43. $(980 + 70 - 75) \div \overline{450 - 375 + 75 - 125} \times (45 - 15 + 20).$
44. $450 \times 65 \div 125 - 80 \times 60 \div 18 \div 3.$
45. $32 + 288 \div 24 - 6 \times 8 + (24 \times 6 - 30).$
46. $19 + 26 - 10 \div (84 - 60 \div 3 - 59) + \overline{72 + 84 \div 12}.$
47. $(\frac{5}{12} + \frac{7}{8} - \frac{3}{4}) \times 1\frac{2}{49} \div \frac{16}{7} \times 3\frac{1}{2}.$
48. $(.0875 + 6.24 - .9 - .004) \times 8.25.$
49. $(\frac{7}{8} + .375 - \frac{5}{8} + .675 - \frac{5}{16}) \div .25.$

50. $16 \times 8 \div 4 \times 96 - 3 \times 4 \times 16\frac{2}{3} + 8 - 7 \times 9 \div 21.$
51. $\frac{2}{3} + \frac{7}{8} - \frac{5}{6} + \frac{7}{9} + \frac{4}{5} - 1\frac{3}{7}.$
52. $78 \times 54 \div 27 - 25 \times 68 \div 17 + (24 - 6 \times 2 - 2 \times 4).$
53. $\frac{24}{49} \times \frac{77}{124} \div \frac{11}{18} \div \frac{2}{3} \times \frac{7}{8}.$
54. $\frac{3}{4} + \frac{2}{3} - \frac{7}{8} + \frac{1}{6} - \frac{1}{9} + \frac{3}{5} + \frac{5}{7} - \frac{8}{9}.$
55. $(\frac{2}{3} + \frac{7}{9} - \frac{5}{18}) \times \frac{36}{77} \div \frac{48}{11} + \frac{3}{4}.$
56. $.025 + .0078 - .03 + 8.96 - 5.0002.$
57. $.75 \times 2.003 \div 5.06.$
58. $.065 \div .13 \times 200 + (.625 - .05 \div 25).$
59. $(.875 + \frac{3}{4} - .9025 \times .06) \times (.45 \div .009 \times 750).$
60. $\frac{2}{3} + \frac{5}{6} - \frac{7}{8} + \frac{17}{81} \times \frac{9}{51} \div \frac{11}{9} - \frac{5}{9} \times \frac{3}{25} \times \frac{15}{20}.$
61. $\frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \frac{1}{9} - \frac{1}{10}.$
62. $\frac{3}{4} \times \frac{8}{9} \times \frac{27}{64} \times \frac{75}{102} \div \frac{7}{8} \div \frac{15}{16} \div \frac{23}{69}.$
63. $.087 + .00625 + 3.825 - .99\frac{3}{4} - 1.001\frac{1}{2} + 6.00\frac{1}{8} - 3.000\frac{1}{16}.$
64. $3\frac{3}{4} + 2\frac{2}{3} - 4\frac{5}{6} + 2\frac{7}{8} - 1\frac{5}{16} + .925\frac{7}{8} - .856\frac{3}{16}.$
65. $7\frac{5}{8} + 2.0075 - 6.9256 + 325\frac{4}{5} - 180\frac{3}{20}.$
66. $\frac{1}{2} + \frac{1}{4} - \frac{1}{6} + \frac{1}{8} - \frac{1}{10} + \frac{1}{12} - \frac{1}{14}.$
67. $\frac{1}{2} + \frac{3}{4} - \frac{5}{8} + \frac{13}{27} \times \frac{81}{26} \div \frac{9}{8} - \frac{17}{19} \times \frac{38}{51} \times \frac{15}{16}.$
68. $\frac{5}{8} \times \frac{24}{65} \div \frac{16}{39} \div \frac{9}{4} \times \frac{20}{31} \div \frac{100}{93} \times \frac{60}{89} \div \frac{15}{178}.$
69. $24.625 + 8.4 - 12.875 + .006 + .0075 - 10.775 + 52.5 - 37.945.$
70. $6\frac{1}{4} + 8\frac{1}{3} - 5\frac{3}{4} + 10\frac{5}{6} - 15\frac{1}{2} + 17.875 - 12.625.$
71. $324.62 - 180.75 + 60.005 - .7875 + 200.005 - 70.8275.$
72. $87 \div 29 \times 14 + 105 \div 21 \times 6 - 360 \div 72 \div 5 \times 50 + 78 \div 39 \times 11.$
73. $56 \times 4 \div 8 + 2 - 125 \times 5 \div 25 + 75 \times 4 \div 50 - 64 \div 8 \div 4 - 9.$

74. $.075 + .0825 + .956 - .0625 - .0925 + .875 - .00025 + .008725.$

75. $7.2 + 6.25 - 8.0095 - 2.975 + .9925 - .000675 + .0875.$

76. $.06\frac{1}{4} + 8.75\frac{1}{2} - 4.08\frac{3}{4} + 12.9835 - 5.05\frac{5}{8} + 6.78\frac{5}{16}.$

77. $9.625 - 4.00975 + 2\frac{7}{8} - 1\frac{7}{16} + 8.725 - 6\frac{3}{4}.$

78. $8.625 \times 2.07 \div .25 \div 6.75.$

79. $56.45 \div 5 \times 18\frac{3}{4} \div .75.$

80. $.64 \div .04 + 8.5 \div .005 - 1600 \times .75 - 18.25 \div 25 + 524 \div .04.$

81. $(93\frac{3}{4} \times 8.36 \div 12\frac{1}{2}) \times 3\frac{1}{8}.$

82. $(4.8 \times 40 \div 6.4 \times 7\frac{1}{5}) \div (9.6 \div 1.6 \times 15.5 \div 3.1 + 6).$

83. $4672.725 \times 480.0075 \div 360.000025.$

84. $36 \div 2.4 + 84 \div .28 - 99.9 \div 3.33 - 484 \div 2.2 + 1024 \div 6.4.$

85. $(.6875 \div .25 \div .5 \div .05) \div (.792 \div .3 \div .06 \div .1).$

86. $3\frac{1}{2} + 4\frac{3}{4} - 5\frac{7}{12} + 8\frac{2}{3} - 4\frac{5}{6} + 6\frac{5}{12} - 2\frac{7}{8}.$

87. $24\frac{7}{9} \times 16\frac{3}{8} \div 15\frac{7}{18} \div 21\frac{9}{24} \times 56\frac{3}{4} \div 48\frac{2}{3}.$

88. $\dfrac{4\frac{1}{7}}{5\frac{1}{9}} \times \dfrac{8\frac{1}{6}}{10\frac{1}{5}} \div \dfrac{9\frac{2}{3} \text{ of } 7\frac{1}{2}}{5\frac{1}{10} \text{ of } 2\frac{7}{8}}.$

89. $\dfrac{6.725}{4.625} \times \dfrac{18.225}{24.075} \div \dfrac{36.045}{54.0675}.$

90. $\left(2\frac{3}{4} + \frac{5}{2} \text{ of } \dfrac{7}{2\frac{4}{5}} + \dfrac{\frac{4}{9}}{\frac{1}{3}}\right) \div 4\frac{8}{22}\frac{5}{8}.$

91. $96 \times 1.12 - (75 - 1.6 \times 2.5) + 96 \times (5 \times .0108 + .3642).$

92. $\dfrac{(3.71 - 1.908) \times 7.03}{2.2 - .6}.$

93. $.08\frac{1}{4} \times 1.2\frac{1}{2} \div .006\frac{1}{4} \times .016.$

94. $\dfrac{\frac{4}{5}}{\frac{6}{7}} \div \dfrac{1\frac{6}{25}}{\frac{13}{18}} \times \dfrac{7\frac{2}{5}}{\frac{8\frac{3}{8}}{6\frac{1}{2}}}{18\frac{3}{4}}$.

95. $\dfrac{15\frac{5}{6}}{18\frac{4}{9}} \times \dfrac{27\frac{3}{4}}{36\frac{2}{5}} \div \dfrac{4\frac{1}{2} \div 6\frac{3}{4}}{9\frac{3}{4} \div 12\frac{4}{9}}$.

96. $(14\frac{1}{12} \times 16\frac{8}{65} \div 24\frac{3}{4}) + (44.25 \div 6.5 \times 3)$.

97. $\dfrac{20\frac{4}{5}}{72\frac{2}{3}} \div \dfrac{18\frac{2}{3}}{84\frac{5}{6}} \times \dfrac{\frac{1}{2} \text{ of } \frac{5}{6} \div \frac{8}{15}}{\frac{2}{3} \div \frac{3}{5} \text{ of } \frac{25}{18}}$.

98. $864 \div 12 - 124 \div (775 \div 25) + 54 \div (61 - 34)$.

99. $7\frac{1}{2} - 3\frac{8}{33} - \frac{2}{11} - \frac{1}{3} + 5\frac{1}{6}$.

100. $\dfrac{4\frac{1}{2} + 2\frac{1}{3} \div \frac{2}{3}}{6\frac{1}{2} - 1\frac{2}{3} \times \frac{3}{2}}$.

101. $(15 - 10 \times .3) \times 6.192 \div (7 \times 5.4 - 35.048)$.

102. $\frac{1}{5} \div \frac{3}{4} \text{ of } \frac{2}{3} \times \frac{5}{6} + \frac{4}{7} \div \frac{1}{2} \text{ of } \frac{2}{5} \div \frac{3}{10} \div \frac{1}{5}$.

103. $.75 + .25 \times 3 + 1.4 \div .7 - .32 \times 4$.

104. $\left(2\frac{3}{4} + \frac{5}{2} \text{ of } \dfrac{7}{3\frac{4}{5}} - \dfrac{1\frac{2}{3}}{2\frac{1}{2}}\right) \div 1\frac{76}{228}$.

105. $5\frac{1}{3} \text{ of } \dfrac{1}{1\frac{1}{3} + 2\frac{1}{4}} \div \dfrac{4\frac{1}{5} + 5\frac{1}{4}}{4\frac{1}{4} + 3\frac{2}{3}}$.

106. $\dfrac{\frac{2}{3}}{5} + 7\frac{1}{5} \div \dfrac{\frac{2}{3} \times 7\frac{1}{2}}{\frac{1}{9}}$.

107. $4.75 \times 8 + 7.248 \div 120 + 8.56 \times .07 + .071 \times 36$.

108. $\dfrac{(2 + \frac{1}{5}) \div (3 + \frac{1}{7})}{(2 - \frac{1}{3}) \times (4 - 3\frac{3}{7})}$.

109. $(\frac{2}{3} + \frac{3}{4} - \frac{7}{12}) \times \frac{12}{25} - \frac{7}{8} \times \frac{16}{49} + \frac{9}{70} + \frac{7}{9} \div \frac{35}{18}$.

110. $\frac{6}{7} \times \frac{7}{16} \times \frac{25}{81} \times \frac{36}{125} \div \frac{35}{64} \div \frac{72}{625} \div \frac{69}{2269}$.

111. $\frac{1}{4} + \frac{3}{8} + \frac{5}{12} - \frac{7}{8} + \frac{7}{9} \text{ of } \frac{30}{49} \text{ of } \frac{14}{25} - \frac{8}{17} \text{ of } \frac{68}{97} \text{ of } \frac{1}{2}\frac{9}{2}\frac{4}{5}$ of $\frac{25}{64}$.

112. $\frac{7}{8} - \frac{1}{2} \text{ of } \frac{3}{4} - \frac{1}{3} \text{ of } \frac{3}{4} - \frac{1}{4} \text{ of } \frac{4}{5} - \frac{1}{5} \text{ of } \frac{5}{6} + \frac{17}{19} \text{ of } \frac{76}{85}$.

113. $(\frac{15}{16} - \frac{7}{8} \text{ of } \frac{19}{21} \text{ of } \frac{16}{57}) \div (\frac{4}{9} + \frac{11}{15} \text{ of } \frac{2}{2}\frac{2}{3}\frac{5}{1} \text{ of } \frac{14}{25})$.

114. $\frac{5}{6} \div \frac{7}{8} \times \frac{24}{37} \div \frac{39}{74} \div \frac{15}{23} \times \frac{74}{69} \times \frac{14}{27} \div \frac{18}{25} \div \frac{16}{57}$.

115. $\frac{225}{236} \div \frac{385}{448} \times \frac{725}{10224} \div \frac{12225}{9964}$.

116. $\frac{11845}{25225} \times \frac{37509}{82889} \div \frac{47807}{248867} \div \frac{23685}{116225}$.

117. $\frac{18}{25}$ of $\frac{27}{20} + \frac{7}{8}$ of $\frac{32}{49} - \frac{10}{27} \div \frac{25}{27}$.

118. $\frac{1}{10} - \frac{1}{15} + \frac{1}{20} - \frac{1}{30} + \frac{1}{40} - \frac{1}{50} + \frac{1}{60} - \frac{1}{70}$.

119. $\frac{39}{125} \times \frac{50}{169} \div \frac{75}{824} \div (\frac{13}{87} \times \frac{58}{39} \div \frac{14}{95})$.

120. $\frac{3}{7}$ of $\frac{5}{8} \div \frac{9}{28} \div \frac{4}{9} \div \frac{20}{81} \times \frac{6}{7} - \frac{4}{15}$ of $\frac{36}{65} \div \frac{56}{135}$.

CHAPTER II

Problems Involving Common Fractions

The problems in this chapter and in the following chapters are especially designed to emphasize *continuity of thought.* They are made as practical as possible, considering that conditions in different localities are different, and that what is practical in one community may not be practical in another community.

The present chapter deals with problems that involve fractional relations, i.e., common fractions. The problems are of such a nature that various phases of the subject of arithmetic are involved, e.g., many of the applications of percentage; but the fractional relation is always used.

The solutions should be made as concise as possible, yet *clear* and *complete.* The following solutions for the problems under I in this Chapter are suggestive:

1. (*a*) The depth $\times$ the part = the width.

$$150 \text{ ft.} \times \text{the part} = 40 \text{ ft.}$$

$$\therefore \text{The part} = \frac{40 \text{ ft.}}{150 \text{ ft.}} = \frac{40}{150} = \frac{4}{15}.$$

(*b*) The width $\times$ the part = the depth.

$$40 \text{ ft.} \times \text{the part} = 150 \text{ ft.}$$

$$\therefore \text{The part} = \frac{150 \text{ ft.}}{40 \text{ ft.}} = \frac{150}{40} = \frac{15}{4}.$$

2. The number of square yards $= \frac{\overset{50}{\cancel{150}} \times 40}{\underset{3}{\cancel{9}}} = \frac{2000}{3}$ $= 666\frac{2}{3}$.

3. The number of feet in perimeter $=$
$2\,(150 + 40) = 2 \times 190 = 380.$
The number of square feet in the area $=$
$150 \times 40 = 6000.$
$6000 \times$ the part $= 380.$
$\therefore$ The part $= \frac{380}{6000} = \frac{19}{300}$.

4. (*a*) The price paid per square foot $= \$1000 \div 6000 = \$\frac{1}{6} = 16\frac{2}{3}$ cents.

(*b*) The price per square yard $= \$\frac{1}{\underset{2}{\cancel{6}}} \times \overset{3}{\cancel{9}} = \$\frac{3}{2} = \$1.50.$

5. The cost at 14 cents per square yard $=$
$\$.14 \times \frac{2000}{3} = \$\frac{280}{3} = \$93.33\frac{1}{3}.$

6. The number of posts $= \frac{40}{8} + \frac{40}{8} + \frac{150}{8} + \frac{150}{8} =$
$5 + 5 + 19 + 19 = 48.$

Note. — It is impossible to place all the posts 8 feet apart. In two cases two posts will be only 6 feet apart.

7. The perimeter of the lot $= 380$ ft.
$\therefore$ The cost of the fence $= 8$ cents $\times 380 =$ $30.40.

8. The entire cost $= \$1000 + \$93.33\frac{1}{3} + \$30.40 = \$1123.73\frac{1}{3}$.

$\therefore$ The S. P. $= \$1123.73\frac{1}{3} \times \frac{8}{8} = \$\frac{\overset{\$}{\cancel{8}}42\,1.40}{\underset{8}{\cancel{8}}} \times \frac{\overset{3}{\cancel{8}}}{\underset{8}{\cancel{8}}} = \$1264.20.$

Solutions like these bring out clearly the facts stated in the problem, and the thing or things required to be found. They are full of *content* and at the same time *concise*. Moreover they serve as a stepping-stone to the solving of problems in algebra.

I

I purchased a lot 40 feet wide and 150 feet deep for $1000.

1. The width is what part of the depth? The depth is what part of the width?

2. How many square yards in the lot?

3. The number of feet in the perimeter is what part of the number of square feet in the area?

4. How much was paid per square foot? How much per square yard?

5. What will it cost to sod the lot at 14 cents per square yard?

6. How many posts will be required to enclose the lot by a fence, if the posts are placed 8 feet apart?

7. How much will the fence cost at 8 cents per linear foot?

8. If I make the above improvements on the lot, and then sell it at $\frac{9}{8}$ of the entire cost, how much will I receive?

II

The distance from Terre Haute to Brazil is 16 miles.

1. How long will it take a train to go from Terre Haute to Brazil at the rate of 40 miles per hour?

2. How long will it take an interurban car, at the rate of 22 miles an hour?

3. How long will it require to drive the distance at the rate of 6 miles an hour?

4. How long will it require to go on a bicycle at the rate of 5 miles an hour?

5. In what time can a man walk the distance at the rate of $2\frac{1}{2}$ miles in 50 minutes?

6. If the wheel of a bicycle is 28 inches in diameter, how many revolutions will it make in traveling from Terre Haute to Brazil? (Circumference of wheel equals diameter $\times 3\frac{1}{7}$.)

7. How many revolutions does it make a minute?

8. The man walks what part as fast as the train travels?

9. What is the smallest number of miles that may be traveled in each of the above five ways in an integral number of hours?

10. If the distance from Brazil to Indianapolis is $3\frac{1}{2}$ times the distance from Terre Haute to Brazil, what is the distance from Terre Haute to Indianapolis?

11. How far from Indianapolis is a place that is $4\frac{1}{2}$ times as far west from Terre Haute as Indianapolis is east?

III

A, B, C, and D own a mill valued at $24,000.

1. A owns $\frac{1}{3}$ of the mill, B owns $\frac{1}{4}$, C owns $\frac{1}{6}$, and D owns the remainder. What part of the mill does D own, and what is his part worth?

2. B's share is what part of A's, C's, and D's shares respectively?

3. B and C together own what part of the mill?

4. If their net profit for the year was $4800, how should it be apportioned?

5. If the mill was insured for $\frac{4}{5}$ of its value at $1.75 per hundred, how much insurance did each pay?

6. They traded the mill for an elevator worth $\frac{5}{4}$ as much as the mill. How much additional did each pay?

IV

I purchased the south $\frac{1}{2}$ of the northwest quarter of a section of land.

1. Draw diagram to show how many acres I have purchased.
2. How much will the posts cost at 15 cents each to enclose the tract of land by a fence, if the posts are placed 16 feet apart?
3. What will the wire cost at 35 cents per linear rod?
4. How much did I pay per acre for the land, if I paid \$6040 for all of it?
5. If I sell the farm for \$7200, the selling price will be what part of the cost?
6. The gain will be what part of the cost?

V

A man pays tax to the amount of \$152.50.

1. He pays a poll tax of \$2.50. The tax on his personal property and real estate is $\frac{1}{40}$ of the assessed value. What is the assessed valuation of his personal property and real estate?
2. The assessed valuation is $\frac{3}{5}$ of the real value. What is the real value?
3. $\frac{2}{5}$ of the real value is invested in a farm which is valued at \$50 per acre. How many acres in the farm?
4. During a certain year, $\frac{1}{2}$ of the farm was sown in wheat, which yielded 25 bushels per acre and was sold at 90 cents per bushel. How much was received for the wheat?

5. $\frac{1}{2}$ of the remainder was planted in corn, which yielded 50 bushels per acre and was sold at 60 cents per bushel. How much did the corn bring?

6. $\frac{1}{2}$ of the remainder was sown in oats, which yielded 35 bushels per acre and was sold at 25 cents per bushel. How much did the oats bring?

7. The remainder was put in meadow which yielded 5 tons per acre and was sold for $9 per ton. How much was received for the hay?

8. The gross income from the farm was what part of the value of the farm?

VI

John, Harry, and James together have 243 marbles.

1. John has $\frac{1}{2}$ as many as Harry, and Harry $\frac{1}{3}$ as many as James. How many has each?

2. Harry has what part of all?

3. James' marbles are how many times John's plus Harry's?

4. How many marbles must James give to John and how many to Harry so that all may have an equal number?

5. If the marbles be divided among John, Harry, and James in the ratio of 7, 9, and 11, how many will each receive?

6. Then John's marbles will be what part of Harry's plus James'?

7. Each one now has what part as many as he had in the first division?

VII

$\frac{3}{5}$ of Howard's marbles are $\frac{3}{4}$ of Byron's.

1. They together have 630 marbles. How many has each?

2. How many marbles must Byron give Howard so that Howard's marbles will be $\frac{1}{4}$ more than Byron's?

3. Frederic comes forward with 210 marbles. He has what part of all the marbles?

4. Byron's marbles are what part of Howard's plus Frederic's?

5. How many marbles must Howard give to Byron and to Frederic, so that all may have equal numbers?

6. Divide all the marbles in the ratio of 8, 9, and 11.

VIII

Three boys have together 22,344 marbles.

1. Divide them in the ratio of 3, 4, and 5.
2. Divide them in the ratio of 7, 8, and 9.
3. Divide them in the ratio of $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{7}{8}$.
4. Divide them in the ratio of $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{4}{5}$.
5. $\frac{1}{2}$ of $\frac{5}{7}$ of $\frac{9}{11}$ of the marbles is what part of $\frac{2}{3}$ of $\frac{13}{14}$ of $\frac{23}{36}$ of the marbles?
6. Give two interpretations of the expression "$\frac{3}{4}$."

IX

Mr. Jones sold his interest in a store for $5600.

1. He invested $\frac{3}{7}$ of the amount in the S. W. $\frac{1}{4}$ of the N. E. $\frac{1}{4}$ of a section of land. How much did he pay per acre?

2. He invested $\frac{1}{2}$ of the remainder in cattle at $25 per head. How many cattle did he buy?

3. He invested the remainder in two lots, paying $\frac{3}{5}$ as much for one as for the other. Required the price he paid for each lot.

4. The investment in land is what part of the investment in cattle?

5. The investment in cattle is what part of the investment in each lot respectively?

6. He sold the less expensive lot so as to gain $\frac{2}{5}$ of the cost. How much did he receive?

7. He sold the other lot and lost $\frac{1}{4}$ of the cost. What was the selling price?

8. Did he gain or lose on the two lots and how much?

9. He sold the cattle at an average gain of $5 per head. How much did he receive?

10. The selling price of all was what part of the cost of all?

11. The average selling price per cow was what part of the average cost per cow?

X

A man purchased a herd of cattle for $1760, paying on the average $22 per head.

1. Required the number of cattle purchased.

2. The weight of the cattle was 32,000 pounds. What was the cost per pound?

3. What was the average weight per head?

4. The cattle were placed in a pasture for five

months, at the end of which time their weight had increased $\frac{2}{5}$ of the original weight. Required the weight of the herd.

5. They were sold at an advance in price of 20 cents per hundred pounds. What amount was received for them?

6. The gain is what fractional part of the cost?

7. How much was gained by the advance in price?

8. If they had been sold for the same price per pound for which they were purchased, the gain would have been what part of the cost? Find this in two ways.

XI

Mr. Jones pays a tax of $177.70 including a poll tax of $2.50.

1. What is the assessed valuation of Mr. Jones' real estate and personal property, if the rate of taxation is $\$2\frac{2}{5}$ per hundred?

2. What is the real value of the assessable property, if it is assessed for $\frac{5}{8}$ of the real value?

3. If Mr. Jones carries three years' insurance on $8000 worth of property at the rate of $\$\frac{4}{5}$ per hundred, what is the premium?

4. Mr. Jones sold a piece of property that cost him $3600, at a gain of $\frac{2}{3}$ of the cost. What was the selling price and what was the gain?

5. A commission agent sold the property for Mr. Jones and charged $\frac{3}{200}$ of what he received. What was his commission?

6. How much would Mr. Jones have received if he had asked \$4500 for the property and then sold it at $\frac{1}{10}$ and $\frac{1}{15}$ off?

7. His gain would have been what part of the cost?

XII

In a certain high school there are enrolled 850 pupils.

1. There are $\frac{8}{9}$ as many boys as girls. How many boys and how many girls are enrolled?

2. The number of boys and the number of girls is respectively what part of the enrollment?

3. The number of boys is $\frac{5}{16}$ of how many boys?

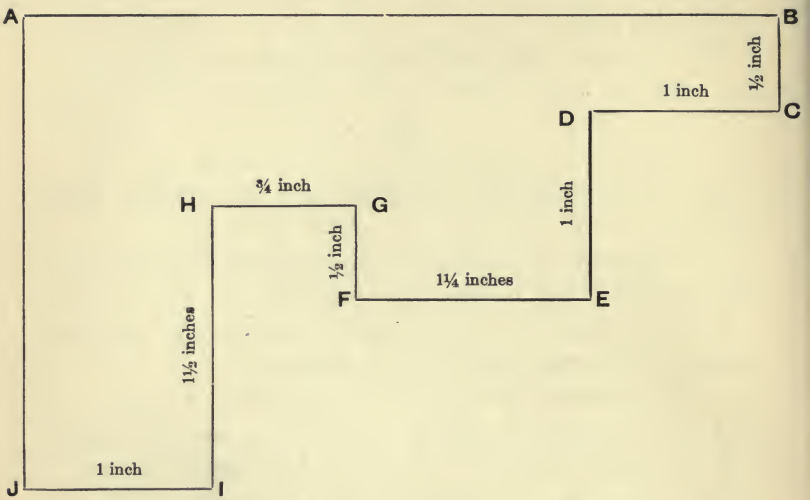
4. The number of girls is $\frac{8}{7}$ of $\frac{21}{40}$ of how many girls?

5. The enrollment in another high school is 2125. This is what part of the enrollment in the first school?

6. The ratio of the number of boys to the number of girls in number 5 is 42 : 43. Required to find the number of boys and the number of girls.

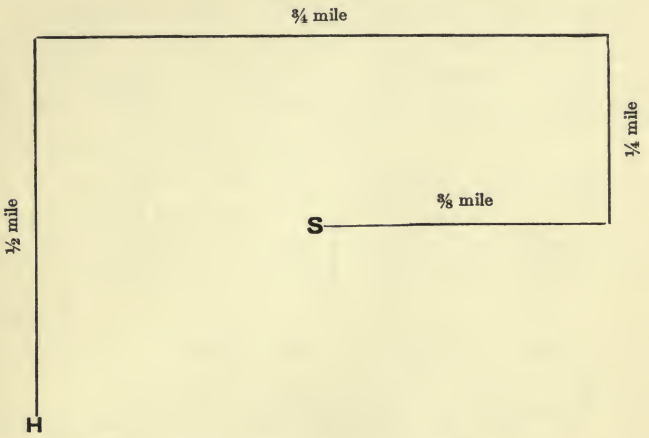
7. Divide 1728 in the ratio of 5, 9, and 13.

XIII



1. What is the length of line AB?
2. What is the length of line AJ?
3. What is the perimeter of the figure?
4. Line AJ is what part of the perimeter? What part of line AB?
5. Line EF is what part of line HI? of line BC?
6. Line AB is what part of a foot? Of a yard? Of a rod?
7. Line AJ is what part of a foot? Of a yard? Of a rod?
8. Line EF plus line HI is what part of a foot? Of a yard? Of a rod?

XIV



1. H is Frederic's home and S is the school he attends. How many miles must he ride to school on his wheel?

2. What part of the journey has he taken when he reaches the first corner?

3. What part of the journey has he taken when he reaches the second corner?

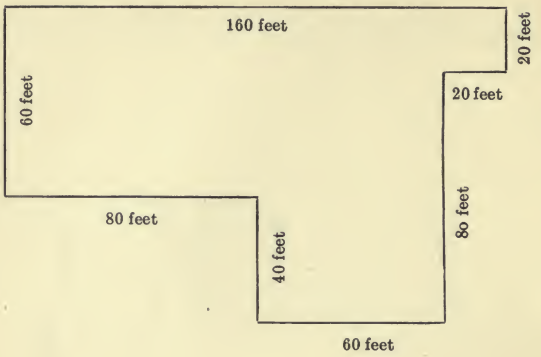
4. Where is the halfway point?

5. How many rods from the second corner to the third corner? From the third corner to the school?

6. How many miles does Frederic ride per day if he goes home for lunch?

7. How many miles will he ride during eight school months, deducting three holidays?

XV



1. This figure is a plan of a lot. What is the perimeter in rods? What is the perimeter in miles?

2. How many posts can be set on the boundary ten feet apart?

3. How many rods of wire will be required to enclose it by a fence of six wires?

4. Find out the cost of smooth wire for fencing and determine the total cost of the wire.

5. If the rectangle 40 feet by 60 feet in the plan is enclosed by a fence, how many fruit trees can be planted in the same, if they are placed at least $3\frac{1}{2}$ feet from the fence and at least one rod apart?

6. If a cement walk four feet wide is placed along the side 160 feet long, and along the side 60 feet long, how many square feet does the walk contain?

7. The area of the walk is what fraction of an acre?

XVI

A commission agent purchased a farm for Mr. Rose. He paid $5600 for the farm and charged $80 commission.

1. What was the total cost of the farm to Mr. Rose?
2. What part of the investment in the farm did the agent charge for his commission?
3. If the farm contained 75 acres, what price did the agent pay per acre?
4. The commission exceeds the cost per acre by how much? The cost per acre is what part of the commission?
5. Required the amount of tax to be paid on the farm at the rate of $2.63 per hundred dollars, the farm being assessed for $\frac{3}{4}$ of its value?
6. What must be the net income from the farm to yield $\frac{3}{40}$ of the total investment?
7. $\frac{4}{5}$ of the cost of the farm is $\frac{2}{9}$ of what sum?

XVII

I purchased a lot 60 feet wide and 150 feet deep for $800.

1. How many square yards in the area of the lot?
2. How much did the lot cost per front foot?
3. How much did it cost per square foot? How much per square yard?
4. I built a barn lengthwise in one corner of the lot. The barn is 60 feet long and 40 feet wide. The base of the barn covers what part of the lot?
5. How many posts are required to build a fence

around the remainder of the lot, if they are placed 6 feet apart as nearly as possible?

6. Required to find the number of boards 12 feet long to build a fence six boards high around the lot. (The barn is to serve as a fence.)

7. Required to find the cost of these boards, if they are 6 inches wide, at $1.75 per hundred board feet?

8. The cost of the fence is what part of the cost of the lot?

XVIII

I purchased a rectangular plot of ground, containing one acre, for $120.

1. If the plot is 8 rods wide, how long is it?

2. What was the cost per square rod?

3. I planted the plot in corn. If the rows run the long way, how many rows are there if the rows are $2\frac{1}{2}$ feet apart and the outside rows are one foot from the fence?

4. Single grains are planted 20 inches apart and 10 inches from each end. How many grains are planted?

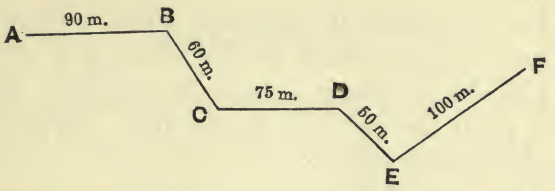
5. If on the average each grain produces an ear of corn, what is the total number of ears?

6. How many bushels have been raised, counting 80 ears to a bushel?

7. How much is the corn worth at 65 cents per bushel?

8. Counting $\frac{1}{3}$ of the receipts for expenses, what part of the investment of the lot was realized?

XIX



The broken line A B C D E F represents a road. A, B, C, D, and F represent cities.

1. How far will a man travel on his wheel to go from A to F?

2. How long will it require to travel this distance at the rate of $2\frac{1}{4}$ miles in 15 minutes?

3. The distance from A to B is what part of the distance from A to F?

4. The distance from B to D is what part of the distance from A to B?

5. If two men leave A and F respectively at the same time and travel at the same rate toward each other, where will they meet?

6. The number of miles each traveled is what part of the distance from C to D?

XX

A man's annual income is $1800.

1. $\frac{1}{3}$ of this income is from a farm. What is the value of the farm, if the income is $\frac{2}{2\frac{2}{5}}$ of the value?

2. $\frac{1}{9}$ of the income is from an investment in a mine.

This income is $\frac{4}{5}\frac{}{5}$ of the investment. What is the investment?

3. $\frac{3}{8}$ of the income is from bank stock. What is the investment in bank stock, if the income is $\frac{3}{2}\frac{}{6}$ of it?

4. $\frac{1}{6}$ of the income is rent for a dwelling. The income is $\frac{3}{4}\frac{}{9}$ of the value of the dwelling. What is the value of the dwelling?

5. What part of the income is not yet accounted for?

6. The remaining income is $\frac{5}{9}\frac{}{6}$ of the amount of money he has on interest. What amount has he on interest?

7. The total income is what part of the total investment?

CHAPTER III

Problems Involving Decimal Fractions

In the problems in this chapter the notion of decimal fractions is predominant. In some cases the pupils will be required to investigate the current prices of certain articles; e.g., groceries, as in sets I, II, III, and IV.

Many of the problems in this chapter are similar to those in Chapter II, except that decimal fractions are used instead of common fractions. Hence the method of procedure in solving the problems will be the same. The following solutions of the problems in set XV are intended to be suggestive:

1. The assessed valuation = \$1500 × .55 = \$825.
   The no. of \$100 = \$825 ÷ \$100 = 8.25.
   ∴ The tax = \$2.84 × 8.25 = \$23.43.
2. The amount for which the machine is insured = \$1500 × .75 = \$1125.
   The no. of \$100 = \$1125 ÷ \$100 = 11.25.
   ∴ The premium = \$.80 × 11.25 = \$9.
3. The amount of depreciation = \$1500 × .35 = \$525.
   ∴ The value would then be \$1500 − \$525 = \$975.
4. The cost $\times \frac{\text{the no. of hundredths}}{100} = \$900$

   $\$1500 \times \frac{\text{the no. of hundredths}}{100} = \$900.$

$$\therefore \frac{\text{The no. of hundredths}}{100} = \$900 \div \$1500 = .60.$$

$\therefore$ The no. of hundredths $= .60 \times 100 = 60.$

5. The number of acres purchased $= \$900 \div \$75 = 12.$

6. The amount of rent per acre $= \$75 \times .07 = \$5.25.$

I

Using the current market price find the cost of:

1. 1 qt. of cranberries; 3 qts.; 1 gal.
2. 1 pk. of apples; $\frac{1}{2}$ pk.; 1 bu.
3. $\frac{1}{2}$ bu. of sweet potatoes; $\frac{1}{2}$ pk.; 2 bu.
4. $\frac{1}{2}$ lb. of coffee; $\frac{1}{4}$ lb.; 2 lbs.
5. $\frac{1}{2}$ lb. of tea; 1 lb.; $\frac{1}{4}$ lb.
6. 2 lbs. of corn meal; 5 lbs.; 10 lbs.
7. $\frac{1}{2}$ doz. bananas; $1\frac{1}{2}$ doz.
8. 2 bars of laundry soap; 3; 5; 10.
9. 1 qt. navy beans; 2 qts.; 1 pk.
10. 5 lbs. of granulated sugar; 25 lbs.
11. 25 lbs. of the best flour; 100 lbs.
12. $1\frac{1}{2}$ lbs. of beef steak; $3\frac{1}{2}$ lbs.; 5 lbs.

II

Using the current market price find amount of:

1. Starch to be given for 10c.; 15c.; 25c.
2. English walnuts, 5c.; 10c.; 25c.
3. Pepper, 10c.; 15c.; 20c.
4. Rice, 10c.; 25c.; 50c.
5. Granulated sugar, 25c.; 50c.; $1.00.

6. Butter, 15c.; 35c.; 50c.
7. Soap, 25c.; 50c. $1.00.
8. Prunes, 25c.; 50c.
9. Apricots, 25c.; 50c.
10. Chicken, 30c.; 50c.; $1.00.
11. Veal steak, 25c.; 50c.; 80c.
12. Eggs, 15c.; 25c.; 60c.

III

Compare the cost of:

1. Sugar when bought by the pound and by the 25-lb. sack.
2. Toilet soap, when bought by the bar, and by the quarter's worth.
3. Laundry soap, when bought by the bar and by the quarter's worth; by the bar and by the box; by the quarter's worth and by the box.
4. Potatoes, bought by the quarter-peck, by the peck, and by the bushel.
5. Sweet potatoes, bought as in 4.
6. Canned goods, when bought by the can and by the dozen.

IV

Make out a bill for the following order of goods, using prevailing market prices:

3 loaves of bread; 5 lbs. of granulated sugar; 1 lb. butter; $1\frac{1}{2}$ lbs. pork chops; 2 dozen eggs; 1 lb. coffee; $\frac{1}{2}$ lb. tea at 60c.; celery, 10c.; 1 pt. oysters; $\frac{1}{2}$ pk. peaches; 1 lb. crackers.

V

Make out a bill for the following order of goods:

$2\frac{1}{2}$ yds. of lace at 25c. a yd.; $3\frac{1}{4}$ yds. of hair ribbon at 35c. a yd.; 8 yds. of calico at $8\frac{1}{3}$c. a yd.; 12 yds. of percale at 15c. a yd.; 5 yds. of dress goods at $12\frac{1}{2}$c. a yd.; 3 handkerchiefs at 25c. each; 7 yds. of silk at $1.39 a yd.; $\frac{5}{8}$ of a yd. of velvet ribbon at 20c. a yd.

VI

The following table shows the deposits and number of depositors for a certain Trust Company for eight days:

Date	*Deposits*	*No. of Depositors*
October 10	$2,250	18
" 11	3,726	25
" 13	1,750	12
" 14	980	8
" 15	4,278	37
" 16	3,780	42
" 17	2,121	28
" 18	5,760	56

1. Find the total deposit for the eight days.
2. Find the total number of depositors.
3. Find the average daily deposit.
4. Find the average daily number of depositors.
5. Find the average deposit for all the depositors.
6. Tell by inspection which day had the larger average deposit October 17 or October 18.
7. Do the same for October 13 and October 14.

VII

A man receives a salary of $160 per month.

1. What is his annual income?

2. How much rent does he pay annually at the rate of $22\frac{1}{2}$ per month?

3. Find the amount of his fuel bill at the rate of $7.75 per month for eight months.

4. What is his annual grocery bill at the rate of $6.50 per week?

5. Calculate his annual gas bill and light bill, the former at the rate of $2.40 and the latter at the rate of $1.80 per month.

6. Calculating his annual expenditure for clothes $250, and his incidental expenses $2.50 per week, how much does he save annually?

7. What is the interest on his annual savings for one year, if it is .05 of the annual savings?

VIII

John P. Walker purchased of The Model Hardware Company, Riverside, Cal., Aug. 8, 1910, the following:

6 dozen bolts at 50 cents per dozen; 4 dozen bolts at $2\frac{1}{2}$ cents each; 2 augers at $2.75; 3 gimlets at 50 cents; 60 pounds of nails at $3\frac{1}{2}$ cents; 2 garden rakes at 75 cents; 2 hoes at 35 cents; 2 hatchets at $1.25; 3 hammers at 75 cents; 2 saws at $2.50; $\frac{1}{2}$ dozen boxes of tacks at 5 cents; 1 hone at 65 cents; 15 rods of wire at $12\frac{1}{2}$ cents per yard; 2 express wagons at $2.75 and $.90 respectively; 3 knives at 40 cents; 1 lawn mower, $6.25; 1 fishing outfit, $2.75; and 2 razors at $2.40.

Make out a bill and receipt it.

IX

William Jones purchased the following articles of Pettis Dry Goods Company, Indianapolis, Ind., July 10, 1911, at a discount of .18 of the cost:

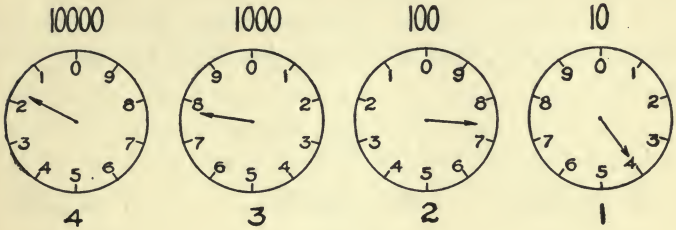
3-piece parlor set at $55; 3 rockers at $9.50; 1 davenport at $40; 2 rockers at $5.50; 3 chairs at $8.50; book case at $37.50; 1 dining table at $25; ½ dozen chairs at $3; 1 buffet at $40.50; 1 kitchen cabinet at $15; 1 breakfast table at $6.50; 3 chairs at $.75; 1 gas range at $26.75; 1 stand at $18.50; 2 bedsteads at $50 and $35 respectively; 1 dresser at $37.50; 1 chiffonier at $25.75; 1 hall tree at $14.50; and 2 mirrors at $12.50. Make out a bill and receipt it.

X

Harry Portsmouth purchased the following goods from H. A. Mossman, Newark, New Jersey, June 22, 1912, at a discount of .10 of the cost for cash:

3 dozen handkerchiefs at 25 cents each; 2 umbrellas at $3.50; 3 children's hats at $1.50; 1 garment at $18.50; ½ dozen hose at 37½ cents; 12 yards lace insertion at 15 cents; 15 yards ribbon at 12½ cents; 20 yards beading at 8 cents; 3 spoons at $1.25; 2 pairs side combs at 90 cents; 2 pairs silk gloves at $2.75; 1 veil at 75 cents; 1 dozen collars at 12½ cents; 6 spools of thread at 5 cents; 3 books at $1.20; 4 books at $.60; ½ dozen dolls at $.50; 8 toys at 25 cents; 4 toys at $1.25; lady's coat at $15; 2 rugs at $26.50; 15 yards of carpet at 75 cents; 18 yards matting at 35 cents; 8 yards linoleum at 95 cents; and 2 pairs lace curtains at $8.50. Make out a bill and receipt it.

XI



This drawing represents the dial of an electric meter. The contract price varies from $7\frac{1}{2}$ cents to 10 cents per kilowatt hour.

The reading as indicated above is 1774 kilowatt hours.

1. What is the reading when the hand on No. 4 is between 2 and 3; on No. 3, between 4 and 5; on No. 2, between 3 and 4; and on No. 1, at 5?

2. What is the reading when the hand on No. 4 is at 3; on No. 3, at 0; on No. 2, between 7 and 8; and on No. 1, at 6?

3. Practice reading the meter with the hands in different positions.

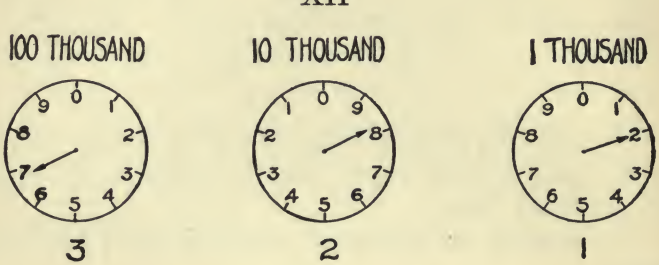
4. The reading of a meter at successive times was 476 and 512. How much was the bill for the month at \$.085 per kilowatt hour?

5. Read your electric meter for two successive months and calculate the bill at \$.09 per kilowatt hour.

6. In case your school uses electric current, read the meter at intervals of a week and determine the cost at \$.075 per kilowatt hour.

7. Determine the position of the hands on the dials for the readings in problem 4.

8. Bring an electric bill from home and determine the position of the hands on the dials for the given readings.



This drawing represents the dials of a gas meter.

The rate per gas is from \$.60 to \$1.25 per thousand cu. ft.

The reading as indicated above is 68,200 cu. ft.

1. Give the reading when the hand on No. 3 is between 1 and 2; on No. 2, between 3 and 4; and on No. 1, at 7.

2. Give the reading when the hand on No. 3 is at 0; on No. 2, between 8 and 9; and on No. 1, at 5.

3. Practice reading the meter with the hands in various positions.

4. Give two readings representing successive months and calculate the gas bill for the month at \$.90 per thousand cu. ft.

5. Read your gas meter for two successive months and calculate the bill.

6. The reading of a meter at successive times was 78,400 and 86,800. How much was the bill for the month at $.85 per thousand cu. ft.?

7. Determine the position of the hands on the dial for the readings in problem 6.

8. Bring a receipted gas bill and determine the position of the hands on the dial for the given readings.

XIII

A certain family used the following amount of gas and electricity during the year, 1912:

Month	*Gas in cu. ft.*	*Electricity in k.w. hours*
January	3,500	25
February	3,300	24
March	3,000	22
April	3,200	18
May	2,900	14
June	2,800	8
July	2,200	9
August	2,100	9
September	3,000	16
October	3,100	20
November	2,700	24
December	2,500	28

1. What was the gas bill for the year at $.90 per thousand cu. ft.?

2. Calculate the electric bill for the year at $.08 per kilowatt hour.

3. Find the average monthly bill for gas.

4. Find the average monthly bill for electricity.

5. Find the bill for gas for January, June, and November, respectively.

6. Find the bill for electricity for February, July, and December respectively.

7. The smallest monthly bill for electricity is how many hundredths of the annual bill for electricity?

8. Account for the variations in the monthly bills for electricity.

XIV

A certain family used the following amount of fuel during the year 1912:

4 tons of Pocahontas at $4.75 per ton, bought in the summer.

2 tons of anthracite at $7.75 per ton, bought in the summer.

4 tons of coke at $5.50 per ton, bought in the winter.

2 tons of Pocahontas at $5.75 per ton, bought in the winter.

1. Find the total cost of the fuel if $.25 per ton is charged for carrying in the coal and $.50 per ton, for carrying in the coke.

2. The cost of the anthracite is how many hundredths of the cost of the Pocahontas bought in the summer?

3. The cost of the Pocahontas bought in the summer is how many times the cost of the Pocahontas bought in the winter?

4. The cost of the anthracite is how many hundredths of the cost of all the Pocahontas?

5. The cost of the coke is how many hundredths of the cost of all the coal?

6. The cost of the coke is how many hundredths of the cost of all the fuel?

7. Why is more charged for carrying a ton of coke than a ton of coal?

XV

A bought an automobile for $1500.

1. What amount of tax is paid for the automobile if assessed for .55 of the cost, at $2.84 per hundred?

2. If the machine is insured for three years for .75 of the cost, at $.80 per hundred, what is the premium?

3. If the machine depreciated .35 of its value the first year, how much was it then worth?

4. If the machine was sold for $900, the selling price is how many hundredths of the cost?

5. If the proceeds were invested in farm land at $75 per acre, how many acres were purchased?

6. For how much per acre must the farm be rented to yield an income of .07 of the investment?

XVI

Mr. Black's annual net income from his farm is $600.

1. If his income is .08 of his investment, what is his investment?

2. How many acres in the farm if he paid $75 per acre?

3. How much tax does he pay if he is assessed .66$\frac{2}{3}$ of the investment, and pays at the rate of $2.15 per hundred?

4. He raised $712.50 worth of wheat, at the rate of $.95 per bushel, on 30 acres. What was the yield per acre?

5. 10 acres of oats yielded 35 bushels per acre. The oats sold for $157.50. What was the selling price per bushel?

6. 20 acres of corn yielded 40 bushels per acre. How much was it worth at $.65 per bushel?

7. The value of the corn is what decimal fraction of the value of the wheat?

XVII

The tax rate in a certain city is $2.60 per hundred dollars.

1. If the total tax from assessable property is $200,000, what is the assessed valuation of the property?

2. What is the real value of the property if the assessed valuation is .625 of the real value?

3. How much tax does Mr. B. pay whose property is assessed at $12,500; and who pays for one poll at the rate of $3.25?

4. What is the real value of Mr. B's property?

5. If the above City had been required to raise $225,000 from the taxable property, what would have been the tax rate?

6. Explain just what determines the tax rate?

7. Explain the manner of assessing property?

8. What is meant by poll tax?

XVIII

A horse was sold for $200.

1. The selling price is 1.25 of the cost price. What was the cost of the horse?

2. If the horse had been sold for $120, the selling price would have been how many hundredths of the cost?

3. The horse was insured against fire for three years, for $150 at the rate of $.95 per hundred. What was the premium?

4. $200 is how many hundredths more than $120?

5. What is .0625 of $150?

6. $250 is how many hundredths less than $300?

7. Find .18 of .45 of $2500.

XIX

Mr. Smith bought a house and lot for $3900.

1. The lot cost .625 as much as the house. What was the cost of each?

2. The value of the lot is how many hundredths of the value of the property?

3. The value of the property is how many hundredths of the value of the house?

4. The property was assessed for .68 of the value. Calculate the tax at the rate of $2.42 per hundred.

5. The house was insured for three years for .875 of its value at the rate of $.75 per hundred. What was the premium?

6. The property was sold at a gain of .22 of the cost. What was the gain? What was the selling price?

7. If it had been sold for $3500, the loss would have been how many hundredths of the cost?

XX

I purchased a lot 45 feet wide and 120 feet deep for $1200.

1. What is the cost per front foot?

2. What is the cost per square foot?

3. The area of the lot is what decimal fraction of an acre?

4. What is the cost per square rod?

5. For how much must I sell the lot to gain .24 of the cost?

6. A commission agent sold it for $1450 and charged .015 of what he received for selling. What was his commission?

7. I invested the proceeds in R.R. stock at $106 per share. How many shares did I buy and what sum remained?

CHAPTER IV

Problems in Applications of Percentage

The problems in this chapter involve the applications of percentage as well as a review of common and decimal fractions. Instructors frequently teach the applications of percentage as a series of distinct and independent subjects. As a result, pupils usually solve the problems by rule. Definite rules are learned for solving problems in profit and loss; definite rules for commission; definite rules for interest; etc. As long as the pupil remembers the rule, he gets along very well, but if he happens to forget the rule, he is at a total loss as to what to do.

The problems in this chapter serve to unify the subject of percentage in all of its applications. The problems in the different applications of percentage are not solved by different methods, but by exactly the same method.

When a certain part of a certain number of dollars is found, it is called *gain* in one case; *loss* in another case; *commission* in another case; *discount* in another; *interest* in another; *tax* in another; etc. The method is exactly the same, but the *name* for the result is different. Of course it is important that the teacher explain very carefully to the class and give concrete illustrations of just what is meant by the terms, *com-*

mission, discount, tax, interest, etc. That is not the purpose of this text.

The problems in this chapter differ in nature very little from those in the preceding chapters. The new and the *only* new term is the term *per cent* (%). But when it has been made clear that whenever the sign "%" is written with a number, it is just another way of expressing the same number written as a decimal, or as a common fraction, — that, for example, 12% of a number is the same as .12 of the number, or is the same as $\frac{12}{100}$ of the number, — then it is easy to see that there is really nothing new about percentage. When this point is clearly understood, and much drill should be given on it, then the problems in this chapter may be solved as readily and in the same manner as those in Chapter II and Chapter III.

In solving problems in percentage the pupil should be encouraged to use that form (whether per cent, decimal fraction, or common fraction) which most appeals to him. The use of the pernicious 100% method, which has run its course, should be discouraged.

The following solutions, which are the solutions to the problems in set I, are suggestive:

1. The cost $\times$ 1.20 = \$3600.

   $\therefore$ The cost = \$3600 $\div$ 1.20 = \$3000.

Note. — Let it be optional with the pupil to divide by 1.20 or by $\frac{6}{5}$. It is a good thing to do both at different times.

2. The cost of the house + $\frac{1}{3}$ the cost of the house = \$3600.

$\therefore \frac{4}{3}$ the cost of the house = \$3600.

$\therefore$ The cost of the house = \$3600 $\div \frac{4}{5}$ = \$$\overset{900}{\cancel{3600}} \times \frac{3}{\cancel{4}}$ = \$2700.

Note. — A briefer form may be used as soon as the pupil understands the work; e.g.,

Let C = cost.
Then $C + \frac{1}{3}C$ = \$3600
$\frac{4}{3}C$ = \$3600
C = \$3600 $\div \frac{4}{3}$ = \$2700.

3. The insured value = \$$\overset{300}{\cancel{2700}} \times \frac{7}{\cancel{8}}$ = \$2100.
$\therefore$ The premium = \$2100 $\times$ .00$\frac{3}{4}$ = \$15.75.

Note. — Attention should be called to the fact that this is not a practical problem, since property is usually insured for a period of three or five years at a certain rate per one hundred dollars.

4. The assessed valuation = \$3600 $\times \frac{4}{5}$ = \$2880.
$\therefore$ The amount of tax = \$1.75 $\times \frac{2880}{100}$ = \$50.40.
5. The S. P. would have been \$3000 $\times$ .90 = \$2700.
6. The S. P. = \$3600 $\times$ 1.15 = \$4140.
7. Mr. Brown's loss = \$3000 − \$2700 = \$300.

Mr. Smith's gain = \$4140 − \$3600 = \$540.

$$\$540 \times \frac{\text{the no. of per cent}}{100} = \$300.$$

$$\therefore \frac{\text{The no. of per cent}}{100} = \$300 \div \$540 = .55\tfrac{5}{9}.$$

$\therefore$ The no. of per cent = .55$\frac{5}{9} \times 100 = 55\frac{5}{9}$.

I

Mr. Brown sold his house and lot for $3600 to Mr. Smith.

1. If Mr. Brown sold his property at a gain of 20%, how much did he pay for the property?

2. If the lot is worth $\frac{1}{3}$ as much as the house, how much did Mr. Smith pay for the house?

3. Mr. Smith insured the house for $\frac{7}{9}$ of what he paid for it at $\frac{3}{4}$%. How much premium did he pay?

4. How much tax did Mr. Smith pay, if his property was assessed for $\frac{4}{5}$ of its value at the rate of $1.75 per hundred?

5. If Mr. Brown had sold his property at a loss of 10%, how much would he have received?

6. For what price must Mr. Smith sell to gain 15%?

7. Mr. Brown's loss in No. 5 is what % of Mr. Smith's gain in No. 6?

II

John and Edwin have together 140 marbles.

1. If John's marbles are 75% of Edwin's marbles, how many marbles has each?

2. Edwin's marbles are how many per cent of John's marbles?

3. What per cent of his marbles must Edwin give John, so that they will both have the same number?

4. Finly and Paul wish to buy enough marbles from John and Edwin so that the four will have equal numbers. How many should each sell?

5. If they increase their number of marbles by 120%, how many marbles will they then have?

III

Dan, Leslie, and John have 72 marbles.

1. Divide the above marbles in the ratio of 3, 4, and 5.
2. What % of all the marbles has each?
3. Dan's marbles are how many % of John's?
4. Leslie's are how many % of Dan's?
5. John's marbles are 40% of how many marbles?
6. Dan's marbles plus Leslie's marbles are 14% of how many marbles?

IV

Mr. Sankey sold his house and lot for $4500.

1. If Mr. Sankey gained 20% in the above transaction, how much did the property cost him?
2. If the lot cost $\frac{2}{3}$ as much as the house, what was the cost of each?
3. The cost of the lot was what per cent of the cost of the house?
4. If the property was assessed at $\frac{2}{3}$ of the cost, how much tax did Mr. Sankey pay at $2.62 per hundred?
5. The house was insured for $\frac{4}{5}$ of its value. How much premium was paid at $1\frac{1}{4}\%$?

V

A man sold a horse for $175.

1. If he gained 25% of the cost, what was the cost of the horse?
2. How much did he gain? Find the gain in two ways.

3. Had he sold the horse for $120, what per cent would he have lost?

4. What would have been the selling price, had he sold it at a gain of 32%?

5. The gain in the second problem is what per cent of the loss in the third problem?

VI

At a men's furnishing store, the selling price of a suit of clothes is $25.

1. What did the merchant pay for the suit if the selling price is 125% of the cost?

2. If the suit is sold for $18, what per cent is lost?

3. The gain in the first problem is what per cent of the loss in the second problem?

4. Harry earns $80 per month. If he buys the above suit for 10% less than the regular selling price, and pays $20 for board; what per cent of his monthly earnings has he left?

5. If Harry receives an increase of 35%, what will be his increase in salary for one year?

VII

A commission agent sold a mill for $24,000.

1. The agent receives $300 for selling. What was his rate of commission?

2. The mill was owned by five persons. If they held equal shares, how much did each receive?

3. They then purchased an elevator for 60% of the selling price of the mill. What did the elevator cost?

4. How much money has each of the above persons now?

5. How many acres of land can each buy at $45 per acre?

VIII

In a certain school there are 450 pupils.

1. There are $\frac{2}{3}$ as many boys as girls. How many are boys and how many are girls?

2. The number of boys is what per cent of the number of girls?

3. Had the number of boys been 45 more, it would have been what per cent of the number of girls?

4. $\frac{2}{3}$ of $\frac{3}{7}$ of $\frac{7}{8}$ of the number of boys is what part of $\frac{3}{4}$ of $\frac{2}{9}$ of $\frac{1}{18}$ of the number of girls?

5. If 10 boys and 50 girls withdraw, the number of boys is what per cent of the number of pupils?

IX

Mr. A. invested $2500 in a mill.

1. A dividend of 25% was declared but $12\frac{1}{2}\%$ were required to cover expenses and $2\frac{3}{4}\%$ were placed in the reserve fund. What is Mr. A's yearly income?

2. If he was assessed $\frac{4}{5}$ of his investment, at the rate of $2\frac{3}{5}\%$, what was Mr. A's net income?

3. Mr. A sold his interest at an advance of 20%, and invested in a farm at $50 per acre. How much was his tax reduced if his farm was assessed for $\frac{5}{9}$ of its value at the same rate?

4. If he rented the farm for $2.30 per acre, how much was his net income increased or diminished?

5. He sold the farm at an advance of $12\frac{1}{2}\%$ and invested that amount in a house for which he paid 10% more than it was worth. What was the value of the house?

X

Mr. C owns a house and lot for which he paid $3600.

1. A commission agent sold C's property for $3000, and charged him $1\frac{1}{2}\%$ commission. What was the commission?

2. What per cent did C lose?

3. If the commission agent invested the proceeds in sugar at 5 cents per pound after deducting his commission of 2%, how many pounds did he buy? (Is this a practical problem?)

4. What per cent would C have gained had the property been sold for $4000?

5. How much would the agent have received and how much would he have invested in sugar?

XI

A commission agent charged $60 for selling a house and lot at the rate of $1\frac{1}{4}\%$.

1. What was the selling price of the property?

2. How much money did the agent turn over to his Principal?

3. If he invested the net proceeds in horses at $120 apiece, after deducting his commission of $1\frac{1}{2}\%$ for buying, how many horses did he buy?

4. How many pounds of sugar can he buy for the

unexpended sum at $4\frac{1}{2}$ cents per pound, after deducting his commission of 3%?

5. What is the total amount of the agent's commission in the above transactions?

XII

A man purchased a house for $2800.

1. How much is 25% of 75% of the cost of the house?
2. If he sells the house for $2500, what will be his loss per cent?
3. If he sells it for $3000, what will be his gain per cent?
4. If a commission agent sells the house for $2900 and charges $1\frac{1}{4}$% for selling, how much money will he remit to the owner?
5. If the owner directs the commission agent to invest the net proceeds in cows at $50 each after deducting his commission of 2%, how many cows can he buy?
6. If the owner of the above house was assessed $\frac{3}{4}$ of the value of the house, what amount of tax did he pay at $2.42 per hundred?

XIII

Mr. Smith owns a house and lot valued at $4800.

1. What amount of tax does Mr. Smith pay at the rate of 2.25 per hundred, if he is assessed $\frac{7}{8}$ of the value?
2. If the house is worth $\frac{3}{4}$ of the property and is insured for full value, what premium does Mr. Smith pay at $1\frac{3}{4}$%?

3. If a commission agent sells the above property at a gain of 20%, and charges a commission of $1\frac{1}{2}\%$, how much is his commission?

4. If the agent invests the proceeds in horses at $120 each after deducting his commission of 2%, how many horses can he buy?

5. What is 20% of 35% of $450?

6. 160 is what per cent of 720?

XIV

I bought .375 of a section of land.

1. If I paid $75 per acre, how much did I pay?

2. How much is the whole section worth at the same rate?

3. What is the value of the south $\frac{1}{2}$ of the S. W. quarter?

4. What is the perimeter of a section of land in rods?

5. How many posts if placed 16 feet apart are required for a fence to enclose a quarter section?

6. If I sold my land at $15 per acre more than I paid, what per cent did I gain?

7. I sold the land May 13, 1908, and took in payment a note due Sept. 29, 1908. How much did I receive when the note was due, at 6%?

XV

Mr. A sold a horse for $150.

1. If Mr. A gained 20% of what he paid for the horse, what was his gain?

2. Had he received \$115, what would have been the loss %?

3. If the horse is assessed at \$90, how much tax is paid for it at \$2.60 per hundred?

4. If A had asked \$180 for the horse, and then sold it for cash at a discount of 15 and 10%, what would have been his gain %?

5. If A had taken in payment a note for \$160, due in 9 months, 16 days at 6%, what would he have received for his horse?

XVI

Mr. Jackson owns a section of land.

1. If he paid \$48,000 for the land, what was the average price per acre?

2. If he was assessed for $\frac{3}{4}$ of its value, what amount of tax did he pay at \$2.70 per hundred?

3. Mr. Jackson sold the south $\frac{1}{2}$ of the S. W. quarter at \$90 per acre. How much did he receive and what was his gain per cent?

4. If he had taken a note for the amount, payable in 1 year and 6 months, with interest at 6%, what amount would he have received?

5. If he had had the note discounted at a bank, 8 months after date, at 8%, what amount would he have received?

6. If after discounting the note, a commission agent had invested the proceeds in cattle at \$40 apiece, how many could he have purchased after deducting his commission of 2%?

7. If he invested the unexpended sum in sugar at 5 cents per pound, after deducting his commission of $1\frac{1}{2}\%$, how many pounds could he buy?

XVII

Mr. Clark owns a house and lot for which he paid $3600.

1. The lot is worth $\frac{4}{5}$ as much as the house. What is the value of each?

2. The value of the house is what per cent of the value of the property?

3. The value of the lot is 25% of what sum?

4. What amount of tax does Mr. Clark pay at $2.62 per hundred, if he is assessed $\frac{7}{8}$ of the value?

5. He has his house insured for $\frac{4}{5}$ of its value. How much premium does he pay at $1\frac{1}{8}\%$?

6. If Mr. Clark offers the property for sale for $4500, less 5 and 10% for cash, how much would he gain?

7. If a commission agent should sell the property at an advance of 15%, what would be Mr. Clark's net profit, if the agent charged a commission of $1\frac{1}{2}\%$?

8. If the agent be instructed to invest the net proceeds in horses at $150 each, after deducting his commission of 2% for buying, how many can he buy?

XVIII

Mr. Jones had $2700.

1. He invested the amount in a house and lot, paying $\frac{4}{5}$ as much for the lot as for the house. How much did he pay for each?

2. What amount of tax did he pay at \$2.73 per hundred, if he was assessed $\frac{7}{8}$ of the real value?

3. How much was his premium on insuring the house at $1\frac{1}{4}\%$, if he had it insured for its real value?

4. Mr. Jones offers the property for sale for \$3000, less a discount of 10 and 5%. How much will he lose?

5. A commission agent sells it at a loss of 5%, charging $1\frac{1}{8}\%$ commission. What is the agent's commission?

6. The agent invested the proceeds in coffee at 30 cents per pound, after deducting his commission of 2%. How many pounds did he buy?

XIX

Mr. Brown sold a house and lot for \$5600, which was at a loss of 20%.

1. What was the value of the property?

2. The lot was worth $\frac{2}{3}$ as much as the house, what was the value of each?

3. If the property was assessed for $\frac{5}{8}$ of its value, how much tax did Mr. Brown pay at \$2.56 per hundred?

4. If he had taken a note for the amount received, due in 8 months with interest at 6%, how much would he have received?

5. If Mr. Brown had had the note discounted at a bank 3 months after date, at 8%, what amount would he have received?

XX

Mr. Smith purchased a lot for \$3000.

1. If Mr. Smith paid 80% of the value of the lot, what was the value?

2. $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{4}{5}$ of what Mr. Smith paid is $\frac{5}{18}$ of what Mr. Brown paid for his lot. How much did Mr. Brown pay?

3. Mr. Smith's lot cost what per cent of Mr. Brown's lot?

4. What is the tax on both lots if they were assessed at $\frac{3}{4}$ of their value, at the rate of \$2.30 per hundred?

5. If Mr. Smith asks \$4500, but sells his lot at a discount of 15 and 5%, how much does he receive?

6. $\frac{3}{2}\frac{1}{5} \times \frac{8\frac{1}{2}}{10\frac{1}{5}} = ?$

XXI

A man bought a house and lot for \$6000.

1. If the house is worth $\frac{2}{3}$ as much as the lot, what is each worth?

2. If the house and lot were sold for 20% less than the asking price, what was the asking price?

3. If the man who sold the house paid \$4500 for the property, what was his gain %?

4. If the agent who sold the house for \$6000 received \$75 commission, what was his rate of commission?

5. How much premium does the man pay, if he has his house insured for \$3000 at $\frac{3}{4}$%?

6. His property is assessed at $\frac{2}{3}$ the value. What is the amount of his tax at \$2.25 per hundred dollars?

XXII

A man bought a house and lot for \$4500.

1. If the lot is worth $\frac{4}{5}$ as much as the house, what is the value of each?

2. What insurance does the owner pay at $1\frac{1}{2}\%$ if the house is insured for $\frac{4}{5}$ of its value?

3. If the property is assessed at $\frac{7}{9}$ of its value, at $2.43 per hundred, what is the amount of the tax?

4. If the property sold for $4200, what was the loss %?

5. Had the owner of the property asked $6000 and then sold it at a discount of 5 and 10%, what would have been the gain %?

XXIII

A man bought a house and lot.

1. If the house cost $2400 and the lot $\frac{3}{8}$ as much, what was the cost of both?

2. He sold the house and lot for $3900. What was the gain %?

3. $\frac{2}{3}$ of $\frac{3}{11}$ of the cost of the property is what % of $\frac{5}{13}$ of the selling price?

4. If the man had taken a note for the property for $3400 for 2 years, 7 months, 18 days at 6% interest, what amount would he have received?

5. What was the amount of the tax on the property at $2.70 per hundred, if it was assessed at $\frac{5}{8}$ of the cost?

XXIV

A man owns a house and lot.

1. If the house cost him $2700 and the lot cost $\frac{2}{9}$ as much as the house, what is their total cost?

2. If they advance in price and he sells them at $33\frac{1}{3}\%$ profit, what does he receive for them?

3. If he takes a man's note for them, what will be its amount in 8 months at 6%?

4. If he should invest the amount of the note when it is due in a farm and sell the farm for $3600, what would be his per cent of loss on the farm?

5. The selling price of the farm is how many per cent of the original cost of the house and lot?

XXV

A man sold 120 bushels of wheat at 95 cents per bushel and 600 bushels of corn at 62 cents per bushel.

1. How much did he receive?

2. He invested the money in horses at $115 each. How many horses did he buy?

3. He sold the horses at a gain of 20%. How much did he receive?

4. If he had taken a note for the amount for 8 months at 6%, how much would he have received?

5. How much would he have received, had he discounted the note at a bank at 8%, 3 months after date?

6. State two principles of division.

XXVI

A has $150 and B has $240.

1. A's money is how many % of B's?

2. B's money is what % of A's?

3. A's money is what % of A's plus B's?

4. $\frac{1}{2}$ of A's money is what part of $\frac{2}{3}$ of B's?

5. B must give what part of his money to A so that both will have equal sums?

6. If B loses $20, how much must A earn to have as much as B?

7. If A and B take their money, and divide it in the ratio of 6 to 7, how much will each receive?

XXVII

Mr. Siebe invested $5000 in a mill.

1. If his annual income was $450, what rate per cent did he receive on his investment?

2. What amount of tax did he pay at the rate of $.027 on the dollar?

3. He sold his stock at an advance of $12\frac{1}{2}\%$, how much did he receive?

4. He invested this amount in mining stock, which paid a semi-annual income of $4\frac{1}{2}\%$. How much did he increase his annual income?

5. He then sold his stock at a discount of 8%, how much did he receive?

6. He employed an agent to invest this amount in land at $70 per acre, after deducting his commission of $1\frac{1}{2}\%$. How many acres did he buy?

XXVIII

Mr. M. had property valued at $3200.

1. A commission agent sold the property at an advance of 25%. What was his commission at $1\frac{1}{4}\%$?

2. The agent invested the proceeds in horses at $115 each, after deducting his commission of 2%. How many horses did he buy?

3. He purchased sheep with the balance after deducting his commission of 2%. How many sheep did he buy at $4 apiece?

4. He invested the balance in sugar at 5 cents per pound, after deducting his commission of 2%. How many pounds of sugar did he buy?

5. What is 8% of 40% of 85% of $1600.

XXIX

Mr. C, who owns a house and lot, pays $71.43 tax.

1. If he pays a poll tax of $2.43, what is the assessed valuation of his property at $2.30 per hundred?

2. If the property is assessed at $\frac{4}{5}$ of the real value, what is the value?

3. The house is worth $\frac{8}{7}$ as much as the lot. What is the value of each?

4. What premium does Mr. C pay if his house is insured for $\frac{5}{7}$ of its value at $1\frac{1}{4}\%$?

5. If a commission agent sells the property for $4100, charging $1\frac{1}{2}\%$, what is Mr. C's net gain %?

6. If Mr. C had sold the property for $4200 by taking in payment a 60-day note, which he might have discounted at a bank at 6%, would it have been better than the commission agent's offer and how much?

XXX

Mr. Williams has $4500.

1. Divide the above sum in the ratio of 3, 4, and 5.

2. He invested the amount in a plot of ground containing 12 acres, with a house on it. Find the value

of the house, and the land per acre, if the house was worth $\frac{3}{7}$ as much as the land.

3. He was assessed $\frac{7}{9}$ of the real value. How much tax did he pay at $2.73 per hundred?

4. He offered to sell the property for $5400, less a discount of $2\frac{1}{2}$ and 5%. How much would he have gained or lost?

5. If he had sold the property for $4800 by taking in payment a note payable in one year and four months, with interest at 6%, how much would he have received?

6. If he had had the note discounted at a bank at 8%, 10 months after date, how much would he have received?

XXXI

Mr. Fox sold his house and lot for $4500.

1. If Mr. Fox made 25% by the transaction, how much did he pay for the property?

2. If he paid $\frac{4}{5}$ as much for the lot as for the house, what was the cost of each?

3. The cost of the lot is what % of the selling price of the property?

4. If Mr. Fox paid tax on an amount equivalent to $\frac{7}{9}$ of what he received for the property, how much did he pay at $2.40 per hundred?

5. Had Mr. Fox taken an interest-bearing note for the amount he received, for 1 year, 10 months, 12 days at 6%, what sum would he have received?

6. If he had had the note discounted one year after date at 8%, what amount would he have received?

XXXII

A man bought a house and lot, and paid $1400 for the lot.

1. If the house is worth $1\frac{5}{7}$ times as much as the lot, what is their total value?

2. The cost of the lot is what % of the cost of the property?

3. The property was assessed at $\frac{15}{19}$ of the value. How much tax did he pay at $2.25 per hundred?

4. If he had the house insured for $\frac{3}{4}$ of its value, how much premium did he pay at $1\frac{1}{2}\%$?

5. If he sold the property for $4000, taking in payment an 8 months' interest-bearing note, with interest at 6%, how much did he receive?

6. If he had had the note discounted at a bank 2 months after date at 8%, how much would he have received?

XXXIII

Mr. A sold a house for $5000 through a commission agent. The agent received $87.50. Mr. A had paid $4500 for the house.

1. What was A's net gain per cent?

2. What was the agent's rate % of commission?

3. The selling price is what per cent of the cost?

4. Had the selling price been 2% more what would it have been?

5. If the agent had asked $6000, but had sold it for 15 and 10% off, what would have been the selling price?

XXXIV

The assessed valuation of a town is $2,450,000. A tax of $41,800 is necessary to defray expenses. There are 5000 polls at $1.50 each.

1. What is the rate of taxation?
2. What is Mr. C's tax who owns a farm assessed at $3500, and pays for one poll?
3. Mr. D's tax is $57.60. He pays for one poll. What is the assessed valuation of his property?

XXXV

Mr. A had an interest of $3000 in a corporation.

1. If at the end of the year, the corporation made a gross gain of 18% but required 7% to cover expenses and placed 2% in the reserve fund, what income did Mr. A receive?
2. If Mr. A paid $\frac{2}{5}\%$ insurance and taxes at the rate of $2.25 per hundred, how much is his net income?
3. Mr. A invested the $3000 in a farm at $40 per acre. He pays a tax of $1.75 per hundred for $\frac{2}{3}$ of its value. He receives an income of $2.50 per acre. Has he increased or diminished his net income and how much?
4. Mr. A sold the farm at a loss of $12\frac{1}{2}\%$. How much did he receive?
5. Had he taken a note for that amount for 8 months and 15 days with interest at 6%, what amount would he have received?
6. State two principles of multiplication.

XXXVI

Mr. Adams bought a lot for $1200.

1. He built a house on this lot which cost 187½% as much as the lot. What was the cost of the lot and house?

2. If the property was assessed at ⅔ of the value, what amount of tax did Mr. Adams pay at the rate of $2.24 per hundred?

3. How much premium did he pay for insuring his house for ⅚ of its value at the rate of 80 cents per hundred for three years?

4. He sold his property for $4140. What % did he gain?

5. If he had taken a note for this amount due in 8 months with interest at 6%, what amount would he have received?

XXXVII

Mr. Davis bought a horse and a carriage for $264.

1. The horse cost ⅗ as much as the carriage. What was the cost of each?

2. The cost of the carriage is what % of the cost of the horse?

3. Mr. Davis sold the horse and the carriage at a loss of 12½%. How much did he receive?

4. If he took a 60-day note with interest at 6%, what amount did he receive?

5. If he had had the note discounted at 8% 20 days after date, what amount would he have received?

XXXVIII

Mr. James has $3900.

1. Divide this sum in the ratio of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.

2. He invested the amount in a house and lot paying $1\frac{3}{12}$ as much for the house as for the lot, how much did he pay for each?

3. What amount of tax did he pay if he was assessed $\frac{2}{3}$ of the real value, the rate of taxation being $2.74 per hundred?

4. A commission agent sold the property at a gain of 15%, charging $1\frac{1}{2}\%$ commission. What was his commission?

5. He invested the net proceeds in horses at $150 each after deducting his commission of 2%. How many horses did he purchase?

6. The commission agent invested the unexpended sum in coffee at 20 cents per pound after deducting his commission of 2%. How many pounds did he buy?

XXXIX

Twenty boys organize an athletic club with a capital of $160.

1. How much does each boy contribute if they share equally?

2. If the above capital is divided into 50 cent shares, how many shares will there be?

3. Frank Thomas, the president, takes 30 shares at par. What is the value of his stock?

4. After the members have subscribed for all the

stock they care for, 12 shares remain. They are bought by a non-member at 15% above par. How much does he pay for them?

5. One of the original stockholders retires from the club, and sells his stock to the captain at a discount of 20%. If he had 6 shares, how much did he lose by his investment?

6. How many shares can be bought for $4.05 if they are bought at 10% below par?

7. At the end of the season, the members of the club found that they had $16 in the treasury, over and above expenses. If this was divided among the stockholders in proportion to the number of shares they held, how much of the dividend would John Mason receive, who had 10 shares?

8. At the beginning of the next season, the club levied an assessment of $12\frac{1}{2}\%$ to cover initial expenses. How much was paid on each share?

9. One of the original members at once sold his stock at 60 cents per share. What was the gain % on the par value of the stock?

10. What was the gain % on the total investment of the stock?

XL

Mr. D has $6000. Which of the following investments will bring the largest income?

1. In 8% stock at 150.
2. In 7% stock at 125.
3. In $5\frac{1}{2}\%$ stock at par.
4. In $4\frac{1}{2}\%$ stock at 20% discount.

5. In 3% stock at 40% discount.

6. In general merchandise with a guaranteed income of $5\frac{3}{4}\%$.

7. In bonds bought at a premium of 20%, bringing an income of $6\frac{1}{2}\%$.

8. In a farm at \$75 per acre with a net income of \$4.25 per acre.

CHAPTER V

Problems in Measurement and Mensuration

The following problems are those which are usually given under the subject of mensuration, which includes problems of carpeting, of papering rooms, etc. The following solutions, which are solutions to the problems in set V are suggestive:

1. The no. of posts $= \frac{40}{8} + \frac{40}{8} + \frac{180}{8} + \frac{180}{8} =$
$5 + 5 + 23 + 23 = 56.$

Note. — The above solution may require some explanation by the teacher. *Common sense* must always take precedence in the solution of problems.

2. The cost of the posts $=$
$\frac{\overset{3}{\cancel{6}}}{} \times \frac{1}{\cancel{2}} \times \cancel{4} \times 56 \times \frac{1}{\cancel{100}\ \cancel{25}} \times \overset{\cdot 0\ 9\ 6}{\cancel{\$2.40}} = \$16.13.$

Note. — The answer should be given to the nearest cent.

3. The perimeter $= 2\,(180 + 40) = 440$ ft.
$\therefore$ The cost of the lumber $=$
$\frac{\overset{1\ 1}{\cancel{440}}}{\overset{2\ 2}{}} \times \frac{1}{\cancel{2}} \times \cancel{5} \times \frac{1}{\cancel{100}\ \cancel{20}} \times \$1.95 = \$21.45.$

4. The no. of sq. yds. $= \frac{\overset{20}{\cancel{180}} \times 40}{\cancel{9}} = 800.$
$\therefore$ The cost of sodding $= \$.15 \times 800 = \$120.$

5. The length of the longest string in feet = $\sqrt{180^2 + 40^2} = \sqrt{44{,}000} = 209.76$.

Note. — This should be accompanied by a drawing.

6. The distance in feet = $\sqrt{180^2 + 40^2 + 4^2} = \sqrt{44{,}016} = 209.799$.

I

Mr. D purchased a lot 60 feet wide and 100 feet deep.

1. How many posts are required to enclose the lot with a fence, if the posts are placed 8 feet apart?
2. What will they cost at $1.50 per hundred board feet, if they are 8 feet by 4 inches by 3 inches?
3. If the fence is 5 boards high, what will the boards cost at $1.75 per hundred?
4. What will it cost to sod the lot at 15 cents per square yard?
5. The cost of the posts is what % of the cost of the boards?
6. The cost of the lawn is what % of the whole cost of improvements?

II

Mr. A purchased a plot of ground 250 feet north and south and 240 feet east and west.

1. How much did it cost at $90 per acre?
2. Mr. A planned an alley 10 feet wide through the middle of the lot east and west. How many square yards in the alley?

3. He then laid out lots on each side 30 feet wide. If he sold $\frac{1}{2}$ of them at \$50 apiece and the other half at \$60 apiece how much did he receive?

4. What was his gain per cent?

5. If the posts for fences to enclose all the lots are placed 6 feet apart, how many will be required?

6. How many rods of fence will be required to enclose all the lots?

III

A certain field contains 40 acres.

1. If the field is rectangular, and 120 rods long; how wide is it?

2. If it is a square, what is the length of one side?

3. If it is a general parallelogram, 160 rods long, how wide is it?

4. If it is a trapezoid, and the sum of the parallel sides is 200 rods, what is the altitude?

5. What is the perimeter of each of the fields?

IV

I purchased a plot of ground 45 rods by 40 rods for \$900.

1. How much did I pay per acre?

2. Beginning at one corner, I sold 10 contiguous lots each 40 feet wide by 120 feet deep, for \$50 each. How many acres did I sell?

3. What was my gain %?

4. The perimeter of the 10 lots is what % of the perimeter of the remaining plot of ground?

5. If an alley twelve feet wide be built around the two sides of the sold piece of land, how many square yards would it contain?

V

The dimensions of a lot are 40 feet by 180 feet.

1. How many posts are required for a fence to surround the lot, if they are placed 8 feet apart?

2. If the posts measure 4 inches by 6 inches by 6 feet, what will they cost at $2.40 per hundred board feet?

3. A six board fence is put around the lot. What is the cost of the lumber at $1.95 per hundred?

4. What is the cost of sodding the lot, at 15 cents per square yard?

5. What is the length of the longest string that may be stretched across the lot?

6. If the posts are two feet in the ground, what is the distance from the top of a corner post to the opposite corner of the lot?

VI

A certain field contains 30 acres.

1. If the field is rectangular, and 80 rods long, how wide is it?

2. What is the perimeter? What is the diagonal?

3. If the field is in the shape of an isosceles triangle, with base 100 rods, what is the altitude?

4. What is the perimeter?

5. If the field is circular in shape, what is the diameter?

6. Which of the fields will require the least fencing, and by how many rods?

VII

Mr. Brown purchased a lot 40 feet wide by 120 feet deep, for $1500. He built a house on this lot, which cost him $3500.

1. If the house covered a space of 1500 square feet, what will it cost to sod the yard at 15 cents per square yard?

2. The parlor is 16 feet by 14 feet by 12 feet. What will it cost to paper the walls and ceiling at 75 cents per roll put on, and the border costing 30 cents per yard? A roll is 24 feet long and 18 inches wide.

3. How much will a carpet cost for the floor at $2.25 per yard, laying it the more economical way, if it is $\frac{3}{4}$ yard wide?

4. The sitting room is 15 feet by 12 feet by 12 feet. What will it cost to paper the walls and ceiling at 60 cents per roll put on, and the border costing 25 cents per yard?

5. What will the carpet cost for this floor at $2.00 per yard, if it is $\frac{3}{4}$ yard wide?

6. Each of the two bedrooms is 14 feet by 12 feet by 12 feet. What will it cost to paper the walls and ceilings of the same at 40 cents per roll put on, with a border at 15 cents per yard?

7. What will be the cost of the matting for the two rooms at 40 cents per yard, the matting being 1 yard wide?

8. The dining room is 16 feet by 15 feet by 12 feet. Find the cost of papering the walls and ceiling at 70 cents per roll put on, with a border at 35 cents per yard.

9. What will the carpet cost to cover the floor at \$2.15 per yard, if it is $\frac{3}{4}$ yard wide?

10. The kitchen is 12 feet by 12 feet by 12 feet. What will it cost to paint the walls and ceiling at 20 cents per square yard?

11. What will the linoleum cost at 75 cents per yard for every yard in width?

12. If Mr. Brown furnished the house with \$800 and if \$150 be allowed for incidental expenditures, what are his total expenses?

13. If his property is assessed at 60% of what he paid, how much tax does he pay at \$2.37 per hundred?

14. If he has the house and personal property insured for $\frac{4}{5}$ of its value at $1\frac{1}{4}\%$, how much premium does he pay?

15. If the lot is a corner lot, how much will the walks cost if they are 4 feet wide, at 10 cents per square foot?

VIII

A school room is 35 feet long, 28 feet wide, and 14 feet high.

1. How many square feet in the ceiling?
2. How many feet in the perimeter?

3. How many square yards in the walls?
4. The width is how many % of the length?
5. The perimeter is how many % of the height?
6. The area of the ceiling is 125% of how many square feet?

IX

I built a barn 60 feet long, 40 feet wide and 20 feet high to the top of the siding. It is covered with a comb-shaped roof which rises to a point 15 feet above the siding.

1. What is the cost of the lumber for the siding and gables at $1.50 per hundred?
2. What is the length of the rafters if they are made to project one foot from the edge of the barn?
3. How many rafters are required if they are placed two feet apart and the roof is made to project two feet at each gable?
4. If the shingles are 5 inches wide and are laid 4 inches to the weather, what do they cost at $4.50 per thousand? (A double row to start with.)
5. The floor of the loft is 6 feet below the top of the siding. How many cubic feet in the loft?
6. How many bushels of wheat can be placed in the loft, if the wheat is placed 5 feet deep?
7. What is the diagonal of the barn?
8. If I wish to make a bin in the barn to hold 500 bushels of corn, how long must it be, if it is 10 feet wide and 8 feet deep?

X

A plot of ground 30 rods long and 20 rods wide is surrounded by a wire fence. The posts are placed 15 feet apart, and the fence consists of 6 wires. A barn 50 feet long and 30 feet wide stands lengthwise of the plot in the center.

Its roof is comb-shaped and rises 20 feet at the ridge. This roof projects 1 foot at the eaves and gables. The side walls of the barn are 16 feet high.

1 How many posts are required to build the fence?

2. The posts are 8 feet long and 4 inches square. How many board feet do they contain?

3. What is the cost of the wire at one cent per yard?

4. What portion of the lot is covered by the barn?

5. How much siding will the barn require including the gables?

6. How long are the rafters?

7. What will the shingles cost at $3 per thousand, if they are 4 inches wide and are placed $4\frac{1}{3}$ inches to the weather? (A double row to start with.)

8. How much space is there in the loft if its floor is 3 feet below the top of the side walls?

XI

I purchased a lot 60 feet wide and 100 feet deep, east and west. I built a barn 50 feet long, and 40 feet wide lengthwise in the south-west corner of the lot. The side walls of the barn are 20 feet high. Its roof is comb-shaped and rises 15 feet, at the ridge. This

roof projects 1 foot at the eaves and gables. A fence six boards high is put around the portion of the lot not taken care of by the barn. The posts are 10 feet apart. In neither case is the barn used as a post.

1. What will it cost to sod the portion of the lot not covered by the barn at 12 cents per square yard?
2. What is the distance from the north-east corner of the barn to the north-east corner of the lot?
3. How many board feet of lumber in the posts if they are 8 feet long, and 3 inches square?
4. What will the boards for the fence cost at 90 cents per hundred?
5. What is the length of the rafters?
6. How much siding will the barn require including the gables?
7. What will the shingles cost at $3.50 per thousand, if they are 4 inches wide, and are placed $4\frac{1}{3}$ inches to the weather? (A double row to start with.)
8. How much space is there in the loft if its floor is 3 feet below the top of the side walls?
9. What is the distance from the top of the siding of the north-east corner of the barn to the north-east corner of the lot?

XII

A square prism has for the sides of its base 12 feet and its altitude 25 feet.

1. What is the lateral surface?
2. What is the entire surface?

3. What is its volume?
4. What is the lateral surface of a pyramid having the same dimensions?
5. What is the entire surface of the pyramid?
6. What is its volume?

XIII

The radius of the base of a cylinder is 8 feet, and its altitude is 20 feet.

1. What is the circumference of the base?
2. What is the convex surface?
3. What is the area of the base?
4. What is the entire surface?
5. What is the volume?
6. What is the convex surface of a cone with the same dimensions?
7. What is the entire surface?
8. What is the volume?

XIV

I wish to make a cistern 8 feet in diameter and 10 feet deep when completed.

1. Not making any allowance for cement, what will it cost to excavate the cistern at 75 cents per load?
2. What will it cost to cement the bottom and wall at 25 cents per square yard?
3. What are the contents of the cistern in gallons? In barrels?

4. What is the length of the longest stick that can be placed in the cistern?

5. What would be the contents in gallons of a conical cistern with the same dimensions?

XV

I wish to build a cylindrical cistern with cemented bottom and wall. It is to be 8 feet in diameter and 16 feet deep when completed.

1. What will it cost to excavate the dirt at 50 cents per cubic yard, if the cement at the bottom is made 6 inches thick, and the wall 4 inches thick?

2. What is the cost of cementing the bottom at 75 cents per square yard?

3. What is the cost of cementing the wall at 90 cents per square yard?

4. What is the capacity of the cistern in gallons? In barrels?

5. What is the length of the longest stick that can be placed in the cistern?

6. What will be the total cost of the cistern?

XVI

Mr. Smith desires to build a cellar 30 feet long, 25 feet wide, and 8 feet deep, inside measurements.

1. If the walls are 2 feet thick, what is the cost of excavation at 55 cents per cubic yard?

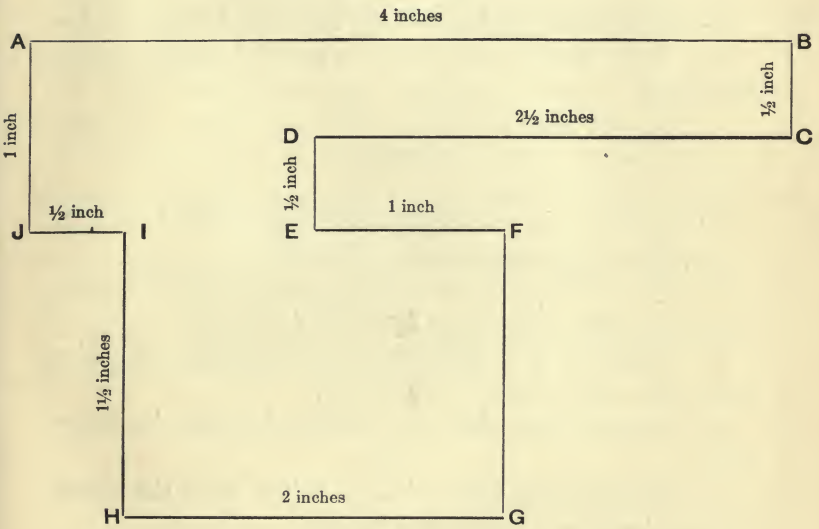
2. What will be the cost of the bricks at $8 per thousand, no allowance being made for mortar?

3. What is the diagonal of the floor? Of the cellar?

4. How many bushels of wheat could be placed in a bin with the same dimensions?

5. How many gallons of water in a tank of the same dimensions?

XVII



This drawing represents a plot of ground. The scale is 40 rods to the inch.

1. What is the perimeter in rods? In miles?

2. Extend the side CD until it will intersect AJ as at K. What is the area of ABCK?

3. Connect E and I by a straight line. What is the area of DEJK?

4. What is the area of FGHI?

5. How many square rods in the whole plot? How many acres?

6. The area of FGHI is what part of the area of the whole plot? What %?

7. What is the distance from F to H?

8. Required the distance from D to I.

9. Required the distance from B to I.

10. The length of FC is what % of the length of AG?

11. How much is the plot of ground worth at $75 per acre?

XVIII

The side of an equilateral triangle is $18\sqrt{3}$ inches.

1. What is the area of the triangle?

2. What is the altitude of an isosceles triangle having the same area, and whose base is 12 inches?

3. Required the altitude of a rectangle with the same area and a base of 20 inches.

4. Required the side of a square having the same area.

5. Required the base of a rhombus with the same area and whose altitude is 4 inches.

6. Required the altitude of a trapezoid having the same area, and whose parallel sides are respectively 6 and 10 inches.

7. Required the radius of a circle having the same area.

8. Which of these figures has the shortest perimeter? Which has the longest perimeter?

XIX

A certain recitation room is 28 feet long, 16 feet wide and 10 feet high.

1. Find the diagonal of the floor.
2. What is the diagonal of the room?
3. What is the lateral surface of the room? What is the area of the floor and ceiling?
4. What is the volume of the room in cubic feet? In cubic yards?
5. The room has three windows each 7 feet by 45 inches. What % of the lateral surface is glass?
6. There are two blackboards, each 4 feet wide, extending lengthwise across the room. What is the total amount of blackboard surface?
7. The glass surface plus the board surface is what per cent of the floor surface?
8. How many gallons of water will a tank of the same dimensions as the room hold?

XX

In a certain house there are a parlor, a sitting room, a dining room, a kitchen, and three bedrooms.

1. The dimensions of the parlor are 14 feet by 12 feet by 10 feet. What will it cost to cover the floor with a carpet $\frac{3}{4}$ of a yard wide at $1.75 per yard, laying it the more economical way?
2. What will it cost to paper the walls and ceiling with paper at 40 cents per roll put on, allowing for

two windows each 6 feet by 45 inches and two doors each 8 feet by 3 feet?

3. The dimensions of the sitting room are 16 feet by 14 feet by 12 feet. Required the cost of carpeting it with carpet $\frac{3}{4}$ of a yard wide at $1.60 per yard, laying it the more economical way.

4. Required the cost of papering the walls and ceiling with paper at 35 cents per roll put on, allowing for 3 windows each 6 feet by 4 feet and 2 doors each 8 feet by 39 inches.

5. The dining room is 15 feet by 12 feet by 10 feet. Required the cost of carpeting it with carpet $\frac{3}{4}$ of a yard wide at $1.50 per yard, laying it the more economical way.

6. The dining room has 2 windows each 6 feet by 40 inches and 2 doors each 8 feet by 3 feet. What will it cost to paper the room with paper at 30 cents per roll put on, and a border at 40 cents per yard?

7. The kitchen is 12 feet by 12 feet by 10 feet. How much will the linoleum cost at 85 cents per yard in two-yard widths?

8. The three bedrooms are each 14 feet by 12 feet by 10 feet. What will the matting cost for the three rooms at 35 cents per yard?

9. Each bedroom has two windows each 5 feet by 3 feet, and one door 8 feet by 3 feet. What will the paper cost at 25 cents per roll put on, and a border at 20 cents per yard?

10. What is the total cost of the decorations for all the rooms?

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