Study Guide
Chapter 3 Test

3.1: Solve One-Step Equations
- **Be able to use inverse operations to isolate the variable and solve one-step equations**

Ex: $\frac{7}{2} \cdot \frac{2}{7}n = -5 \cdot \frac{7}{2}$

$n = -17\frac{1}{2}$ **or** $n = -\frac{35}{2}$

Ex: $-5 + x = -4$

$\underline{+5 \qquad +5}$

$x = 1$

Ex: $1 - x = -2$

$\underline{-1 \qquad -1}$
$-x = -3$

$x = 3$

3.2/3.3: Solve 2/Multi-Step Equations
- **Be able to use inverse operations and reverse PEMDAS to solve multi-step equations**

Ex: $4w + 2w = 24$

$\dfrac{6w}{6} = \dfrac{24}{6}$

$w = 4$

Ex: $\dfrac{x}{2} + 5 = 11$

$\underline{-5 \quad -5}$

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

$x = 12$

Ex: $5x - 4(x - 3) = 17$

$5x - 4x + 12 = 17$ *Be sure to rewrite sub.

$1x + 12 = 17$

$x = 5$

Ex: $\frac{4}{3} \cdot \frac{3}{4}(z - 6) = 12 \cdot \frac{4}{3}$

$z - 6 = 16$

$z = 22$

Ex: $-4 = 2(x - 2) - 3(1 - x)$

$-4 = 2x - 4 - 3 + 3x$ *Rewrite sub. As adding a negative

$-4 = 5x - 7$

$\underline{+7 \qquad +7}$

$\dfrac{3}{5} = \dfrac{5x}{5}$

$x = \dfrac{3}{5}$

*Start by multiplying by the reciprocal
rather than distributing to help avoid fractions

3.4: Solve equations with variables on both sides

- **Be able to solve equations with variables on both sides by moving variable terms together**

Ex: $3m - 25 - 8m = m - 14$

$-5m - 25 = m - 14$
$\underline{+5m \qquad\quad +5m}$
$\quad -25 = 6m - 14$
$\quad \underline{+14 \qquad +14}$
$\quad \underline{-11 = 6m}$
$\qquad 6 \quad\; 6$

$m = -\dfrac{11}{6}$

Ex: $4(m - 3) = 2(6 - 2m)$

$4m - 12 = 12 - 4m$
$\underline{+4m \qquad\qquad +4m}$
$8m - 12 = 12$
$\underline{+12 \quad\; +12}$
$8m = 24$

$m = 3$

- **Be able to identify when an equation has no solution, infinite solutions or 0 as the solution**

Ex: $-5(3a - 4) = 7a + 27 - 7$

$-15a + 20 = 7a + 20$
$\underline{+15a \qquad\quad +15a}$
$\quad 20 = 22a + 20$
$\quad \underline{-20 \qquad\quad -20}$
$\quad \underline{0 = 22a}$
$\quad 22 \quad 22$

$a = 0$

Ex: $4(3x + 2) = 2(6x + 4)$

$12x + 8 = 12x + 8$
$\underline{-12x \qquad -12x}$
$\qquad 8 = 8$

any number *don't forget to say what x

can be

Ex: $5z - 6 = (z - 1)5$

$5z - 6 = 5z - 5$
$\underline{-5z \qquad\; -5z}$
$-6 = -5$
No solution

3.2-3.4: Solve Real-World Problems Involving Equations

For each problem, be able to set up an equation to represent the situation, then solve the equation. Be sure to identify a variable.

Ex: John's family is moving and he needs to rent a U-Haul truck. The truck costs $250. He also wants to hire movers to help that cost $40 per hour. If he can only spend $750, how many hours could he hire movers for?

   a) Write an equation to represent the situation. Be sure to identify a variable and what it represents.

   x: # hours
   $250 + 40x = 750$

   b) Solve your equation.

   $250 + 40x = 750$
   $\underline{-250 \qquad\quad -250}$
   $\qquad \underline{40x = 500}$
   $\qquad\; 40 \quad\; 40$

   $x = 12.5$ hours

Ex: A major league baseball pitcher pitches from a distance of 60 feet 6 inches (*6 inches = how many feet?*). The pitcher can throw a ball at 90 miles per hour (132 feet per second). How long (in seconds) does it take the pitch to reach the batter?

$$d = rt$$
$$\frac{60.5}{132} = \frac{132t}{132}$$

*Need to use 60.5 because this is feet, and 132 ft/s because it wants to know how long in seconds.

$$0.46 \text{ sec} = t$$

Ex: Amy wants to join a movie theater club where should would pay $150 up front and then get to see as many movies as she wants in theaters for $5 each. A non-member must pay $12.50 for each movie. Amy wants to set up an equation to figure out when the cost of a member and a non-member would be equal.

   a) Set up and solve an equation to represent the situation. Be sure to identify a variable and what it represents.

   x: # movies
   $$150 + 5x = 12.5x$$

   b) Solve your equation.

   $$150 + 5x = 12.5x$$
   $$\underline{-5x \quad -5x}$$
   $$\frac{150}{7.5} = \frac{7.5x}{7.5}$$
   $$20 = x$$

   c) Explain the meaning of the solution as well as when Amy should choose to become a member and when she should choose to remain a non-member.

   It will take 20 movies for the cost of a member and non-member to be the same. If Amy wants to go to more than 20 movies, she should be a member, and she wants to go to less than 20 movies, she should be a non-member.

Ex: You want to make and sell holiday scarves. Your goal is to earn a profit of $500. You plan to sell each scarf for $5 and the cost of materials to make all scarves will be $200. Set up and solve a profit equation to determine how many scarves you will need to sell in order to meet your goal of a $500 profit.

   x: # Scarves
   $$P = I - E$$
   $$500 = 5x - 200$$
   $$\underline{+200 \qquad +200}$$
   $$\frac{700}{5} = \frac{5x}{5}$$
   $$x = 140 \text{ Scarves}$$

3.5/3.6: Write ratios and write/solve proportions

- **Be able to set up and solve ratios and proportions**

Ex: $\dfrac{34}{6} = \dfrac{2z+1}{2}$

$68 = 6(2z + 1)$
$68 = 12z + 6$
$\underline{-6 \qquad -6}$
$\dfrac{62}{12} = \dfrac{12z}{12}$

$$z = \dfrac{31}{6}$$

Ex: $\dfrac{-4a-1}{-10a} = \dfrac{3}{8}$

$8(-4a - 1) = -30a$
$-32a - 8 = -30a$
$\underline{+32a \qquad\quad +32a}$
$\qquad -8 = 2a$

$$a = -4$$

Ex: There are 10 girls and 12 boys in Mr. Taliaferro's Social Studies class.

a) What is the ratio of boys to girls?

$\dfrac{12}{10} = \dfrac{6}{5}$

b) What is the ratio of girls to all students?

$\dfrac{10}{22} = \dfrac{5}{11}$

Ex: You can read 20 pages of Fahrenheit 451 in 45 minutes. How many pages can you read in 1.5 **hours**? Set up a proportion and solve.

$\dfrac{20}{45} = \dfrac{x}{90}$ *90 minutes is 1.5 **hours**

$\dfrac{1800}{45} = \dfrac{45x}{45}$

$x = 40$ pages

3.7: Set up and solve percent problems

- **Be able to set up and solve percent and percent of change problems using the percent proportion**

Ex: What is 42.5% of 380?

$\dfrac{x}{380} = \dfrac{42.5}{100}$

161.5

Ex: 90 is what percent of 250?

$\dfrac{90}{250} = \dfrac{x}{100}$

36%

Ex: A survey asks high school seniors whether they would be willing to pay $5 for their yearbook. 198 students said "yes." This is 88% of the senior class. How many seniors are there in the high school?

$$\frac{198}{x} = \frac{88}{100}$$

225

3.8: Rewrite equations and formulas

- **Be able to solve a literal equation for a variable**

Ex: The area of a circular ring is found by using the formula $A = 4\pi pw$

a) Solve for p.

$$p = \frac{A}{4\pi w}$$

b) Find p when the area is 905 square feet

and the width is 9 feet

About 8 feet

- **Be able to write equations in function form**

Ex: $4x - 2y = -18$

$$\frac{-4x \qquad -4x}{-2y = -18 - 4x}$$
$$\overline{-2} \qquad -2$$

$y = 2x + 9$

Ex: $4y - x = 20$

$$\frac{+x \qquad +x}{4y = 20 + x}$$
$$\overline{4} \qquad 4$$

$y = \dfrac{1}{4}x + 5$