

Chapter 1 Study Guide

Name: Key 2018-2019

Overall goal: Understand how to solve linear equations.

How will you show that you know how to solve linear equations.

You will be able .... to describe how to solve simple equations.

to solve multi-step equations including using unit analysis to solve these equations.

to solve absolute value equations.

to identify special solutions of equations.

to rewrite equations and formulas.

Solve the following equations. Check or justify when asked.

1.  $x + 3 = -6$   
 $\quad -3 \quad -3$

$x = -9$

2.  $3y + 11 = -16$  Justify each step.  
 $\quad -11 \quad -11$  Subtraction prop. of equality

$\frac{3y}{3} = \frac{-27}{3}$  Division prop. of equality.

$y = -9$

3.  $\frac{3}{2}(x - 2) - 5 = 19$  Check your solution.  
 $\quad +5 \quad +5$

$\frac{2}{2} \cdot \frac{3}{2}(x - 2) = \frac{24}{1} \cdot \left(\frac{2}{3}\right)$

$x - 2 = 16$   
 $\quad +2 \quad +2$

$x = 18$

Check:

$\frac{3}{2}(18 - 2) - 5 \stackrel{?}{=} 19$

$\frac{3}{2}(16) - 5 \stackrel{?}{=} 19$

$24 - 5 \stackrel{?}{=} 19$

$19 = 19 \checkmark$

4.  $3(n + 4) = \frac{1}{2}(6n + 4)$

$3n + 12 = 3n + 2$   
 $\quad -3n \quad -3n$

$12 = 2$  False /  $\boxed{\text{No solution}}$

5.  $2(y-4) = -4(y+8)$  Justify each step.

$$2y - 8 = -4y - 32 \quad \text{Distributive Prop.}$$

$$\begin{array}{r} +4y \\ 6y - 8 = -32 \end{array}$$

$$\begin{array}{r} +8 \\ 6y - 8 = -32 \\ +8 \quad +8 \end{array}$$

Add. Prop. of Equality

$$\frac{6y}{6} = \frac{-24}{6}$$

" " " " Division Prop. of Equality

$$\boxed{y = -4}$$

6.  $5(1+x) = 5x+5$

$$\begin{array}{r} 5 + 5x = 5x + 5 \\ -5x \quad -5x \end{array}$$

$$5 = 5 \quad \text{True}$$

$\boxed{\text{Infinitely many solutions}}$

7.  $|y+3| = 17$

$$\begin{array}{r} y+3 = 17 \\ -3 \quad -3 \end{array} \quad \text{or} \quad \begin{array}{r} y+3 = -17 \\ -3 \quad -3 \end{array}$$

$$\boxed{y = 14 \quad \text{or} \quad y = -20}$$

8.  $-2|5x-7|+9 = -7$

$$\begin{array}{r} -2|5x-7| = -16 \\ -2 \quad -2 \end{array}$$

$$|5x-7| = 8$$

$$\begin{array}{r} 5x-7 = 8 \\ +7 \quad +7 \end{array} \quad \text{or} \quad \begin{array}{r} 5x-7 = -8 \\ +7 \quad +7 \end{array}$$

$$\frac{5x}{5} = \frac{15}{5} \quad \text{or} \quad \frac{5x}{5} = \frac{-1}{5}$$

$$\boxed{x = 3 \quad \text{or} \quad x = -\frac{1}{5}}$$

9.  $|2x + 6| = 4x$  Check your solutions.

$$\begin{array}{r} 2x + 6 = 4x \\ -2x \quad -2x \end{array} \quad \text{or} \quad \begin{array}{r} 2x + 6 = -4x \\ -2x \quad -2x \end{array}$$

$$\frac{6}{2} = \frac{2x}{2}$$

$$\boxed{3 = x}$$

$$\frac{6}{-6} = \frac{-6x}{-6}$$

$$\boxed{-1 = x}$$

Extraneous solution.

(only one solution)

Check

$$|2(3) + 6| \stackrel{?}{=} 4(3)$$

$$|6 + 6| \stackrel{?}{=} 12$$

$$|12| = 12$$

$$12 = 12 \checkmark$$

$$|2(-1) + 6| \stackrel{?}{=} 4(-1)$$

$$|-2 + 6| \stackrel{?}{=} -4$$

$$|4| \stackrel{?}{=} -4$$

$$4 = -4 \text{ X False}$$

10.  $|x - 2| = |4 + x|$

$$\begin{array}{r} x - 2 = 4 + x \\ -x \quad -x \end{array} \quad \text{or} \quad \begin{array}{r} x - 2 = -(4 + x) \\ -x \quad -x \end{array}$$

$$-2 = 4 \text{ X}$$

False, no solution.

$$\begin{array}{r} x - 2 = -4 - x \\ +x \quad +x \end{array}$$

$$\begin{array}{r} 2x - 2 = -4 \\ +2 \quad +2 \end{array}$$

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

$$\boxed{x = -1}$$

also only one solution

11. The minimum sustained wind speed of a Category 1 hurricane is 74 miles per hour. The maximum sustained wind speed is 95 miles per hour. Write an absolute value equation that represents the minimum and maximum speeds.

$$\text{max} = 95$$

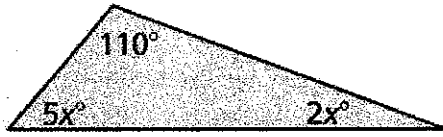
$$\text{min} = 74$$

$$\text{midpoint} = \frac{95 + 74}{2} = \frac{169}{2} = 84.5$$

$$\text{distance} = 95 - 84.5 = 10.5$$

$$\boxed{|x - 84.5| = 10.5}$$

12. Find the value of  $x$ . Then find the angle measures of the polygon.



Sum of angle measures:  $180^\circ$

Angle measures

$110^\circ, 50^\circ, 20^\circ$

$$110 + 5x + 2x = 180$$

$$110 + 7x = 180$$

$$-110 \quad -110$$

$$\frac{7x}{7} = \frac{70}{7}$$

$$x = 10$$

$$5(10) = 50^\circ$$

$$2(10) = 20^\circ$$

13. Solve the literal equation for  $y$ .

$$2x - 4y = 20$$

$$-2x \quad -2x$$

$$\frac{-4y}{-4} = \frac{-2x + 20}{-4}$$

$$y = \frac{1}{2}x - 5$$

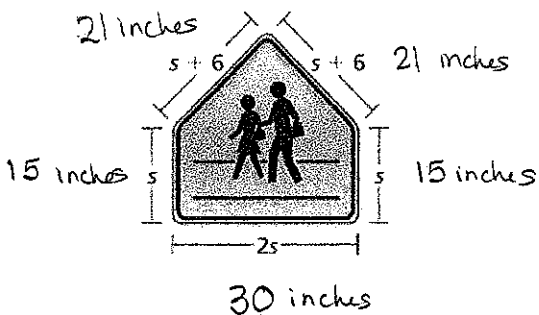
14. Solve the literal equation for  $y$ .

$$a = 9y + 3yx$$

$$\frac{a}{(9+3x)} = \frac{y(9+3x)}{(9+3x)}$$

$$\frac{a}{(9+3x)} = y$$

15. The perimeter of the school crossing sign is 102 inches. What is the length of each side?



$$s + 6 + s + 6 + s + s + 2s = 102$$

$$6s + 12 = 102$$

$$\frac{6s}{6} = \frac{90}{6}$$

$$s = 15 \text{ inches}$$

16. Write and solve an equation to find the month when you would pay the same total amount for each Internet service.

	Installation Fee	Price per month
Company A	\$60.00	\$42.95
Company B	\$25.00	\$49.95

$x = \#$  of months

Company A:  $60 + 42.95x = \text{cost}$   
 Company B:  $25 + 49.95x = \text{cost}$

↔ want equal cost.

$$\begin{array}{r} 60 + 42.95x = 25 + 49.95x \\ -42.95x \quad \quad -42.95x \end{array}$$

$$\begin{array}{r} 60 = 25 + 7x \\ -25 \quad -25 \end{array}$$

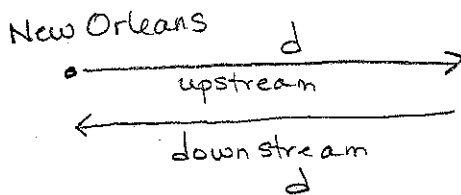
$$\frac{35}{7} = \frac{7x}{7}$$

$$5 = x$$

After 5 months you would pay the same amount for cell phone service.

17. A boat leaves New Orleans and travels upstream on the Mississippi River for 4 hours. The return trip takes only 2.8 hours because the boat travels 3 miles per hour faster downstream due to the current. How far does the boat travel upstream?

$$d = rt$$



takes 4 hours =  $t$

takes 2.8 hours =  $t$

$r =$  rate going upstream

$r + 3 =$  rate going downstream.

distance is the same going upstream or downstream.

$$\text{distance upstream} = 4r$$

$$\text{distance downstream} = 2.8(r+3)$$

$$4r = 2.8(r+3)$$

$$\begin{array}{r} 4r = 2.8r + 8.4 \\ -2.8r \quad -2.8r \end{array}$$

$$\frac{1.2r}{1.2} = \frac{8.4}{1.2}$$

$$r = 7$$

$$7 \cdot 4 = 28$$

The rate of the boat going upstream is 7mph so the boat travelled 28 miles upstream.

18. A common statistic used in professional football is the quarterback rating. This rating is made up of four major factors. One factor is the completion rating given by the formula

$$R = 5 \left( \frac{C}{A} - 0.3 \right)$$

where  $C$  is the number of completed passes and  $A$  is the number of attempted passes.

Solve the formula for  $C$ .

$$\frac{R}{5} = \frac{5 \left( \frac{C}{A} - 0.3 \right)}{5}$$

$$\frac{R}{5} = \frac{C}{A} - 0.3$$

$$A \cdot \left( \frac{R}{5} \right) + 0.3 = \frac{C}{A} \cdot A$$

$$A \left( \frac{R}{5} \right) + 0.3 = C$$

19. The volume  $V$  of a pyramid is given by the formula  $V = \frac{1}{3}Bh$ , where  $B$  is the area of the base and  $h$  is the height.

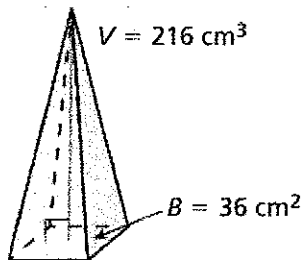
a. Solve the formula for  $h$ .

$$\frac{3}{1} \cdot V = \frac{1}{3} Bh \cdot \frac{3}{1}$$

$$\frac{3V}{B} = \frac{Bh}{B}$$

$$\frac{3V}{B} = h$$

b. Find the height  $h$  of the pyramid.



$$\frac{3 \cdot 216}{36} = h$$

$$\frac{648}{36} = h$$

$$18 = h$$

The height of the pyramid is 18 cm.