

Accelerated Math

Chapter 8

Writing Equations and Inequalities for Word Problems

Key

**Always define a variable for the unknown

**At this point we are writing equations and inequalities in one variable

**If there is more than one unknown, define the second, third...unknown in terms of the first unknown

**Use the numbers in the problem. Do not do any arithmetic until after your equation is written.

EX # 1 Mason's computer downloads files at a rate of 200 kilobytes per second. The computer has already downloaded the first 480 kilobytes of a 3150-kilobyte file. Write an equation that can be used to find the number of seconds it will take to download the rest of the file. Let n = # of seconds to download rest of file

kilobytes already downloaded	+	kilobytes still needed to be downloaded	=	Total kilobyte file
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$$480 + 200n = 3150$$

$$\begin{array}{r} 480 + 200n = 3150 \\ -480 \qquad -480 \\ \hline \end{array}$$

$$200n = 2670$$

$$\frac{200n}{200} = \frac{2670}{200}$$

$$n = 13.35 \text{ sec}$$

EX # 2 Four friends share the cost of renting a game system. Each person also rents one game for \$7.25. If each person pays \$12, write an equation that can be used to find the cost of renting the system?

cost for 1 person	=	cost of 1 game	+	$\frac{1}{4}$ cost of system
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Let n = cost of system

$$12 = 7.25 + \frac{1}{4}n$$

$$\begin{array}{r} 12 = 7.25 + \frac{1}{4}n \\ -7.25 \qquad -7.25 \\ \hline \end{array}$$

$$4.75 = \frac{1}{4}n$$

$$(4)(4.75) = \frac{1}{4}n(4)$$

$$19 = n$$

\$19 to rent system

EX # 3 One side of a triangle is three times the second side. The third side is one less than the second side. If the perimeter of the triangle is 479 mm, write an equation that can be used to find the lengths of the three sides.

$$3x = 1^{\text{st}} \text{ side}$$

$$x = 2^{\text{nd}} \text{ side}$$

$$x-1 = 3^{\text{rd}} \text{ side}$$

Perimeter	=	side 1	+	side 2	+	side 3
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$$479 = 3x + x + x - 1$$

$$\begin{array}{r} 479 = 5x - 1 \\ +1 \qquad +1 \\ \hline \end{array}$$

$$480 = 5x$$

$$\begin{array}{r} 480 \quad 5x \\ \underline{\quad} \quad \underline{\quad} \\ 96 \quad = \quad x \end{array}$$

$$96 = x$$

$$\begin{array}{l} x = 96 \text{ mm} \\ 3 \cdot x = 3 \cdot 96 = 288 \text{ mm} \\ x - 1 = 96 - 1 = 95 \text{ mm} \end{array}$$

EX # 4 Sara scored 158 points this season in basketball. This is two more than three times the number she scored last season. Write an equation to find the number of points she scored last season.

$n = \# \text{ pts scored last season}$

$$\boxed{\text{This season's pts}} = 3 \cdot \boxed{\text{points last season}} + 2$$

$$158 = 3n + 2$$

$$\begin{array}{r} -2 \qquad -2 \\ \hline \end{array}$$

$$156 = 3n$$

$$\frac{156}{3} = \frac{3n}{3}$$

$$52 = n$$

52 pts

EX # 5 The length of a rectangle is one more than five times its width. If its perimeter is 248 cm, write an equation that can be used to find the dimensions of the rectangle.

$n = \text{width}$

$$5n + 1 = \text{length}$$

$$P = 2l + 2w$$

$$248 = 2(5n + 1) + 2n$$

$$248 = 10n + 2 + 2n$$

$$248 = 12n + 2$$

$$\begin{array}{r} -2 \qquad -2 \\ \hline \end{array}$$

$$246 = 12n$$

$$\frac{246}{12} = \frac{12n}{12}$$

$$20.5 = n$$

$$5 \cdot 20.5 + 1 = 103.5 \text{ cm}$$

EX # 6 Kim is going bowling and has \$25 to spend. Each game costs \$3. Shoes cost \$2.50 to rent and she wants a snack that costs \$4.50. Write and solve an inequality to find the maximum number of games she can bowl.

$$\text{cost of bowling} \leq 25$$

Let $g = \# \text{ games}$

$$\text{cost of games} + \text{shoes} + \text{snack} \leq 25$$

$$3g + 2.50 + 4.50 \leq 25$$

$$\begin{array}{r} 3g + 7 \leq 25 \\ -7 \qquad -7 \\ \hline \end{array}$$

$$3g \leq 18$$

$$\frac{3g}{3} \leq \frac{18}{3}$$

$$g \leq 6$$

6 games

EX # 7 The perimeter of a rectangle is at most 80 cm. The length of the rectangle is two more than three times its width. Write and solve an inequality to find the maximum dimensions of the rectangle.

$$\text{Perimeter} \leq 80$$

$n = \text{width}$

$$3n + 2 = \text{length}$$

$$2l + 2w \leq 80$$

$$2(3n + 2) + 2n \leq 80$$

$$6n + 4 + 2n \leq 80$$

$$\begin{array}{r} 8n + 4 \leq 80 \\ -4 \qquad -4 \\ \hline \end{array}$$

$$8n \leq 76$$

$$\frac{8n}{8} \leq \frac{76}{8}$$

$$n \leq 9.5$$

width 9.5 cm