# 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:** $\frac{2}{7}n = -4$

$\frac{7}{2} \cdot \frac{2}{7}n = -4 \cdot \frac{7}{2}$

$n = -14$

**Ex:** $-5 + x = -4$

$+5 \quad +5$

$x = 1$

**Ex:** $1 - x = -2$

$-1 \quad -1$

$-x = -3$

$x = 3$

**Ex:** $x - 8 = -12$

$+8 \quad +8$

$x = -4$

**Ex:** $4 \cdot \frac{x}{4} = 3 \cdot 4$

$x = 12$

**Ex:** $5x = 30$

$\frac{5x}{5} = \frac{30}{5}$

$x = 6$

## 3.2/3.3: Solve 2/Multi-Step Equations

**- Be able to use inverse operations and reverse PEMDAS to solve multi-step equations**

***Hint: Before you distribute, rewrite subtraction as adding a negative!**

**Ex:** $4w + 2w = 24$

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

$w = 4$

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

$-5 \quad -5$

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

$x = 12$

**Ex:** $-4x + 5 = 21$

$-5 \quad -5$

$\frac{-4x}{-4} = \frac{16}{-4}$

$x = -4$

**Ex:** $2x + 7 = 5$

$-7 \quad -7$

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

$x = -1$

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

$5x + 12 - 4x = 17$

$x + 12 = 17$

$x = 5$

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

**Rewrite first as:** $-4 = 2(x-2) + -3(1 + -x)$

$-4 = 2x - 4 + -3 + 3x$ (Distribute)

$-4 = 5x - 7$ (Combine)

$+7 \quad +7$

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

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

**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.

Let $x$ = number of hours

$250 + 40x = 750$

b) Solve your equation.

$250 + 40x = 750$

$-250 \quad -250$

$\frac{40x}{40} = \frac{500}{40}$

$x = 12.5$

## 3.4: Solve equations with variables on both sides

***Hint: Do all the math you can *before* you start moving things to the other side. (Combine like terms, distribute) When it is time to move things to the other side, do variables before numbers!**

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

**Ex:** $5x - 10 = 2x + 20$

$-2x \quad -2x$

$3x - 10 = 20$

$+10 \quad +10$

$\frac{3x}{3} = \frac{30}{3}$

$x = 10$

**Ex:** $-3x + 6 = -8x + 11$

$+8x \quad +8x$

$5x + 6 = 11$

$-6 \quad -6$

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

$x = 1$

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

$-5m-25=m-14$
$+5m \quad +5m$
$-25=6m-14$
$+14 \quad +14$
$\frac{-11}{6}=\frac{6m}{6}$

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

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

$4m-12=12-4m$
$+4m \quad +4m$
$8m-12=12$
$+12 \quad +12$
$8m=24$

$m=3$

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

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

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

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

$12x+8=12x+8$
$-12x \quad -12x$
$8=8$

any number *don't forget to say what $x$ can be

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

$5z-6=5z-5$
$-5z \quad -5z$
$-6=-5$
No solution

## 3.5/3.6: Write ratios and write/solve proportions

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

**Ex:** $\frac{x}{7}=\frac{4}{14}$

$\frac{14x}{14}=\frac{28}{14}$
$x=2$

**Ex:** $\frac{2x}{8}=\frac{6}{3}$

$\frac{6x}{6}=\frac{48}{6}$
$x=8$

**Ex:** $\frac{6}{2}=\frac{x+3}{4}$

$24=2(x+3)$
$24=2x+6$
$-6 \quad -6$
$\frac{18}{2}=\frac{2x}{2}$
$9=x$

**Ex:** There are 10 girls and 12 boys in Mr. Taliaferro's Social Studies class. a) What is the ratio of boys to girls? b) What is the ratio of girls to all students? *Hint: Is your answer in simplest form?

a) $\frac{12}{10} = \frac{6}{5}$ *Make sure the correct numbers are on top and bottom based on how it is written

This means that for every 6 boys there are 5 girls

b) $\frac{10}{22} = \frac{5}{11}$

This means that for every 11 students total there are 5 girls

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

$$\frac{20}{45} = \frac{x}{90}$$

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

$$40 = x$$

**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?

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

$$\frac{100x}{100} = \frac{16150}{100}$$

$$x = 161.5$$

**Ex:** 90 is what percent of 250?

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

$$\frac{9000}{250} = \frac{250x}{250}$$

$$36 = x$$

**Ex:** 45 is 30% of what number?

$$\frac{45}{x} = \frac{30}{100}$$

$$\frac{4500}{30} = \frac{30x}{30}$$

$$150 = x$$

**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?

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

$$\frac{88x}{88} = \frac{19800}{88}$$

$$x = 225$$