Exercises [A-1]

1. (a) A boy walks for x hours at $3\frac{1}{2}$ m.p.h. and bicycles for $(5 - x)$ hours at $9\frac{1}{2}$ m.p.h. If the total distance traveled is d miles, express d in terms of x.
   (b) Find the value of d when $x = \frac{3}{4}$.
   (c) Find the value of x for which $d = 38\frac{1}{2}$.
2. (a) If d is in miles and r is in miles per hour, in what units is t expressed when the formula $t = d/r$ is used?
   (b) A boy walks x miles at 3 m.p.h. and bicycles $(40 - x)$ miles at 8 m.p.h. If the total number of hours is n, express n in terms of x.
   (c) Find the value of n when $x = 6$.
   (d) Find the value of x for which the total time is 6 hours 40 minutes.
3. (a) A man drives for 1 hour in a city, averaging 20 m.p.h., and for 3 hours on open roads, averaging 40 m.p.h. Find his average speed for the 4 hours.
   (b) A man drives for 1 hour at an average speed of x m.p.h. and for 3 more hours at an average speed of $2x$ m.p.h. If his average speed for the 4 hours is v m.p.h., express v in terms of x.
   (c) Find to the nearest tenth the value of x for which $v = 40$.
4. A rectangle is x in. wide and $(x + 3)$ in. long. Between it and an outer rectangle is a border which is 2 in. wide on each side.
   (a) Write the dimensions of the outer rectangle.
   (b) Obtain the area of the border in terms of x in simplest form.
   (c) Find the value of x for which the area of the border is 172 sq. in.
5. (a) If 10 lb. of candy costing 60 cents per pound are mixed with 40 lb. of candy costing 90 cents per pound, find the cost per pound of the mixture.
   (b) If x lb. of candy costing 60 cents per pound are mixed with $(50 - x)$ lb. of candy costing 90 cents per pound, express in terms of x in simplest form the cost of one pound of the mixture.
   (c) Find the value of x for which the cost of one pound of the mixture is 69 cents.
6. (a) A man invests $\$x$ at $2\frac{1}{2}\%$ and $\$(5000 - x)$ at $5\frac{1}{2}\%$. If $\$I$ is the total annual income from the investments, express I in terms of x in simplest form.
   (b) Find the total income when $x = 1500$.
   (c) Find the value of x for which the total income is \$194.
7. (a) If x lb. of a 30% acid solution are mixed with $(100 - x)$ lb. of a 50% acid solution, and A represents the number of pounds of acid in the mixture, express A in terms of x.

(**b**) Find the value of x for which the mixture forms a 42% solution of the acid.

8. (**a**) Write an expression for the total value of x pounds of tea at 65 cents per pound and y pounds of tea at 80 cents per pound.

(**b**) If the tea in part (**a**) is mixed and sold at a profit of 25%, write an expression for the total selling price.

9. A rectangular room is 6 ft. longer than it is wide. If each dimension were increased by 2 ft., the area of the room would be increased by 64 sq. ft. Find the original dimensions of the room.

10. The length of a room exceeds its width by 4 ft. A rug covers the floor except for a border 2 ft. wide all around it. If the area of the border is 68 sq. ft., find the area of the rug.

11. A boy completes a 30-mile trip in 3 hours 45 minutes, cycling part of the distance at an average speed of 10 m.p.h. and walking the rest at an average rate of $2\frac{1}{2}$ m.p.h. Find the number of miles walked.

12. A walks at a speed which is $\frac{1}{2}$ m.p.h. faster than B's walking speed. In 5 hours B walks 1 mile more than A walks in 4 hours. Find A's walking speed.

13. A boy skates across a pond, with the wind, at a speed of 12 m.p.h., and returns against the wind at a speed of 4 m.p.h. If he takes 45 minutes for the round trip, find the width of the pond. Find also the boy's average speed on the round trip.

14. A man has \$5000 invested, part at $4\frac{1}{2}$% and the rest at 6%. If the total annual income from the investments is \$270, how much is invested at $4\frac{1}{2}$%?

15. A man invests $\frac{2}{5}$ of his capital at 4%, $\frac{1}{3}$ of his capital at 5%, and the rest of his capital at $2\frac{1}{2}$%. His total income from these investments is \$1180 a year. Find the amount of his capital.

16. A boy bought some oranges at the rate of 6 for 15 cents, and made a profit of 66 cents by selling them at the rate of 5 for 18 cents. How many oranges did he buy?

17. A baseball club bought 6 dozen balls, some being practice balls costing \$1.75 each and the others being game balls costing \$2.75 each. If the total bill was \$150, find the number of practice balls bought.

18. How many pounds of tea worth 85 cents per pound must be mixed with 5 lb. of tea worth 70 cents per pound to make a mixture which is worth 80 cents per pound?

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1. a. $d = 47\frac{1}{2} - 6x$
   b. 43
   c. $1\frac{1}{2}$
2. a. hours
   b. $n = 5 + \frac{5}{24}x$
   c. $6\frac{1}{4}$
   d. 8
3. a. 35 m.p.h.
   b. $v = \frac{7x}{4}$
   c. 22.9
4. a. Width, $(x + 4)$ in.
   Length, $(x + 7)$ in.
   b. $(8x + 28)$ sq.in.
   c. 18
5. a. 84 cents
   b. $(90 - \frac{3}{5}x)$ cents
   c. 35
6. a. $I = 275 - 0.03x$
   b. \$230
   c. \$2700

7. a. $A = 50 - \frac{1}{5}x$
   b. 40
8. a. $(65x + 80y)$ cents
   b. $\frac{5}{4}(65x + 80y)$ cents
9. 12 ft. by 18 ft.
10. $38\frac{1}{4}$ sq.ft.
11. $2\frac{1}{2}$ mi.
12. $3\frac{1}{2}$ m.p.h.
13. $2\frac{1}{4}$ mi.; 6 m.p.h.
14. \$2000
15. \$30,000
16. 60
17. 48
18. 10
19. 80
20. $1\frac{1}{2}$
21. 50
22. 750