

Define variables and write an equation. Solve and check your solutions. Fold this paper in half and tape into your book.

Section 1—Number Problems:

1. Twice a number increased by 12 is equal to 31 less than three times the number. Find the number.

$$\begin{array}{r} 2n + 12 = 3n - 31 \\ -2n + 31 \quad -2n + 31 \\ \hline 43 = n \end{array}$$

2. One-half of the difference between a number and the constant 16 is 9.5. Find the number.

$$\frac{1}{2}(n - 16) = 9.5$$

$$\frac{0.5}{0.5}(n - 16) = \frac{9.5}{0.5}$$

$$n - 16 = 19$$

$$+16 \quad +16$$

$$n = 35$$

3. Five-eighths of a number is three more than one-half of the number. Find the number.

$$\frac{5}{8}x = \frac{1}{2}x + 3$$

$$-\frac{4}{8}x \quad -\frac{1}{2}x$$

$$\frac{1}{8}x = 3$$

$$\times 8 \quad \times 8$$

$$x = 24$$

Section 2—Geometry Problems:

4. A rectangle has a length that is 5 units more than twice its width. If the perimeter is 62 units more than twice the width, what is the width?

$l = 2w + 5$
 $P = 2w + 62$

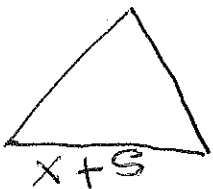
$$P = 2l + 2w$$

$$2w + 62 = 2(2w + 5) + 2w$$

$$2w + 62 = 2w + 4w + 10$$

$$\begin{array}{r} 2w + 62 = 6w + 10 \\ -2w - 10 \quad -2w - 10 \\ \hline 32 = 4w \\ \div 4 \quad \div 4 \\ 8 = w \end{array}$$

5. An equilateral triangle has side length of 5 units more than x. If the perimeter is 36 units, what is x?



$$36 = 3(x + 5)$$

$$36 = 3x + 15$$

$$-15 \quad -15$$

$$21 = 3x$$

$$\div 3 \quad \div 3$$

$$7 = x$$

6. The measures of the angles of a triangle are x° , $(x + 5)^\circ$, and $(2x + 3)^\circ$. What are the measures of each angle?

$$x + (x + 5) + (2x + 3) = 180$$

$$4x + 8 = 180$$

$$-8 \quad -8$$

$$\frac{4x}{4} = \frac{172}{4} \quad x = 43$$

1: 43°
 2: $(43 + 5) = 48^\circ$
 3: $(2(43) + 3) = 89^\circ$

Section 3—Scenario Problems:

7. The French club raised money to buy shirts for their club members. They must pay the manufacturer a set up fee of \$110 plus \$5.50 for each t-shirt. If they raised \$250, how many t-shirts can they purchase?

$$\begin{array}{r} 110 + 5.5t = 250 \\ -110 \quad -110 \\ \hline 5.5t = 140 \\ \frac{5.5t}{5.5} = \frac{140}{5.5} \\ t = 25.45 \end{array}$$

25 t-shirts

8. When exercising, a person's pulse rate should not exceed a certain limit. This maximum rate is represented by the equation $P = 0.8(220 - a)$ where a is age in years and P is the pulse rate. Find the age of a person whose maximum pulse is 152.

$$\begin{array}{r} 152 = 0.8(220 - a) \\ 152 = 176 - 0.8a \\ -176 \quad -176 \\ \hline -24 = -0.8a \\ \frac{-24}{-0.8} = \frac{-0.8a}{-0.8} \end{array}$$

$a = 30$ years old

9. Hank needs to rent a moving truck and is comparing rental prices. Company A charges a rate of \$40 per day. Company B charges \$60 down payment plus \$20 per day. After how many days will the two companies charge the same amount?

$$\begin{array}{r} 40d = 60 + 20d \\ -20d \quad -20d \\ \hline 20d = 60 \\ \frac{20d}{20} = \frac{60}{20} \\ d = 3 \end{array}$$

3 days

Section 4—Literal Equation Problems:

10. The following equation can be used to determine the volume of a rectangular prism, where V is the volume, l is the length, w is the width, and h is the height of the prism. Solve for h .

$$\frac{V = lwh}{lw \quad lw}$$

$$h = \frac{V}{lw}$$

11. Solve the following equation for y .

$$\begin{array}{r} Ax + By = C \\ -Ax \quad -Ax \\ \hline By = C - Ax \\ \frac{By}{B} = \frac{C - Ax}{B} \end{array}$$

$$y = \frac{C - Ax}{B}$$

12. Area of a circle is represented by $A = \pi d$. If the area of a circle is 32 sq. feet, write equation that could be used to find the diameter, d .

$$\frac{A}{\pi} = \frac{\pi d}{\pi}$$

$$d = \frac{A}{\pi}$$

$$d = \frac{32}{\pi}$$