

Unit 1 Study Guide

**Variables on One Side**

Solve the following equations:

1.  $5 + x = -2$

$-5 \quad -5$

$x = -7$

2.  $3x - 4x = -11$

$-1 \cdot -x = -11 \cdot -1$

$x = 11$

3.  $\frac{x}{21} \neq \frac{5}{7}$

$\frac{7x}{7} = \frac{105}{7}$

$x = 15$

4.  $3 + 4(1 - x) = -13$

$3 + 4 - 4x = -13$

$7 - 4x = -13$

$-4x = -20$

$x = 5$

5.  $\frac{3}{4} \neq \frac{9}{x+7}$

$36 = 3(x+7)$

$36 = 3x + 21$

$-21 \quad -21$

$15 = \frac{3x}{3}$

$5 = x$

6.  $(\frac{1}{3}x + 5 = \frac{40}{3}) \cdot 3$

$x + 15 = 40$

$-15 \quad -15$

$x = 25$

**Context**

Solve each problem by writing an equation. Be sure to define your variables and write your answer in a complete sentence.

7. The trapezoid has a perimeter of 61. Solve for x.

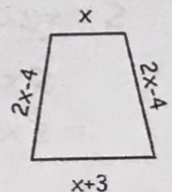
$x + 2x - 4 + x + 3 + 2x - 4 = 61$

$6x - 5 = 61$

$+5 \quad +5$

$\frac{6x}{6} = \frac{66}{6}$

$x = 11$



8. Each month, Danny's new cell phone plan costs him \$62, plus \$0.04 per text message sent. He has budgeted \$70 for his phone bill for February. How many text messages can he send? Write and solve an equation to represent this situation.

$$x = \text{text msgs}$$

$$0.04x + 62 = 70$$

$$\quad -62 \quad -62$$

$$0.04x = 8$$

$$\frac{100}{4} \cdot \frac{4}{100} x = 8 \cdot \frac{100}{4}$$

$$x = 200$$

9. You are selling t-shirts that you make. You charge \$15 per t-shirt and you have already spent \$75 on supplies. If you want to make a \$300 profit, how many t-shirts do you need to sell?

$$x = \text{t-shirts}$$

$$15x - 75 = 300$$

$$\quad +75 \quad +75$$

$$\frac{15x}{15} = \frac{375}{15}$$

$$x = 25$$

10. SWM and South are both having membership drives for SFTS. SWM has 120 members and are signing up an average of 8 members per week. South has 75 members and are signing up an average of 11 members per week. How many weeks will it take until they have the same amount of members?

$$x = \text{weeks}$$

$$120 + 8x = 75 + 11x$$

$$\quad -8x \quad -8x$$

$$120 = 75 + 3x$$

$$\quad -75 \quad -75$$

$$\frac{45}{3} = \frac{3x}{3}$$

$$15 = x$$

### Variables on Both Sides

Solve the following equations:

$$11. 5(x + 4) + 3 = 14 + 5x + 9$$

$$5x + 20 + 3 = 23 + 5x$$

$$5x + 23 = 23 + 5x$$

$$\quad -5x \quad -5x$$

$$23 = 23$$

Infinite solutions

$$12. 4x - 2(3x - 1) = 14 - 6x$$

$$4x - 6x + 2 = 14 - 6x$$

$$\quad -2x + 2 = 14 - 6x$$

$$\quad +6x \quad +6x$$

$$4x + 2 = 14$$

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

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$$\frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

$$13. \frac{3}{5x} = \frac{1}{x-3}$$

$$5x = 3(x-3)$$

$$5x = 3x - 9$$

$$-3x \quad -3x$$

$$\frac{2x}{2} = \frac{-9}{2}$$

$$x = -\frac{9}{2} \text{ or } -4\frac{1}{2}$$

$$14. 9x - 3x = \frac{3}{4}(8x - 1)$$

$$6x = 6x - \frac{3}{4}$$

$$-6x \quad -6x$$

$$0 = -\frac{3}{4}$$

no solution

$$15. \frac{1}{4}(x + 12) + 16 = x - 12$$

$$\frac{1}{4}x + 3 + 16 = x - 12$$

$$\frac{1}{4}x + 19 = x - 12$$

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

$$19 = \frac{3}{4}x - 12$$

$$+12 \quad +12$$

$$\frac{4}{3} \cdot 31 = \frac{3}{4}x \cdot \frac{4}{3}$$

$$16. 3x + 12 - x = 16 - 2x$$

$$\frac{124}{3} = 41\frac{1}{3} = x$$

$$2x + 12 = 16 - 2x$$

$$+2x \quad +2x$$

$$4x + 12 = 16$$

$$-12 \quad -12$$

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

$$x = 1$$

### Literal Equations

Solve the following formulas for the specified variable.

$$17. V = \frac{1}{2}Pl \cdot 2 \text{ Solve for } l.$$

$$\frac{2V}{P} = \frac{Pl}{P}$$

$$\frac{2V}{P} = l$$

$$19. P = 2(l + w) \text{ Solve for } l.$$

$$\frac{P}{2} = l + w$$

$$-w \quad -w$$

$$\frac{P}{2} - w = l$$

$$18. 3x + 2y = 7 \text{ Solve for } y.$$

$$-3x \quad -3x$$

$$\frac{2y}{2} = \frac{7-3x}{2}$$

$$y = \frac{7-3x}{2}$$

$$20. w = p(v_2 - v_1) \text{ Solve for } v_2.$$

$$\frac{w}{p} = (v_2 - v_1)$$

$$+v_1 \quad +v_1$$

$$\frac{w}{p} + v_1 = v_2$$