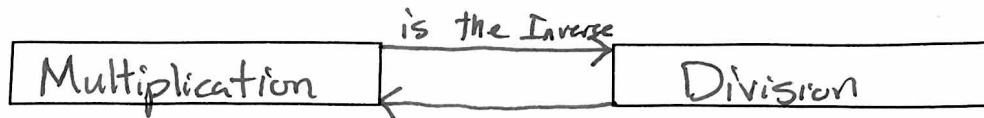
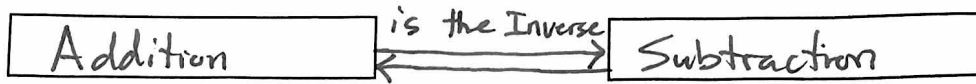


Chapter 4 Guide Notes

A) Prior Knowledge

1) Solving algebraic equations by balancing:

- a) You can use inverse operations to solve an equation. When you do, keep the equation balanced by performing addition, subtraction, multiplication, or division by the same non zero number on both sides.



- b) Also remember,

$$2 - 2 = 0 \text{ and } -2 + 2 = 0$$

$$\frac{2}{3} \div \frac{2}{3} = \frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$$

- c) Equivalent Equations = Expressions that are the same, even though they may look a little different.

B) Solving One-Step Equations

Solve each equation. Check your solution.

$$\begin{array}{r} 1) \ x + 9 = 3 \\ \underline{-9 \quad -9} \\ x = -6 \end{array}$$

$$\begin{aligned} x + 9 &= 3 \\ (-6) + 9 &= 3 \\ 3 &= 3 \end{aligned}$$

$$\begin{array}{r} 2) \ x - 2 = 11 \\ \underline{+2 \quad +2} \\ x = 13 \end{array}$$

$$\begin{aligned} x - 2 &= 11 \\ (13) - 2 &= 11 \\ 11 &= 11 \end{aligned}$$

$$\begin{array}{r} 3) \ -4x = -32 \\ \underline{-4 \quad -4} \\ x = 8 \end{array}$$

$$\begin{aligned} -4x &= -32 \\ -4(8) &= -32 \\ -32 &= -32 \end{aligned}$$

$$\frac{3}{5}$$

$$4) \frac{3}{5}x = -9$$

$$\frac{5}{3} \cdot \frac{3}{5}x = -9 \cdot \frac{5}{3}$$

$$\frac{15}{15}x = -\frac{45}{3}$$

$$x = -15$$

$$5) -\frac{2}{7}x = 6$$

$$\left(-\frac{7}{2}\right) \cdot \left(-\frac{2}{7}\right)x = (6)\left(-\frac{7}{2}\right)$$

$$++\left(\frac{14}{14}\right)x = -\frac{42}{2}$$

$$x = -21$$

$$6) \frac{56}{16} = \frac{x}{2}$$

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

$$2x = 14$$

$$x = 7$$

$$7) \frac{y}{9} = \frac{35}{15}$$

$$\frac{15}{9} = \frac{35}{15}$$

$$3y = 9 \cdot 7$$

$$\frac{3y}{3} = \frac{9 \cdot 7}{3}$$

$$y = \frac{63}{3} \quad y = 21$$

C) Two-Step Equations

Do the order of operations backwards!!!

PMDAS $\rightarrow$ SADMP

$$1) \frac{x}{2} + 3 = 12$$

$$\frac{x}{2} = 9 \quad (2)$$

$$\frac{2}{2}x = 18$$

$$x = 18$$

$$2) 5y - 7y = 6$$

$$\frac{-2y}{-2} = \frac{6}{-2}$$

$$y = -3$$

$$\frac{3}{5}x = -9$$

$$\frac{3}{5}(-15) = -9$$

$$-\frac{45}{5} = -9$$

$$-9 = -9$$

$$-\frac{2}{7}x = 6$$

$$-\frac{2}{7}(-21) = 6$$

$$-\frac{2}{7}\left(-\frac{21}{1}\right) = 6$$

$$\frac{42}{7} = 6$$

$$6 = 6$$

$$2x = 14$$

$$2(7) = 14$$

$$14 = 14$$

$$\frac{y}{9} = \frac{35}{15}$$

$$\frac{21}{9} = \frac{35}{15}$$

$$\frac{7}{3} = \frac{7}{3}$$

$$\frac{x}{2} + 3 = 12$$

$$\frac{18}{2} + 3 = 12$$

$$9 + 3 = 12$$

$$12 = 12$$

$$2) 5y - 7y = 6$$

$$5(-3) - 7(-3) = 6$$

$$-15 - 21 = 6$$

$$-36 = 6$$

- 3) The value of y is 7 more than 2 times the value of x . Find x when $y = 15$.

$$\begin{aligned}
 y &= 2x + 7 \\
 15 &= 2x + 7 \\
 \underline{-7 \quad -7} & \\
 8 &= 2x \\
 \frac{8}{2} &= \frac{2x}{2} \quad x = 4
 \end{aligned}$$

- 4) You have some change in your pocket. After you gave your friend \$0.40, you had \$1.10 left. Write an equation for the amount you originally had in your pocket. Then solve.

$$\begin{aligned}
 x - 0.40 &= 1.10 \\
 \underline{+0.40 \quad +0.40} & \\
 x &= \$1.50
 \end{aligned}$$

D) Multi-Step, With Variables on Both Sides of the Equation
Solve Each.

1) $8x - 3x - 10 = 20$

$$\begin{aligned}
 5x - 10 &= 20 \\
 \underline{+10 \quad +10} & \\
 5x &= 30 \\
 \frac{5x}{5} &= \frac{30}{5} \\
 x &= 6
 \end{aligned}$$

- Combine like terms
- Addition Property
- Division Property
- Reduce/Simplify

What is the Distributive Property?

Distributive Property = $a(b+c) = ab+ac$

2) $7x + 2(x + 6) = 39$

$$\begin{aligned}
 7x + 2x + 12 &= 39 \\
 9x + 12 &= 39 \\
 \underline{-12 \quad -12} & \\
 9x &= 27 \\
 \frac{9x}{9} &= \frac{27}{9}
 \end{aligned}$$

$x = 3$

3

- Distributive Property
- Combine like terms
- Subtraction Property
- Division Property
- Reduce/Simplify

$$3) 5(4x+1) - 3(5x-6) = 38$$

$$20x + 5 - 15x + 18 = 38$$

$$\begin{array}{r} 5x + 23 = 38 \\ -23 \quad -23 \\ \hline \end{array}$$

$$\frac{5x}{5} = \frac{15}{5}$$

$$x = 5$$

$$4) \frac{3}{2}(3x+5) = -24$$

$$\begin{array}{r} \frac{9}{2}x + \frac{15}{2} = -24 \\ -\frac{15}{2} \quad -\frac{15}{2} \\ \hline \frac{9}{2}x = -\frac{48}{2} - \frac{15}{2} \end{array}$$

$$\frac{\frac{9}{2}x}{\frac{9}{2}} = \frac{\frac{63}{2}}{\frac{9}{2}}$$

$$x = \frac{63}{2} \cdot \frac{2}{9} = 7$$

$$x = 7$$

$$5) 7 - 8x = 4x - 17$$

$$\begin{array}{r} - 8x = 4x - 17 \\ +8x \quad +8x \\ \hline 7 = 12x - 17 \\ +17 \quad +17 \\ \hline 24 = 12x \\ 12 \quad 12 \end{array}$$

$$x = 2$$

$$6) 6x - 5 = \frac{1}{4}(16x + 60)$$

$$6x - 5 = \frac{16}{4}x + \frac{60}{4}$$

$$\begin{array}{r} 6x - 5 = 4x + 15 \\ -4x \quad -4x \\ \hline 2x - 5 = 15 \end{array}$$

$$\begin{array}{r} 2x - 5 = 15 \\ +5 \quad +5 \\ \hline 2x = 20 \\ \frac{2x}{2} = \frac{20}{2} \end{array}$$

$$x = 10$$

$$7) 8y - 6 = \frac{2}{3}(6y + 15)$$

$$8y - 6 = \frac{2}{3} \cdot 6y + \frac{2}{3} \cdot 15$$

$$8y - 6 = \frac{12}{3}y + \frac{30}{3}$$

$$\begin{array}{r} 8y - 6 = 4y + 10 \\ -4y \quad -4y \\ \hline 4y - 6 = 10 \end{array}$$

$$\begin{array}{r} 4y - 6 = 10 \\ +6 \quad +6 \\ \hline 4y = 16 \end{array}$$

$$\frac{4y}{4} = \frac{16}{4}$$

$$y = 4$$