

Lesson 2-3

Objective - To solve multi-step equations.

Combine like terms

$$4c - c + 8 = 30$$

$$3c + 8 = 30$$

$$\begin{array}{r} -8 \quad -8 \\ \hline \end{array}$$

$$\frac{3c}{3} = \frac{22}{3}$$

$$c = \frac{22}{3} = 7\frac{1}{3}$$

Distribute

$$5(y - 4) = 12$$

$$5y - 20 = 12$$

$$\begin{array}{r} +20 \quad +20 \\ \hline \end{array}$$

$$\frac{5y}{5} = \frac{32}{5}$$

$$y = \frac{32}{5} = 6\frac{2}{5}$$

Solve.

1) $3(x - 2) = 17$

$$3x - 6 = 17$$

$$\begin{array}{r} +6 \quad +6 \\ \hline \end{array}$$

$$\frac{3x}{3} = \frac{23}{3}$$

$$x = \frac{23}{3} = 7\frac{2}{3}$$

3) $12 - 2(x + 4) = 28$

$$12 - 2x - 8 = 28$$

$$-2x + 4 = 28$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\frac{-2x}{-2} = \frac{24}{-2}$$

$$x = -12$$

2) $-5 - x = 9$

$$-5 + x = 9$$

$$\begin{array}{r} +5 \quad +5 \\ \hline \end{array}$$

$$x = 14$$

4) $\frac{5-y}{4} = 10(4)$

$$5 - y = 40$$

$$\begin{array}{r} -5 \quad -5 \\ \hline \end{array}$$

$$(-1) \cdot y = 35(-1)$$

$$y = -35$$

Solve.

5) $6(x + 4) - 2(x - 7) = 10$

$$6x + 24 - 2x + 14 = 10$$

$$4x + 38 = 10$$

$$\begin{array}{r} -38 \quad -38 \\ \hline \end{array}$$

$$\frac{4x}{4} = \frac{-28}{4}$$

$$x = -7$$

Solve.

6) $8 - 4[x - (2x + 4)] = 16$

$$8 - 4[x - 2x - 4] = 16$$

$$8 - 4[-x - 4] = 16$$

$$8 + 4x + 16 = 16$$

$$4x + 24 = 16$$

$$\begin{array}{r} -24 \quad -24 \\ \hline \end{array}$$

$$\frac{4x}{4} = \frac{-8}{4}$$

$$x = -2$$

Translate each sentence into a mathematical equation or inequality.

1) Eight less than twice the sum of four and y is the same as 19.

$$2(4 + y) - 8 = 19$$

2) Six more than x is more than twice the difference of x and 7.

$$x + 6 > 2(x - 7)$$

3) The quotient of m and 3 is six less than the product of 10 and m.

$$m \div 3 = 10m - 6$$

4) Five less than x is less than five less x.

$$x - 5 < 5 - x$$

Translate and solve.

5) Five times the sum of x and 4 is added to 9 and the result is 64.

$$9 + 5(x + 4) = 64$$

$$9 + 5x + 20 = 64$$

$$5x + 29 = 64$$

$$\begin{array}{r} -29 \quad -29 \\ \hline \end{array}$$

$$\frac{5x}{5} = \frac{35}{5}$$

$$x = 7$$

Lesson 2-3 (cont.)

6) Use a variable equation to solve.

The length of a rectangle is 5 less than 3 times its width. If the perimeter is 30 ft, find its dimensions.

x	$3x - 5$	$2(x) + 2(3x - 5) = 30$
		$2x + 6x - 10 = 30$
Let $x =$	width = 5	$\begin{array}{r} +10 \quad +10 \\ \hline 8x = 40 \\ \hline x = 5 \end{array}$
$3x - 5 =$	length = 10	

Provide a reason that justifies each step.

Statement	Reason
$5(2x - 3) = 35$	Given
$10x - 15 = 35$	Distributive Property
$10x - 15 + 15 = 35 + 15$	Addition Property of Equality
$10x = 50$	Inverse Property
$\frac{1}{10} \cdot 10x = 50 \cdot \frac{1}{10}$	Multip. Property of Equality
$x = 5$	Inverse Property

Provide a reason that justifies each step.

Statement	Reason
$2a + 3(a - 4) = 13$	Given
$2a + (3a - 12) = 13$	Distributive Property
$(2a + 3a) - 12 = 13$	Associative Property of Add.
$5a - 12 = 13$	Like Terms
$5a - 12 + 12 = 13 + 12$	Addition Property of Equality
$5a = 25$	Inverse Property
$\frac{1}{5} \cdot 5a = 25 \cdot \frac{1}{5}$	Multip. Property of Equality
$a = 5$	Inverse Property

Consecutive Integer Problems

Integers	Even Integers	Odd Integers
$x - 3$	$x - 6$	$x - 6$
$x - 2$	$x - 4$	$x - 4$
$x - 1$	$x - 2$	$x - 2$
Let $x =$ any integer	Let $x =$ any even integer	Let $x =$ any odd integer
$x + 1$	$x + 2$	$x + 2$
$x + 2$	$x + 4$	$x + 4$
$x + 3$	$x + 6$	$x + 6$

1) The sum of three consecutive integers is 75. Find the integers.

Let $x =$ 1st integer	= 24
$x + 1 =$ 2nd integer	= 25
$x + 2 =$ 3rd integer	= 26
$x + (x + 1) + (x + 2) = 75$	
$3x + 3 = 75$	
$\begin{array}{r} -3 \quad -3 \\ \hline 3x = 72 \\ \hline \frac{3x}{3} = \frac{72}{3} \\ \hline x = 24 \end{array}$	

2) The sum of four consecutive odd integers is -40. Find the integers.

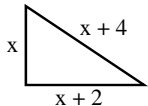
Let $x =$ 1st odd integer	= -13
$x + 2 =$ 2nd odd integer	= -11
$x + 4 =$ 3rd odd integer	= -9
$x + 6 =$ 4th odd integer	= -7
$x + (x + 2) + (x + 4) + (x + 6) = -40$	
$4x + 12 = -40$	
$\begin{array}{r} -12 \quad -12 \\ \hline 4x = -52 \\ \hline \frac{4x}{4} = \frac{-52}{4} \\ \hline x = -13 \end{array}$	

Lesson 2-3 (cont.)

3) The smallest of three consecutive even integers is 18 less than twice the largest. Find the integers.

$$\begin{aligned}
 \text{Let } x &= \text{1st even integer} = 10 \\
 x + 2 &= \text{2nd even integer} = 12 \\
 x + 4 &= \text{3rd even integer} = 14 \\
 x &= 2(x + 4) - 18 \\
 x &= 2x + 8 - 18 \\
 x &= 2x - 10 \\
 \frac{-2x \quad -2x}{-x} &= \frac{-10}{-10} \\
 (-1)(-x) &= -10(-1) \\
 x &= 10
 \end{aligned}$$

4) The lengths of the sides of a triangle are consecutive even integers. If the perimeter is 24 inches, find the length of each side.

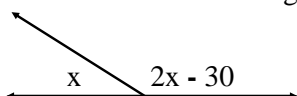


$$\begin{aligned}
 x + (x + 2) + (x + 4) &= 24 \\
 3x + 6 &= 24 \\
 \frac{-6 \quad -6}{3} &= \frac{18}{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{Let } x &= \text{1st side} = 6 \text{ in.} \\
 x + 2 &= \text{2nd side} = 8 \text{ in.} \\
 x + 4 &= \text{3rd side} = 10 \text{ in.} \\
 x &= 6
 \end{aligned}$$

5) Write a variable equation and solve.

Find an angle whose supplement is 30° less than twice the angle.



$$\begin{aligned}
 x + (2x - 30) &= 180 \\
 3x - 30 &= 180 \\
 \frac{+30 \quad +30}{3x} &= \frac{210}{3} \\
 x &= 70 \quad (70^\circ)
 \end{aligned}$$

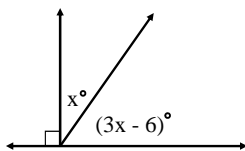
6) Write a variable equation and solve.

Find an angle whose complement is 20° more than three times the angle.



$$\begin{aligned}
 x + 3x + 20 &= 90 \\
 4x + 20 &= 90 \\
 \frac{-20 \quad -20}{4} &= \frac{70}{4} \\
 x &= 17.5^\circ
 \end{aligned}$$

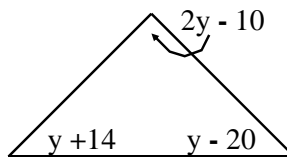
7) An angle is 6 degrees less than 3 times its complement. Find the angle.



$$\begin{aligned}
 x + (3x - 6) &= 90 \\
 4x - 6 &= 90 \\
 \frac{+6 \quad +6}{4} &= \frac{96}{4} \\
 x &= 24
 \end{aligned}$$

$$\begin{aligned}
 \text{Let } x &= \text{the complement} = 24^\circ \\
 3x - 6 &= \text{the angle} = 3(24) - 6 = 66^\circ
 \end{aligned}$$

8) Find each angle below.

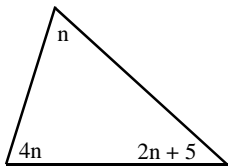


$$\begin{aligned}
 y + 14 &= 63^\circ \\
 2y - 10 &= 88^\circ \\
 y - 20 &= 29^\circ \\
 &= 180
 \end{aligned}$$

$$\begin{aligned}
 (y + 14) + (2y - 10) + (y - 20) &= 180 \\
 4y - 16 &= 180 \\
 \frac{+16 \quad +16}{4} &= \frac{196}{4} \\
 y &= 49
 \end{aligned}$$

Lesson 2-3 (cont.)

9) The largest angle in a triangle is four times the smallest. The third angle is 5 more than twice the smallest. Find each angle.



$$n + (2n + 5) + 4n = 180$$

$$7n + 5 = 180$$

$$\begin{array}{r} -5 \quad -5 \\ \hline \end{array}$$

$$\frac{7n}{7} = \frac{175}{7}$$

$$n = 25$$

Let n = the smallest angle = 25°

$2n + 5$ = the middle angle = 55°

$4n$ = the largest angle = 100°