

# **TEKS/STAAR-BASED LESSONS**

# **Grade 7 Student Materials Six Weeks 1**

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## GRADE 7 MATHEMATICS

(7.1) Number, operation, and quantitative reasoning. The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (A) compare and order integers and positive rational numbers.

# 7.1A STUDENT ACTIVITY 1

Which of these fractions,  $\frac{3}{5}$  or  $\frac{2}{5}$ , is greater?

- The fractions have the same \_\_\_\_\_. Compare the \_\_\_\_\_.
- Since  $3 > 2$ , the fraction  $\frac{3}{5} > \frac{2}{5}$ .

Draw a model to compare  $\frac{3}{5}$  and  $\frac{2}{5}$  in the space below.

Which of these fractions,  $\frac{7}{12}$  or  $\frac{5}{8}$ , is greater?

- The fractions have different denominators. First, find a \_\_\_\_\_.  
Multiples of 12: \_\_\_\_\_ Multiples of 8: \_\_\_\_\_  
The least common multiple of 12 and 8 is \_\_\_\_\_. I will use it as the \_\_\_\_\_  
\_\_\_\_\_ for the two fractions.

- Next, rewrite  $\frac{7}{12}$  as an equivalent fraction with a denominator of \_\_\_\_\_.

Since  $12 \times \underline{\quad} = 24$ , multiply the fraction  $\frac{7}{12}$  by the fraction  $\frac{\square}{\square}$ .  $\frac{7 \times 2}{12 \times 2} = \frac{\square}{\square}$

Next, rewrite  $\frac{5}{8}$  as an equivalent fraction with a denominator of \_\_\_\_\_.

Since  $8 \times \underline{\quad} = 24$ , I will multiply the fraction  $\frac{5}{8}$  by the fraction  $\frac{\square}{\square}$ .  $\frac{5 \times 3}{8 \times 3} = \frac{\square}{\square}$

- Now compare  $\frac{\square}{\square}$  and  $\frac{\square}{\square}$ . Because  $\underline{\quad} > \underline{\quad}$ , I know that  $\frac{\square}{\square} > \frac{\square}{\square}$ .

- Now compare  $\frac{7}{12}$  and  $\frac{5}{8}$ . The greater fraction is  $\frac{\square}{\square}$ .

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# 7.1A STUDENT ACTIVITY 2

Circle the larger mixed fraction in each pair.

$$2\frac{3}{4} \quad 2\frac{5}{10}$$

**PAIR 1**

$$5\frac{3}{8} \quad 5\frac{2}{5}$$

**PAIR 2**

$$12\frac{5}{6} \quad 12\frac{6}{9}$$

**PAIR 3**

$$7\frac{8}{13} \quad 7\frac{2}{3}$$

**PAIR 4**

$$1\frac{5}{12} \quad 2\frac{11}{24}$$

**PAIR 5**

- **PAIR 1:** Because the whole numbers are the same, compare only the \_\_\_\_\_ parts.

Use a common denominator of \_\_\_\_\_ to find equivalent fractions.

The equivalent fractions are  $\frac{\square}{\square}$  and  $\frac{\square}{\square}$ . Compare \_\_\_\_\_ and \_\_\_\_\_.

The larger fraction is  $\frac{\square}{\square}$ . Circle the larger fraction in the Pair 1 box at the top of the page.

- **PAIR 2:** Because the whole numbers are the same, compare only the \_\_\_\_\_ parts.

Use a common denominator of \_\_\_\_\_ to find equivalent fractions.

The equivalent fractions are  $\frac{\square}{\square}$  and  $\frac{\square}{\square}$ . Compare \_\_\_\_\_ and \_\_\_\_\_.

The larger fraction is  $\frac{\square}{\square}$ . Circle the larger fraction in the Pair 2 box at the top of the page.

- **PAIR 3:** Because the whole numbers are the same, compare only the \_\_\_\_\_ parts.

Use a common denominator of \_\_\_\_\_ to find equivalent fractions.

The equivalent fractions are  $\frac{\square}{\square}$  and  $\frac{\square}{\square}$ . Compare \_\_\_\_\_ and \_\_\_\_\_.

The larger fraction is  $\frac{\square}{\square}$ . Circle the larger fraction in the Pair 3 box at the top of the page.

- **PAIR 4:** Because the whole numbers are the same, compare only the \_\_\_\_\_ parts.

Use a common denominator of \_\_\_\_\_ to find equivalent fractions.

The equivalent fractions are  $\frac{\square}{\square}$  and  $\frac{\square}{\square}$ . Compare \_\_\_\_\_ and \_\_\_\_\_.

The larger fraction is  $\frac{\square}{\square}$ . Circle the larger fraction in the Pair 4 box at the top of the page.

- **PAIR 5:** Because the whole numbers are different, compare only the \_\_\_\_\_ numbers.

The larger mixed fraction is  $\frac{\square}{\square}$ . Circle the larger mixed fraction in the Pair 5 box at the top of the page.

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# 7.1A STUDENT ACTIVITY 3

**PART I:** Circle the larger decimal in each pair.

3.25
2.46

**PAIR 1**

5.276
5.345

**PAIR 2**

11.2
1.02

**PAIR 3**

9.52
9.509

**PAIR 4**

4.37
6.37

**PAIR 5**

- **PAIR 1:** Compare only the \_\_\_\_\_ place. Since \_\_\_\_\_ > \_\_\_\_\_, \_\_\_\_\_ > \_\_\_\_\_.
- **PAIR 2:** Since they both have a 5 in the ones place, compare the \_\_\_\_\_ place. Since \_\_\_\_\_ > \_\_\_\_\_, \_\_\_\_\_ > \_\_\_\_\_.
- **PAIR 3:** Compare only the \_\_\_\_\_ place. Since \_\_\_\_\_ > \_\_\_\_\_, \_\_\_\_\_ > \_\_\_\_\_.
- **PAIR 4:** Since they both have a \_\_\_\_\_ in the ones place and a 5 in their \_\_\_\_\_ place, compare the \_\_\_\_\_ place. Since \_\_\_\_\_ > \_\_\_\_\_, \_\_\_\_\_ > \_\_\_\_\_.
- **PAIR 5:** Compare the \_\_\_\_\_ positions. Since \_\_\_\_\_ > \_\_\_\_\_, \_\_\_\_\_ > \_\_\_\_\_.

**PART II:**

Order 0.897, 1.903, 0.992, and 1.309 from greatest to least.

\_\_\_\_\_ > \_\_\_\_\_ > \_\_\_\_\_ > \_\_\_\_\_

The numbers in order from greatest to least are:

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Order 23.09, 3.796, 29.095, and 9.706 from least to greatest.

\_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_

The numbers in order from least to greatest are:

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

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# 7.1A STUDENT ACTIVITY 4

**PART I:** Write a fraction that lies between each pair of fractions on the number line.

$\frac{1}{8}, \frac{\square}{\square}, \frac{1}{4}$
-----------------------------------------------------

**PAIR 1**

$\frac{1}{4}, \frac{\square}{\square}, \frac{3}{8}$
-----------------------------------------------------

**PAIR 2**

$\frac{3}{8}, \frac{\square}{\square}, \frac{1}{2}$
-----------------------------------------------------

**PAIR 3**

$\frac{1}{2}, \frac{\square}{\square}, \frac{8}{12}$
------------------------------------------------------

**PAIR 4**

$\frac{1}{3}, \frac{\square}{\square}, \frac{5}{9}$
-----------------------------------------------------

**PAIR 5**

**PART II:** Write a decimal number that lies between each pair of decimal numbers on the line between the two decimal numbers.

$3.05$ <hr style="width: 50%; margin: 5px auto;"/> $3.16$
--------------------------------------------------------------

**PAIR 1**

$5.276$ <hr style="width: 50%; margin: 5px auto;"/> $5.345$
----------------------------------------------------------------

**PAIR 2**

$11.02$ <hr style="width: 50%; margin: 5px auto;"/> $11.22$
----------------------------------------------------------------

**PAIR 3**

$9.52$ <hr style="width: 50%; margin: 5px auto;"/> $9.602$
---------------------------------------------------------------

**PAIR 4**

$4.17$ <hr style="width: 50%; margin: 5px auto;"/> $4.324$
---------------------------------------------------------------

**PAIR 5**

**PART III:**

Write three fractions that are close to  $\frac{3}{4}$  on a number line.

$$\frac{\square}{\square} < \frac{\square}{\square} < \frac{3}{4} < \frac{\square}{\square} < \frac{\square}{\square}$$

Write four decimal numbers that are close to 0.85 on a number line.

$$\underline{\hspace{2cm}} < \underline{\hspace{2cm}} < 0.85 < \underline{\hspace{2cm}} < \underline{\hspace{2cm}}$$

**PART IV:**

Of the numbers  $6\frac{1}{3}$ , 6, and 6.03, which is between the other two numbers? \_\_\_\_\_

Of the numbers  $\frac{2}{8}$ , 0.2, and 1, which is between the other two numbers? \_\_\_\_\_

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# PROBLEM SOLVING PLAN

## UNDERSTAND

Summarize the problem in your own words.

Describe the main idea of the problem.

Identify the supporting details needed to solve the problem.

Identify extraneous information and delete the information.

## PLAN

Choose a strategy for solving the problem.

Draw a picture or a diagram

Look for a pattern

Guess and check

Act it out

Make a chart or a table

Work a simpler problem

Work backwards

Make an organized list

Use logical reasoning

Brainstorm

Write a number sentence or an equation

## SOLVE

Estimate the answer to the problem.

Solve the problem.

## LOOK BACK

Check the answer for reasonableness.

Check to make sure the answer matches the question.

Solve the problem in another way.

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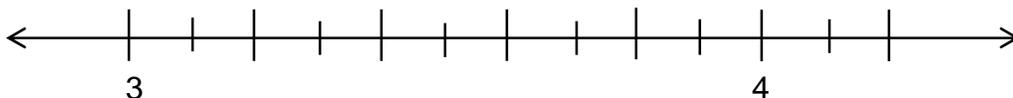
# 7.1A OPEN ENDED 1

The South Houston Middle School Science Club tracked a hurricane that was predicted to make landfall in Galveston. They recorded the amount of rainfall in Houston during 4 days as they tracked the hurricane. The total rainfall for 4 consecutive days is given in the table below.

Day	1	2	3	4
Rainfall (in inches)	$3\frac{2}{3}$	$3\frac{11}{12}$	$3\frac{5}{6}$	$3\frac{5}{8}$

- Order the amounts of rainfall from greatest to least. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
- If Day 5 rainfall was less than Day 4 but greater than 3 inches, what are three possible rainfall amounts for Day 5?  
\_\_\_\_\_

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. Will a picture or diagram be helpful on this problem? If so, how?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension** (7.12A, 7.2F): What is the range of the rainfall amounts for these four days?
6. **Extension** (7.1A): Locate, mark and label the 4 rainfall amounts on the number line.



## GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (A) compare and order integers and positive rational numbers.

# 7.1A OPEN ENDED 2

The table shows the batting averages for five players on the Texas Rangers baseball team.

Batting Averages

Player	Average
L. Nix	0.304
A. Soriano	0.296
K. Mench	0.271
H. Blalock	0.299
M. Young	0.322

- List the batting averages in order from greatest to least.

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

- List the names of the players in order from the player with the lowest batting average to the player with the highest batting average.

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

- If E. Kunz has a batting average that is higher than L. Nix's average but lower than M. Young's average, list three possible values for his batting average.

\_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_

- What mathematical concepts and vocabulary do I need to know to be able to work this problem?
- Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
- What problem-solving strategy or strategies will I use to help solve this problem?
- Extension (7.3B):** If Hank Blalock gets to bat 100 more times this season, about how many more hits can the manager expect him to hit?

# GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses rational numbers in a variety of equivalent forms. The student is expected to: (A) compare and order integers and positive rational numbers.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

## 7.1A Homework 1

1. Mr. Thomas has 4 opened cans of different colors of paint after painting rooms in Mrs. Long's house. He estimates the cans are  $\frac{1}{2}$ ,  $\frac{4}{5}$ ,  $\frac{1}{4}$  and  $\frac{3}{4}$  full. Order these amounts of paint from least to greatest.

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

2. The National League Batting Champions for 2000-2004 are given below.

### National League Batting Champions 2000-2004

Year	Player, Team	Batting Average
2000	T. Helton, Colorado	0.372
2001	L. Walker, Colorado	0.350
2002	B. Bonds, San Francisco	0.370
2003	A. Pujols, St. Louis	0.359
2004	B. Bonds, San Francisco	0.362

- Order the batting averages from lowest to highest: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

- Order the years from highest to lowest batting average: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

3. Place each of the mixed fractions in the rectangular box between the pair of mixed fractions they will lie between when placed on a number line.

$2\frac{3}{4}$	$2\frac{1}{3}$	$2\frac{1}{5}$	$1\frac{7}{8}$	$1\frac{2}{3}$
----------------	----------------	----------------	----------------	----------------

$2$ , \_\_\_\_\_,  $2\frac{3}{10}$

$1\frac{1}{2}$ , \_\_\_\_\_,  $1\frac{3}{4}$

$2\frac{1}{4}$ , \_\_\_\_\_,  $2\frac{1}{2}$

$2\frac{2}{3}$ , \_\_\_\_\_,  $2\frac{11}{12}$

$1\frac{3}{4}$ , \_\_\_\_\_,  $1\frac{15}{16}$

4. Circle the larger fraction or mixed number in each number pair below.

$\frac{3}{5}$  and  $\frac{7}{10}$

$3\frac{7}{12}$  and  $3\frac{5}{8}$

$\frac{5}{6}$  and  $\frac{7}{8}$

$\frac{2}{3}$  and  $\frac{7}{12}$

5. Circle the decimals below that would lie between 3.2 and 3.28 on a number line.

3.021

3.209

3.275

3.282

3.027

3.269



## GRADE 7 MATHEMATICS

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### Equivalent Fractions and Decimals

Following are equivalent fractions and decimals which Grade 7 students are expected to know by memory.

FRACTION	DECIMAL	FRACTION	DECIMAL
$\frac{1}{2}$	= 0.5	$\frac{3}{5}$	= 0.6
$\frac{2}{2}$	= 1.0	$\frac{4}{5}$	= 0.8
$\frac{1}{3}$	= $0.\overline{3}$	$\frac{5}{5}$	= 1.0
$\frac{2}{3}$	= $0.\overline{6}$	$\frac{1}{8}$	= 0.125
$\frac{3}{3}$	= 1.0	$\frac{2}{8}$	= 0.25
$\frac{1}{4}$	= 0.25	$\frac{3}{8}$	= 0.375
$\frac{2}{4}$	= 0.5	$\frac{4}{8}$	= 0.5
$\frac{3}{4}$	= 0.75	$\frac{5}{8}$	= 0.625
$\frac{4}{4}$	= 1.0	$\frac{6}{8}$	= 0.75
$\frac{1}{5}$	= 0.2	$\frac{7}{8}$	= 0.875
$\frac{2}{5}$	= 0.4	$\frac{8}{8}$	= 1.0

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# 7.1B STUDENT ACTIVITY 1

**How do I convert  $\frac{3}{4}$  to an equivalent decimal?**

Divide the \_\_\_\_\_ by the \_\_\_\_\_ .

The quotient is \_\_\_\_\_.

Therefore, \_\_\_\_\_ is the decimal equivalent to  $\frac{3}{4}$ .

**How do I convert  $\frac{7}{8}$  to an equivalent decimal?**

Divide the \_\_\_\_\_ by the \_\_\_\_\_ .

The quotient is \_\_\_\_\_.

Therefore, \_\_\_\_\_ is the decimal equivalent to  $\frac{7}{8}$ .

**How do I convert 0.75 to an equivalent fraction?**

Use \_\_\_\_\_ as the denominator because it is the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the numerator because they are the \_\_\_\_\_ to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Therefore, \_\_\_\_\_ is the fraction equivalent to 0.75.

**How do I convert 47.25 to a mixed fraction?**

Use \_\_\_\_\_ as the denominator because it is the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the numerator because they are the \_\_\_\_\_ to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the whole-number part of the \_\_\_\_\_ because they are the digits to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Therefore, \_\_\_\_\_ is the mixed fraction equivalent of 47.25.

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**How do I convert  $\frac{1}{4}$  to an equivalent decimal?**

Divide the \_\_\_\_\_ by the \_\_\_\_\_ .

The quotient is \_\_\_\_\_.

Therefore, \_\_\_\_\_ is the decimal equivalent of  $\frac{1}{4}$ .

**How do I convert  $\frac{6}{8}$  to an equivalent decimal?**

Divide the \_\_\_\_\_ by the \_\_\_\_\_ .

The quotient is \_\_\_\_\_.

Therefore, \_\_\_\_\_ is the decimal equivalent of  $\frac{6}{8}$ .

**How do I convert 0.625 to an equivalent fraction?**

Use \_\_\_\_\_ as the denominator because it is the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the numerator because they are the \_\_\_\_\_ to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Therefore, \_\_\_\_\_ is the fraction equivalent of 0.625.

**How do I convert 0.125 to an equivalent fraction?**

Use \_\_\_\_\_ as the denominator because it is the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the numerator because they are the \_\_\_\_\_ to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Therefore, \_\_\_\_\_ is the fraction equivalent of 0.125.

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### How do I convert 0.875 to an equivalent fraction?

Use \_\_\_\_\_ as the denominator because it is the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the numerator because they are the \_\_\_\_\_ to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Therefore, \_\_\_\_\_ is the fraction equivalent to 0.875.

### How do I convert 12.75 to a mixed fraction?

Use \_\_\_\_\_ as the denominator because it is the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the numerator because they are the \_\_\_\_\_ to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Use \_\_\_\_\_ as the whole-number part of the \_\_\_\_\_ because they are the digits to the \_\_\_\_\_ of the \_\_\_\_\_ point.

Therefore, \_\_\_\_\_ is the mixed fraction equivalent to 12.75.

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# 7.1B STUDENT ACTIVITY 2

Write a decimal equivalent for the fraction in each box.

$$\frac{1}{2} = 0.\underline{\quad}$$

$$\frac{2}{5} = 0.\underline{\quad}$$

$$\frac{4}{5} = 0.\underline{\quad}$$

$$\frac{3}{8} = 0.\underline{\quad}$$

$$\frac{5}{8} = 0.\underline{\quad}$$

For each fraction converted to a decimal, divide the \_\_\_\_\_ by the \_\_\_\_\_.

The quotient is the \_\_\_\_\_ of the fraction.

Write a fraction equivalent for the decimal in each box.

$$0.25 = \frac{\square}{\square}$$

$$0.75 = \frac{\square}{\square}$$

$$0.6 = \frac{\square}{\square}$$

$$0.125 = \frac{\square}{\square}$$

$$0.875 = \frac{\square}{\square}$$

For each decimal converted to a fraction, use the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ as the denominator. Then use the \_\_\_\_\_ to the right of the \_\_\_\_\_ as the \_\_\_\_\_.

Write a mixed number equivalent for the decimal in each box.

$$21.5 = \underline{\quad} \frac{\square}{\square}$$

$$33.2 = \underline{\quad} \frac{\square}{\square}$$

$$8.75 = \underline{\quad} \frac{\square}{\square}$$

$$1.25 = \underline{\quad} \frac{\square}{\square}$$

$$87.4 = \underline{\quad} \frac{\square}{\square}$$

For each decimal number converted to a mixed number, use the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ as the denominator. Then used the \_\_\_\_\_ to the right of the \_\_\_\_\_ as the \_\_\_\_\_. Finally, use any \_\_\_\_\_ to the left of the decimal point as the \_\_\_\_\_ number part of the \_\_\_\_\_ number.

## GRADE 7 MATHEMATICS

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**Write a decimal equivalent for the fraction in each box.**

$$\frac{1}{3} = 0.\underline{\quad}$$

$$\frac{3}{4} = 0.\underline{\quad}$$

$$\frac{2}{5} = 0.\underline{\quad}$$

$$\frac{4}{8} = 0.\underline{\quad}$$

$$\frac{7}{8} = 0.\underline{\quad}$$

For each fraction converted to a decimal, divide the \_\_\_\_\_ by the \_\_\_\_\_.

The quotient is the \_\_\_\_\_ of the fraction.

**Write a fraction equivalent for the decimal in each box.**

$$0.6 = \frac{\square}{\square}$$

$$0.35 = \frac{\square}{\square}$$

$$0.25 = \frac{\square}{\square}$$

$$0.625 = \frac{\square}{\square}$$

$$0.8 = \frac{\square}{\square}$$

For each non-repeating decimal converted to a fraction, use the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ as the denominator. Then use the \_\_\_\_\_ to the right of the \_\_\_\_\_ as the \_\_\_\_\_.

For the repeating decimal, \_\_\_\_\_, I must remember that it is equivalent to  $\frac{\square}{\square}$ .

**Write a mixed number equivalent for the decimal in each box.**

$$51.2 = \underline{\quad} \frac{\square}{\square}$$

$$97.5 = \underline{\quad} \frac{\square}{\square}$$

$$6.25 = \underline{\quad} \frac{\square}{\square}$$

$$3.75 = \underline{\quad} \frac{\square}{\square}$$

$$71.6 = \underline{\quad} \frac{\square}{\square}$$

For each decimal converted to a mixed number, I used the \_\_\_\_\_ of the digit farthest to the right of the \_\_\_\_\_ as the denominator. I then used the \_\_\_\_\_ to the right of the \_\_\_\_\_ as the \_\_\_\_\_.

Finally, I used any \_\_\_\_\_ to the left of the decimal point as the \_\_\_\_\_-number part of the \_\_\_\_\_ number.

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# 7.1B STUDENT ACTIVITY 3

## EQUIVALENT FRACTIONS AND DECIMALS MODELS

**Problem:** What strategies can you use to find equivalent decimal and fraction representations?

**Materials:** 3 different colored strips of 3" x 16" paper per pair of students  
1 marker per pair of students

**Procedure:** Work in pairs for this activity. Individually record answers to questions on Student Activity 3.

**Look at one of the colored strips of paper. This strip represents 1 whole.**

- Label the following benchmark fractions on one strip of paper with a marker:  $\frac{1}{10}$ ,  $\frac{1}{5}$ ,  $\frac{1}{4}$ ,  $\frac{1}{3}$ , and  $\frac{1}{2}$ .
- Label benchmark decimals from 0 to 1 on the second strip of paper with a marker:
- Line up the strips to show equivalent fractions and decimals.
- Combine the fraction benchmarks and decimal benchmarks to represent equivalent decimals and fractions by transferring both to the third strip of paper.

**Answer the following questions – each person records on their own Student Activity 3 sheet.**

- What strategies did you use for combining the fraction and decimal benchmarks to represent equivalent fractions and decimals?

- What are three equivalent fractions for each benchmark fraction?

$$\frac{1}{10} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$\frac{1}{5} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$\frac{1}{4} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$\frac{1}{3} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

$$\frac{1}{2} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

## GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator.

- Where can you place  $\frac{2}{5}$  on the number line in relation to the benchmark fractions? Why?
- How can you use the number lines with benchmarks to help you decide where to place other fractions and decimals?
- How can you apply your knowledge of the number lines to convert between other fractions and decimals?

## GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator.

# 7.1B OPEN ENDED 1

The seventh grade class celebrated the end of the school year with a party at the park.

- Three-fourths of the seventh grade class was able to attend. What decimal part of the class was able to attend? \_\_\_\_\_ Show your work.
- What fractional part of the boys played in the tennis tournament if 0.375 of the boys played? \_\_\_\_\_ Show your work.
- One-fifth of the girls went swimming at the party. What decimal part of the girls went swimming? \_\_\_\_\_ Show your work.
- Six-eighths of the seventh grade students ate hot dogs for dinner. What decimal part of the students ate hot dogs? \_\_\_\_\_
- If 0.125 of the students ate hamburgers for dinner, what fractional part of the students ate hamburgers? \_\_\_\_\_ Show your work.

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?

2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?

3. Will a picture or diagram be helpful on this problem? If so, how?

4. What problem-solving strategy or strategies will I use to help solve this problem?

5. **Extension** (TEKS 7.1A): Locate, mark and label the number line.

**A** = the decimal part of the class that was able to attend

**B** = the fractional part of the boys that played in the tennis tournament

**C** = the decimal part of the girls that went swimming

**D** = the fractional part of the students that ate hamburgers

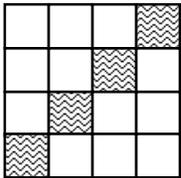


## GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator.

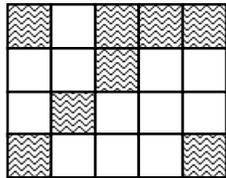
# 7.1B OPEN ENDED 2

Part of each diagram is shaded. In each diagram represent the shaded part as a fraction and as a decimal.



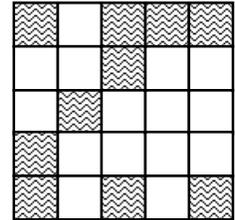
Decimal: \_\_\_\_\_

Fraction: \_\_\_\_\_



Decimal: \_\_\_\_\_

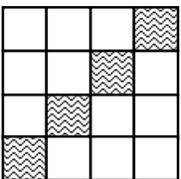
Fraction: \_\_\_\_\_



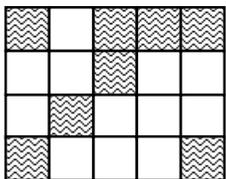
Decimal: \_\_\_\_\_

Fraction: \_\_\_\_\_

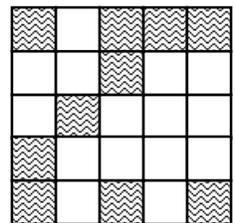
1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. What problem-solving strategy or strategies will I use to help solve this problem?
4. **Extension** (7.2D): Write the ratio of shaded to unshaded squares in each of the diagrams.



**Ratio:** \_\_\_\_\_



**Ratio:** \_\_\_\_\_



**Ratio:** \_\_\_\_\_

## GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.1B Homework 1

1. Write the decimal equivalent to each of the given fractions.

$$\frac{1}{5} = \underline{\hspace{2cm}}$$

$$\frac{9}{20} = \underline{\hspace{2cm}}$$

$$\frac{7}{25} = \underline{\hspace{2cm}}$$

2. Write the fraction or mixed number equivalent to each of the given decimals.

$$0.75 = \underline{\hspace{2cm}}$$

$$0.15 = \underline{\hspace{2cm}}$$

$$1.3 = \underline{\hspace{2cm}}$$

3. Martha weighed 85.4 pounds. Write her weight as a mixed fraction.

4. Luis got  $35\frac{7}{8}$  pages of his history assignment read before he left school. Write this number as a mixed decimal.

5. Susan walked  $3\frac{1}{4}$  miles on Monday and  $4\frac{5}{8}$  miles on Tuesday. Write the number of miles she walked each of the days as decimals. Monday: \_\_\_\_\_ Tuesday: \_\_\_\_\_

## GRADE 7 MATHEMATICS

**(7.1) Number, operation, and quantitative reasoning.** The student represents and uses numbers in a variety of equivalent forms. The student is expected to: (B) convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator.

NAME \_\_\_\_\_

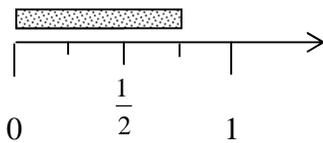
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SCORE \_\_\_/5

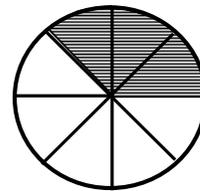
### 7.1B Homework 2

1. Express  $\frac{24}{6}$  as a whole number. Show your work.

2. Write a fraction and the decimal equivalent for each model below.



\_\_\_\_\_ and \_\_\_\_\_



\_\_\_\_\_ and \_\_\_\_\_

3. The following lists contain three numbers that are equivalent. Fill in the blank with a value that could represent the missing number in the group.

$\frac{3}{4}$ , \_\_\_\_\_, 0.75

1.2,  $1\frac{1}{5}$ , \_\_\_\_\_

$\frac{30}{5}$ , \_\_\_\_\_, 6.0

4. The following table shows the number of homework problems three middle school students was assigned and the number they each completed.

Student	Problems Assigned	Problems Completed
Amy	12	8
Jenny	10	5
Lara	8	6

• Which student completed 0.5 of the problems she had assigned? \_\_\_\_\_ Show your work.

• Which student completed 0.75 of the problems she had assigned? \_\_\_\_\_ Show your work.

5. Mary planted 20 seeds. Only 14 of them sprouted. Represent the seeds that sprouted as a fraction and as a decimal number. Show your work.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

# 7.2A STUDENT ACTIVITY 1

**Problem 1:** Ms. Verona estimates that she needs 4.5 yards of fabric to cover the bulletin boards in the choir room. The fabric she wants costs \$6.75 per yard. How can she find the total cost of the fabric?

- Use math manipulatives to make a model to represent the problem. Sketch the model below.

- Draw a picture or a diagram to represent the problem.

- Write an expression to represent the problem.

You use the operation of \_\_\_\_\_ to find the total cost of the fabric.

The expression \_\_\_\_\_ can be used to find the total cost of the fabric.

- Represent the problem by writing an equation.

Let  $t$  represent the total cost of the fabric.

The equation \_\_\_\_\_ = \_\_\_\_\_ can be used to find the total cost of the fabric.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

**Problem 2:** Candace is pouring candle wax into molds to make 0.2-pound candles. How can you find the maximum number of candles that can be made from 6.5 pounds of candle wax?

- Use math manipulatives to make a model. Sketch the model below.

- Draw a picture or a diagram to represent the problem.

- Write an expression to represent the problem.

You use the operation of \_\_\_\_\_ to find the maximum number of candles.

The expression \_\_\_\_\_ can be used to find the maximum number of 0.2-pound candles that can be made from 6.5 pounds of candle wax.

- Represent the problem by writing an equation.

Let  $c$  represent the total number of candles.

The equation \_\_\_\_\_ = \_\_\_\_\_ can be used to find the total number of 0.2-pound candles that can be made from 6.5 pounds of candle wax.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

# 7.2A STUDENT ACTIVITY 2

**Problem 1:** Vincent has  $3\frac{3}{4}$  pounds of sugar to make 15 gallons of lemonade for the school picnic. How can he find how many pounds of sugar to put into each gallon of lemonade?

- Use math manipulatives to make a model. Sketch the model below.

- Draw a picture or a diagram to represent the problem.

- Write an expression to represent the problem.

You use the operation of \_\_\_\_\_ to find the amount of sugar for each gallon of lemonade.

The expression \_\_\_\_\_ can be used to find the amount of sugar for each gallon of lemonade.

- Represent the problem by writing an equation.

Let  $s$  represent the amount of sugar.

The equation \_\_\_\_\_ = \_\_\_\_\_ can be used to find the amount of sugar for each gallon of lemonade.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

**Problem 2:** Vera estimates that she needs  $\frac{1}{6}$  of a yard of ribbon to tie around a diploma for graduation. How can you find how many diplomas can be tied from the  $\frac{5}{8}$  yard of ribbon Vera has left?

- Use math manipulatives to make a model to represent the problem. Sketch the model below.

- Draw a picture or a diagram to represent the problem.

- Write an expression to represent the problem.

You use the operation of \_\_\_\_\_ to find the number of diplomas that can be tied with  $\frac{5}{8}$  yard of ribbon.

The expression \_\_\_\_\_ can be used to find the number of diplomas that can be tied with  $\frac{5}{8}$  yard of ribbon.

- Represent the problem by writing an equation.

Let  $d$  represent the number of diplomas.

The equation \_\_\_\_\_ = \_\_\_\_\_ can be used to find the number of diplomas that can be tied with  $\frac{5}{8}$  yard of ribbon.

## GRADE 7 MATHEMATICS

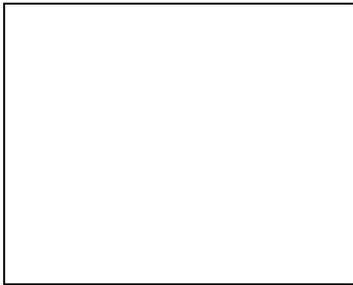
**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

### 7.2A STUDENT ACTIVITY 3

Work with a partner to represent each of the following problems using the Fraction Rectangles.

Sketch the representation for each of the problems and record the product shown by the model.

$$\frac{1}{2} \times \frac{2}{3}$$



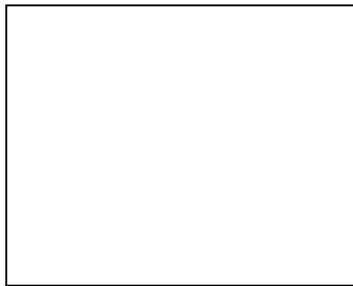
The product shown by this model is  $\frac{\square}{\square}$ .

$$\frac{2}{3} \times \frac{1}{4}$$



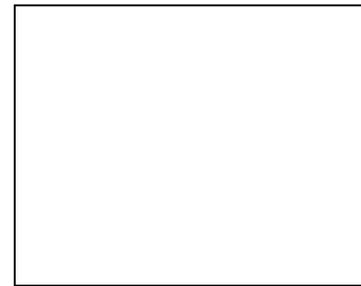
The product shown by this model is  $\frac{\square}{\square}$ .

$$\frac{1}{2} \times \frac{1}{3}$$



The product shown by this model is  $\frac{\square}{\square}$ .

$$\frac{1}{4} \times \frac{1}{3}$$



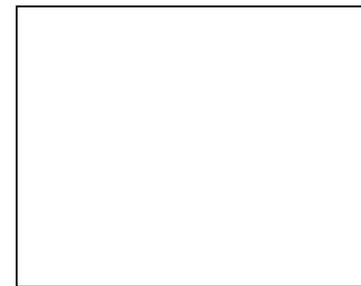
The product shown by this model is  $\frac{\square}{\square}$ .

$$\frac{3}{4} \times \frac{1}{4}$$



$\frac{\square}{\square}$

$$\frac{2}{4} \times \frac{1}{3}$$



$\frac{\square}{\square}$

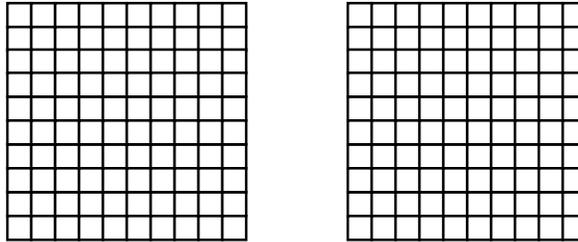
## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

# 7.2A OPEN ENDED 1

Marion has a 1.5 meter length of rope. He needs to cut the rope into 0.3 meter lengths. How many pieces will Marion have?

- Use base ten manipulatives to model the problem. Sketch the model.



- Draw a picture or a diagram to represent the problem.

- Write an expression to represent the problem.

- Write an equation to represent the problem.

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?

2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?

3. What problem-solving strategy or strategies will I use to help solve this problem?

4. **Extension** (7.1B): Write 1.5 as a fraction. \_\_\_\_\_ Write 0.3 as a fraction. \_\_\_\_\_

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

# 7.2A OPEN ENDED 2

Mrs. Garcia plans to bake biscuits for her bridge club breakfast. The recipe she uses requires  $\frac{2}{3}$  cup of flour. She wants to make  $1\frac{1}{2}$  recipes. How can she determine the amount of flour she will need?

- Use manipulatives to model the problem. Sketch the model.
  
  - Draw a picture or a diagram to represent the problem.
  
  - Write an expression to represent the problem.
  
  - Write an equation to represent the problem.
1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
  2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
  3. Will a picture or diagram be helpful on this problem? If so, how?
  4. What problem-solving strategy or strategies will I use to help solve this problem?
  5. **Extension (7.1B):** Represent  $1\frac{1}{2}$  as a decimal. \_\_\_\_\_

# GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

NAME \_\_\_\_\_

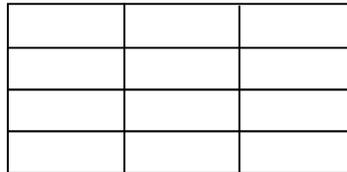
DATE \_\_\_\_\_

SCORE \_\_\_/5

## 7.2A Homework 1

1. Shade the model below to represent the expression  $\frac{1}{4} \times \frac{2}{3}$ .

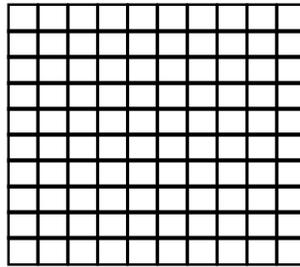
Shade the first fraction using . Shade the second fraction using . The area shaded  represents the product.



The shaded area shows the product is  $\frac{\square}{\square}$ .

2. Shade the model below to represent the expression  $0.2 \times 0.8$ .

Shade the first decimal using . Shade the second decimal using . The area shaded  represents the product.



The shaded area shows the product is \_\_\_\_\_.

3. Mary uses 1.2 ounces of shampoo each time she washes her hair. The bottle of shampoo she buys contains 16.8 ounces. Write a verbal description and an expression that can be used to determine the number of times she can shampoo her hair with one bottle of shampoo.

Verbal Description:

Expression:

4. Mr. Santiago earns \$15 an hour working at the local factory. He worked  $40\frac{1}{2}$  hours this week. Write an equation that can be used to determine  $t$ , the total amount of his earnings this week.

5. Jonas had  $4\frac{1}{2}$  watermelons left after his July 4<sup>th</sup> party. He cut each of the whole watermelons into fourths and cut the half watermelon into halves. Draw a model to show how many pieces of watermelon Jonas had after he cut the leftovers.

# GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

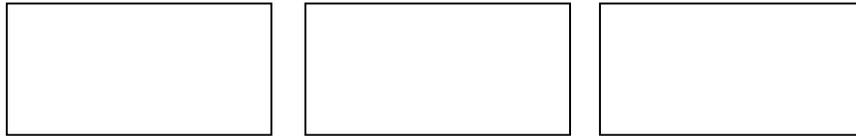
NAME \_\_\_\_\_

DATE \_\_\_\_\_

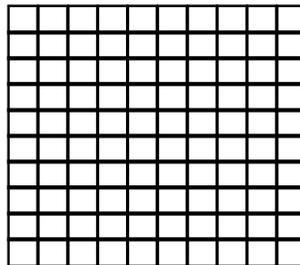
SCORE \_\_\_/5

## 7.2A Homework 2

1. Sketch a model to represent  $3 \div \frac{1}{4}$ . The model shows the quotient is \_\_\_\_\_.



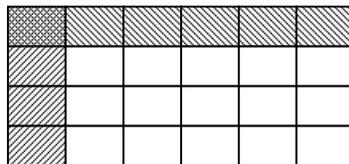
2. Shade the model below to represent  $0.5 \times 0.3$ .  
Shade the first decimal using . Shade the second decimal using . The area shaded represents the product.



The shaded area shows the product is \_\_\_\_\_.

3. Write the expression represented by the model.

$$\frac{\square}{\square} \times \frac{\square}{\square}$$



The shaded area shows the product is  $\frac{\square}{\square}$ .

4. Mrs. Berry is making hamburgers for her son's birthday party. She has purchased  $10\frac{1}{2}$  pounds of hamburger meat. Write a verbal description and an expression that can be used to determine the number of  $\frac{1}{2}$ -pound hamburger patties she can make from the  $10\frac{1}{2}$  pounds of hamburger meat.

Verbal Description:

Expression:

5. Sharlene has 2.5 quarts of orange juice. She drinks a 12.5 ounce glass of orange juice each day. How can do you determine the number of ounces of orange juice Sharlene has? Write an equation that can be used to determine  $n$ , the number of 12.5 ounce glasses of orange juice Sharlene can pour from the 2.5 quarts.

# GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (A) represent multiplication and division situations involving fractions and decimals with models, including concrete objects, pictures, words, and numbers.

NAME \_\_\_\_\_

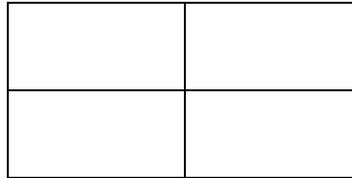
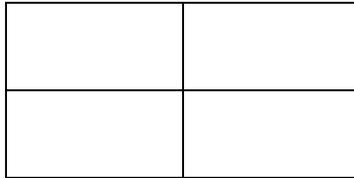
DATE \_\_\_\_\_

SCORE \_\_\_/5

## 7.2A Homework 3

1. Shade the model below to represent  $1\frac{1}{2} \times \frac{1}{2}$ .

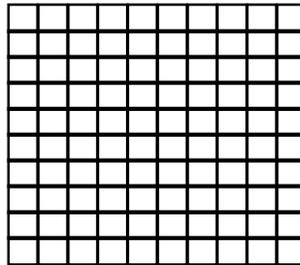
Shade the first fraction using . Shade the second fraction using . The area shaded represents the product.



The shaded area shows the product is  $\frac{\square}{\square}$ .

2. Shade the model below to represent  $0.1 \times 0.9$ .

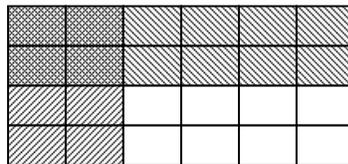
Shade the first decimal using . Shade the second decimal using . The area shaded represents the product.



The shaded area shows the product is \_\_\_\_\_.

3. Write the expression represented by the model.

$$\frac{\square}{\square} \times \frac{\square}{\square}$$



The shaded area shows the product is  $\frac{\square}{\square}$ .

4. Mr. Jones drove 315 miles last week. His car gets 15.5 miles per gallon of gasoline. Write a verbal description and an expression that can be used to determine the number of gallons of gasoline he used last week to drive 315 miles.

Verbal Description:

Expression:

5. Susan uses 2.5 ounces of coffee grounds when she makes a pot of coffee. She buys coffee in a 32-ounce can. Write an equation that can be used to determine  $p$ , the number of pots of coffee she can make from the 32-ounce can of coffee.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

# 7.2D STUDENT ACTIVITY 1

**Problem 1:** Jesse mows several lawns in his neighborhood. He uses 4 gallons of gas to mow 8 lawns. How much gas does Jesse use per lawn?

- To solve this problem, write a \_\_\_\_\_ that compares the number of \_\_\_\_\_ to the number of \_\_\_\_\_.

$$\frac{\text{gallons of gas}}{\text{lawns}} \quad \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

This shows a rate of \_\_\_ gallons of gas to every \_\_\_ lawns.

- Now \_\_\_\_\_ the numerator and denominator by \_\_\_\_\_ to find the unit rate.

$$\frac{\text{gallons of gas}}{\text{lawns}} \quad \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

Jesse will use \_\_\_\_\_ gallon of gas \_\_\_\_\_ lawn.

**Problem 2:** Ranna needs a piece of red cedar lumber to build a bird house. The lumber yard sells 4-foot lengths of red cedar for \$8.96. Use a unit rate to find the cost of the lumber per foot.

- To solve this problem, write a \_\_\_\_\_ that compares the \_\_\_\_\_ of the lumber to the \_\_\_\_\_ of the lumber.

$$\frac{\text{total cost.}}{\text{length of lumber}} \quad \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

This shows a total cost of \_\_\_\_\_ for every \_\_\_\_\_ length of lumber.

- Now \_\_\_\_\_ the numerator and denominator by \_\_\_\_\_ to find the unit cost.

$$\frac{\text{total cost}}{\text{length of lumber}} \quad \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

Ranna will pay \_\_\_\_\_ per \_\_\_\_\_ of lumber.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

# 7.2D STUDENT ACTIVITY 2

**Problem:** Celina and Jesse went to the grocery store to buy snacks for their softball team. Sports drinks were \$2.00 for 16 ounces and apple juice was \$1.60 for 12 ounces. They decided to buy the apple juice. Did they make the most economical choice?

- What strategies can you use to solve the problem?
- What number sense strategies can be used to figure the unit rate mentally?
- What other strategies can you use in addition to unit rate?
- Find the cost of the sports drink per ounce. Show your work.
- Find the cost of the apple juice per ounce. Show your work.
- Describe the ratio between the cost and number of ounces.
- Explain how division can be used to find unit rates in this problem.
- Explain how unit rates can be used to make comparisons in this problem.
- Did Celina and Jesse make the most economical choice when they decided to buy the apple juice? Explain your answer.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

# 7.2D STUDENT ACTIVITY 3

**PART I: Complete the table below to express each ratio as a unit rate.**

Ratio	Rate	Unit Rate
36 commercials in 2 hours on TV	$\frac{36 \text{ commercials}}{2 \text{ hours}}$	18 commercials per hour
372 students for 12 teachers		
500 words read in 8 minutes		
\$47.95 for 7 hours		
57 sit-ups in 3 minutes		
216 miles on 16 gallons of gas		
\$5.40 for 1 dozen bagels		

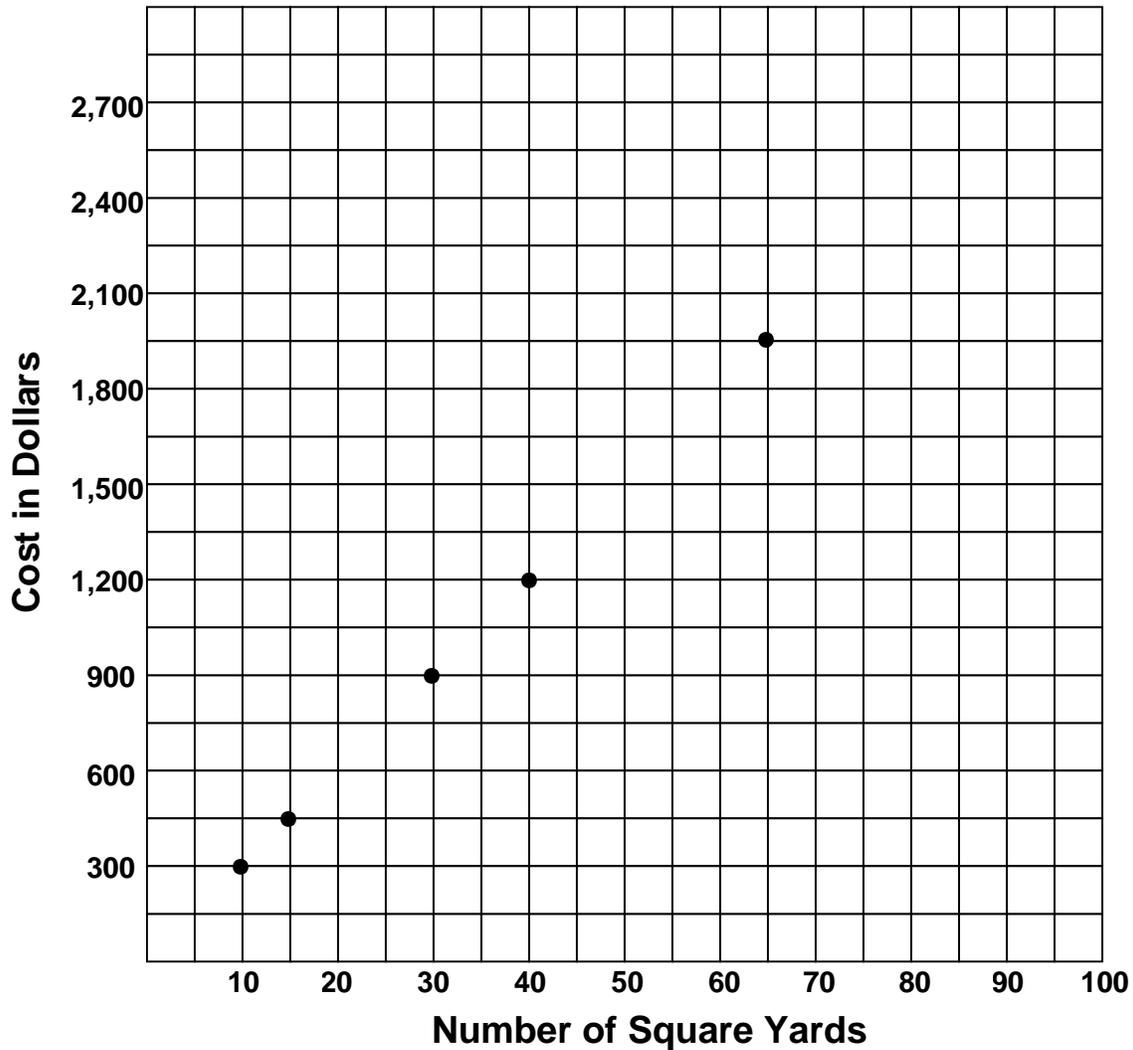
**PART II: Find the unit price of each item. Round to the nearest tenth of a cent. Show your work on the back of this page.**

Item	Unit Rate
2.2L of soda for \$2.19	$\frac{99.5 \text{¢}}{L}$
24 cans of dog food for \$7.60	
1.5 dozen granola bars for \$5.99	
12 pair of socks for \$8.88	

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

**PART III:** The graph shows the relationship between the amount charged by a stone mason to lay stone for sidewalks, patios and stone walls and the number of square yards of stone laid.



- Explain why this graph represents a proportional relationship.
- Identify two different unit rates that describe this proportional relationship. Explain each unit rate.
- Since the rate of charge is constant, how much would you expect to pay for 1,200 square yards of stone to be laid? Use a unit rate to determine your answer. Show your work.
- How many square yards of stone can be laid for \$150? Use a unit rate to determine your answer. Show your work.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

# 7.2D OPEN ENDED 1

**Problem Situation:** Micah and his older cousin are driving from Lubbock, Texas to New Orleans, Louisiana. After 9 hours they have driven 495 miles. They have used 16.5 gallons of gas.

**Problem 1:** What is their average driving speed in miles per hour?

- Write a ratio that answers the question.
- Record your answer as a unit rate.
- Explain how you solved the problem.

**Problem 2:** How many miles have they traveled per gallon of gas?

- Write a ratio that answers the question.
- Record your answer as a unit rate.
- Explain how you solved the problem.

1. What mathematical concepts and vocabulary do I need to know to be able to work these problems?
2. Will the Grade 7 Mathematics Formula Chart be helpful on these problems? Why or why not?
3. Will a picture or diagram be helpful on these problems? If so, how?
4. What problem-solving strategy or strategies will I use to help solve these problems?
5. **Extension** (7.2B, 7.2F, 7.2G): The car holds 22 gallons of gas. Micah and his cousin plan to travel at the same average rate of speed for 6 more hours. They filled the tank before they left home. When do they need to stop and buy gas?

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.2D Homework 1

1. Joan bought two dozen cupcakes for \$4.80. How much did each cupcake cost? Show your work.

2. Look the prices for various sizes of bottles of window cleaner.

Size in Ounces	Price
12	\$1.56
18	\$2.16
20	\$2.20
24	\$2.88

If you are only considering cost per ounce, which size is the best buy? \_\_\_\_\_ Explain your answer.

What is the unit rate of the size that is the best buy? Show your work.

3. Mrs. Johnson's new car has an 18 gallon gas tank. If she can travel 400 miles on one tank of gasoline, what is her miles -per-gallon rate to the nearest whole number? Show your work.

4. Before any deductions LeAnn's father earns \$640 a week when he works 40 hours. What does he earn per hour? Justify your answer.

5. Water filled a tank of 288 liters in 12 minutes. What was the rate of the water filling the tank? Justify your answer.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.2D Homework 2

1. Jimmy bought 30 baseball cards for \$9.60. How much did each card cost? Show your work.

2. The table below shows the prices for various size packages of pencils.

Number of Pencils	Price	Unit Rate (Cost per Pencil)
12	\$1.20	
18	\$1.98	
20	\$1.80	
24	\$1.68	

- Complete the column for Unit Rate (Cost per Pencil) in the table. Show your work.

- Order the units rates from least to greatest.

- Is the least unit rate always the “best buy” for a family? Explain your answer.

3. The Johnson family drove 560 miles on their vacation. If the driving time was about 9 hours, what is the approximate rate they drove? Show your work.

4. Larry’s Salad and Soup buys carrots in 20 pound bags. A bag cost \$4.60. What is the cost of the carrots per pound? Show your work.

5. Mrs. Garcia used 12 cups of meat to make 16 meat pies. How much meat is used for one pie? Show your work.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (D) use division to find unit rates and ratios in proportional relationships such as speed, density, price, recipes, and student-teacher ratio.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.2D Homework 3

1. Christie bought a sleeve of golf balls for \$8.10. A sleeve contains 3 golf balls. How much did each ball cost? Show your work.

2. The table below shows the prices for various size packages of pens.

Number of Pens	Price	Unit Rate (Cost per Pen)
3	\$2.10	
5	\$3.00	
6	\$3.30	
8	\$4.00	

- Complete the column for Unit Rate (Cost per Pen) in the table. Show your work.
  - Order the units rates from greatest to least.
  - Which size package has a unit rate of “2 pens per dollar”?
3. The Johnson family purchased 60 gallons of gasoline while traveling on vacation. If the gasoline cost them \$108, what is the average cost per gallon for the gasoline? Show your work.
4. If an 18-inch gold chain is sold for \$30, what is the cost per inch and what is the inch per dollar rates? Show your work.

**Cost per inch:**

**Inch per dollar:**

5. Mrs. Songer used 12 cups of flour to make 8 piecrusts. How much flour is used for one piecrust? Show your work.

## GRADE 7 MATHEMATICS

(7.2) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

# 7.2E STUDENT ACTIVITY 1

**Problem 1: Simplify the expression  $5 + (6 \cdot 3 - 2) \div 4 \cdot 3^2$ .**

### **STEP 1:**

First, perform any \_\_\_\_\_ in \_\_\_\_\_ and brackets. There are \_\_\_\_\_ and \_\_\_\_\_ signs within the \_\_\_\_\_.

The order of operations says to \_\_\_\_\_ before you \_\_\_\_\_.

$$\begin{array}{r} 5 + (6 \cdot 3 - 2) \div 4 \cdot 3^2 \\ \_ + (\_ - \_) \div \_ \cdot \_ ^2 = \\ \_ + \_ \div \_ \cdot \_ ^2 \end{array}$$

### **STEP 2:**

Next, \_\_\_\_\_ any terms with \_\_\_\_\_.

$$\begin{array}{r} + \div \cdot ^2 = \\ + \div \cdot \end{array}$$

### **STEP 3:**

Now, \_\_\_\_\_ and \_\_\_\_\_ from left to right.

$$\begin{array}{r} \_ + \_ \div \_ \cdot \_ = \\ \_ + \_ \cdot \_ = \\ \_ + \_ \end{array}$$

### **STEP 4:**

Finally, \_\_\_\_\_ and \_\_\_\_\_ from left to right.

$$\begin{array}{r} + = \\ \_ \end{array}$$

The expression  $5 + (6 \cdot 3 - 2) \div 4 \cdot 3^2$  simplifies to \_\_\_\_\_.



## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

# 7.2E STUDENT ACTIVITY 2

For this activity you will work in groups of four. Your teacher will give each group of 4 students a set of expression cards in a ziplock baggie.

Each student in the group will draw 8 expression cards from the baggie and use the cards to make an expression with those cards. You must use at least 6 of the expression cards you draw. If you cannot make an expression with at least 6 of the cards, then you may continue drawing from the baggie until you are able to do so.

Every student in the group must simplify their own expression and the expressions made by the other students in the group. Show your work to simplify other student's expression on the back of Student Activity 2 Record.

Complete Student Activity 2 Record for your expression.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

# 7.2E STUDENT ACTIVITY 2 RECORD

Record the eight cards you drew to create an expression:

\_\_\_\_\_

Record your expression using at least six of the cards:

Record any additional cards you drew to create your expression:

**Record the steps that can be used to find the value of your expression:**

**STEP 1:** Simplify any operations in parentheses and brackets. If there is more than one operation within a set of parentheses, follow the order of operations in steps 2, 3, and 4.

**STEP 2:** Simplify any terms with exponents.

**STEP 3:** Calculate all multiplication and division from left to right.

**STEP 4:** Calculate all addition and subtraction from left to right.

- What happens if you put your cards in a different order?
- What do you do first to find the value of your expression?
- How could you change the value of your expression?
- How could you rearrange your cards to create an expression with the greatest value possible?
- How could you rearrange your cards to create an expression with the least value possible?

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

# 7.2E OPEN ENDED 1

Simplify the expression  $1 + 8 \div 2 \times 3 - 1 + 3^2$ . Follow the order of operations.

- Record the process you use in words. For example, first . . . , next . . . , then....
- Represent each step in the written process in numbers and symbols. For example,  $8 \div 2 = 4$  .
- Complete the recording of the process by stating “The expression . . . simplifies to . . .”

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. Will a picture or diagram be helpful on this problem? If so, how?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension** (7.2E): In the expression above if a parenthesis is inserted around the  $3 - 1$ , how would the simplifying steps change?
6. **Extension** (7.2E): Evaluate the expression  $1 + 8 \div 2 \times (3 - 1) + 3^2$ . Show your work.

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

# 7.2E OPEN ENDED 2

Simplify the expression  $(5 \cdot 7 + 3) - 8 \div 4$  . Follow the order of operations

- Record the process you use in words. For example, first . . . , next . . . , then....
- Represent each step in the written process in numbers and symbols. For example,  $5 \cdot 7 = 35$  .
- Complete the recording of the process by stating “The expression . . . simplifies to . . .”

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. Will a picture or diagram be helpful on this problem? If so, how?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension** (7.2F, 7.2G): Marcus is buying 4 pounds of hamburger meat for \$14.75. Write an expression that could be used to represent the cost of 6.5 pounds of hamburger meat.

## GRADE 7 MATHEMATICS

(7.2) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.2E Homework 1

1. Look at the expression below.

$$3 + 4(2^2 + 6) \div 8$$

- What is the first step to simplify the expression? \_\_\_\_\_
- After completing the first step what would you do next? \_\_\_\_\_
- Continue the process of simplifying the expression. What is the value of the expression? \_\_\_\_\_

2. Evaluate the expressions below. Show your work.

$$3 + 4(2 + 6) \div 16$$

$$(3 + 5)^2 + 6 - 65$$

$$\frac{3+5}{4-2} \times 10 \div 2$$

Which of the expressions have a value of 5?

3. Create an expression using all four operations and at least one exponent that will have a value of 20.

4. Look at the work Danny did to simplify this expression.

$$\begin{aligned} & (3 + 2^2) + 8 \div (5 - 1) \\ & = (3 + 4) + 8 \div (5 - 1) \\ & = 7 + 8 \div 4 \\ & = 15 \div 4 \\ & = 3.75 \end{aligned}$$

Is his solution correct? Explain.

If you think his work has errors make corrections and reevaluate the expression.

5. Simplify :  $6 \times 4 \div 3 + 8 - 4$

## GRADE 7 MATHEMATICS

**(7.2) Number, operation, and quantitative reasoning.** The student adds, subtracts, multiplies, or divides to solve problems and justify solutions. The student is expected to: (E) simplify numerical expressions involving order of operations and exponents.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.2E Homework 2

1. Look at the expression below.

$$5 + 3 \times (2 + 6 \div 3) - 7$$

- What is the first step to simplify the expression? \_\_\_\_\_
- After completing the first step what would you do next? \_\_\_\_\_
- Continue the process of simplifying the expression. What is the value of the expression? \_\_\_\_\_

2. Evaluate the expressions below. Show your work.

$$15 + 4^2 + (6 - 3) \div 3$$

$$(3^2 + 5) + 6 \times 3$$

$$(10 \times 4 - 16) \times 10 \div 8$$

Do any of the expressions have a value of 30? If so, which one(s)?

3. Create an expression using all four operations and at least one exponent that will have a value of 15.

4. Look at the work Lucy did to simplify this expression.

$$(3 + 5)^2 + 18 \div (5 + 1)$$

$$= (8)^2 + 18 \div 6$$

$$= 64 + 3$$

$$= 67$$

Is her solution correct? Explain.

If you think Lucy's work has errors make corrections in her work and reevaluate the expression.

5. Simplify :  $16 \div 4 \times 3 - 8 + 4^2$

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

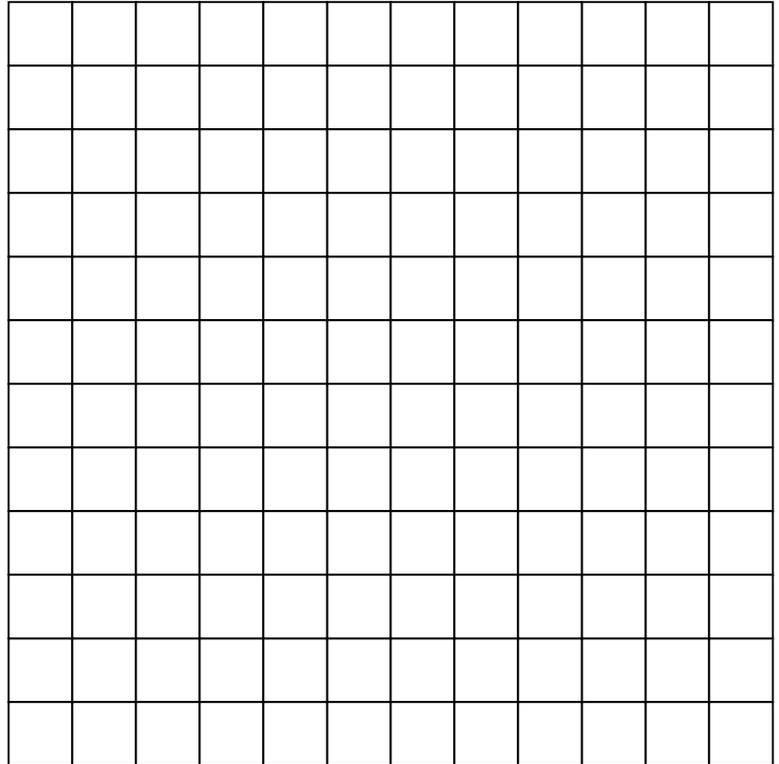
# 7.3B STUDENT ACTIVITY 1

## RELATED MEASUREMENT UNITS

**PART 1:** Using the ratio 1 yard : 3 feet, complete this table and graph the ordered pairs. Label the scale on the x and y axes.

Feet ( $x$ )	Yards ( $y$ )
	1
	$\frac{1}{3}$
5	
	2
36	
4.5	
24	
	3
45	15
	0.9
$x$	$y$

Yards



Feet

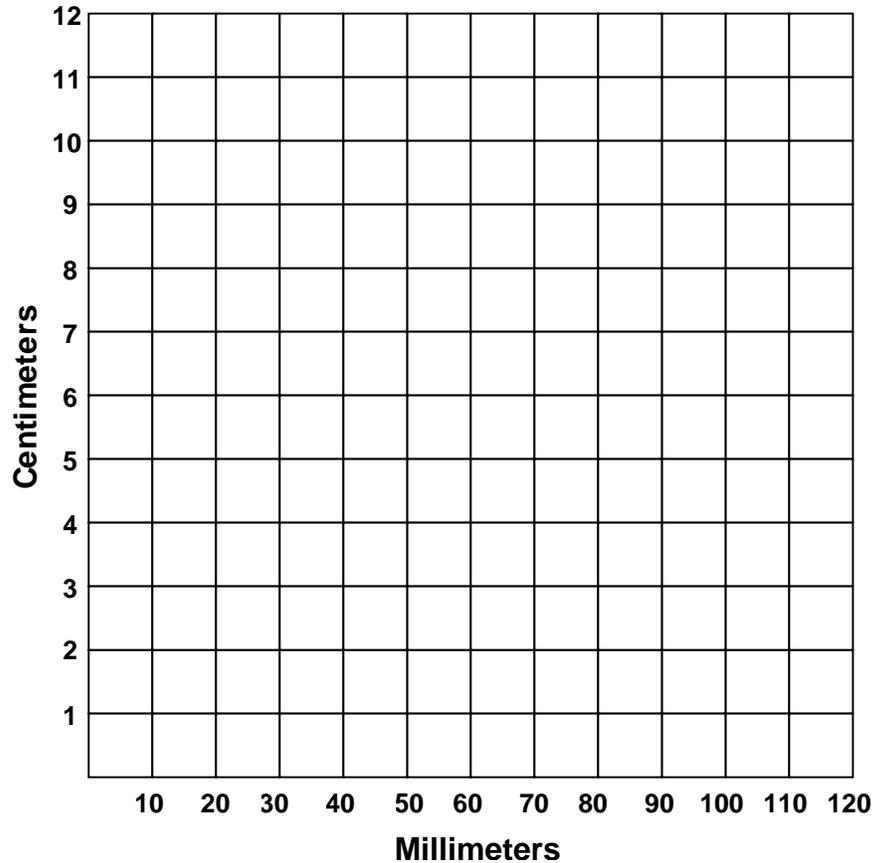
- Describe the graph.
- Explain how you know that there is a proportional relationship between the number of feet and the number of yards.
- What two unit rates appear in this relationship? Explain each unit rate.
- Does the ordered pair (7.5, 2.5) belong in your table? Explain why or why not.

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

**PART 2:** Using the ratio 1 cm: 10 mm, complete this table and graph the ordered pairs.

mm ( $x$ )	cm ( $y$ )
	1
30	3
	2.5
	6
80	
45	
	12
	0.9
110	
	7
$x$	$y$



- Describe the graph.
- Write a sentence to describe the relationship represented on the graph.
- What two unit rates appear in this relationship? Explain each unit rate.
- If you added the  $x$ -value of 16 to your table, what  $y$ -value would you add? Explain.
- Which unit rate would you use to change 23 centimeters to millimeters? Explain.

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

# 7.3B STUDENT ACTIVITY 2

**Problem 1:** A party planner is making bows to decorate for a graduation party. 3 bows take 18 feet of ribbon. She is making 21 bows. How many yards of ribbon will she use?

First find how many feet of ribbon are needed to make 21 bows.

- Identify the \_\_\_\_\_ being \_\_\_\_\_. Be certain to compare the corresponding \_\_\_\_\_ in the same \_\_\_\_\_.

Number of Bows	Number of Feet of Ribbon
3	18
21	x

- Write a \_\_\_\_\_ using the two \_\_\_\_\_. Let x equal the number of \_\_\_\_\_ it takes to make \_\_\_\_\_ bows.

$$\frac{\text{bows}}{\text{feet of ribbon}} = \frac{\square}{x}$$

- Use cross products or another appropriate method to solve the proportion.

$$\frac{\square}{\square} = \frac{\square}{x}$$

$$\_\_\_ x = \_\_\_ \cdot \_\_\_$$

$$x = \_\_\_$$

To make 21 bows she will need \_\_\_\_\_ feet of ribbon.

Now find how many yards of ribbon she will need.

- Identify the \_\_\_\_\_ being \_\_\_\_\_. Be certain to compare the corresponding \_\_\_\_\_ in the same \_\_\_\_\_.

Number of Feet	Number of Yards
3	1
126	x

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

- Write a \_\_\_\_\_ using the two \_\_\_\_\_. Let  $x$  equal the number of \_\_\_\_\_ it takes to make \_\_\_\_\_ feet.

$$\frac{\text{feet}}{\text{yards}} = \frac{\square}{\square} = \frac{\square}{x}$$

- Use cross products or another appropriate method to solve the proportion.

$$\frac{\square}{\square} = \frac{\square}{x}$$

$$\square \cdot x = \square \cdot \square$$

$$x = \square$$

To make 21 bows she will need \_\_\_\_\_ yards of ribbon.

- Proportions can be set up in \_\_\_\_\_ ways, as long as the \_\_\_\_\_ between the \_\_\_\_\_ stays the \_\_\_\_\_.
- Write 3 different ways to set up the proportion you used to find how many feet of ribbon are needed to make 21 bows.

The \_\_\_\_\_ products are the same in each of the above proportions.

- Write 3 different ways to set up the proportion you used to find how many yards of ribbon are needed to make 21 bows.

The \_\_\_\_\_ products are the same in each of the above proportions.

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

**Problem 2:** A building has 70 floors. Each of the first 5 floors is 7 meters high. The rest of the floors are each 5 meters high. How tall is the building?

To find the height of the building, find the total height of the first \_\_\_\_\_ floors and the total height of the remaining \_\_\_\_\_ floors. Combine the two total heights to find the height of the building.

Find the height of the first \_\_\_\_\_ floors:

- Identify the \_\_\_\_\_ being \_\_\_\_\_. Be certain to compare the corresponding \_\_\_\_\_ in the same \_\_\_\_\_.

Floors	Height in Meters
1	7
5	x

- Write a \_\_\_\_\_ using the two \_\_\_\_\_. Let x equal the total height of \_\_\_\_\_ floors that are each \_\_\_\_\_ meters high.

$$\frac{\text{number of floors}}{\text{height in meters}} = \frac{\square}{x}$$

- Use cross products or another appropriate method to solve the proportion.

$$\frac{\square}{\square} = \frac{\square}{x}$$

$$\text{---} x = \text{---} \cdot \text{---}$$

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

The total height of the first 5 floors is \_\_\_\_\_ meters.

Now find the height of the remaining \_\_\_\_\_ floors.

- Identify the \_\_\_\_\_ being \_\_\_\_\_. Be certain to compare the corresponding \_\_\_\_\_ in the same \_\_\_\_\_.

Floors	Height in Meters
1	5
65	x

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

- Write a \_\_\_\_\_ using the two \_\_\_\_\_. Let  $x$  equal the total height of \_\_\_\_\_ floors that are each \_\_\_\_\_ meters high. .

$$\frac{\text{number of floors}}{\text{height in meters}} = \frac{\square}{x}$$

- Use cross products or another appropriate method to solve the proportion.

$$\frac{\square}{\square} = \frac{\square}{x}$$

$$\square x = \square \cdot \square$$

$$x = \square$$

The total height of the remaining 65 floors is \_\_\_\_\_ meters.

- Combine the height of the first 5 floors and the remaining 65 floors to find the total height of the building.

$$\square \text{ meters} + \square \text{ meters} = \square \text{ meters}$$

The total height of the building is \_\_\_\_\_ meters.

- Proportions can be set up in \_\_\_\_\_ ways, as long as the \_\_\_\_\_ between the \_\_\_\_\_ stays the \_\_\_\_\_.
- Write 3 different ways to set up the proportion you used to find the total height of the first 5 floors.

The \_\_\_\_\_ products are the same in each of the above proportions.

- Write 3 different ways to set up the proportion you used to find the total height of the remaining 65 floors.

The \_\_\_\_\_ products are the same in each of the above proportions.

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

# 7.3B OPEN ENDED 1

A blue whale can weigh as much as 150 tons. Jerry wants to list its weight in pounds in his science report. How many pounds does the whale weigh? Show your work.

- Identify the ratios being compared. Be certain to compare the corresponding quantities in the same order.
  - Write a proportion using the two ratios.
  - Use cross products or another appropriate method to solve the proportion.
  - Write the proportion you used to solve this problem in 3 different ways.
1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
  2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
  3. Will a picture or diagram be helpful on this problem? If so, how?
  4. What problem-solving strategy or strategies will I use to help solve this problem?
  5. **Extension (7.3B):** Write a unit rate for pounds and tons.

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.3B Homework 1

- Eight ounces of meat will serve one person.
  - How many people should a five-pound roast feed? Do you need to use your formula chart for this problem? Why or why not? Show the proportion you will use to solve this problem and the solution process.
  - How pounds of meat will you need for a party of twenty? Show the proportion you will use to solve this problem and the solution process.
- If 6 gallons of punch has 2 gallons of pineapple juice as one of its ingredients, how much pineapple juice would you use to make 9 gallons of punch? Show the proportion you will use to solve this problem and the solution process.
- Mrs. Jones uses 1 ream of paper for every 30 students when she runs her tutorials for the six weeks. She has 150 students that she tutors. How many reams of paper will she need for this six weeks tutorials? Show the proportion you will use to solve this problem and the solution process.
- If one gallon of paint will cover 350 square feet of wall space, how many gallons paint should Joseph buy to paint his bedroom that has 1,400 square feet of wall space? Show the proportion you will use to solve this problem and the solution process.
- Luis can run the 800 meters in 2 minutes 10 seconds. At this same rate, how long will it take him to run 400 meters? Show the proportion you will use to solve this problem and the solution process.

## GRADE 7 MATHEMATICS

**(7.3) Patterns, relationships, and algebraic thinking.** The student solves problems involving direct proportional relationships. The student is expected to: (B) estimate and find solutions to application problems involving proportional relationships such as similarity, scaling, unit costs, and related measurement units.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.3B Homework 2

1. Barney needed to convert 9 feet 9 inches into yards. He used the following proportion.

$$\frac{117}{x} = \frac{12}{1}$$

He solved for  $x$  and gave his answer. Do you agree with his strategy for solving this problem?

If you don't agree, make the appropriate changes to the proportion.

2. Convert 192 ounces to gallons. Show the proportion you will use and the solution process.
3. Convert 15 pints to quarts. Show the proportion you will use and the solution process.
4. Louisa does 250 sit-ups each day as part of her exercise program. How many sit-ups will she do in a week? Show the proportion you will use and the solution process.
5. If 1 yard is equivalent to 36 inches, how many inches are there in 15 yards? Show the proportion you will use and the solution process.

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

### Understanding how you can use formulas to solve problems

The Grade 7 Mathematics Chart lists formulas for perimeter and area of the following polygons.

Perimeter	
square	$P = 4s$
rectangle	$P = 2l + 2w$ or $P = 2(l + w)$

Area	
square	$A = s^2$
rectangle	$A = lw$ or $A = bh$
triangle	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$
trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$ or $A = \frac{(b_1 + b_2)h}{2}$

### When using a formula to solve a problem, follow these steps:

- Identify the formula that applies to the problem you are solving.
- Identify what the variables in the formula stand for.
- Substitute the variables in the formula with their values from the problem.
- Perform the calculations. Remember to use the correct order of operations.
- State the solution to the problem using the appropriate units of measurement.

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

# 7.4A/7.4B/7.9A STUDENT ACTIVITY 1

## RECTANGLE RELATIONSHIPS PART I

**Problem:** What are the relationships between the dimensions of a rectangle, the perimeter of the rectangle, and the area of the rectangle?

**Materials:** 4 – 20 centimeter lengths of wire, ribbon, or pipe cleaners per group of 4 students  
 4 rulers (metric and customary) per group of 4 students  
 1 dark pen or marker per group of 4 students

**Procedure:** Work in groups of 4 for this activity. Record data and answer questions following the Rectangle Relationships Record.

- Number your group members #1, #2, #3, and #4.
- Each member of the group forms a rectangle from a 20-centimeter length of wire, ribbon, or pipe cleaner. The ends of the wire must meet at a **vertex** of the rectangle.
- Each member of the group writes a description of their strategy for building their rectangle on the back of this sheet.
- Each member orally shares their strategy with the rest of the group.
- The group compares the rectangles to make sure they have 4 different varieties. For example, short and wide, skinny and long, square, etc. Remake any rectangles that are the same so the group has 4 different varieties of rectangles.
- Each member of the group takes one rectangle, marks the vertices with a dark marker, then straightens the rectangle into a line segment. Lay all four straightened rectangles on the table. The group then compares all the marks on the various rectangles and records observations on the back of this page.
- Each group member measures and records the length, width, perimeter and area of their rectangle on the Rectangle Relationships Recording Sheet. Measure and record in centimeters and inches.

### RECTANGLE RELATIONSHIPS RECORD

Group Member	#1	#2	#3	#4	Sum of length and width (cm)			
Length (cm)					#1	#2	#3	#4
Width (cm)								
Perimeter (cm)								
Area (cm <sup>2</sup> )					Sum of length and width (in.)			
Length (in.)					#1	#2	#3	#4
Width (in.)								
Perimeter (in.)								
Area (in. <sup>2</sup> )								

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

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- Each group member shares their data so that all group members can complete their entire tables.

**Complete the following after recording the data in the table:**

- What patterns do you see in the table?
- What do you notice about the sums of the lengths and widths for the 4 rectangles?
- If you know one side of a rectangle with a perimeter of 20 cm is 2.8 centimeters, what can you conclude about the other sides' measurements?
- Write a sentence that describes the relationship between the numbers in your table and the length of the wire.
- Write a mathematical rule that describes the relationship between the numbers in your table and the length of the wire. (e.g.,  $l + w = \frac{20}{2}$ ,  $10 - l = w$ )
- What if your wire is 30 centimeters in length, how would that change your rule?

**EXTENSION: Complete the following using the data in the table:**

- Write a sentence that describes the relationship between the numbers in your table and the area of the rectangle.
- Justify your answer using data from the table.
- Write a mathematical rule that describes the relationship between the numbers in your table and the area of the rectangles formed by the wire. (e.g.,  $l = \frac{20}{w}$ )

## GRADE 7 MATHEMATICS

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### RECTANGLE RELATIONSHIPS PART II

**Activity:** Can you represent the data for length and width on a graph?

**Materials:** 4 sheets of centimeter grid paper per group  
4 rulers (metric and customary) per group of 4 students  
1 set colored pens or pencils per group of 4 students

**Procedure:** Work in groups of 4 for this activity. Graph the length (cm) and width (cm) data from Part I on centimeter grid paper. Title and label the graph.

**Complete the following after recording the data and labeling the graph:**

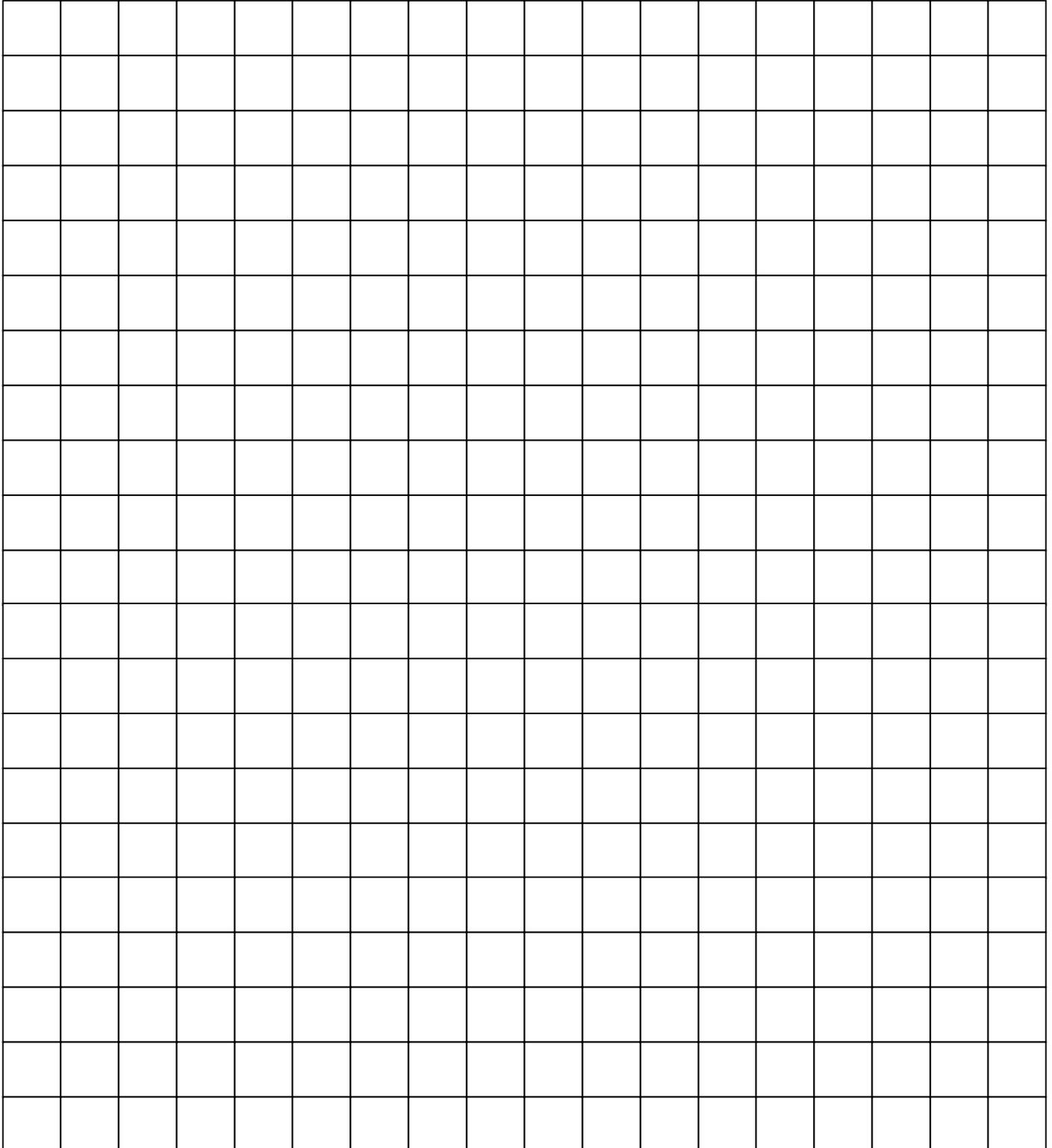
- How did you decide to label the axes on the graph?
- How did you decide the scale for the axes on the graph?
- What does an ordered pair on your graph represent?
- Write a symbolic rule for your graph. Explain the rule.
- Describe your graph including the appearance, shape, direction, etc.
- If you know one dimension of a rectangle, how can you use the graph to find the other dimension?
- How can you determine the perimeter of the rectangle from the graph?
- Is 20 centimeters a reasonable dimension for the rectangle? Why or why not?
- As one dimension increases what do you notice about the other dimension?
- When the dimensions on the graph are the same, what kind of special shape do you have?
- If the perimeter of the rectangle is 30 centimeters, how does that change your graph?
- How are the table, graph, and symbolic rule related?

## GRADE 7 MATHEMATICS

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### Centimeter Grid Paper



## GRADE 7 MATHEMATICS

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# 7.4A/7.4B/7.9A STUDENT ACTIVITY 2

**PART I: Write a formula that could be used to find the side of a square,  $s$ , given the perimeter of the square,  $P$ .**

The formula in the Grade 7 Mathematics Chart that relates the side of a square to its perimeter is  $P = \underline{\hspace{2cm}}$ .

Rewrite the formula so that it gives  $s$  in terms of  $P$ .

To do so, divide both sides of the equation by  $\underline{\hspace{2cm}}$ .

$$\frac{P}{\square} = \frac{4s}{\square}$$

$$\frac{P}{\square} = \square$$

The new formula is  $s = \frac{\square}{\square}$ .

**PART II: Write a formula that could be used to find the width of a rectangle,  $w$ , given the length of the rectangle,  $l$ , and given the perimeter of the rectangle,  $P$ .**

The formulas in the Grade 7 Mathematics Chart that relates the width of a rectangle to its length and its perimeter are  $P = \underline{\hspace{2cm}}$  or  $P = \underline{\hspace{2cm}}$ .

Rewrite the first formula so that it gives  $w$  in terms of  $l$  and  $P$ .

To do so, divide both sides of the equation by  $\underline{\hspace{2cm}}$ .

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

$$\frac{P}{\square} = \square + \square$$

Now subtract  $l$  from both sides of the equation.

$$\frac{P}{\square} - l = \square + \square - l$$

$$\frac{P}{\square} - l = \square$$

The new formula is  $w = \frac{\square}{\square} - \underline{\hspace{2cm}}$ .

## GRADE 7 MATHEMATICS

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### PART III: Write a formula that could be used to find the length of a rectangle, $l$ , given the area of the rectangle, $A$ .

The formula in the Grade 7 Mathematics Chart that relates the length of a rectangle to its area is  $A = \underline{\hspace{2cm}}$ .

Rewrite the formula so that it gives  $l$  in terms of  $A$ .

To do so, divide both sides of the equation by  $\underline{\hspace{2cm}}$ .

$$\frac{A}{\square} = \frac{lw}{\square}$$

$$\frac{A}{\square} = \square$$

The new formula is  $l = \frac{\square}{\square}$ .

### PART IV: Write a formula that could be used to find the height of a triangle, $h$ , given the area of the triangle, $A$ .

The formulas in the Grade 7 Mathematics Chart that relates the height of a triangle to its area is  $A = \underline{\hspace{2cm}}$  or  $A = \underline{\hspace{2cm}}$  or.

Rewrite the formula  $A = \frac{bh}{2}$  so that it gives  $h$  in terms of  $A$ .

First, multiply both sides of the equation by  $\underline{\hspace{2cm}}$ .

$$\square \cdot A = \square \cdot \frac{bh}{2}$$

$$\square A = bh$$

Next, divide both sides of the equation by  $\underline{\hspace{2cm}}$ .

$$2A = bh$$

$$\frac{2A}{\square} = \frac{bh}{\square}$$

The new formula is  $h = \frac{\square}{\square}$ .

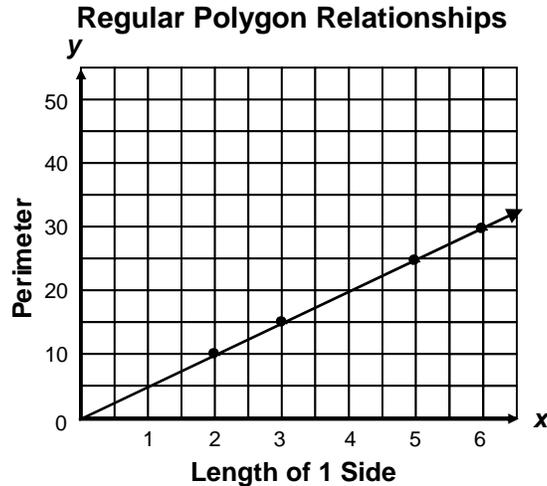
## GRADE 7 MATHEMATICS

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**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

# 7.4A/7.4B/7.9A STUDENT ACTIVITY 3

This graph shows the relationship between the length of 1 side of a regular polygon and its perimeter.



Build a table that represents the data in the above graph.

Write the coordinates of the four points plotted on the graph.

(\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_)

The x-coordinates of the points represent the \_\_\_\_\_ of \_\_\_\_ side.

The y-coordinates of the points represent the \_\_\_\_\_.

Fill in the table so that it shows the same relationship between the length of 1 side of a regular polygon and its perimeter.

**Regular Polygon Relationships**

Length of 1 Side	Perimeter

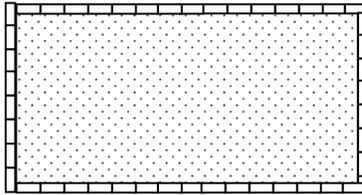
## GRADE 7 MATHEMATICS

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# 7.4A/7.4B/7.9A STUDENT ACTIVITY 4

**Problem 1:** Jay plans to lay bricks around the edge of a rectangular patio. The patio is 15 feet long and 8.5 feet wide. Each brick is 10 inches long. What is the minimum number of bricks he will need to buy to complete the project?



Use the formula for \_\_\_\_\_ of a \_\_\_\_\_ to find the distance around the patio.

$$P = 2(\text{_____} + \text{_____})$$

$$P = 2(\text{_____} + \text{_____})$$

$$P = 2(\text{_____})$$

$$P = \text{_____}$$

The perimeter of the patio is \_\_\_\_\_ feet.

The length of the bricks is given in \_\_\_\_\_, but the perimeter of the patio is expressed in \_\_\_\_\_.

Convert the perimeter to an equivalent number of inches.

$$1 \text{ foot} = \text{_____} \text{ inches}$$

$$47 \text{ feet} \times \text{_____} \text{ inches per foot} = \text{_____} \text{ inches}$$

Divide \_\_\_\_\_ by \_\_\_\_\_ to find the number of bricks he will need.

$$\text{_____} \div 10 = \text{_____}$$

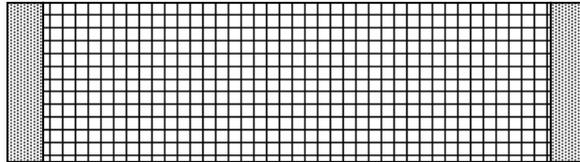
Jay will need \_\_\_\_\_ bricks. Since Jay cannot buy part of a brick, he will need to buy at least \_\_\_\_\_ bricks to complete the project.

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

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**Problem 2:** Sylvia wants to sew some blanket binding along both short ends of a rectangular stadium blanket. The perimeter of the blanket is 8 yards. The length of the blanket is 2.5 yards. How many inches of blanket binding will Sylvia need?



- Identify the \_\_\_\_\_ that applies to the problem.  
The problem involves the perimeter of a rectangle:  $P = 2l + 2w$ .
- Identify what the \_\_\_\_\_ in the formula stand for.  
 $P$  stands for \_\_\_\_\_,  $l$  stands for \_\_\_\_\_, and  $w$  stands for \_\_\_\_\_.
- Replace the \_\_\_\_\_ in the formula with their values from the problem.

$$P = 2l + 2w$$

$$\square = 2(\square) + 2w$$

- Solve for \_\_\_\_\_.

$$8 = \square + 2w$$

$$8 - 5 = 5 + 2w - \square$$

$$\square = 2w$$

$$\frac{3}{2} = \frac{2w}{2}$$

$$1.5 = w$$

- State the solution to the problem using the appropriate units of measurement.  
Sylvia will need  $2(1.5) = \underline{\hspace{1cm}}$  yards of blanket binding. The problem asks how many \_\_\_\_\_ of blanket binding Sylvia will need, so convert \_\_\_\_\_ to \_\_\_\_\_.  
\_\_\_\_\_ inches = \_\_\_\_\_ foot, and \_\_\_\_\_ feet = \_\_\_\_\_ yard.

$$\left( \frac{\square \text{ feet}}{\square \text{ yard}} \right) \cdot \left( \frac{\square \text{ inches}}{\square \text{ foot}} \right) = \frac{\square \text{ inches}}{\square \text{ yard}}$$

$$\square \text{ yards} \cdot \left( \frac{\square \text{ inches}}{\square \text{ yard}} \right) = \square \text{ inches}$$

Sylvia will need \_\_\_\_\_ inches of blanket binding.

## GRADE 7 MATHEMATICS

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# 7.4A/7.4B/7.9A STUDENT ACTIVITY 5

**Problem 1:** A rectangular deck has a perimeter of 103 feet. The width of the deck is 27.7 feet. What is the approximate area of the deck?

- Identify the \_\_\_\_\_ that apply to the problem.  
The \_\_\_\_\_ of the deck and the \_\_\_\_\_ of the deck are given in the problem. Use the \_\_\_\_\_ of a rectangle formula to find the approximate length of the deck, then use the \_\_\_\_\_ of a rectangle formula to find the approximate area of the deck.

The problem involves the perimeter and area of a rectangle:  $P = 2l + 2w$  and  $A = lw$ .

- Identify what the \_\_\_\_\_ in the formulas stand for.  
 $P$  stands for \_\_\_\_\_,  $l$  stands for \_\_\_\_\_, and  $w$  stands for \_\_\_\_\_ and  $A$  stands for area.
- Use the \_\_\_\_\_ formula to find the approximate length of the rectangle. Replace the \_\_\_\_\_ in the formula with their approximate values from the problem.  
The perimeter,  $P$ , is approximately 100 feet. The width,  $w$ , is approximately 28 feet. Let  $l$  equal the length of the rectangle in feet.

$$P = 2l + 2w$$

$$\square = 2l + 2\square$$

- Solve for \_\_\_\_\_.

$$100 = 2l + 56$$

$$100 - \square = 2l + 56 - \square$$

$$\square = 2l$$

$$\frac{\square}{2} = \frac{2l}{2}$$

$$\square = l$$

- State the solution to the problem using the appropriate units of measurement.  
The approximate length of the deck is \_\_\_\_\_ feet.
- Now find the approximate area of the deck. Use the \_\_\_\_\_ formula to find the area of the deck. Replace the \_\_\_\_\_ in the formula with their approximate values.

$$A = lw$$

$$A = \_\_\_ \times \_\_\_$$

- Solve for \_\_\_\_\_.

$$A = \_\_\_ \times \_\_\_$$

$$A = \_\_\_$$

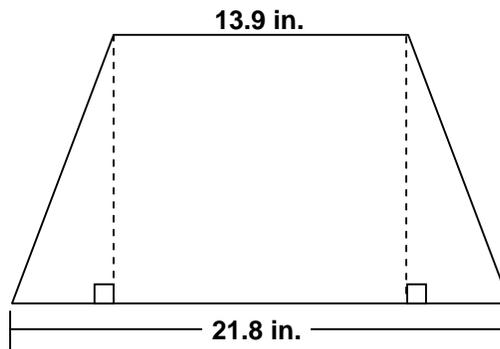
- State the solution to the problem using the appropriate units of measurement.  
The approximate area of the deck is \_\_\_\_\_ square feet.

## GRADE 7 MATHEMATICS

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**Problem 2:** Rosa is designing placemats for her dining table. She has decided to make the placemats in the shape of a trapezoid. Each side of the square in the center of the trapezoid placemat is 13.9 inches. The length of the longer base of each placemat is 21.8 inches. What is the approximate area of each placemat?



- Identify the \_\_\_\_\_ that applies to the problem.

The problem involves the area of a trapezoid:  $A = \frac{1}{2}(b_1 + b_2)h$  or  $A = \frac{(b_1 + b_2)h}{2}$ .

- Identify what the \_\_\_\_\_ in the formulas stand for.

$A$  stands for \_\_\_\_\_,  $b_1$  stands for the length of one \_\_\_\_\_,  $b_2$  stands for the length of the other \_\_\_\_\_, and  $h$  stands for \_\_\_\_\_.

- Replace the \_\_\_\_\_ in the formula with their approximate values from the problem.

The length of one base,  $b_1$ , is approximately \_\_\_\_ inches. The length of the other base,  $b_2$ , is approximately \_\_\_\_ inches. The height,  $h$ , is approximately \_\_\_\_ inches because the center of the trapezoid is a \_\_\_\_\_ and all 4 sides of a \_\_\_\_\_ are equal lengths.

$$A = \frac{(b_1 + b_2)h}{2}$$

$$A = \frac{(\square + \square)\square}{2}$$

- Solve for \_\_\_\_\_.

$$A = \frac{(\square + \square)\square}{2}$$

$$A = \frac{\square \times \square}{2}$$

$$A = \frac{\square}{2}$$

$$A = \underline{\hspace{2cm}}$$

- State the solution to the problem using the appropriate units of measurement.

The approximate area of a placemat is \_\_\_\_\_ square inches.

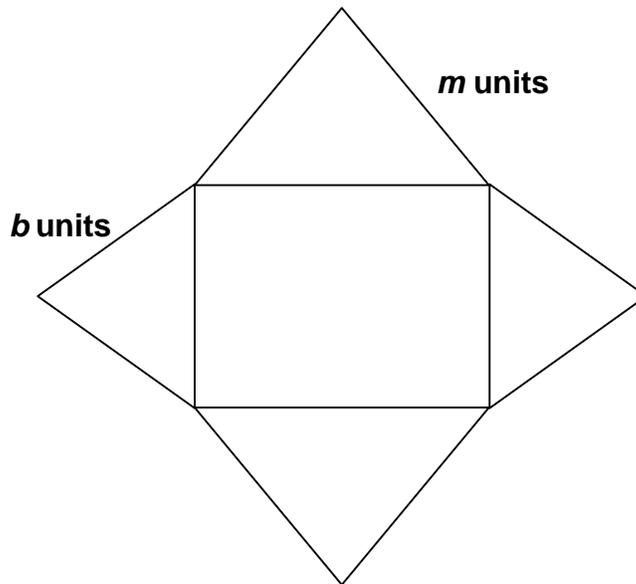
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# 7.4A/7.4B/7.9A OPEN ENDED 1

A composite figure is shown below. It has a rectangular center shape and two sets of congruent isosceles triangles attached to the four sides of the rectangle.



- Write a formula can be used to find the perimeter,  $P$ , of the figure?
  - Explain your formula.
1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
  2. Will the Grade 7 Mathematics Chart be helpful on this problem? Why or why not?
  3. Will a picture or diagram be helpful on this problem? If so, how?
  4. What problem-solving strategy or strategies will I use to help solve this problem?
  5. **Extension:** (7.8C) If the perimeter of the figure above is 30 inches, give two possible values for  $b$  and  $m$  if  $m$  is larger than  $b$ .

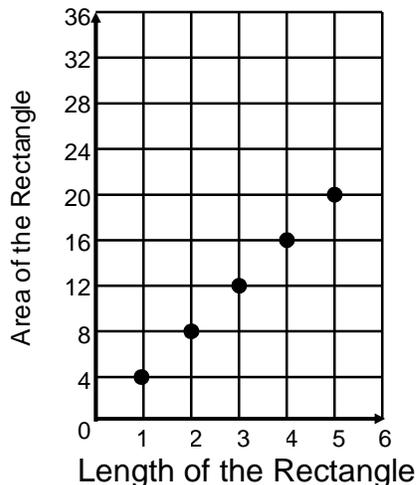
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# 7.4A/7.4B/7.9A OPEN ENDED 2

The relationship of the area of a family of rectangles with a constant width is shown in the graph below.



- Using the graph, predict the area of the rectangle that belongs to this family that would have a length of 9 units. \_\_\_\_\_
- Predict the area of the rectangle that would have a length of 13 units. \_\_\_\_\_ Show your work.
- Predict the length of the rectangle that would have an area of 18 square units. \_\_\_\_\_ Show your work.

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. Will a picture or diagram be helpful on this problem? If so, how?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension (7.8C):** What is the perimeter of the rectangle above whose length is 5 units? Show your work.

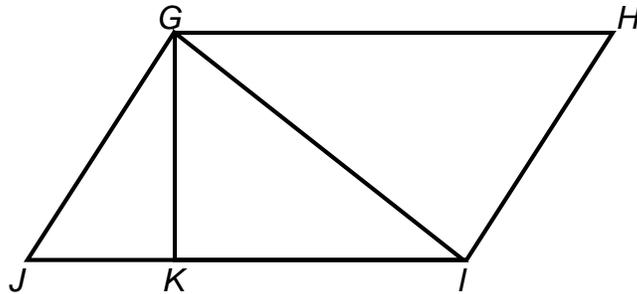
## GRADE 7 MATHEMATICS

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# 7.4A/7.4B/7.9A OPEN ENDED 3

In parallelogram  $GHIJ$ ,  $\overline{GK}$  is perpendicular to  $\overline{IJ}$ .



What is the area of triangle  $GJI$ ?

- Identify the formula that applies to the problem.
- Identify what the variables in the formula represent.
- Replace the variables in the formula with their values from the problem. (Hint: use your ruler.)
- Perform the calculations called for in the formula.
- State the solution to the problem using the appropriate units of measurement.

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Chart be helpful on this problem? Why or why not?
3. Will a picture or diagram be helpful on this problem? If so, how?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension (7.9A):** If triangle  $GHI$  is congruent to triangle  $GJI$ , what is the area of parallelogram  $GHIJ$ ?

## GRADE 7 MATHEMATICS

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NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

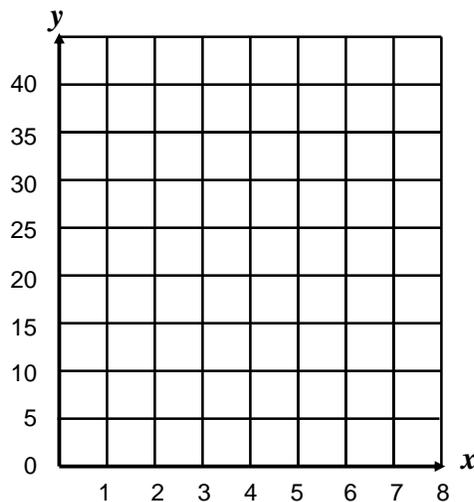
### 7.4A/7.4B/7.9A Homework 1

1. The table shows the relationship between the length of 1 side of a regular polygon and its perimeter.

**Regular Polygons**

Length of Side (inches)	Perimeter (inches)
1	5
2	10
3	15
3.5	17.5
5	25
6	30

Draw and label a graph to represent the relationship in the table.



- Predict the perimeter if the side length is 4.5 units. \_\_\_\_\_
- What type of regular polygon is represented by this data? \_\_\_\_\_
- Write a formula that could be used to find the perimeter if the side length is  $x$ . \_\_\_\_\_

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

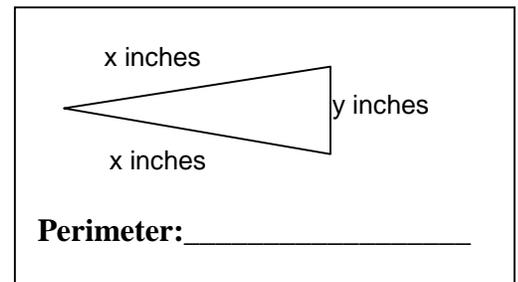
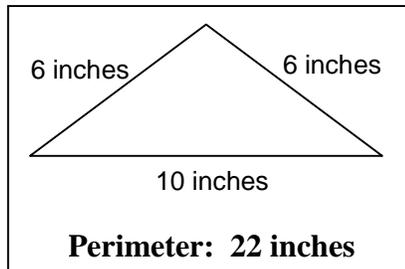
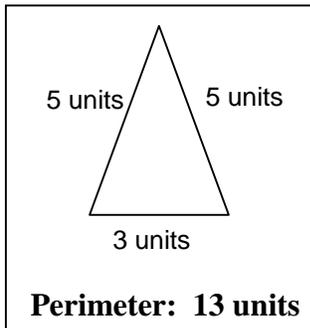
2. The table shows the relationship between the length of 1 side of a regular polygon and its area.

**Regular Polygon**

Length of Side (inches)	Area (square inches)
2	4
3	9
4	16
5	25
6	36
$n$	

The polygon used in the table is a \_\_\_\_\_. The formula for the area for a \_\_\_\_\_ with side length  $n$ , is  $A =$  \_\_\_\_\_.

3. Some examples of isosceles triangles are shown.



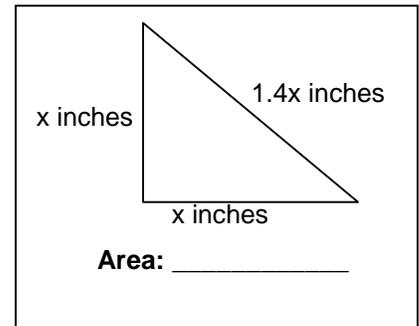
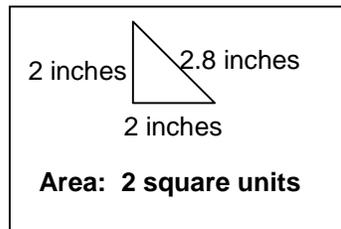
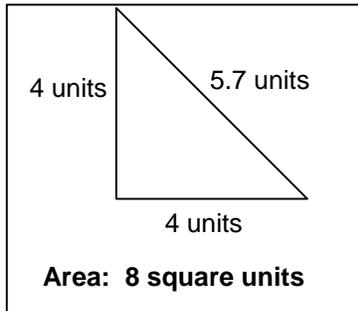
Determine a formula that can be used to find the perimeter of an isosceles triangle with  $x$  leg lengths and  $y$  base. Show your work.

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

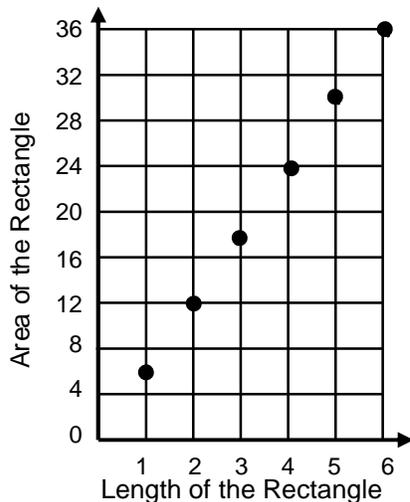
**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

4. Some examples of isosceles right triangles are shown below.



Determine a formula that can be used to find the area of an isosceles right triangle with  $x$  leg lengths. Show your work.

5. The relationship of the area of a family of rectangles with a constant width is shown in the graph below.



- Using the graph predict the area of the rectangle that belongs to this family that would have a length of 3.5 units. Show your work.
- Using the graph predict the length of the rectangle that has an area of 9 square units. Show your work.
- What is the width of all the rectangles in this family? Show your work.
- Write a formula that can be used to find the area of any rectangle in this family with length  $l$ . Show your work.

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

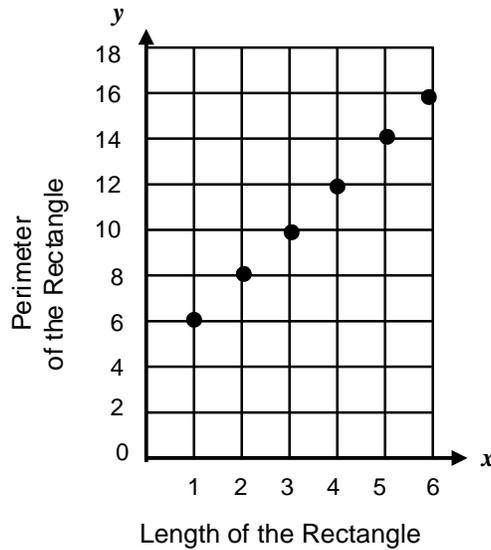
NAME \_\_\_\_\_

DATE \_\_\_\_\_

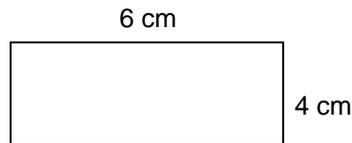
SCORE \_\_\_/5

### 7.4A/7.4B/7.9A Homework 2

1. The relationship of the perimeter of a family of rectangles with a constant width is shown in the graph below.



- Using the graph predict the perimeter of the rectangle that belongs to this family that would have a length of 1.5 units.
  - Using the graph predict the length of the rectangle that belongs to this family that has a perimeter of 11 units.
2. Write a Yes or No in the blank before each formula to indicate that it can or cannot be used to correctly calculate the perimeter of the rectangle shown.



\_\_\_\_\_  $6 + 4$

\_\_\_\_\_  $2 \times 4 + 2 \times 6$

\_\_\_\_\_  $6 \times 4$

\_\_\_\_\_  $2(6 + 4)$

\_\_\_\_\_  $6 + 4 + 6 + 4$

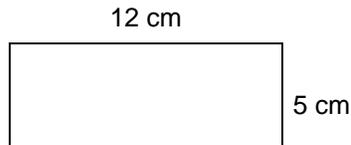
\_\_\_\_\_  $4^2 + 6^2$

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

3. Write a Yes or No in the blank before each formula to indicate that it can or cannot be used to correctly calculate the area of the rectangle shown.



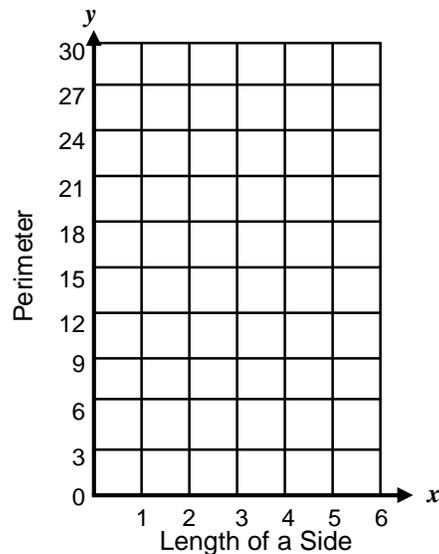
_____ $12 \times 5$	_____ $12 \times 5 + 12 \times 5$	_____ $2 \cdot 12 + 2 \cdot 5$
_____ $\frac{1}{2}(12 \cdot 5)$	_____ $12 + 5 \cdot 12 + 5$	_____ $12^2 + 5^2$

4. Write a Yes or No in the blank before each formula to indicate that it can or cannot be used to find the area of a square whose side length is  $s$ .

_____ $s + s + s + s$	_____ $s \times s$	_____ $4s$
_____ $\frac{1}{2}(s^2)$	_____ $s^2$	_____ $2(s + s)$

5. The table shows the relationship between the length of 1 side of a regular polygon and its perimeter.

<b>Regular Polygon</b>	
Length of a Side	Perimeter
1	6
2	12
2.5	15
4	24
4.5	27
5	30



- Graph the data in the table on the grid.
- What type of polygon is represented by this data? \_\_\_\_\_
- Predict the perimeter of a polygon with the side length is 6. \_\_\_\_\_
- Write a formula that can be used to calculate the perimeter of the regular polygon if the side length is  $n$ .

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.  
**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

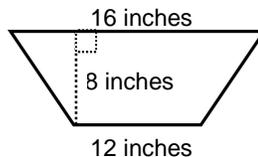
### 7.4A/7.4B/7.9A Homework 3

1. Mr. Logan forms a square from a piece of twine that is 10 feet long. What is the area of the square? Explain how you found the area.
2. The following drawing represents the patio the Smith family is having built in their backyard. In the sketch a centimeter represents 2 feet. Use your Grade 7 Mathematics Chart ruler to measure the dimensions of the shape to the nearest centimeter.



What is the perimeter of the patio in feet? Explain how you found the perimeter of the patio.

3. Find the area of the trapezoid shown below.



Write the formula you will use to find the area.

Show the formula with the values of the dimensions substituted in the appropriate places.

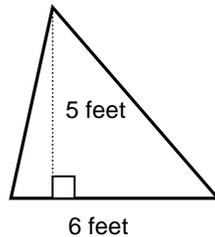
The area of the trapezoid is \_\_\_\_\_ square inches.

## GRADE 7 MATHEMATICS

**(7.4) Patterns, relationships, and algebraic thinking.** The student represents a relationship in numerical, geometric, verbal, and symbolic form. The student is expected to: (A) generate formulas involving conversions, perimeter, area, circumference, volume, and scaling. (B) graph data to demonstrate relationships in familiar concepts such as conversions, perimeter, area, circumference, volume, and scaling.

**(7.9) Measurement.** The student solves application problems involving estimation and measurement. The student is expected to: (A) estimate measurements and solve application problems involving length (including perimeter and circumference) and area of polygons and other shapes.

4. Find the area of the triangle below.



- i. Write the formula you will use to find the area.

b. Show the formula with the values of the dimensions substituted in the appropriate places.

c. The area of the triangle is \_\_\_\_\_ square feet.

5. A rectangle has an area of 48 square feet and a length of 8 feet. What is the perimeter of the rectangle?

What information do you need to know to be able to answer this question?

Draw and label a sketch of the figure. Show the work you used to find the needed information.

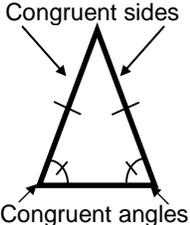
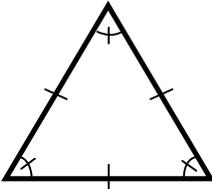
The perimeter of the rectangle is \_\_\_\_\_ feet.

## GRADE 7 MATHEMATICS

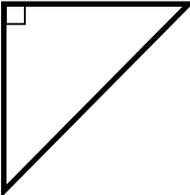
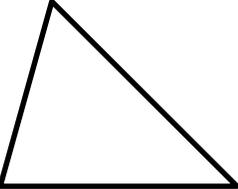
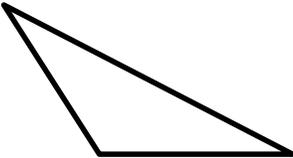
**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

**Grade 7 students should be familiar with the classification of the following types of triangles:**

### Classifying Triangles by Sides

Type	Example	Properties
Scalene triangle		<ul style="list-style-type: none"> <li>No sides are congruent.</li> <li>No angles are congruent.</li> </ul>
Isosceles triangle		<ul style="list-style-type: none"> <li>At least 2 congruent sides.</li> <li>Two angles, called the base angles are congruent.</li> </ul>
Equilateral triangle		<ul style="list-style-type: none"> <li>All three sides are congruent.</li> <li>All three angles are congruent.</li> </ul>

### Classifying Triangles by Angles

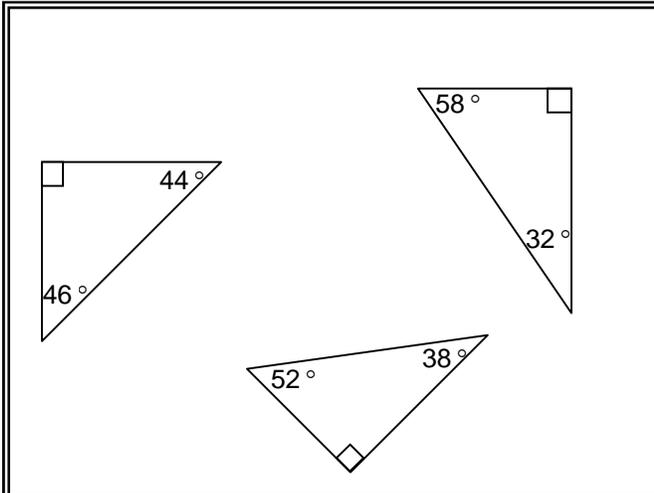
Type	Example	Properties
Right triangle		<ul style="list-style-type: none"> <li>Exactly one angle is a right angle.</li> <li>The acute angles are complementary.</li> <li>The side opposite the right angle, called the hypotenuse, is the longest side.</li> </ul>
Acute triangle		<ul style="list-style-type: none"> <li>All three angles are acute.</li> </ul>
Obtuse triangle		<ul style="list-style-type: none"> <li>Exactly one angle is an obtuse angle.</li> </ul>

## GRADE 7 MATHEMATICS

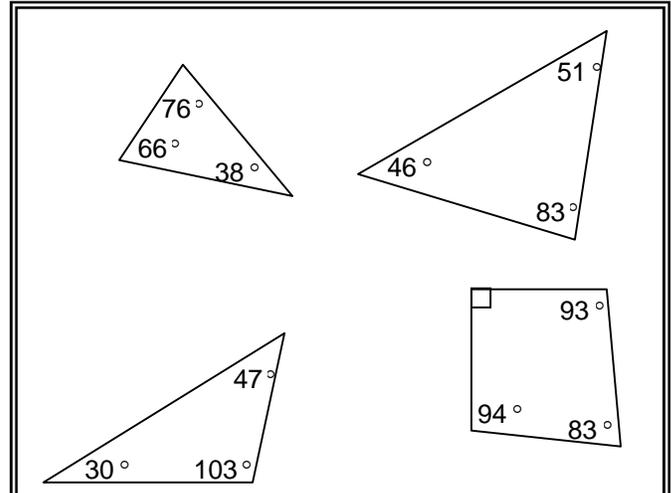
(7.6) Geometry and spatial reasoning. The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

# 7.6B STUDENT ACTIVITY 1

Justify orally why each triangle belongs in the set. Communicate with your partner using geometric vocabulary. Write a definition for each type of triangle.

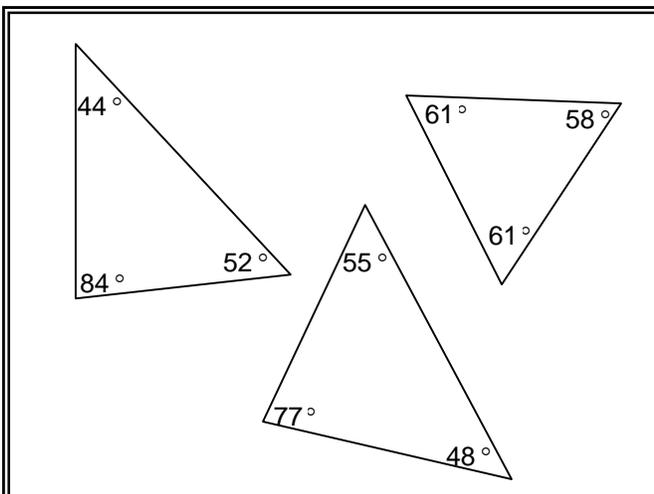


These are right triangles.

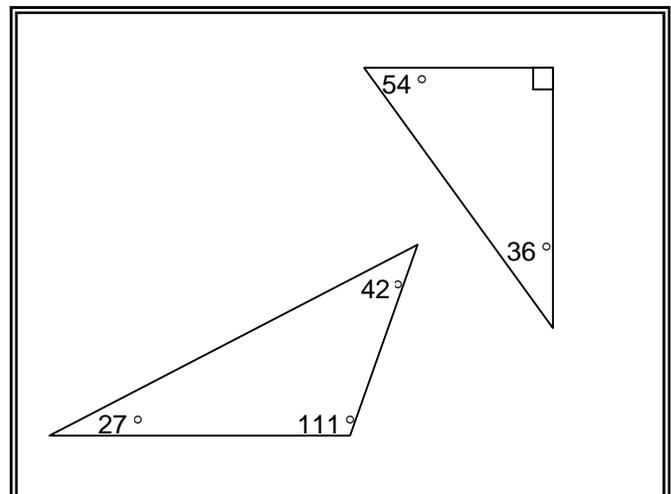


These are not right triangles.

Write a definition for a right triangle.



These are acute triangles.



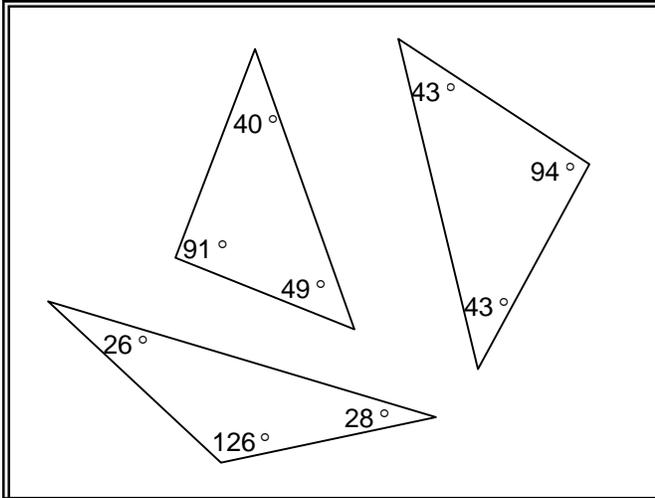
These are not acute triangles.

Write a definition for an acute triangle.

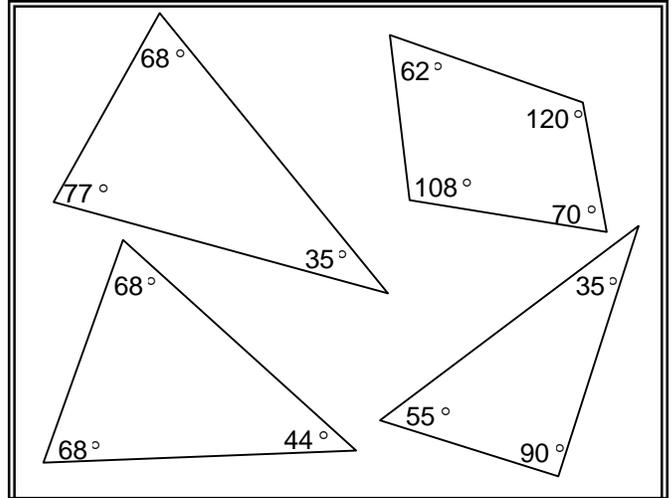
## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

**Justify orally why each triangle belongs in the set. Communicate with your partner using geometric vocabulary. Write a definition for each type of triangle.**

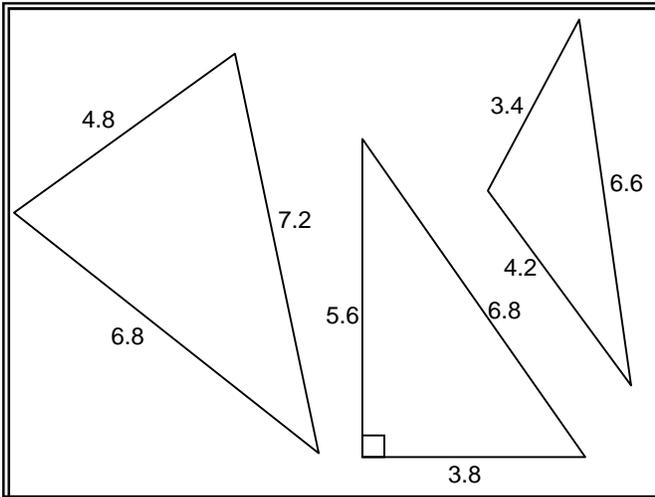


**These are obtuse triangles.**

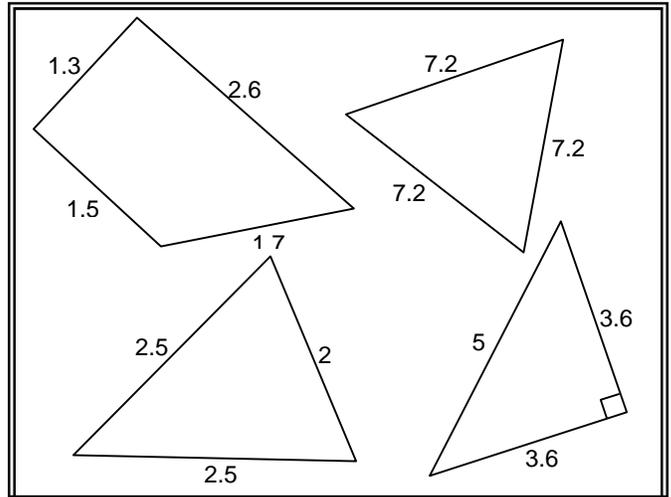


**These are not obtuse triangles.**

**Write a definition for an obtuse triangle.**



**These are scalene triangles.**



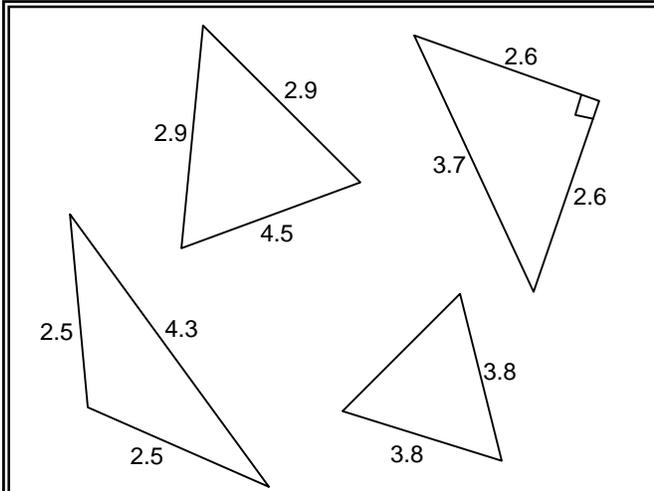
**These are not scalene triangles.**

**Write a definition for a scalene triangle.**

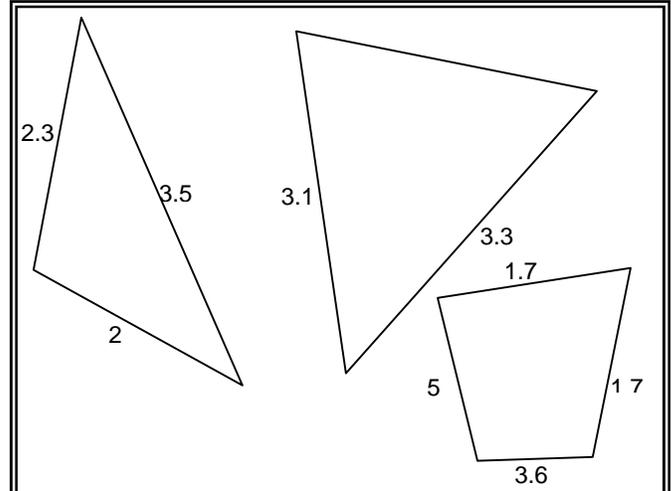
# GRADE 7 MATHEMATICS

(7.6) Geometry and spatial reasoning. The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

Justify orally why each triangle belongs in the set. Communicate with your partner using geometric vocabulary. Write a definition for each type of triangle.

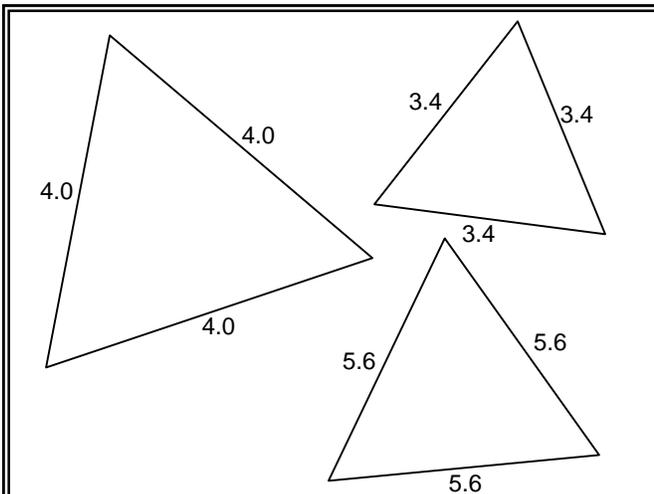


These are isosceles triangles.

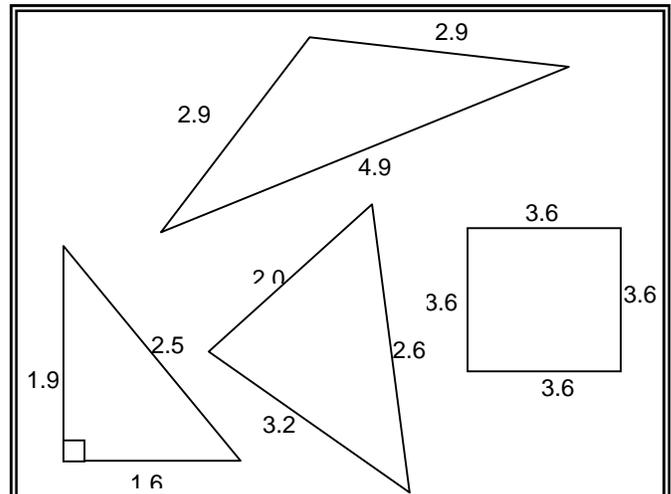


These are not isosceles triangles.

Write a definition for an isosceles triangle.



These are equilateral triangles.



These are not equilateral triangles.

Write a definition for an equilateral triangle.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

# 7.6B STUDENT ACTIVITY 2

## TRIANGLE CLASSIFICATION

Triangles are \_\_\_\_\_, \_\_\_\_\_ - \_\_\_\_\_ figures.

Triangles can be classified based on information about their \_\_\_\_\_ and \_\_\_\_\_.

A triangle is a \_\_\_\_\_-sided \_\_\_\_\_.

The sum of the measures of the \_\_\_\_\_ angles of any triangle is \_\_\_\_\_°.

A triangle with no sides congruent and no angles congruent is a(n) \_\_\_\_\_ triangle.

Sketch three examples of this triangle.

A triangle with at least two congruent sides, and with two base angles that are congruent is a(n) \_\_\_\_\_ triangle.

Sketch three examples of this triangle.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

A triangle with all three sides congruent and all three angles congruent is a(n) \_\_\_\_\_ triangle.

Sketch three examples of this triangle.

A triangle with exactly one right angle, complementary acute angles and the side opposite the right angle is the longest side is a(n) \_\_\_\_\_ triangle. The side opposite the right angle is called the \_\_\_\_\_.

Sketch three examples of this triangle.

A triangle with three acute angles is a(n) \_\_\_\_\_ triangle.

Sketch three examples of this triangle.

A triangle with exactly one obtuse angle is a(n) \_\_\_\_\_ triangle.

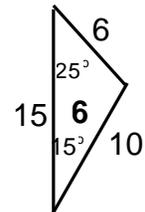
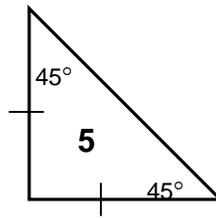
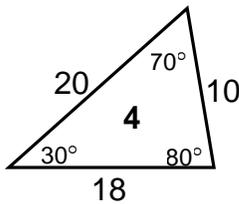
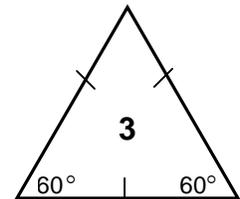
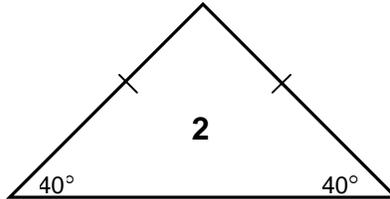
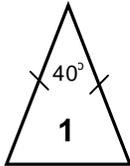
Sketch three examples of this triangle.

## GRADE 7 MATHEMATICS

(7.6) **Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

# 7.6B OPEN ENDED 1

Classify each triangle based on sides and angles.



1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Chart be helpful on this problem? Why or why not?
3. How are sides marked to show they have different lengths?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension (7.9A):** The side lengths of Triangle #5 above are 8, 8 and 11.3 units. Find the perimeter of the triangle. Show your work.
6. **Extension (7.9A):** Find the area of Triangle #5 using the measurement in Extension #5. Show your work.

# GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

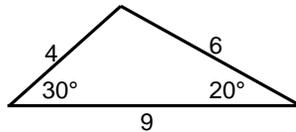
SCORE \_\_\_/5

## 7.6B Homework 1

1. Identify the name of the triangle that has the following characteristics.

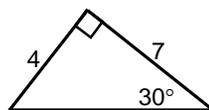
- All three sides are congruent. \_\_\_\_\_
- All three angles are congruent. \_\_\_\_\_
- All three angles have different measures. \_\_\_\_\_
- Two angles have the same measure. \_\_\_\_\_
- One angle measure is  $90^\circ$ . \_\_\_\_\_
- Two sides are congruent and one angle measure is  $120^\circ$ . \_\_\_\_\_

2. Look at the triangle that is given below.



- The missing angle has a measure of \_\_\_\_\_  $^\circ$  because the sum of the three angles must be \_\_\_\_\_  $^\circ$  and the two given angles have a sum of \_\_\_\_\_  $^\circ$ . Therefore, this triangle is an \_\_\_\_\_ triangle.
- Since all three sides are different lengths, the triangle is a \_\_\_\_\_ triangle.  
The triangle can be classified as an \_\_\_\_\_ triangle.

3. Analyze this triangle.

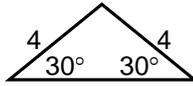


- The marking on one of the angles identifies the angle as a(n) \_\_\_\_\_ angle. Therefore, this triangle is a \_\_\_\_\_ triangle.
- The side opposite the right angle is the \_\_\_\_\_ side. The side opposite the \_\_\_\_\_ angle is called the \_\_\_\_\_.
- All three sides of the triangle are different lengths. Therefore, the triangle is a \_\_\_\_\_ triangle.
- The triangle is classified as a(n) \_\_\_\_\_ triangle.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

4. Analyze this triangle.



- The missing angle has a measure of \_\_\_\_\_° because the sum of the three angles must be \_\_\_\_\_° and the two given angles have a sum of \_\_\_\_\_°. Therefore, the triangle is a(n) \_\_\_\_\_ triangle.
- Two sides of the triangle are congruent. Therefore, the triangle is a(n) \_\_\_\_\_ triangle.
- The triangle is classified as a(n) \_\_\_\_\_ triangle.

5. Three angle measures of four different triangles are given below. Classify each triangle using only angle measures.

- 20° , 40° , 120° \_\_\_\_\_
- 60° , 60° , 60° \_\_\_\_\_
- 45° , 48° , 87° \_\_\_\_\_
- 20° , 70° , 90° \_\_\_\_\_

# GRADE 7 MATHEMATICS

(7.6) Geometry and spatial reasoning. The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

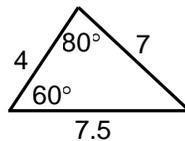
SCORE \_\_\_/5

## 7.6B Homework 2

1. Identify triangles with the following characteristics.

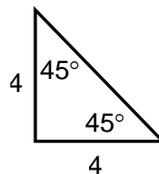
- One angle measures  $150^\circ$  . \_\_\_\_\_
- All three angles measure less than  $90^\circ$  . \_\_\_\_\_
- All three angles measure less than  $90^\circ$  and two of the angles are congruent. \_\_\_\_\_
- Two sides of the triangle are congruent. \_\_\_\_\_
- Two angle measures have a sum of  $90^\circ$  . \_\_\_\_\_
- Two sides are congruent and one angle measures  $90^\circ$  . \_\_\_\_\_

2. Use properties to classify the triangle.



- The missing angle has a measure of \_\_\_\_\_  $^\circ$  because the sum of the three angles must be \_\_\_\_\_  $^\circ$  and the two given angles have a sum of \_\_\_\_\_  $^\circ$ . Therefore, this triangle is a(n) \_\_\_\_\_ triangle.
- No sides are congruent, therefore the triangle is a(n) \_\_\_\_\_ triangle.
- The triangle is classified as a(n) \_\_\_\_\_ triangle.

3. Use properties to classify the triangle.

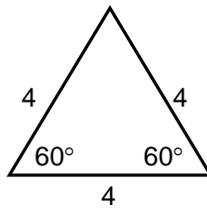


- The missing angle has a measure of \_\_\_\_\_  $^\circ$  because the sum of the three angles must be \_\_\_\_\_  $^\circ$  and the two given angles have a sum of \_\_\_\_\_  $^\circ$ . Therefore, this triangle is a(n) \_\_\_\_\_ triangle.
- Two of the sides are congruent, therefore the triangle is a(n) \_\_\_\_\_ triangle.
- The triangle is classified as a(n) \_\_\_\_\_ triangle.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (B) use properties to classify triangles and quadrilaterals.

4. Use properties to classify the triangle.



- The missing angle has a measure of \_\_\_\_\_ ° because the sum of the three angles must be \_\_\_\_\_ ° and the two given angles have a sum of \_\_\_\_\_ °. All three angles are \_\_\_\_\_, therefore, the triangle is a(n) \_\_\_\_\_ triangle.
- All the sides of the triangle are congruent. Therefore the triangle is a(n) \_\_\_\_\_ triangle.
- If the sides of a triangle are all congruent to each other, then the angles will each measure \_\_\_\_\_ °.
- The triangle is classified as a(n) \_\_\_\_\_ triangle.

5. The side lengths of three different triangles are given below. Classify each triangle using only side measures.

• 4, 6, 9 \_\_\_\_\_

• 6, 6, 6 \_\_\_\_\_

• 5, 5, 8 \_\_\_\_\_

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

# 7.6D STUDENT ACTIVITY 1

**Problem:** Are these shapes similar?

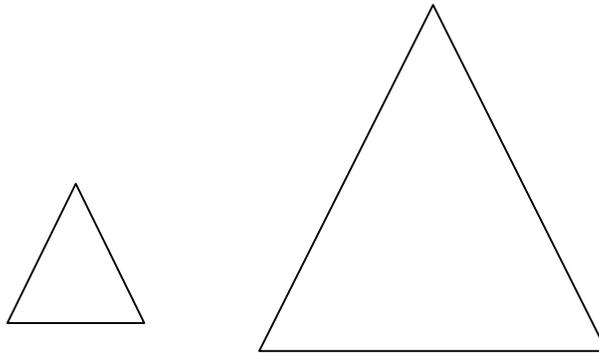
**Materials:** 1 metric ruler per pair of students  
1 protractor per pair of students

**Procedure:** Work in pairs for this activity.

- For each pair of two-dimensional figures decide if the figures appear to be similar without making any measurements. Record and justify your decision before measuring each pair of figures.
- Use a ruler to make linear measurements and record on the figures.
- Use a protractor to make angle measurements and record the measurements on the figures.
- Write a description of what it means for two shapes to be similar.
- If any pairs of figures are not similar, change the second figure in the box so that it is similar to the first figure. Record side and angle measurements of the figure you create.

**Without measuring:** Do you think these figures are similar? \_\_\_\_\_ Justify your answer.

Measure and record side and angle measurements on each figure.



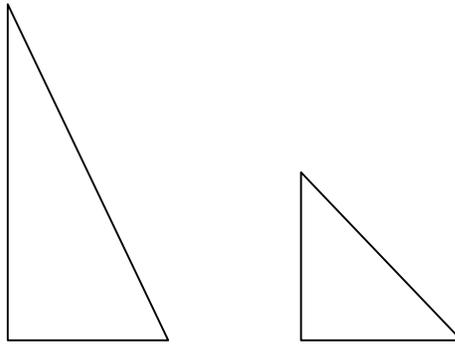
Are the figures similar? \_\_\_\_\_ Explain your answer.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

**Without measuring:** Do you think these figures are similar? \_\_\_\_\_ Justify your answer.

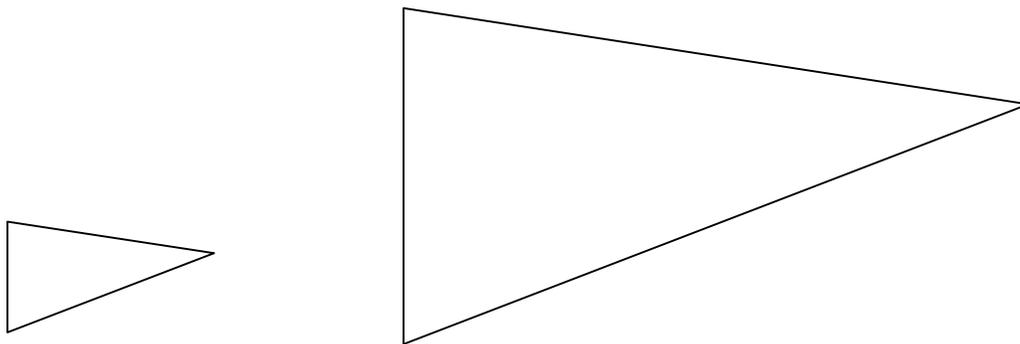
Measure and record side and angle measurements on each figure.



Are the figures similar? \_\_\_\_\_ Explain your answer.

**Without measuring:** Do you think these figures are similar? \_\_\_\_\_ Justify your answer.

Measure and record side and angle measurements on each figure.



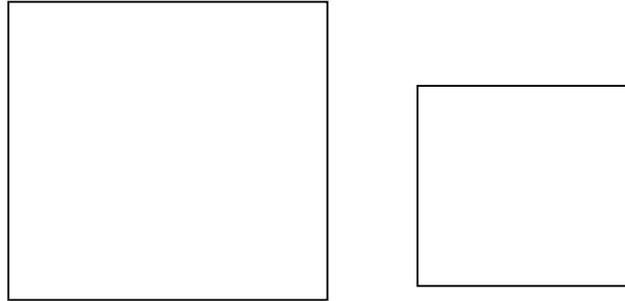
Are the figures similar? \_\_\_\_\_ Explain your answer.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

**Without measuring:** Do you think these figures are similar? \_\_\_\_\_ Justify your answer.

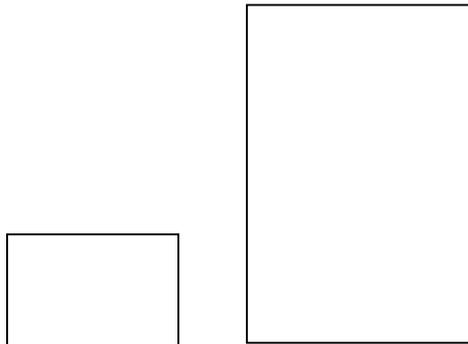
Measure and record side and angle measurements on each figure.



Are the figures similar? \_\_\_\_\_ Explain your answer.

**Without measuring:** Do you think these figures are similar? \_\_\_\_\_ Justify your answer.

Measure and record side and angle measurements on each figure.



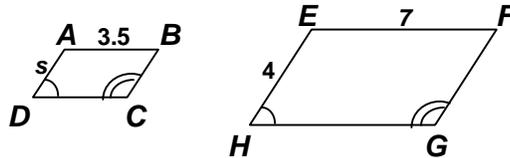
Are the figures similar? \_\_\_\_\_ Explain your answer.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

# 7.6D STUDENT ACTIVITY 2

**Problem 1:** Parallelogram  $ABCD$  is similar to parallelogram  $EFGH$ . Write and solve a proportion to find  $s$ , the length of side  $AD$ .



- Corresponding sides of similar figures are \_\_\_\_\_.  
 $AB$  corresponds to \_\_\_\_\_.  
 $AD$  corresponds to \_\_\_\_\_.
- Write a proportion that compares the ratios of corresponding sides.

$$\frac{\text{small}}{\text{large}} = \frac{\square}{\square} = \frac{\square}{\square}$$

- Substitute the values into the proportion.

$$\frac{\square}{\square} = \frac{s}{\square}$$

- Use cross products.

$$\begin{aligned} \square \times \square &= \square s \\ \square &= \square s \end{aligned}$$

- Divide both sides by 7 to find the value of  $s$ .

$$\frac{\square}{\square} = \frac{\square s}{\square}$$

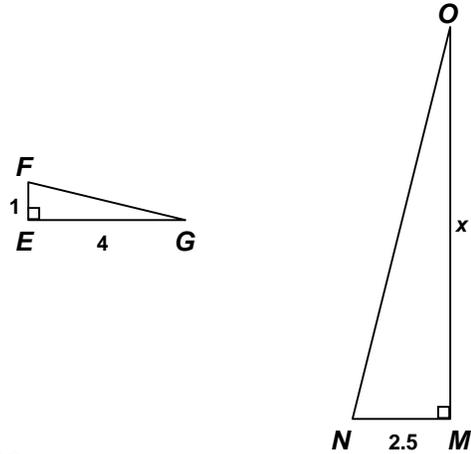
$$\square = s$$

The length of side  $AD$  is \_\_\_\_\_ units.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

**Problem 2:** Right triangles  $EFG$  and  $MNO$  are similar.



Find  $x$ , the length of side  $MO$ .

- Corresponding sides of similar figures are \_\_\_\_\_.

Side  $EF$  corresponds to side \_\_\_\_\_.

Side  $EG$  corresponds to side \_\_\_\_\_.

- Write a proportion that compares the ratios of corresponding sides.

$$\frac{\text{small}}{\text{large}} = \frac{\square}{\square} = \frac{\square}{\square}$$

- Substitute the values into the proportion.

$$\frac{\square}{\square} = \frac{\square}{x}$$

- Solve the proportion.

$$\underline{\hspace{1cm}} x = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} x = \underline{\hspace{1cm}}$$

$$\frac{\square}{\square} x = \frac{\square}{\square}$$

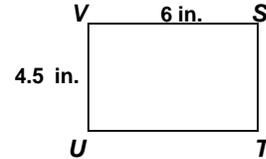
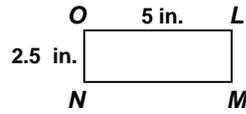
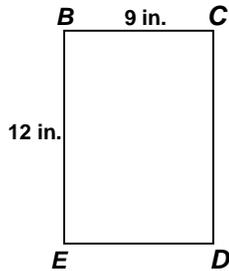
$$x = \square$$

The length of side  $MO$  is \_\_\_\_\_ units.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

**Problem 3:** Which rectangle is similar to rectangle  $BCDE$ ?



- Corresponding angles of similar figures are congruent. All the angles in a rectangle are \_\_\_\_\_ angles, so both of the other rectangles have angles that are \_\_\_\_\_ to the corresponding angles in rectangle  $BCDE$ .
- The ratios of the lengths of corresponding sides of similar figures form proportions. Match up the corresponding sides of rectangles  $BCDE$  and  $LMNO$ .

Side  $BC$  corresponds to side  $LM$ .

Side  $EB$  corresponds to side \_\_\_\_\_.

Express the lengths of the corresponding sides as ratios.

$$\frac{BC}{LM} = \frac{9}{\square} \qquad \frac{EB}{OL} = \frac{\square}{5}$$

Write a proportion that compares the ratios of the corresponding sides. If the proportion is true, the cross products will be equal.

$$\frac{9}{\square} = \frac{\square}{5}$$

\_\_\_\_\_  $\neq$  \_\_\_\_\_

The proportion is not true. Rectangles  $BCDE$  and  $LMNO$  are \_\_\_\_\_ similar.

- Match up the corresponding sides of rectangles  $BCDE$  and  $STUV$ .

Side  $BC$  corresponds to side  $ST$ .

Side  $EB$  corresponds to side \_\_\_\_\_.

Express the lengths of the corresponding sides as ratios.

$$\frac{BC}{ST} = \frac{9}{\square} \qquad \frac{EB}{VS} = \frac{\square}{6}$$

Write a proportion that compares the ratios of the corresponding sides. If the proportion is true, the cross products will be equal.

$$\frac{9}{\square} = \frac{\square}{6}$$

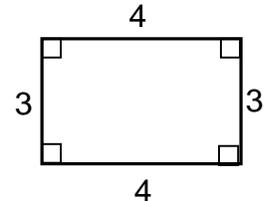
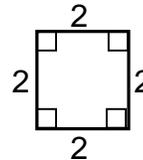
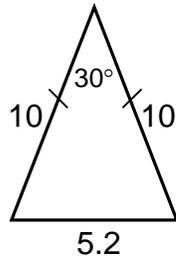
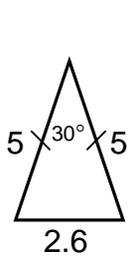
The proportion is true. Rectangles  $BCDE$  and  $STUV$  are \_\_\_\_\_.

## GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

# 7.6D OPEN ENDED 1

Determine which of the following pairs of shapes are similar. Record “similar” or “not similar” on the first line below each pair of shapes. Justify your answer on the additional lines below each pair of shapes.




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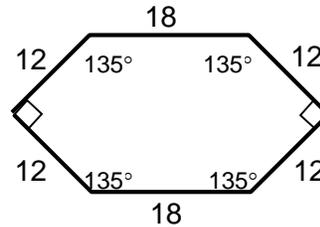
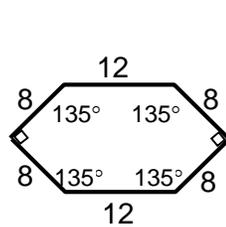
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1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Chart be helpful on this problem? Why or why not?
3. Are congruent figures also similar? Explain.
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension (7.3B):** If the side lengths of a triangle are 8, 12 and 14 units, what will be the lengths of the sides of a smaller similar triangle if there is a ratio of 3:2 for the corresponding sides?

# GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

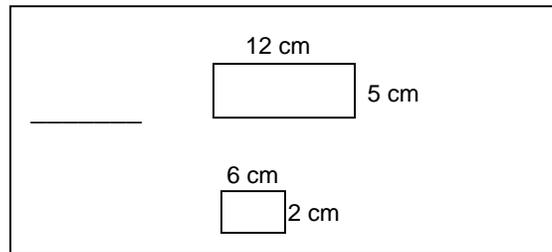
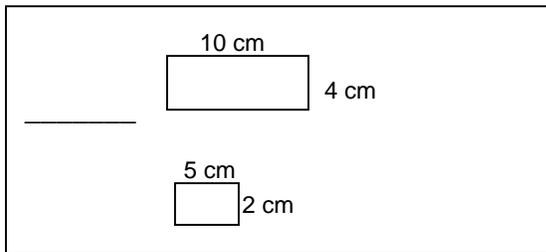
## 7.6D Homework 1

1. State the two properties that must be true for two figures to be similar.

- Corresponding angles must be \_\_\_\_\_.
- Corresponding sides must be \_\_\_\_\_.

2. To verify two rectangles are similar I only need to check the relationship of the \_\_\_\_\_ since the corresponding angles will always be congruent because they are all \_\_\_\_\_ angles.

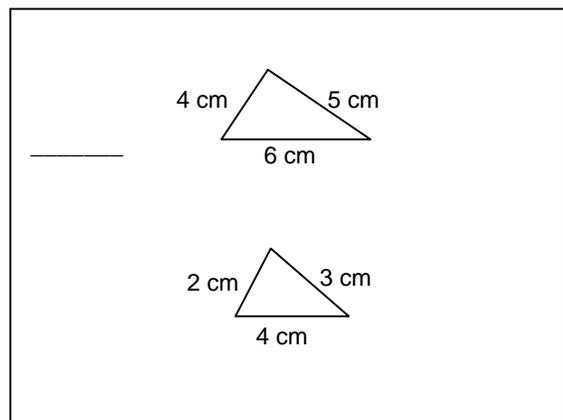
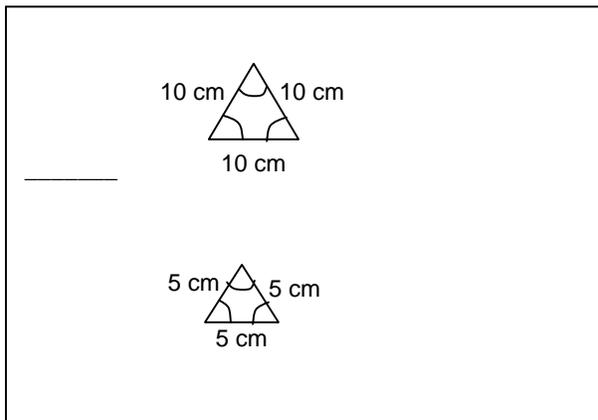
3. Decide if the following pairs of rectangles are similar or not similar. Place an S or an NS in front of each pair to record your decision.



4. Is this statement true or false? Justify your answer.

**Squares are always similar.**

5. Decide if the following pairs of triangles are similar or not similar. Place S or NS in front of each pair to record your decision.



# GRADE 7 MATHEMATICS

**(7.6) Geometry and spatial reasoning.** The student compares and classifies two- and three-dimensional figures using geometric vocabulary and properties. The student is expected to: (D) use critical attributes to define similarity.

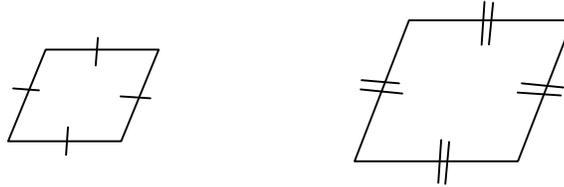
NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

## 7.6D Homework 2

1. Is the pair of figures below similar? \_\_\_\_\_ Justify your answer.



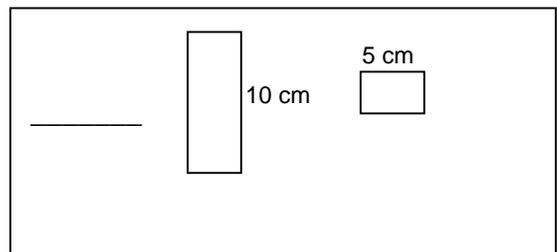
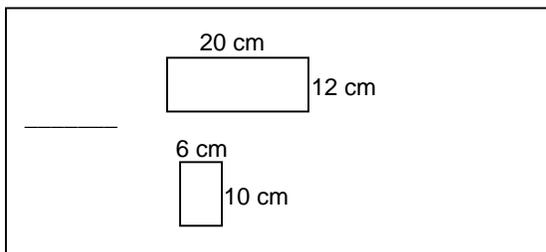
2. If  $\triangle ABC$  is similar to  $\triangle PQR$ , write the proportional relationship that must true.

$$\frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square}$$

3. If  $\triangle ABC$  is similar to  $\triangle PQR$ , write the pairs of angles that must be congruent.

$$\begin{array}{l} \sphericalangle \cong \sphericalangle \\ \sphericalangle \cong \sphericalangle \\ \sphericalangle \cong \sphericalangle \end{array}$$

4. Decide if the following pairs of rectangles are similar or not similar. Place S, NS or M (maybe—can't determine from the information given) in front of each pair to record your decision.



5. Is this statement true or false? Justify your answer.

**Pairs of regular polygons such as a pair of regular hexagons or a pair of regular pentagons are always similar.**

## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

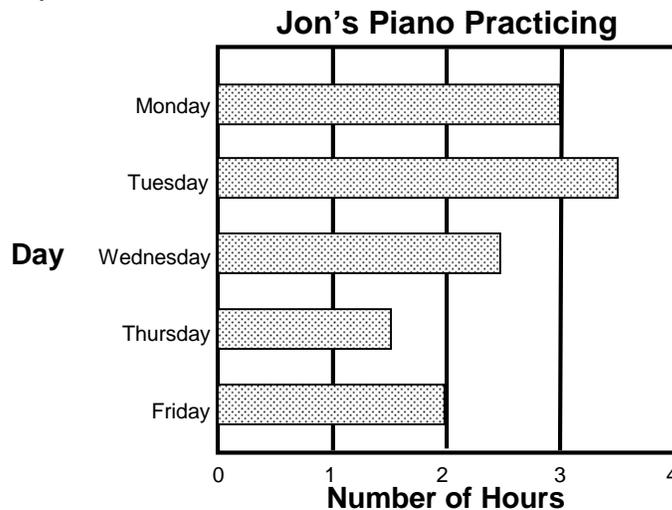
# 7.11A/7.11B STUDENT ACTIVITY 1

**Problem 1:** The table shows the amount of time Jon practiced piano this week.

<b>Jon's Piano Practicing</b>					
<b>Day</b>	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Time (in hours)</b>	3	3.5	2.5	1.5	2

- The first row in the table represents the \_\_\_\_\_ Jon \_\_\_\_\_.
- The second row represents the amount of \_\_\_\_\_ (in \_\_\_\_\_) Jon practiced piano.
- The first data column shows that Jon practiced piano on \_\_\_\_\_ for \_\_\_\_\_ hours.
- The last data column shows that Jon practiced piano on \_\_\_\_\_ for \_\_\_\_\_ hours.

The graph below represents the data in the table and helps compare the number of hours Jon practiced piano each day.



- The scale on the horizontal axis shows the \_\_\_\_\_ Jon spent \_\_\_\_\_.
- The vertical axis shows the \_\_\_\_\_ for which there are data.
- The length of each bar shows the \_\_\_\_\_ Jon spent \_\_\_\_\_ on that particular \_\_\_\_\_. For example, the bar for \_\_\_\_\_ ends halfway between 2 and 3 on the scale. This shows that Jon practiced piano for \_\_\_\_\_ hours on that day.
- When you compare the \_\_\_\_\_ of the \_\_\_\_\_, it is easy to see that Jon practiced piano for the greatest number of hours on \_\_\_\_\_ and the least number of hours on \_\_\_\_\_.

## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

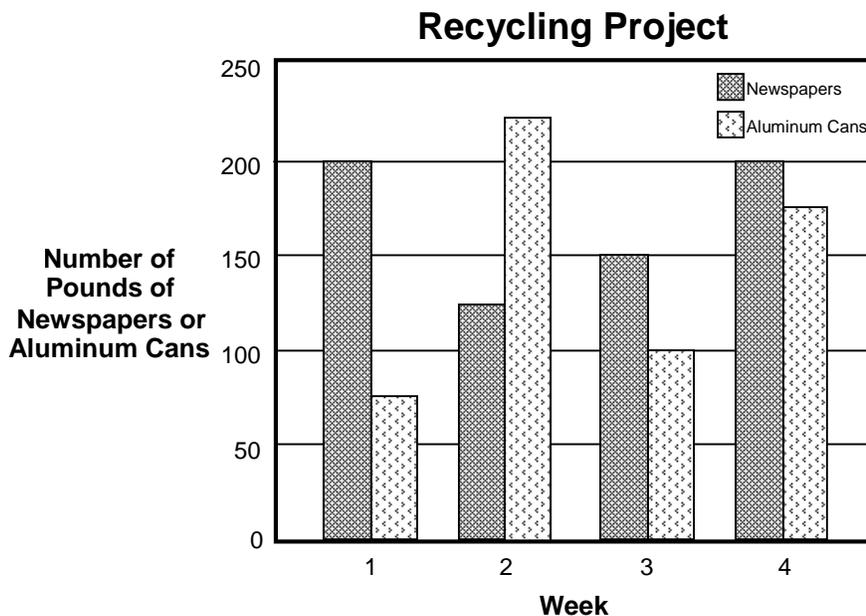
**Problem 2:** The Jefferson Middle School Student Council sponsored a 4-week recycling project. Students collected old newspapers and aluminum cans for recycling. The table below shows the number of pounds of old newspaper and aluminum cans the students collected each week.

**Recycling Project**

Week	Newspapers (in pounds)	Aluminum Cans (in pounds)
1	200	75
2	125	225
3	150	100
4	200	175

- The first column in the table represents the \_\_\_\_\_ of the \_\_\_\_\_.
- The second column represents the amount of \_\_\_\_\_ (in \_\_\_\_\_) collected.
- The third column represents the amount of \_\_\_\_\_ (in \_\_\_\_\_) collected.
- The second data row shows the Student Council collected \_\_\_\_\_ pounds of \_\_\_\_\_ and \_\_\_\_\_ pounds of \_\_\_\_\_ during week \_\_\_\_\_.
- The third data row shows the Student Council collected \_\_\_\_\_ pounds of \_\_\_\_\_ and \_\_\_\_\_ pounds of \_\_\_\_\_ during week \_\_\_\_\_.

The double bar graph below compares the number of \_\_\_\_\_ of \_\_\_\_\_ to the number of \_\_\_\_\_ of \_\_\_\_\_ collected each of the \_\_\_\_\_ weeks in the recycling project.



## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

- The scale on the \_\_\_\_\_ axis shows the weeks of the recycling project.
- The scale on the \_\_\_\_\_ axis shows the number of \_\_\_\_\_ of \_\_\_\_\_ or \_\_\_\_\_ collected.
- The \_\_\_\_\_ indicates which bars represent pounds of \_\_\_\_\_ or pounds of \_\_\_\_\_ collected.
- By looking at the \_\_\_\_\_ of the bars on the graph, you can see that, except in the \_\_\_\_\_ week, the Student Council collected more pounds of \_\_\_\_\_ than pounds of \_\_\_\_\_.
- By adding the totals of the numbers represented by the \_\_\_\_\_ on the graph, you can find the total number of pounds of \_\_\_\_\_ and pounds of \_\_\_\_\_ collected during the recycling project.

Write 2 more conclusions that can be drawn from the data in the graph and justify each conclusion based on data.

- Conclusion 1:

Justification:

- Conclusion 2:

Justification:

## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

# 7.11A/7.11B STUDENT ACTIVITY 2

## LINE GRAPHS

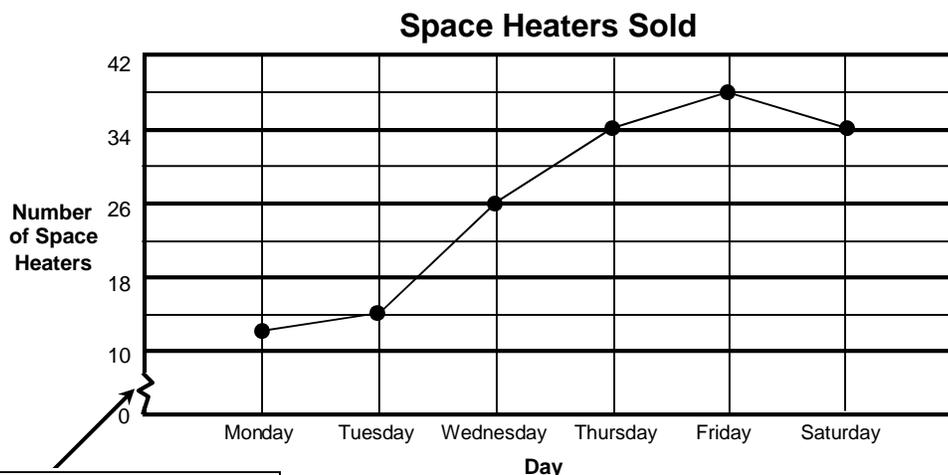
Record low temperatures caused the number of sales of space heaters to increase at a local hardware store. The table below shows the number of space heaters sold over a course of \_\_\_\_\_ days.

**Space Heater Sales**

Day	Number of Heaters Sold
Monday	12
Tuesday	14
Wednesday	26
Thursday	34
Friday	38
Saturday	34

- The first column in the table represents the \_\_\_\_\_ of the \_\_\_\_\_.
- The second column represents the \_\_\_\_\_ of \_\_\_\_\_.
- The second data row shows the hardware store sold \_\_\_\_\_ space heaters on \_\_\_\_\_.
- The fifth data row shows the hardware store sold \_\_\_\_\_ space heaters on \_\_\_\_\_.

This line graph shows the \_\_\_\_\_ of space heaters sold over the course of \_\_\_\_\_ days.



This symbol means there is a break in the scale.

- The broken line on the \_\_\_\_\_-axis indicates that the values between 0 and \_\_\_\_\_ are not included.

## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

- The relative height of the points can be used to compare the \_\_\_\_\_ of space heaters sold each day over the course of \_\_\_\_\_ days.

Here are some conclusions that can be drawn from this graph:

- Between Monday and Tuesday the number of heaters sold increased by about \_\_\_\_\_.
- The number of heaters increased between every two days, except between \_\_\_\_\_ and \_\_\_\_\_.
- The number of heaters sold reached its highest point on \_\_\_\_\_.

Write 2 more conclusions that can be drawn from the data in the graph and justify each conclusion based on data.

- Conclusion #1:

Justification:

- Conclusion #2:

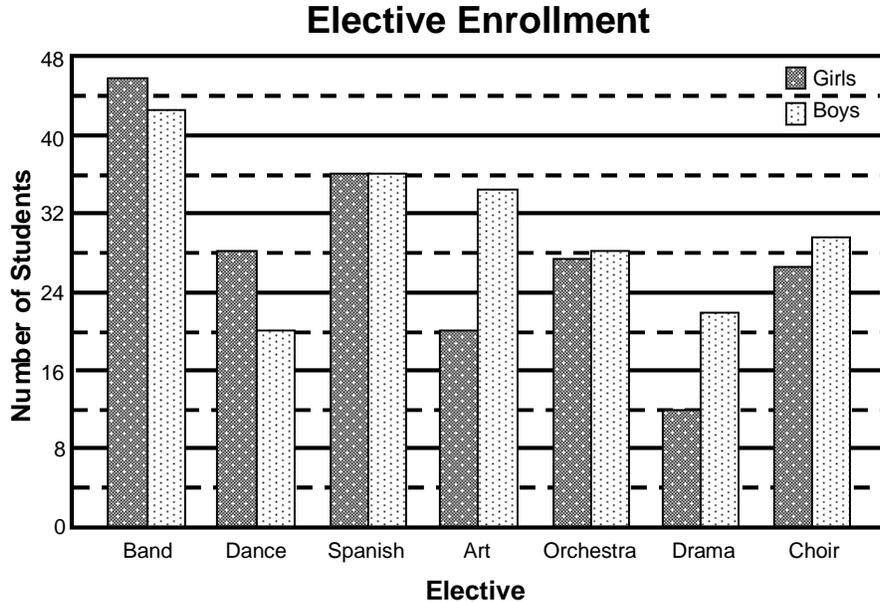
Justification:

## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

# 7.11A/7.11B STUDENT ACTIVITY 3

This double bar graph shows the number of boys and girls enrolled in several electives at Bush Middle School.



Read each statement below. Write a “√” in the box before the statements that are supported by the data in the graph. Write an “X” in the box before the statements that are **not** supported by the data in the graph. Write the justification for your choice on the lines below each statement. In order to make a convincing argument, you need to have data to support your conclusions.

The number of girls taking Spanish is the same as the number of boys taking Spanish.

This statement is supported by the fact that the bar representing the number of \_\_\_\_\_ taking \_\_\_\_\_ and the bar representing the number of \_\_\_\_\_ taking \_\_\_\_\_ are the same height. They are both at \_\_\_\_\_.

More girls than boys are enrolled in band.

This statement is supported by the fact that the \_\_\_\_\_ representing the number of girls enrolled in \_\_\_\_\_ is higher than the bar representing the number of boys enrolled in \_\_\_\_\_. There are \_\_\_\_\_ girls and \_\_\_\_\_ boys enrolled in \_\_\_\_\_.

## GRADE 7 MATHEMATICS

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Boys enjoy electives more than girls do.

This is \_\_\_\_\_ a valid conclusion; there could simply be more \_\_\_\_\_ than \_\_\_\_\_ attending Bush Middle School.

More boys than girls are enrolled in art, orchestra, drama, and choir.

This statement is supported by the fact that the \_\_\_\_\_ for these \_\_\_\_\_ are all higher for \_\_\_\_\_ than for \_\_\_\_\_.

Write two more valid conclusions that are supported by the data in the graph. Write the justification for each conclusion. In order to make a convincing argument, you need to have data to support your conclusions.

• Conclusion 1:

Justification:

• Conclusion 2:

Justification:

Write one invalid conclusion that might be drawn from the graph. Explain why the conclusion might not be valid.

• Invalid Conclusion:

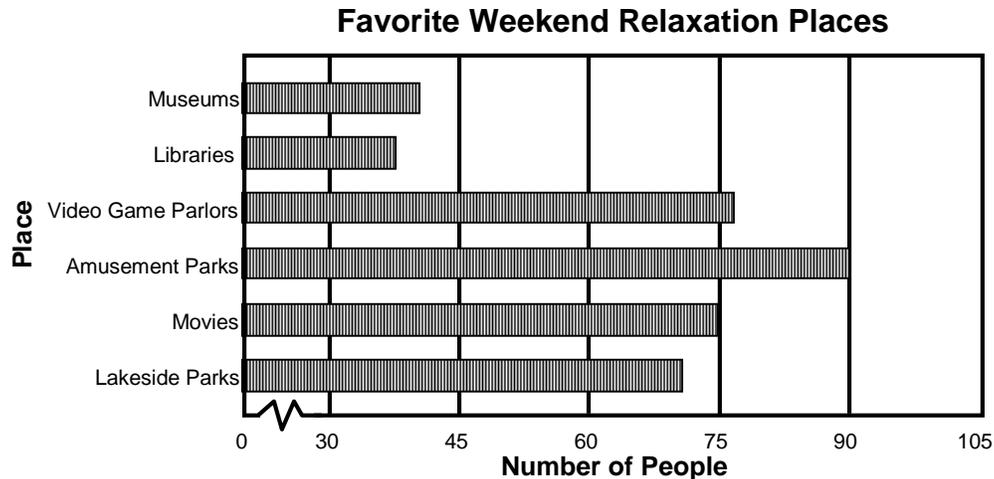
Explanation:

## GRADE 7 MATHEMATICS

**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

# 7.11A/7.11B STUDENT ACTIVITY 4

This bar graph shows the favorite weekend relaxation places of 390 people surveyed.



Read each statement below. Write a “✓” in the box before the statements that are supported by the data in the graph. Write an “X” in the box before the statements that are **not** supported by the data in the graph. Write the justification for your choice on the lines below each statement.

- The number of people who like to relax on weekends at museums and the number of people who like to relax at libraries are about the same.

Justification: \_\_\_\_\_

- The number of people who like to relax on weekends at amusement parks is almost half the number who like to relax at museums.

Justification: \_\_\_\_\_

- About 25% of the people surveyed like to relax on weekends at lakeside parks.

Justification: \_\_\_\_\_

- Slightly fewer than  $\frac{1}{5}$  of the people surveyed like to relax on weekends at the movies.

Justification : \_\_\_\_\_

## GRADE 7 MATHEMATICS

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# 7.11A/7.11B OPEN ENDED 1

Gibson Junior High offers four foreign language classes for students to choose from. The choices include French, Latin, German and Spanish. The counselors surveyed 280 students who were enrolling for either the seventh grade or the eighth grade for the next school year. The students' choices of a foreign language class are shown below.

**Foreign Language Survey**

<b>Foreign Language</b>	<b>Eighth Graders</b>	<b>Seventh Graders</b>
French	35	40
Latin	30	30
German	30	35
Spanish	40	40

Display the data shown above in a horizontal double bar graph.

1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. What scale did I use for the vertical axis of my graphs?
4. What problem-solving strategy or strategies will I use to help solve this problem?
5. **Extension (7.3A):** What fraction of the students surveyed chose Spanish as their foreign language class? Show your work.

## GRADE 7 MATHEMATICS

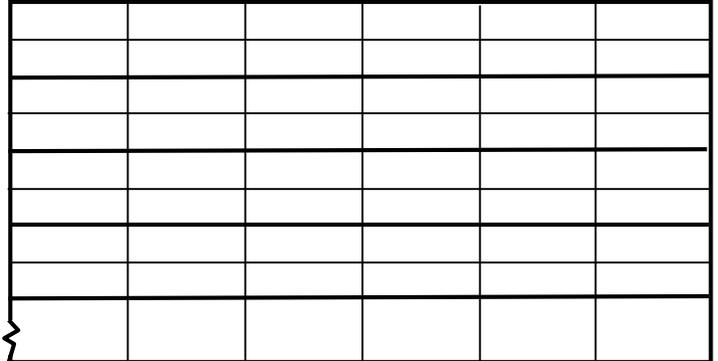
**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

# 7.11A/7.11B OPEN ENDED 2

The student enrollment for Trenton Middle School from 2000-2004 is shown in the table below. Represent the data in a line graph. Label and title the line graph.

**Student Enrollment**

Year	Number of Students
2000	990
2001	1,010
2002	1,050
2003	1,100
2004	1,125



Write two valid conclusions that are supported by the data in the graph. Write the justification for each conclusion. In order to make a convincing argument, you need to have data to support your conclusions.

• Conclusion #1: \_\_\_\_\_

Justification:

• Conclusion #2: \_\_\_\_\_

Justification:

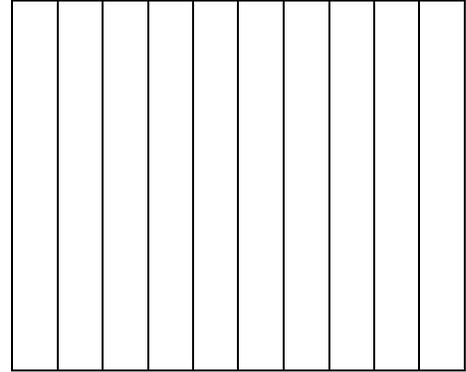
1. What mathematical concepts and vocabulary do I need to know to be able to work this problem?
2. Will the Grade 7 Mathematics Formula Chart be helpful on this problem? Why or why not?
3. What problem-solving strategy or strategies will I use to help solve this problem?
4. **Extension (7.11B):** If the enrollment trend shown in the data continues, what is a good prediction of the enrollment at Trenton Middle School in 2006? Show your work.



## GRADE 7 MATHEMATICS

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3. Four candidates for seventh grade class president at Smith Junior High received the following number of votes: Amy, 250 votes; Larry, 200 votes; Michael, 190 votes; and Alana, 175 votes. Make a table to show the data, then draw and label a bar graph to represent the data.

Write two valid conclusions that can be drawn from the data in the graph. Support each conclusion with data from the graph.

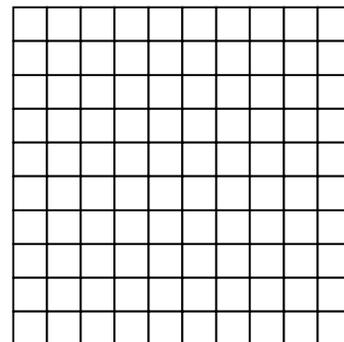
- Conclusion 1:

Supporting data:

- Conclusion 2:

Supporting data:

4. On Saturday it began raining at 8:00 a.m. and rained until 1 p.m. At 4:00 p.m. a local radio station reported the rainfall totaled 0.5 inch at 9:00 a.m., 1.25 inches at 10:00 a.m., 1.75 inches at 11 a.m., 3 inches at noon, and 3.5 inches at 1 p.m. Make a table to show the data, then draw and label a line graph to represent the data.

5. Write two valid conclusions that can be drawn from the data in the graph above. Support each conclusion with data from the graph.

- Conclusion 1:

Supporting data:

- Conclusion 2:

Supporting data:

## GRADE 7 MATHEMATICS

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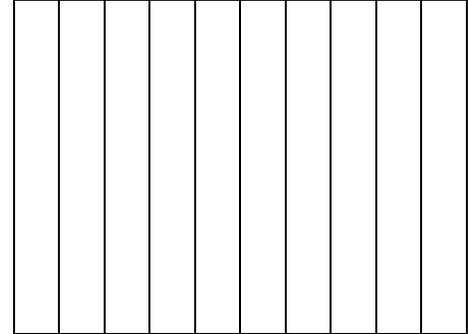
NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.11A/7.11B Homework 2

1. The four seventh grade homerooms at Star Junior High collected \$750 for a local charity. Homeroom 1 collected \$200, homeroom 2 collected \$130, homeroom 4 collected \$275 and the remainder was collected by homeroom 3. Make a table to show the data, then draw and label a bar graph to represent the data.

Write two valid conclusions that can be drawn from the data in the graph. Support each conclusion with data from the graph.

- Conclusion 1:

Supporting data:

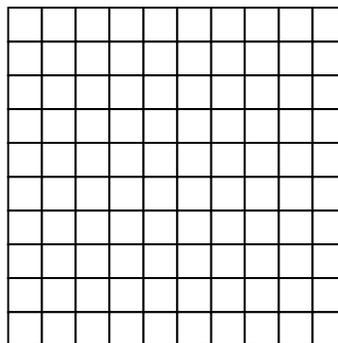
- Conclusion 2:

Supporting data:

2. The data in the table below shows the relationship between the measurements of a scale drawing in centimeters and the measurements of the actual figure in feet.

Centimeters	0	0.5	1	1.25	2	2.5	3
Feet	0	2	4	5	8	10	12

Draw and label a line graph to represent the data.



Write a valid conclusion that can be drawn from the data in the graph. Support the conclusion with data from the graph.

- Conclusion:

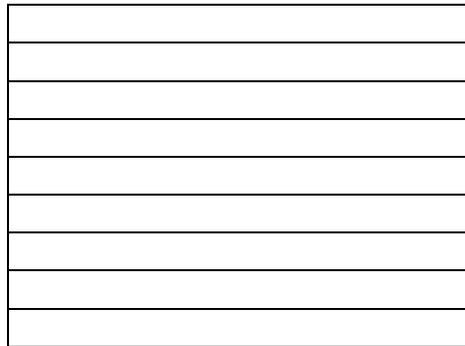
Supporting data:

## GRADE 7 MATHEMATICS

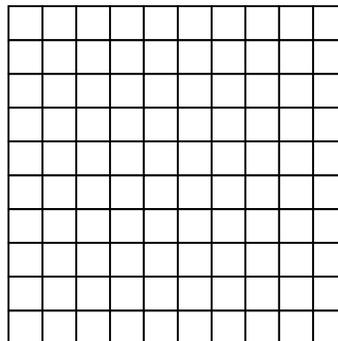
**(7.11) Probability and statistics.** The student understands that the way a set of data is displayed influences its interpretation. The student is expected to: (A) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem and leaf plot, circle graph, and Venn diagrams, and justify the selection; (B) make inferences and convincing arguments based on an analysis of given or collected data.

3. The scores Beth and Luis received on their first four math quizzes are given in the table. Draw and label a bar graph to display the data.

Quiz	1	2	3	4
Beth's Score	80	90	85	70
Luis' Score	85	75	90	85



4. One day in December it began snowing at 9:00 a.m. and snowed most of the day. On the 5:00 p.m. news, a local radio station reported there was an accumulation of 6 inches of snow at noon and a total accumulation of 12 inches of snow at 4:00 p.m., and then the snow had suddenly stopped. Draw and label a line graph to represent the snowfall for the day.



5. Write two valid conclusions that can be drawn from the data in the graph in #4 above. Support each conclusion with data from the graph.

- Conclusion 1:

Supporting data:

- Conclusion 2:

Supporting data:

## GRADE 7 MATHEMATICS

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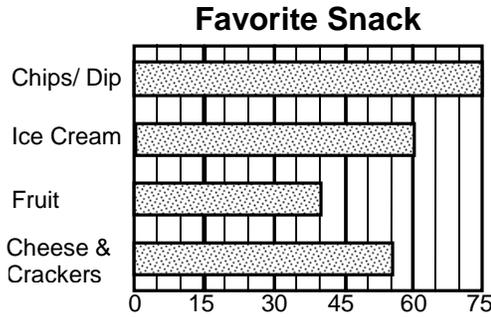
NAME \_\_\_\_\_

DATE \_\_\_\_\_

SCORE \_\_\_/5

### 7.11A/7.11B Homework 3

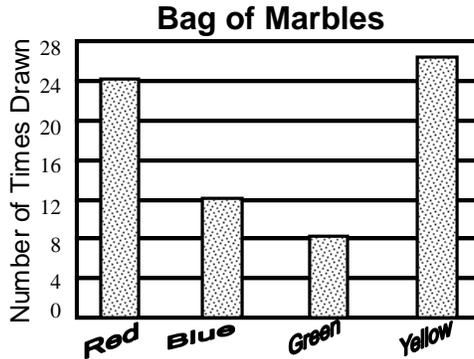
1. Students at Center Junior High were surveyed and asked about their favorite after school snack.



Based on the information in the bar graph, write three conclusions that are supported by the data.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

2. Karla had a bag with colored marbles in it. She drew out a marble, recorded its color, replaced the marble in the bag, and drew another marble. She repeated this process for 70 draws, recorded the data in a tally chart, and then drew the bar graph shown below to represent her data.



Karla made the following statements about the numbers of colored tiles in her bag. Which of the following are valid conclusions based on the data in the graph? Fill in the blank with Yes or No. Justify your decision on the line below each conclusion.

- \_\_\_\_\_ The bag contains twice as many red marbles as blue marbles.

\_\_\_\_\_

- \_\_\_\_\_ The bag contains twice as many blue marbles as green marbles.

\_\_\_\_\_

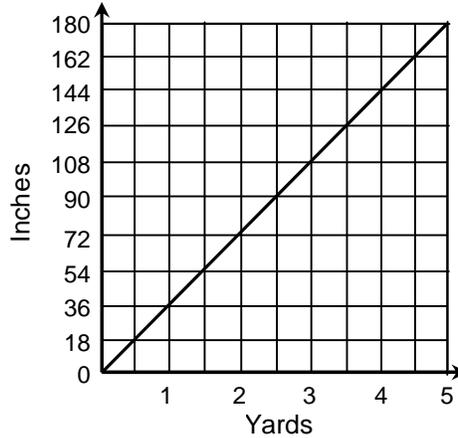
- \_\_\_\_\_ The least number of colored marbles in the bag is green.

\_\_\_\_\_

## GRADE 7 MATHEMATICS

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3. The graph below shows the relationship between yards and inches.

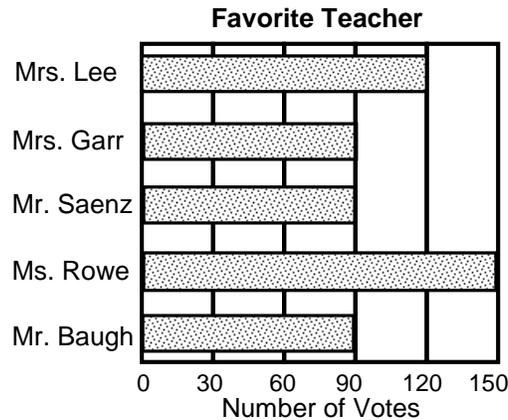


Write two conclusions that are NOT valid because they are not supported by the information on the graph.

a. \_\_\_\_\_.

b. \_\_\_\_\_.

4. Richland Junior High honors a teacher each year as “Favorite Teacher of the Year”. The students vote for this award. The votes for this year have been counted and the results are graphed below.



5. Complete the following statements so that they are reasonable statements based on the data in the graph in #4.

The three teachers that received the same number of votes were \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

Mr. Baugh received \_\_\_\_\_ less votes than Ms. Rowe.

A total of \_\_\_\_\_ votes were counted.

Mrs. Lee received \_\_\_\_\_ more votes than Mrs. Garr.