



**ALPHA PLUS**

**TEACHER'S GUIDE**

# Math 6



**SAMPLE FOR REVIEW**

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**SUCCESS** **OAS**  
*with*

**Oklahoma Academic Standards**



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**Math 6**

**Ensuring Student Success**  
*with*  
**Oklahoma Academic Standards**

*Written by Oklahoma Teachers for Oklahoma Teachers*

*Pam Garner*



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# SUCCESS *with* OAS

## *Math 6 by Pam Garner*

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## FOREWORD

Adopted in 2016 by the State Board of Education, the Oklahoma Academic Standards (OAS) mathematics objectives are measurably more rigorous in content and different in terms of vertical alignment than previous curriculum frameworks.

Immediately, Alpha Plus Educational Systems sought highly qualified teachers to develop a teaching and learning resource specifically aligned to the new standards. CEO Jan Barrick also enlisted my help and that of Dr. Frank Wang, President of the Oklahoma School of Science and Mathematics (OSSM), who is a nationally known, accomplished mathematics educator and an experienced textbook publisher. It has been my pleasure to help ensure the content is of high quality and will provide a solid mathematical foundation.

Written by Oklahoma teachers for Oklahoma teachers, the *Success with OAS: Alpha Plus Mathematics* series provides a robust set of resources relating mathematical skills to the real world of Oklahoma students.

-- Edna McDuffie Manning, *EdD.*, *Mathematics*  
Founder and President Emerita, Oklahoma School of Science and Mathematics

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## INTRODUCTION

The *Success with OAS: Alpha Plus Mathematics* framework for instruction, independent student work, and continuous review will prepare students for comprehensive assessments at each grade level. Following is a summary addressing the most effective way to use each element.

### Teacher's Guide

Objective Statement: At the beginning of each lesson, the OAS objective is stated as adopted. This is helpful when writing lesson plans and understanding the focus of the lesson.

Real-World Connections: Students must be engaged and must relate the concept to their daily lives. Connecting to a real-world application taps into students' prior knowledge and shows the practicality behind the concept. It is suggested that the teacher start with a relevant, age-appropriate game, class discussion, website or video, role-play, or other group activity. This will illustrate the need to learn the skill so that students can use it in their daily lives.

Vocabulary: A list of vocabulary words critical to each OAS Objective is provided, particularly those used in the state's *Test and Item Specifications*. A complete vocabulary definition can be found in the student workbook and in the comprehensive Glossary at the end of the book.

Modeling: The Modeling section provides step-by-step instructions for one or more ways to teach the objective and the skills related to the lesson. Teachers may use this to direct students and add more examples or details as needed for the teachers' lesson plans.

Extension Activities: This is a list of possible resources to enhance the objective lesson. Every author provided links to tools they use in class, to online content available at no charge for teacher use, and to other lesson-planning resources.

Answer Key: Every Teacher's Guide includes a complete Answer Key for each assessment item in the student workbook. The Answer Key for the Continuous Review designates what objectives are assessed.

Comprehensive Examination: A Comprehensive Examination was developed to resemble the state assessment and encompasses every objective taught. It can be used as a pre-test and post-test for the school year to better prepare students for state-mandated tests. The Answer Key provides the answers with objective numbers.

### **Student Workbook**

Objective Statement: At the beginning of each student lesson is the objective statement. It clearly defines the focus of the lesson.

Real-World Connections: Written in age-appropriate language, this section reminds students of prior knowledge they have on the topic and how they might use this skill in their daily lives. Relevance is essential to student engagement in the lesson. Teachers can highlight this scenario for the students with a game, role-play, or other group activity.

Vocabulary: Each lesson includes a vocabulary list with definitions for the words the students will encounter on state assessments. Students should also learn to use the Glossary in the back of the book.

Guided Practice: Every objective lesson includes a Guided Practice, which is a set of items available for use in class as part of, or after, instruction. The ten practice problems reflect every skill students will use when they work independently.

Independent Practice: The Independent Practice is a series of twenty questions and activities the student may do independently, either in the classroom or for homework. The Independent Practice can also be used for reinforcement or review as needed.

Continuous Review: At the end of each lesson, there is a Continuous Review with ten questions covering objectives taught previously in the book or aligned to key skills from previous grade level(s). The Answer Key designates the objective each question assesses. The Continuous Review is in sequence after each objective lesson or can be used as a weekly assessment to reinforce past skills.

**OAS Mathematics**
**Table of Contents**
**6th grade**

| Suggested Order | Objective Number | Objective Description                                                                                                                                                                                                                                                                     | Teacher Guide Page Number | Student Book Page Number |
|-----------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 1               | 6.N.1.1          | Represent integers with counters and on a number line and rational numbers on a number line, recognizing the concepts of opposites, direction, and magnitude; use integers and rational numbers in real-world and mathematical situations, explaining the meaning of 0 in each situation. | 1                         | 1                        |
| 2               | 6.N.1.2          | Compare and order positive rational numbers, represented in various forms, or integers using the symbols $>$ , $<$ , and $=$ .                                                                                                                                                            | 14                        | 11                       |
| 3               | 6.N.1.3          | Explain that a percent represents parts “out of 100” and ratios “to 100”.                                                                                                                                                                                                                 | 31                        | 21                       |
| 4               | 6.N.1.4          | Determine equivalencies among fractions, decimals, and percents. Select among these representations to solve problems.                                                                                                                                                                    | 45                        | 31                       |
| 5               | 6.N.1.5          | Factor whole numbers and express prime and composite numbers as a product of prime factors with exponents.                                                                                                                                                                                | 59                        | 41                       |
| 6               | 6.N.1.6          | Determine the greatest common factors and least common multiples. Use common factors and multiples to calculate with fractions, find equivalent fractions, and express the sum of two-digit numbers with a common factor using the distributive property.                                 | 71                        | 51                       |
| 7               | 6.N.2.1          | Estimate solutions to addition and subtraction of integer problems in order to assess the reasonableness of results.                                                                                                                                                                      | 89                        | 61                       |

**OAS Mathematics**
**Table of Contents**
**6th grade**

| Suggested Order | Objective Number | Objective Description                                                                                                                                                                  | Teacher Guide Page Number | Student Book Page Number |
|-----------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 8               | 6.N.2.2          | Illustrate addition and subtraction of integers using a variety of representations.                                                                                                    | 103                       | 71                       |
| 9               | 6.N.2.3          | Add and subtract integers; use efficient and generalizable procedures including but not limited to standard algorithms.                                                                | 121                       | 83                       |
| 10              | 6.N.3.1          | Identify and use ratios to compare quantities. Recognize that multiplicative comparison and additive comparison are different.                                                         | 135                       | 93                       |
| 11              | 6.N.3.2          | Determine the unit rate for ratios.                                                                                                                                                    | 148                       | 103                      |
| 12              | 6.N.3.3          | Apply the relationship between ratios, equivalent fractions and percents to solve problems in various contexts, including those involving mixture and concentrations.                  | 161                       | 113                      |
| 13              | 6.N.3.4          | Use multiplicative reasoning and representations to solve ratio and unit rate problems.                                                                                                | 175                       | 123                      |
| 14              | 6.N.4.1          | Estimate solutions to problems with whole numbers, decimals, fractions, and mixed numbers and use the estimates to assess the reasonableness of results in the context of the problem. | 189                       | 133                      |
| 15              | 6.N.4.2          | Illustrate multiplication and division of fractions and decimals to show connections to fractions, whole number multiplication, and inverse relationships.                             | 205                       | 143                      |
| 16              | 6.N.4.3          | Multiply and divide fractions and decimals using efficient and generalizable procedures.                                                                                               | 232                       | 159                      |



**OAS Mathematics**
**Table of Contents**
**6th grade**

| Suggested Order | Objective Number | Objective Description                                                                                                                                                                                                                          | Teacher Guide Page Number | Student Book Page Number |
|-----------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 17              | 6.N.4.4          | Solve and interpret real-world and mathematical problems including those involving money, measurement, geometry, and data requiring arithmetic with decimals, fractions, and mixed numbers.                                                    | 254                       | 171                      |
| 18              | 6.A.1.1          | Plot integer- and rational-valued (limited to halves and fourths) ordered-pairs as coordinates in all four quadrants and recognize the reflective relationships among coordinates that differ only by their signs.                             | 268                       | 181                      |
| 19              | 6.A.1.2          | Represent relationships between two varying quantities involving no more than two operations with rules, graphs, and tables; translate between any two of these representations.                                                               | 294                       | 195                      |
| 20              | 6.A.1.3          | Use and evaluate variables in expressions, equations, and inequalities that arise from various contexts, including determining when or if, for a given value of the variable, an equation or inequality involving a variable is true or false. | 314                       | 209                      |
| 21              | 6.A.2.1          | Generate equivalent expression and evaluate expressions involving positive rational numbers by applying the commutative, associative, and distributive properties and order of operations to solve real-world mathematical problems.           | 335                       | 223                      |
| 22              | 6.A.3.1          | Represent real-world or mathematical situations using expressions, equations and inequalities involving variable and rational numbers.                                                                                                         | 349                       | 233                      |

**OAS Mathematics**
**Table of Contents**
**6th grade**

| Suggested Order | Objective Number | Objective Description                                                                                                                                                                                                                                                                                                                                               | Teacher Guide Page Number | Student Book Page Number |
|-----------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 23              | 6.A.3.2          | Use number sense and properties of operations and equality to solve real-world and mathematical problems involving equations in the form $x + p = q$ and $px = q$ , where $x$ , $p$ , and $q$ are nonnegative rational numbers. Graph the solution on a number line, interpret the solution in the original context, and assess the reasonableness of the solution. | 368                       | 243                      |
| 24              | 6.GM.1.1         | Develop and use formulas for the area of squares and parallelograms using a variety of methods including but not limited to the standard algorithm.                                                                                                                                                                                                                 | 386                       | 255                      |
| 25              | 6.GM.1.2         | Develop and use formulas to determine the area of triangles.                                                                                                                                                                                                                                                                                                        | 400                       | 265                      |
| 26              | 6.GM.1.3         | Find the area of right triangles, other triangles, special quadrilaterals, and polygons that can be decomposed into triangles and other shapes to solve real-world and mathematical problems.                                                                                                                                                                       | 414                       | 275                      |
| 27              | 6.GM.2.1         | Solve problems using the relationships between the angles (vertical, complementary, and supplementary) formed by intersecting lines.                                                                                                                                                                                                                                | 431                       | 289                      |
| 28              | 6.GM.2.2         | Develop and use the fact that the sum of the interior angles of a triangle is $180^\circ$ to determine missing angle measure in a triangle.                                                                                                                                                                                                                         | 448                       | 301                      |
| 29              | 6.GM.3.1         | Estimate weights, capacities, and geometric measurements using benchmarks in customary and metric measurement systems with appropriate units.                                                                                                                                                                                                                       | 464                       | 313                      |

**OAS Mathematics**
**Table of Contents**
**6th grade**

| Suggested Order | Objective Number | Objective Description                                                                                                                                                                                             | Teacher Guide Page Number | Student Book Page Number |
|-----------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 30              | 6.GM.3.2         | Solve problems in various real-world and mathematical contexts that require the conversion of weights, capacities, geometric measurements, and time within the same measurement systems using appropriate units.  | 483                       | 325                      |
| 31              | 6.GM.4.1         | Predict, describe, and apply translations (slides), reflections (flips), and rotations (turns) to a two-dimensional figure.                                                                                       | 497                       | 335                      |
| 32              | 6.GM.4.2         | Recognize that translations, reflections, and rotations preserve congruency and use them to show that two figures are congruent.                                                                                  | 521                       | 351                      |
| 33              | 6.GM.4.3         | Use distances between two points that are either vertical or horizontal to each other (not requiring the distance formula) to solve real-world and mathematical problems about congruent two-dimensional figures. | 543                       | 369                      |
| 34              | 6.GM.4.4         | Identify and describe the line(s) of symmetry in two-dimensional shapes.                                                                                                                                          | 562                       | 383                      |
| 35              | 6.D.1.1          | Calculate the mean, median, and mode or a set of real-world data.                                                                                                                                                 | 578                       | 395                      |
| 36              | 6.D.1.2          | Explain and justify which measure of central tendency (mean, median, or mode) would provide the most descriptive information for a given set of data.                                                             | 592                       | 405                      |
| 37              | 6.D.1.3          | Create and analyze box and whisker plots observing how each segment contains one quarter of the data.                                                                                                             | 603                       | 413                      |

**OAS Mathematics**
**Table of Contents**
**6th grade**

| Suggested Order | Objective Number | Objective Description                                                                                                                                                                                                             | Teacher Guide Page Number | Student Book Page Number |
|-----------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| 38              | 6.D.2.1          | Represent possible outcomes using a probability continuum from impossible to certain.                                                                                                                                             | 618                       | 423                      |
| 39              | 6.D.2.2          | Determine the sample space for a given experiment and determine which members of the sample space are related to certain events. Sample space may be determined by the use of tree diagrams, tables or pictorial representations. | 634                       | 433                      |
| 40              | 6.D.2.3          | Demonstrate simple experiments in which the probabilities are known and compare the resulting relative frequencies with the known probabilities. recognizing that there may be differences between the two results.               | 650                       | 439                      |

## Teacher's Guide

**6.N.1.1 Represent integers with counters and on a number line and rational numbers on a number line, recognizing the concepts of opposites, direction, and magnitude; use integers and rational numbers in real-world and mathematical situations, explaining the meaning of 0 in each situation.**

### Real-World Connections

Different situations in everyday life may be represented by positive or negative numbers. For example, you may hear the temperature outside is four below zero. This would be represented by the number  $(-4)$ . If Jana deposited ten dollars in her savings account, that number would be  $(+10)$ . A withdrawal of seven dollars would be represented by  $(-7)$ . Students will represent integers with counters and on a number line and rational numbers on a number line, recognize the concepts of opposites, direction, and magnitude.

### Vocabulary

integers, counters, number line, rational numbers, opposites, direction, magnitude, positive numbers, negative numbers

### Modeling

**Step 1:** Tell students integers are the set of whole numbers including positives, negatives, and zero. Positive numbers are greater than zero, and negative numbers are less than zero. Zero itself is a neutral number and takes no sign. You can graph positive and negative numbers on a number line.

**Step 2:** Show students a number line and discuss how for every positive number there is an opposite negative number.

**Step 3:** Remind students integers are always whole numbers.

## Teacher's Guide 6.N.1.1

**Step 4:** Discuss adding integers.

To add integers, you must pay close attention to the signs of the numbers you are adding.

- Adding integers of the same sign results in an answer with the same sign.

$$-a \text{ plus } -b = -(a \text{ plus } b) \quad \text{or} \quad +a \text{ plus } +b = +(a \text{ plus } b)$$

- Adding integers of different signs results in a question. Which number is larger? The answer must have the same sign as the larger number. However, ignore the addition operations and subtract the smaller from the larger. For example, if you are adding  $5 + (-7)$ , which is the larger number? 7 is larger. So, the answer will be negative. What is the answer?  $7 - 5 = 2$ . Therefore, the answer is -2. This problem may be illustrated on a number line.

**Step 5:** Ask students to solve the following problem.

The temperature of the water outside on Tuesday started at 0 degrees Celsius. It was raised 4 degrees and then lowered 9 degrees. What was the new temperature of the water?

$$0^{\circ} + (+4^{\circ}) + (-9^{\circ}) \quad \text{Problem}$$

$$4^{\circ} + (-9^{\circ}) \quad \text{Subtract smaller (4) from larger (9)}$$

Keep the sign of the larger number.

**-5°** is the answer.

**Step 6:** Discuss magnitude. It is also known as absolute value. Magnitude is always a positive number because it represents how far away from zero the number is located.

### Extension Activities

Oklahoma State Department of Education objective analysis of 6.N.1.1

<http://okmathframework.pbworks.com/w/page/111429742/6-N-1-1>

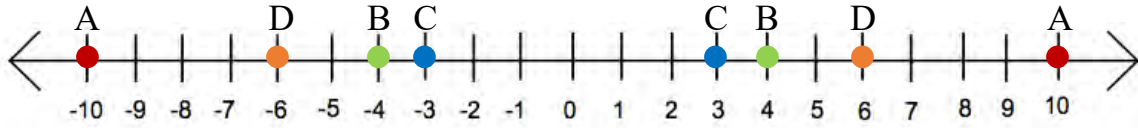
To use number line to compare and order positive rational numbers go to:

[http://digitalcommons.trinity.edu/cgi/viewcontent.cgi?article=1196&context=educ\\_understandings](http://digitalcommons.trinity.edu/cgi/viewcontent.cgi?article=1196&context=educ_understandings)

# Answer Key 6.N.1.1

## Guided Practice

- 8
- 3 and -3
- a. -9      b. 9
- 



- +7
- +10
- 8, 8
- 



- 23
- B

## Independent Practice

- 4



- +8



- 3



- 1
- 0
- 6
- C
- D

## Answer Key 6.N.1.1

### Independent Practice

9. -9
10. +5
11. Related by having the same magnitude or the same absolute value.
12. A
13. +24
14. -43
15. +12
16. -10
17. -576
18. -43
19. Wednesday
20. 10

### Continuous Review (5<sup>th</sup> Grade Review)

1. 50
2. 21
3. 9
4. 6
5. 175
6.  $\frac{6}{5} = 1\frac{1}{5}$
7. 20.706
8. 23, 30, 38, add an additional number to the previous rule
9. 10
10. 54 pieces of candy



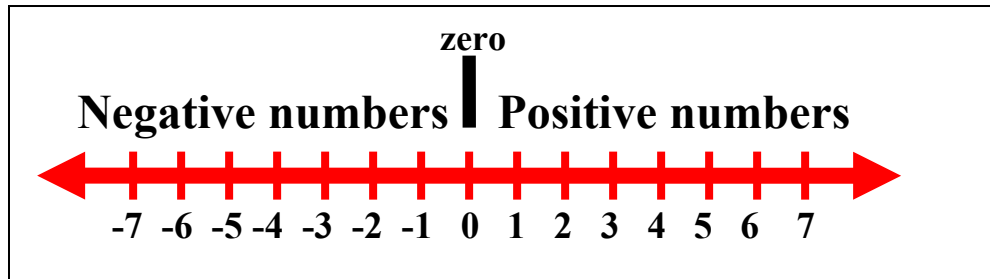
**6.N.1.1 Represent integers with counters and on a number line and rational numbers on a number line, recognizing the concepts of opposites, direction, and magnitude; use integers and rational numbers in real-world and mathematical situations, explaining the meaning of 0 in each situation.**

**Real-World Connections**

Your friend tells you they live five houses away from the park, but he must be wrong because you live five houses away from the park. There is no way both of you can live the same distance away, or can you? Actually, both of you can be right. Both houses can be five houses away, but the houses are in different directions. It is the same with numbers. Another example is if Jana put \$5 in her savings account, that would be represented as (+5). If Jana withdrew \$7 from her savings account it would be represented as (-7). For every whole number on the number line, there is an opposite number on the other side of zero.

**Vocabulary**

|                                   |                                                                                                                                                           |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>integers</b>                   | positive and negative whole numbers including zero                                                                                                        |
| <b>rational number</b>            | the set of numbers that can be written in the form $\frac{a}{b}$ , where $a$ and $b$ are integers and $b$ does not equal zero; these include the integers |
| <b>magnitude</b>                  | the distance of an integer from zero; this is also known as absolute value                                                                                |
| <b>opposites</b>                  | two numbers that are an equal distance from zero on a number line                                                                                         |
| <b>direction on a number line</b> | adding and subtracting from a starting point                                                                                                              |
| <b>absolute value</b>             | the distance of an integer from zero; this is also known as magnitude                                                                                     |
| <b>positive number</b>            | an integer that is greater than zero                                                                                                                      |
| <b>negative number</b>            | an integer that is less than zero                                                                                                                         |

**Examples**

For every positive number on this number line, there is an opposite number on the other side of zero.

If the temperature rises six degrees and drops six degrees, both measurements have the same magnitude, or absolute value. They are both six degrees away from zero. One is moving forward from zero as a positive number; the other is moving backwards from zero as a negative number.

**Guided Practice (6.N.1.1)**

Name: \_\_\_\_\_

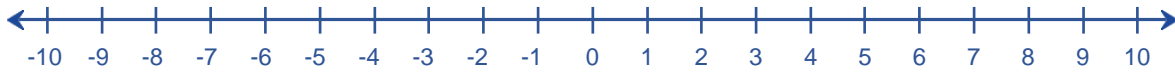
For questions 1 through 7, use the number line to solve the following problems. Use counters if needed.



1. What is the magnitude of 8 and -8? \_\_\_\_\_
  
2. What are the two numbers that are 3 away from 0? \_\_\_\_\_
  
3. a) How would you write a decrease of 9? \_\_\_\_\_  
b) What is the opposite of that number? \_\_\_\_\_
  
4. Graph each integer and its opposite on the number line.  
A 10  
B 4  
C 3  
D 6
  
5. Nathan's football team gained 7 yards on the running play. Write this number as an integer.  
\_\_\_\_\_
  
6. Show how you would represent a \$10 increase in price.  
\_\_\_\_\_
  
7. What is the absolute value of 8? What is the absolute value of -8?  
\_\_\_\_\_

Answer the following questions.

8. Show a gain of 4 on the number line below.



9. Sara donated 23 books to her local elementary school. What integer is represented by Sara's actions?

\_\_\_\_\_

10. Select the group of counters that represent a loss of 7.

- A 7 green circles, each containing a white plus sign (+).
- B 7 red circles, each containing a white minus sign (-).
- C 4 green circles with plus signs and 3 red circles with minus signs.
- D 4 red circles with minus signs and 3 green circles with plus signs.

**Independent Practice**

Name: \_\_\_\_\_

**6.N.1.1 Represent integers with counters and on a number line and rational numbers on a number line, recognizing the concepts of opposites, direction, and magnitude; use integers and rational numbers in real-world and mathematical situations, explaining the meaning of 0 in each situation.**

*For questions 1 through 3, place integers on the number lines.*

1. +4 and -4 Name the magnitude? \_\_\_\_\_



2. A gain of 8 points



3. A loss of 3 feet



*For questions 4 and 5, use the number line provided to name the positive or negative integer.*





4. What integer is 6 units to the left of 5?  
\_\_\_\_\_

5. What integer is 3 units to the right of -3?  
\_\_\_\_\_

**Independent Practice (6.N.1.1)**

Name: \_\_\_\_\_

For questions 6 through 8, use counters to answer the questions.

6. What is the magnitude of the counters if  represents -1 and  represents +1? \_\_\_\_\_



7. Select the group of counters that represent 7 feet above sea level.



8. Select the group of counters that represent 5 degrees below freezing.



For questions 9 through 11, name the positive or negative integer.

9. Joe spent \$9.

\_\_\_\_\_

10. The temperature increased 5 degrees.

\_\_\_\_\_

11. On a number line, how are the locations of 4 and -4 related?

\_\_\_\_\_

**Independent Practice (6.N.1.1)**

Name: \_\_\_\_\_

*For questions 12 through 18, name the positive or negative integer.*

12. A group of friends play a game of golf. After the second hole, their scores were -4, 3, -2, 0. Which was the lowest score?

- A -4
- B 3
- C -2
- D 0

13. A student made 24 chocolate chip cookies for the class party. Name a positive or negative integer to represent the number of cookies made.

\_\_\_\_\_

14. Rio de Janeiro, Brazil is 43 degrees south of the equator. Name a positive or negative integer to represent the location of Rio.

\_\_\_\_\_

15. Samantha invited 12 friends to her birthday party.

\_\_\_\_\_

16. The temperature dropped 10 degrees in one hour.

\_\_\_\_\_

17. What is the opposite of 576?

\_\_\_\_\_

18. What integer represents forty-three feet below sea level?

\_\_\_\_\_

**Independent Practice (6.N.1.1)**

Name: \_\_\_\_\_

*For questions 19 and 20, name the positive or negative integer.*

19. The table shows temperatures for a five-day period.

| Day              | Temperature °F |
|------------------|----------------|
| <b>Sunday</b>    | - 3            |
| <b>Monday</b>    | 0              |
| <b>Tuesday</b>   | -4             |
| <b>Wednesday</b> | 3              |
| <b>Thursday</b>  | 2              |

Which day had the highest temperature?

\_\_\_\_\_

20. What is the absolute value of +10 and -10?

\_\_\_\_\_



*Use the order of operations to evaluate each expression.*

1.  $12 \div 2 \times (6 + 3) - 4$  \_\_\_\_\_

2.  $(27 - 2) \div 5 \times 4 + 1$  \_\_\_\_\_

3.  $12 - (5 + 4) \times 2 \div 6$  \_\_\_\_\_

*Answer the following questions. Simplify when needed.*

4.  $12 \times 0.5 =$  \_\_\_\_\_

5.  $x \div 5 = 35, x =$  \_\_\_\_\_

6.  $\frac{4}{5} + \frac{2}{5} =$  \_\_\_\_\_

7.  $12.456 + 6.25 + 2 =$  \_\_\_\_\_

8. What are the next 3 numbers in this sequence?

2, 3, 5, 8, 12, 17, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Answer: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ What is the pattern? \_\_\_\_\_

9. Estimate for  $842 \div 76$ .

\_\_\_\_\_

10. Victoria has 972 chocolate pieces of candy for a class party. She wants to make her 18 classmates individual bags of candy for the class party. How many pieces of candy will she put in each bag?

\_\_\_\_\_

# 6<sup>th</sup> GRADE

# COMPREHENSIVE

# ASSESSMENT

1. Select a group of counters that represents 4 feet above sea level.



2. All the statements are true *except*

A  $\frac{6}{12} = 50\%$

B  $\frac{1}{3} < 66\%$

C  $\frac{5}{8} < 0.87$

D  $0.75 > \frac{9}{12}$

3. Place these numbers in descending order:

$$\frac{1}{2}, \frac{4}{5}, \frac{1}{4}, \frac{9}{10}$$

A  $\frac{9}{10}, \frac{4}{5}, \frac{1}{2}, \frac{1}{4}$

B  $\frac{3}{4}, \frac{9}{10}, \frac{1}{4}, \frac{1}{2}$

C  $\frac{1}{4}, \frac{1}{2}, \frac{4}{5}, \frac{9}{10}$

D  $\frac{1}{2}, \frac{9}{10}, \frac{1}{4}, \frac{3}{4}$

4. All of the numbers are incorrect to represent 56 out of 100 *except*

A 56%

B 0.56

C .56%

D  $\frac{56}{100}$

5. A student needed to make a 75% on a test to make a “B” in science class. Which of the following would the student need to make?

A  $\frac{7}{12}$

B  $\frac{6}{8}$

C  $\frac{11}{12}$

D  $\frac{7}{8}$

6. What is the prime factorization of 3,087?

A  $3^2 \times 7^2$

B  $3^3 \times 7^2$

C  $3^2 \times 7^3$

D  $3^3 \times 7^3$

50. Bryan was ordering lunch from the following choices.

| Lunch Choices    |        |       |         |            |         |
|------------------|--------|-------|---------|------------|---------|
| <b>Sandwich:</b> | Turkey | Ham   | Chicken | Roast beef | Veggies |
| <b>Bread:</b>    | White  | Wheat | Pita    |            |         |

If he had to choose one sandwich type and one bread, how many different combinations could he make?

- A 8
- B 12
- C 15
- D 18



## OAS Mathematics Glossary

### A

**acute angle:** an angle with a measure greater than  $0^\circ$  but less than  $90^\circ$

**addends:** are the digits in an addition problem that are being added

**absolute value:** the absolute value of a real number is its (non-negative) distance from 0 on a number line; this is also known as magnitude

**addition:** to join two or more numbers or quantities to get one number called a sum or total

**additive comparison problems:** the underlying question is what amount would be added to one quantity to result in the other

**algebraic expression:** a mathematical phrase combining numbers and/or variables; an expression does not contain equality or inequality signs but may include other operators and grouping symbols; both sides of an equation are expressions

**algebraic equation:** includes mathematical signs, symbols, and numbers connected with an equal sign (=); an algebraic equation contains an equal sign

**algorithm:** a step-by-step process for solving a problem

**angle:** a figure formed by two rays with a common endpoint called the vertex and it is measured in degrees ( $^\circ$ )

**angle ruler:** similar to a protractor and is used to measure and draw angles

**analog clock:** a clock with hour, minute, and, sometimes, second hands

**approximation:** the estimate a number, amount or total, often rounding it off to the nearest 10 or 100

**area:** the space occupied by a flat shape (closed two-dimensional shape) or the surface of an object; the number of unit squares that cover the surface of a closed figure; measured in square units such as square centimeters, square feet, square inches, etc.

**area models:** a model using area to show multiplication or division

**area of a circle:** the area of the interior of the circle, which can be found with  $A = \pi r^2$  where  $r$  is the radius and  $\pi$  the irrational number "pi"

**area of a parallelogram:** the area of the interior of the parallelogram; is measured in square units; can be found by using the formula  $A = bh$

**area of similar triangles:** if two similar triangles have sides in the ratio  $x:y$ , then their areas are in the ratio  $x^2:y^2$

**area of a square or rectangle:** the area of the interior of the square or rectangle; is measured in square units; can be found by using the formula  $A = l \times w$  or  $A = lw$ ; area of a square can also be found using the formula  $A = s^2$

**area of a trapezoid:** the sum of its bases multiplied by the height of the trapezoid then divided by 2; the area is measured in square units and can be found using the formula  $A = \frac{1}{2}(b_1 + b_2)h$

## OAS Mathematics Glossary

**area of triangles:** amount of surface a triangle covers and measured in square units; can be found using the formula  $A = \frac{1}{2}bh$

**arrays:** an orderly arrangement of objects arranged in rows or columns

**ascending:** increasing in size

**ascending order:** numbers arranged from smallest to largest

**associative property of addition:** states that the sum remains the same regardless of how they are grouped,  $(a + b) + c = a + (b + c)$

**associative property of multiplication:** states that the product remains the same regardless of how they are grouped,  $(a \times b) \times c = a \times (b \times c)$

**attributes:** characteristics

**average:** a number expressing the central or typical value in a set of data, in particular- the mode, median, or most commonly the mean, which is found by dividing the sum of the values in the set by the number of values in the set

**axis:** a real or imaginary reference line

### B

**bar graph:** a graph that compares data from several situations using vertical or horizontal bars

**bar notation:** a horizontal bar over decimals to indicate that they repeat

**base:** the number or variable representing the factor being multiplied

**base area:** the area of the base denoted with  $B$

**base 10 blocks:** blocks which show base-10 number values

**base of a figure:** a face on which the 3D figure sits

**benchmark:** something by which other things can be measured or compared

**benchmark fractions:** fractions that are easy to visualize or represent, such as,  $\frac{1}{4}$ ,  $\frac{1}{3}$ ,  $\frac{1}{2}$ ,  $\frac{2}{3}$ , and  $\frac{3}{4}$

**biased:** sample in which individuals, items, or data were not equally likely to have been chosen

**box and whisker plot:** a diagram or graph using a number line to show the distribution of a set of data which displays the median, upper and lower quartiles, and the maximum and minimum values of the data

### C

**calculate:** to work something out, a mathematical operation

**calculator:** electronic device used for making mathematical calculations

**capacity:** the maximum amount or number that can be contained or accommodated

**cent:** equals one hundredth of a dollar (100 cents equal one dollar)

**centimeter:** a length of measurement that is equal to 1/100 (0.01) of a meter; it is part of the metric system of measurement, which is used around the world

## OAS Mathematics Glossary

**transversal:** a line that cuts across two or more (usually parallel) lines

**trapezoid:** a quadrilateral only having two sides that are parallel

**tree diagram:** a diagram shaped like a tree used to display sample space by using one branch for each possible outcome in a probability exercise

**triangle:** a polygon with three sides

**triangular prism:** a solid figure with two faces that are triangles

**triangular pyramid:** a solid figure where all the faces are triangles

**two-dimensional figure:** a figure having two dimensions of length and width

**two-step operation:** an equation that takes two steps to solve

### U

**unknowns:** are letters that represent a number that you do not know or an unknown quantity

**unit fractions:** a fraction with a numerator of 1, such as  $\frac{1}{3}$  or  $\frac{1}{5}$

**unit pricing:** a unit price compares the price of something to a unit of measurement; for example, cost per kilogram or cost per liter or gallon

**unit rate:** a comparison of two measurements in which one of the terms has value of one

**upper quartile:** the median of the upper half of data (Q2)

### V

**value:** the numerical worth or amount

**variable:** a symbol used to represent a quantity that can vary, or change; usually a letter but may also be a picture or box

**Venn diagram:** a diagram that uses circles that overlap to organize and show data

**vertex:** the point at which two or more-line segments, edges, lines, or ray meet to form an angle (plural: vertices)

**vertical:** in an up-down direction or position; upright.

**vertical angles:** pairs of opposite congruent angles formed by the intersection of straight lines and they share a common vertex

**vertices:** a point where:

- two or more rays or the sides of an angle meet
- the adjacent sides of a polygon meet
- the edges of a solid figure meet

**volume:** the number of cubic units needed to fill a solid figure (the formula for the volume of rectangular prisms is length  $\times$  width  $\times$  height also written as  $V = l \times w \times h$  or  $V = lwh$ )



### W

**weight:** how heavy an object is, such as ounce (oz), pound (lb), and ton (T)

**whole number:** positive numbers, including zero, without any decimal or fractional parts. (ex: 0, 1,2,3,4,5, ....)

**whole number exponents:** the numbers 0, 1, 2, 3...that indicate how many times the base is used as a factor, e.g., in  $4^3 = 4 \times 4 \times 4 = 64$ , the exponent 3, indicating that 4 is repeated as a factor three times

**wide division:** a strategy to use to solve division problems, instead of long division

**width:** breadth/distance across from side to side

**withdrawal:** money taken out of a bank or money removed from a saving account or a checking account

**word form:** a number written out in words to represent the value of the digits

**word problem:** a math problem presented as a scenario in text form with a variety of number sentences

### X

**x-axis:** the horizontal number line of a coordinate plane used to show horizontal distance

**x-coordinate:** the first number in an ordered pair, it shows the distance a point is along the horizontal axis

**x-intercept:** where the line crosses the  $x$ -axis,  $y = 0$ , when in standard form it is  $C/A$

### Y

**y-axis:** the vertical number line of a coordinate plane used to show vertical distance

**y-coordinate:** the second number in an ordered pair, it shows the distance a point is along the vertical axis

**y-intercept:** where the line crosses the  $y$ -axis,  $x = 0$ , when in standard form it is  $C/B$ , when in slope-intercept form it is  $b$

**yard:** 1 yard is equivalent to 3 feet or 36 inches

### Z

**zero:** the numeral 0, used as a place holder (nothing, none, nil, naught)



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