Chapter 2 Notes

Tentative Assignment Schedule

Lesson 2.2 Page 87 22-42 even, 48-54 even, 82-86 even
Lesson 2.3 Page 96 24-46 even, 74-92 even
Lesson 2.4 Page 103 14-34 even, 36, 42-52 even, 64-84 even
Lesson 2.5 Page 109 8 - 12 even, 20 - 54 even
Review 2.2-2.5 - 10 Points
Quiz 2.2-2.5 - 25 Points

6 days
Objective 1: ____________________________________________________________________________

**Example 1**
**Solving Equations by Using Multiplication**

Solve each equation. Check your answer.

\[ A \quad -4 = \frac{k}{-5}, \quad B \quad \frac{m}{3} = 1 \]

Solve each equation. Check your answer.

\[ 1a. \quad \frac{p}{5} = 10, \quad 1b. \quad -13 = \frac{y}{3}, \quad 1c. \quad \frac{c}{8} = 7 \]

**Example 2**
**Solving Equations by Using Division**

Solve each equation. Check your answers.

\[ A \quad 7x = 56, \quad B \quad 13 = -2u \]

Solve each equation. Check your answer.

\[ 2a. \quad 16 = 4c, \quad 2b. \quad 0.5y = -10, \quad 2c. \quad 15k = 75 \]

**Example 3**
**Solving Equations That Contain Fractions**

Solve each equation.

\[ A \quad \frac{5}{9}v = 35, \quad B \quad \frac{5}{2} = \frac{4y}{3} \]
Solve each equation. Check your answer.

3a. \(-\frac{1}{4} = \frac{1}{5}b\)  
3b. \(\frac{4j}{6} = \frac{2}{3}\)  
3c. \(\frac{1}{6}w = 10\)

EXAMPLE 4  Aviation Application
The distance in miles from the airport that a plane should begin descending, divided by 3, equals the plane's height above the ground in thousands of feet. If a plane is 10,000 feet above the ground, write and solve an equation to find the distance at which the pilot should begin descending.

4. What if…?  A plane began descending 45 miles from the airport. Use the equation above to find how high the plane was flying when the descent began.

Properties of Equality

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition Property of Equality</td>
<td>(a = b)</td>
<td>(a + c = b + c)</td>
</tr>
<tr>
<td>Subtraction Property of Equality</td>
<td>(7 = 7) (\frac{7}{5} = \frac{7}{5})</td>
<td>(2 = 2)</td>
</tr>
<tr>
<td>Multiplication Property of Equality</td>
<td>(a = b)</td>
<td>(ac = bc)</td>
</tr>
<tr>
<td>Division Property of Equality</td>
<td>(8 = 8)</td>
<td>(\frac{8}{4} = \frac{8}{4}) (2 = 2)</td>
</tr>
</tbody>
</table>

Think and Discuss- Journal
Tell how Multiplication and Division Properties of equality are similar to the Addition and Subtraction Properties of Equality.

Homework Page: 87  22-42 even  48-54 even  82-86 even
Lesson 2.3 Solving Two-Step and Multi-Step Equations

Example 1: Solving Two-Step Equations
Solve 10 = 6 - 2x  Check your answer

Example 2: Solving Two-Step Equations that contain Fractions
Solve the equation: Showing work is required
\[ \frac{Q - 1}{15} = \frac{3}{5} \]

Method 1: Use Fraction operations
Method 2: Least Common denominator

Check it Out: Solving Two-Step Equations
Solve a.) -4 + 7x = 3  b) 1.5 = 1.2y - 5.7  c) n/7 + 2 = 2
Check your answer

Solve each equation. Check your answer.

2a. \( \frac{2x}{5} - \frac{1}{2} = 5 \)
2b. \( \frac{3}{4}u + \frac{1}{2} = \frac{7}{8} \)
2c. \( \frac{1}{5}n - \frac{1}{3} = \frac{8}{3} \)

Example 3: Simplifying Before Solving Equations
Solve each equation.

A 6x + 3 - 8x = 13

B 9 = 6 - (x + 2)

Reminder to Check online and web site for additional Help
Solve each equation. Check your answer.

3a. \(2a + 3 - 8a = 8\)
3b. \(-2(3 - d) = 4\)
3c. \(4(x - 2) + 2x = 40\)

**Example 4**

Alex belongs to a music club. In this club, students can buy a student discount card for $19.95. This card allows them to buy CDs for $3.95 each. After one year, Alex has spent $63.40. Write and solve an equation to find how many CDs Alex bought during the year.

4. Sara paid $15.95 to become a member at a gym. She then paid a monthly membership fee. Her total cost for 12 months was $735.95. How much was the monthly fee?

**Example 5**

**Solving Equations to Find an Indicated Value**

If \(3a + 12 = 30\), find the value of \(a + 4\).

5. If \(2x + 4 = -24\), find the value of \(3x\).

**Think and Discuss**

1. Explain the steps you would follow to solve \(2x + 1 = 7\). How is this procedure different from the one you would follow to solve \(2x - 1 = 7\)?

2. **Get Organized** Copy and complete the graphic organizer. In each box, write and solve a multi-step equation. Use addition, subtraction, multiplication, and division at least one time each.

Homework page 96 24-46 even, 74 - 92 even
Objective: _______________________________________________________________________

<table>
<thead>
<tr>
<th>Identity</th>
<th>Contradiction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example 1**  
Solving Equations with Variables on Both Sides

Solve each equation.

**A** \[ 7k = 4k + 15 \]

**B** \[ 5x - 2 = 3x + \]

**Check It Out!**

Solve each equation. Check your answer.

1a. \[ 4b + 2 = 3b \]  
1b. \[ 0.5 + 0.3y = 0.7y - 0.3 \]

**Example 2**  
Simplifying Each Side Before Solving Equations

Solve each equation.

**A** \[ 2(y + 6) = 3y \]

**B** \[ 3 - 5b + 2b = -2 - 2(1 - b) \]

**Check It Out!**

Solve each equation. Check your answer.

2a. \[ \frac{1}{2}(b + 6) = \frac{3}{2}b - 1 \]  
2b. \[ 3x + 15 - 9 = 2(x + 2) \]

**Example 3**  
Infinitely Many Solutions or No Solutions

Solve each equation.

**A** \[ x + 4 - 6x = 6 - 5x - 2 \]

**B** \[ -8x + 6 + 9x = -17 + x \]
Solve each equation.

3a. \(4v + 7 - v = 10 + 3v\)  

3b. \(2c + 7 + c = -14 + 3c + 21\)

---

**Identities and Contradictions**

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When solving an equation, if you get an equation that is always true, the original equation is an identity, and it has infinitely many solutions.</td>
<td>(2 + x = 2 + x)</td>
<td>(-x = -x)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2 = 2)</td>
</tr>
<tr>
<td><strong>Contradiction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When solving an equation, if you get a false equation, the original equation is a contradiction, and it has no solutions.</td>
<td>(1 = 1 + 2)</td>
<td>(1 = 3)</td>
</tr>
</tbody>
</table>

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**Example 4**

**Consumer Application**

The long-distance rates of two phone companies are shown in the table. How long is a call that costs the same amount no matter which company is used? What is the cost of that call?

<table>
<thead>
<tr>
<th>Phone Company</th>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>(36c) plus (3c) per minute</td>
</tr>
<tr>
<td>Company B</td>
<td>(64) per minute</td>
</tr>
</tbody>
</table>

---

4. Four times Greg’s age, decreased by 3, is equal to 3 times Greg’s age, increased by 7. How old is Greg?

---

**THINK AND DISCUSS**

1. Tell which of the following is an identity. Explain your answer.
   - a. \(4(a + 3) - 6 = 3(a + 3) - 6\)
   - b. \(8.3x - 9 + 0.7x = 2 + 9x - 11\)

2. GET ORGANIZED Copy and complete the graphic organizer. In each box, write an example of an equation that has the indicated number of solutions.

   An equation with variables on both sides can have...

   - one solution:
   - many solutions:
   - no solution:
Main Idea: __________________________________________________________________________

<table>
<thead>
<tr>
<th>Formula</th>
<th>Literal Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Solving for a Variable**

**Step 1**

**Step 2** Identify the operations on this variable and the order in which they are applied.

**Step 3** Use inverse operations to undo operations and isolate the variable.

---

**EXAMPLE 1**  

**Sports Application**

In 2004, Ernst Van Dyk won the wheelchair race of the Boston Marathon with a time of about 1.3 hours. The race was about 26.2 miles. What was his average speed? Use the formula \(d = rt\) and round your answer to the nearest tenth.

---

1. Solve the formula \(d = rt\) for \(t\). Find the time in hours that it would take Van Dyk to travel 26.2 miles if his average speed was 18 miles per hour. Round to the nearest hundredth.

---

**EXAMPLE 2**  

**Solving Formulas for a Variable**

**A** The formula for a Fahrenheit temperature in terms of degrees Celsius is \(F = \frac{9}{5}C + 32\). Solve for \(C\).

**B** The formula for a person's typing speed is \(s = \frac{w - 10e}{m}\), where \(s\) is words per minute, \(w\) is number of words typed, \(e\) is number of errors, and \(m\) is number of minutes typing. Solve for \(w\).

---

2. The formula for an object's final velocity \(f\) is \(f = i - gt\), where \(i\) is the object's initial velocity, \(\sigma\) is acceleration due to gravity, and \(t\) is time. Solve for \(i\).
EXAMPLE 3
Solving Literal Equations for a Variable

A Solve \( m - n = 5 \) for \( m \).

B Solve \( \frac{m}{k} = x \) for \( k \).

3a. Solve \( 5 - b = 2t \) for \( t \).
3b. Solve \( D = \frac{m}{V} \) for \( V \).

THINK AND DISCUSS
1. Describe a situation in which a formula could be used more easily if it were “rearranged.” Include the formula in your description.
2. Explain how to solve \( P = 2l + 2w \) for \( w \).
3. GET ORGANIZED Copy and complete the graphic organizer. Write a formula that is used in each subject. Then solve the formula for each of its variables.

<table>
<thead>
<tr>
<th>Common Formulas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
</tr>
<tr>
<td>Geometry</td>
</tr>
<tr>
<td>Physical science</td>
</tr>
<tr>
<td>Earth science</td>
</tr>
</tbody>
</table>

Homework Page 109  8-12 even, 20-54 even
Chapter 2 Notes

Tentative Assignment Schedule

Lesson 2.6 #1 Page 117 1-25 all, #2 118 40-78 evens
Lesson 2.7 Page 124 6-40 even
Lesson 2.8 Page 130 16- 46 even 48-72 Multiple 4's
Lesson 2.9 Page 135 8-14 even, 16-30 even, 36-42 even
Lesson 2.10 Page 141 16 - 40 even, 50-76 even
Review Chapter 2 Test - 20 Points
Test Chapter - 50 Points

6 Days
### Example 1: Using Ratios

The ratio of faculty members to students at a college is 1:15. There are 675 students. How many faculty members are there?

1. The ratio of games won to games lost for a baseball team is 3:2. The team won 18 games. How many games did the team lose?

### Example 2: Finding Unit Rates

Takeru Kobayashi of Japan ate 53.5 hot dogs in 12 minutes to win a contest. Find the unit rate. Round your answer to the nearest hundredth.

2. Cory earns $52.50 in 7 hours. Find the unit rate.
**EXAMPLE 3** Converting Rates

A. As you go deeper underground, the earth's temperature increases. In some places, it may increase by 25°C per kilometer. What is this rate in degrees per meter?

B. The dwarf sea horse *Hippocampus zosterae* swims at a rate of 52.68 feet per hour. What is this speed in inches per minute?

3. A cyclist travels 56 miles in 4 hours. What is the cyclist's speed in feet per second? Round your answer to the nearest tenth and show that your answer is reasonable.

**Cross Products Property**

<table>
<thead>
<tr>
<th>WORDS</th>
<th>NUMBERS</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/3 = 4/6</td>
<td>2\times4 = 3\times6</td>
<td>If ( \frac{a}{b} = \frac{c}{d} ) and ( b \neq 0 ) and ( d \neq 0 ), then ( ad = bc ).</td>
</tr>
</tbody>
</table>

**EXAMPLE 4** Solving Proportions

Solve each proportion.

A. \( \frac{\frac{5}{9}}{\frac{3}{4}} = \frac{3}{w} \)

B. \( \frac{8}{x + 10} = \frac{1}{12} \)

4a. \( \frac{-5}{2} = \frac{y}{8} \)

4b. \( \frac{6 + 3}{5} = \frac{7}{4} \)

**EXAMPLE 5** Scale Drawings and Scale Models

A. On the map, the distance from Chicago to Evanston is 0.625 in. What is the actual distance?

B. The actual distance between North Chicago and Waukegan is 4 mi. What is this distance on the map? Round to the nearest tenth.

5. A scale model of a human heart is 16 ft long. The scale is 32:1. How many inches long is the actual heart it represents?

**THINK AND DISCUSS**

1. Explain two ways to solve the proportion \( \frac{1}{4} = \frac{3}{1} \).

2. How could you show that the answer to Example 5A is reasonable?

3. GET ORGANIZED Copy and complete the graphic organizer. In each box, write an example of each use of ratios.

---

Homework 1 page 117 1-25 all   Homework 2 page 118 40-78 evens
Objective:_________________________________________________________________________

Objective:_________________________________________________________________________

<table>
<thead>
<tr>
<th>Similar</th>
<th>Corresponding sides</th>
<th>Corresponding angles</th>
<th>Indirect Measurement</th>
<th>Scale Factor</th>
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<tbody>
<tr>
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</tbody>
</table>

**Example 1**

*Finding Missing Measures in Similar Figures*

Find the value of \(x\) in each diagram.

A \(\triangle RST \sim \triangle BCD\)

Find the value of \(x\) in each diagram.

B \(FGHIKL \sim MNPQRS\)

1. Find the value of \(x\) in the diagram if \(ABCD \sim WXYZ\).

**Example 2**

*Measurement Application*

A totem pole casts a shadow 45 feet long at the same time that a 6-foot-tall man casts a shadow that is 3 feet long. Write and solve a proportion to find the height of the totem pole.

Both the man and the totem pole form right angles with the ground, and their shadows are cast at the same angle. You can form two similar right triangles.

2a. A forest ranger who is 150 cm tall casts a shadow 45 cm long. At the same time, a nearby tree casts a shadow 195 cm long. Write and solve a proportion to find the height of the tree.

2b. A woman who is 5.5 feet tall casts a shadow 3.5 feet long. At the same time, a building casts a shadow 28 feet long. Write and solve a proportion to find the height of the building.
Example 3 Changing Dimensions

A Every dimension of a 2-by-4-inch rectangle is multiplied by 1.5 to form a similar rectangle. How is the ratio of the perimeters related to the ratio of corresponding sides? How is the ratio of the areas related to the ratio of corresponding sides?

<table>
<thead>
<tr>
<th>Rectangle A</th>
<th>Rectangle B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P = 2l + 2w$</td>
<td></td>
</tr>
<tr>
<td>$A = lw$</td>
<td></td>
</tr>
</tbody>
</table>

B Every dimension of a cylinder with radius 4 cm and height 6 cm is multiplied by $\frac{1}{2}$ to form a similar cylinder. How is the ratio of the volumes related to the ratio of corresponding dimensions?

<table>
<thead>
<tr>
<th>Cylinder A</th>
<th>Cylinder B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V = \pi r^2 h$</td>
<td></td>
</tr>
</tbody>
</table>

3. A rectangle has width 12 inches and length 3 inches. Every dimension of the rectangle is multiplied by $\frac{1}{3}$ to form a similar rectangle. How is the ratio of the perimeters related to the ratio of the corresponding sides?

<table>
<thead>
<tr>
<th>Rectangle A</th>
<th>Rectangle B</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P = 2l + 2w$</td>
<td></td>
</tr>
</tbody>
</table>

Think and Discuss

1. Name some pairs of real-world items that appear to be similar figures.

2. Get organized Copy and complete the graphic organizer. In the top box, sketch and label two similar triangles. Then list the corresponding sides and angles in the bottom boxes.
Objective: _______________________________________________________________________

Homework Page 130 16-46 even 48-72 Multiple 4 (48, 52, 56, 60, 64, 68, 72)

Name: ___________ Date: _____ Period: ___

---

**Example 1** Finding the Part

**A** Find 50% of 20.

**B** Find 105% of 72.

Method 2 Use an equation.

1a. Find 20% of 60.  
1b. Find 210% of 8.  
1c. Find 4% of 36.

---

**Example 2** Finding the Percent

**A** What percent of 60 is 15? 

**B** 440 is what percent of 400?

---

2a. What percent of 35 is 7? 
2b. 27 is what percent of 9?
**EXAMPLE 3 Finding the Whole**

A. 40% of what number is 14?  
B. 40 is 0.8% of what number

**3a.** 120% of what number is 90?  
**3b.** 48 is 15% of what number?

**EXAMPLE 4 Career Application**

Jewelers use the karat system to determine the amount of pure gold in jewelry. Pure gold is 24 karat, meaning the item is 100% gold. A 14-karat gold ring contains 14 parts gold and 10 parts other metal. What percent of the ring is gold? Round your answer to the nearest percent.

4. Use the information above to find the number of karats in a bracelet that is 42% gold. Round your answer to the nearest whole number.

**THINK AND DISCUSS**

1. Describe the numerical value of the percent when the part is greater than the whole. Give an example.
2. 64% of a number is 32. Is the number greater than or less than 32? Explain.
3. GET ORGANIZED Copy and complete the graphic organizer. In each box, write and solve an example using the given method.

*Graphic Organizer:*

- **Solving Percent Problems**
  - Find the part: Equation, Proportion
  - Find the percent: Equation, Proportion
  - Find the whole: Equation, Proportion

---

Homework Page 16-46 even 48-72 Multiple 4 (48,52,56,60,64,68,72)
### Objective:

**Commission**

<table>
<thead>
<tr>
<th></th>
<th>Interest</th>
<th>Sales Tax</th>
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|                  |          |           |

<table>
<thead>
<tr>
<th>Principal</th>
<th>Tip</th>
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<tbody>
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<td></td>
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</tbody>
</table>

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#### Example 1

**Business Application**

Ms. Barns earns a base salary of $42,000 plus a 1.5% commission on sales. Her total sales one year were $700,000. Find her total pay for the year.

---

#### Check it Out 1

1. A telemarketer earns $350 per week plus a 12% commission on sales. Find her total pay for a week in which her sales are $940.

---

#### Example 2

**Finance Application**

A. Find the simple interest paid annually for 2 years on a $900 loan at 16% per year.

B. After 3 months the simple interest earned annually on an investment of $7000 was $63. Find the interest rate.
2a. Find the simple interest earned after 2 years on an investment of $3000 at 4.5% interest earned annually.

2b. The simple interest paid on a loan after 6 months was $306. The annual interest rate was 8%. Find the principal.

**Example 3** Estimating with Percents

A. The dinner check for Maria’s family is $67.95. Estimate a 15% tip.

B. The sales tax rate is 6.25%. Estimate the sales tax on a shirt that costs $29.50.

3a. Estimate a 15% tip on a check for $21.98.

3b. Estimate the tax on shoes that cost $68.50 when the sales tax rate is 8.25%.

**Think and Discuss**

1. Explain how commission, interest, sales tax, and tips are alike.

2. When the sales tax rate is 8.25%, the tax on a $10 purchase is $0.83. Is the tax on $20 twice as much? Explain.

3. **Get Organized** Copy and complete the graphic organizer. In each box, write an example of each type of application and find the answer.

Homework page 135 8-14 even, 16-30 even 36-42 even
Objective: ______________________________________________________________________

<table>
<thead>
<tr>
<th>Percent Change</th>
<th>Percent Increase</th>
<th>Percent Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Discount</th>
<th>Markup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

**EXAMPLE 1**

Finding Percent Increase or Decrease

Find each percent change. Tell whether it is a percent increase or decrease.

A. from 25 to 49

B. from 50 to 45

**EXAMPLE 2**

Finding the Result of a Percent Increase or Decrease

A. Find the result when 30 is increased by 20%.

B. Find the result when 65 is decreased by 80%.

2a. Find the result when 72 is increased by 25%.

2b. Find the result when 10 is decreased by 40%. 
**EXAMPLE 3** Discounts

A Admission to the museum is $8. Students receive a 15% discount. How much is the discount? How much do students pay?

Method 1 A discount is a percent decrease. So find $8 decreased by 15%.

Method 2 Subtract percent discount from 100%.

B Christo used a coupon and paid $7.35 for a pizza that normally cost $10.50. Find the percent discount.

3a. A $220 bicycle was on sale for 60% off. Find the sale price
3b. Ray paid $12 for a $15 T-shirt. What was the percent discount?

**EXAMPLE 4** Markups

A Kaleb buys necklaces at a wholesale cost of $48 each. He then marks up the price by 75% and sells the necklaces. What is the amount of the markup? What is the selling price?

Method 1

Method 2
Add percent markup to 100%.

B Lars purchased a daily planner for $32. The wholesale cost was $ What was the percent markup?

4a. A video game has a 70% markup. The wholesale cost is $9. What is the selling price?
4b. What is the percent markup on a car selling for $31,850 that had a wholesale cost of $9,500?

**THINK AND DISCUSS**

1. 80% of a number is the same as a 2% decrease from that number. A 30% increase from a number is the same as 8% of that number.
2. A markup of 20% will result in a final cost that is how many times the wholesale cost?
3. What information would you need to find the percent change in your school’s population over the last ten years?
4. GET ORGANIZED Copy and complete the graphic organizer. In each box, write and solve an example of the given type of problem.