A+ **ALPHA PLUS**

TEACHER'S GUIDE

Math 8

SUCCESS with OAS

Oklahoma Academic Standards

TEACHER'S GUIDE

SUCCESS with OAS

Math 8

Ensuring Student Success
with
Oklahoma Academic Standards

Written by Oklahoma Teachers for Oklahoma Teachers

Donna Cook

A+

SUCCESS with OAS

Donna Cook recieved her B.A in Math Education in 2000, and her master's degree in 2013 from Cameron University. She currently sits on the Board of Directors for the Oklahoma Council of Teachers of Mathematics.

Ms. Cook was a nominee for the Presidential Award of Excellence in Math and Science Teaching in 2015. She was the Lawton Public School Teacher of the Year for 2016.

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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　　　8th grade

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Teacher's Guide

> **PA.A.1.1 Recognize that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable.**

Real-World Connections

Functions are important as mathematical representations of input/output relationships, but they are also found in many aspects of your daily lives. The amount of gas that is put into a car, input, determines the number of miles that the car can go, output. If someone wants a drink or snack from a vending machine, the amount of money put into the machine (input) determines what can be purchased (output). A person's weekly salary is a function of the number of hours worked (input) and their weekly pay (output). When looking at a function, there is a direct relationship between the input and the output. The input value occurs independent of the output, and is therefore the independent variable. While the output value is dependent on the input and is therefore the dependent variable. Since this relationship is a direct relationship, there can be only one output for each individual input.

Vocabulary

function, domain, range, variable, independent variable, dependent variable

Modeling

> **Step 1:** Discuss an independent variable.
> An independent variable occurs in isolation, despite any other occurrence. Although this happens without an effect of something else, it may affect the outcome of another occurrence.
>
> **Step 2:** Discuss a dependent variable.
> A dependent variable occurs because of something else. It will change based on each individual independent variable.
>
> **Step 3:** Discuss a function.
> A function is when each independent variable produces a unique dependent variable. The parts of a function are the independent variable (domain, x value, or input) and a dependent variable (range, y value, or output). Where each input has one and only one output.

Teacher's Guide   PA.A.1.1

    Step:4 Summarize the lesson with the students. Students need to understand:

- What a dependent variable is, how to identify it, and its relationship to the independent variable.
- What an independent variable is, how to identify it, and its relationship to the dependent variable.
- What a function is and how to identify it.

Extension Activities

Oklahoma State Department of Education objective analysis of PA.A.1.1

    http://okmathframework.pbworks.com/w/page/112827598/PA-A-1-1

Students can create input/output tables or function machines.

Students can make list of independent and dependent variables that occur in real world situations.

Answer Key   PA.A.1.1

Guided Practice

	x, input, domain, independent variable	function	y, output, range, dependent variable
1.	5	$y = 2x$	10
2.	21	$y = \frac{1}{3}x + 2$	9
3.	3	Answers may vary	12

4. # of students, independent and # of rooms, dependent
5. type of booth and the # of booths, independent and # of volunteers per booth and the total number of volunteers, dependent
6. 15, dependent
7. 22, independent
8. 40, dependent
9. Yes
10. No

Independent Practice

1. 9, 30
2. 4, 6
3. 75, 10
4. 13, 12
5. $y = 2(x + 4)$ or $2x + 8$
6. $y = \frac{1}{4}x - 6$
7. $y = 3(x - 2)$ or $3x - 6$
8. $y = \frac{1}{3}x + 7$
9. # of people attending, independent and # of cabins needed, dependent
10. # of students attending and # of parents per bus, independent and # of buses needed and total # of parents needed, dependent
11. 20, dependent
12. -1, independent
13. -1, dependent
14. -17, independent
15. 7, independent
16. 56, dependent
17. No

Answer Key   PA.A.1.1

Independent Practice

18 . Yes
19. 1 hour 12 minutes, rate = independent, time = dependent
20. $32.50, a = independent, c = dependent

Continuous Review

1.   (PA.N.1.1) m^9
2.   (PA.N.1.1) b^4
3.   (PA.N.1.2) 1.706×10^6
4.   (PA.N.1.3) 3.0×10^{-1}
5.   (PA.N.1.4) (PA.N.1.5) Rational, Rational, 16.6, Rational
6.   (PA.N.1.4) (PA.N.1.5) Irrational, Rational, $10\sqrt{2}$, Irrational
7.   (PA.N.1.5) $9\sqrt{3}$
8.   (PA.N.1.5) ≈ 9, between 9 and 10
9.   (PA.N.1.5)


```
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   0       S  1   A M      2
```
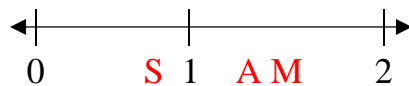
10. (PA.A.1.1)   No, the height of the tree is dependent on the amount
                             of rainfall in that the more it rains the taller the tree is.

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> **PA.A.1.1 Recognize that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable.**

Real-World Connections

Functions are important as mathematical representations of input/output relationships, but they are also found in many aspects of our daily lives. The amount of gas that is put into a car (input) determines the number of miles that the car can go (output). A person's weekly salary is a function of the number of hours worked (input) and their weekly pay (output). When looking at a function, there is a direct relationship between the input and the output. The input value occurs independent of the output, and is therefore the independent variable. While the output value is dependent on the input and is therefore the dependent variable. Since this relationship is a direct relationship, there can only be one output for each individual input.

Vocabulary

function	a rule that assigns to every element of one set (the domain) exactly one element of another set (the range) often thought of as an "input/output" rule, as in every input determines an output
independent variable/domain (x)	the set of "input" or argument values for which the function is defined or the quantity whose value is changed
dependent variable/range (y)	set of all "output" or possibilities after substituting the domain or the quantity that is affected when the input or independent variable is changed
variable	letter or symbol that represents a quantity that can change or that may take on different values

Guided Practice (PA.A.1.1)   Name _____

Complete the following table.

	x, input, domain, independent variable	function	y, output, range, dependent variable
1.	5	$y = 2x$	
2.		$y = \frac{1}{3}x + 2$	9
3.	3		12

Identify the independent and dependent variables in the following scenarios.

4. The Oklahoma State FFA Convention will be at the Cox Center® in Oklahoma City. 240 students from across the state of Oklahoma are attending the convention. Each room will hold 4 students.

   _____

5. CAPS Middle School in Norman is hosting a Carnival for the elementary students as a fundraiser. They will need 150 booths in order to have a successful carnival. 50 of the booths requires 3 volunteers and 100 booths require 2 volunteers based on the type of booth.

   _____
   _____

Find the missing value and identify it as an independent or dependent variable.

6. Find the value y for the function $y = \frac{1}{4}x - 3$, given that $x = 72$. Are you finding the independent or dependent variable for the function?

   _____

7. Find the value of x for the function $y = 3(x + 3)$, if y has a value of 75. Are you finding the independent or dependent variable for the function?

   _____

Guided Practice   (PA.A.1.1)   Name _____

Identify the independent and dependent variables in the following scenarios.

8. The Kiddie Land Park in Duncan has several rides requiring 2 tickets each for adults. A family pack includes entrance for four people, four drinks, four bags of popcorn, and 80 ride tickets. If a mom, dad, and two children visit the park and purchase a family pack, how many tickets will each child have if they ride an equal amount, and neither parent rides any? Are you finding the dependent or independent variable?

_____

Determine if the given situation is a function.

9. The taller a person is, determines the longer arm span they will have.

_____

10. The dolphin ride at the aquarium in Jenks is broken. You can put in 1 token and sometimes get anywhere from 1 ride to 6 rides.

_____

Independent Practice   Name _____

> **PA.A.1.1 Recognize that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable.**

Complete each function table.

1.

x, Input, Domain, Independent Variable	Rule/Function:	*y*, Output, Range, Dependent Variable
2	$y = 7x - 5$	
5		

2.

x, Input, Domain, Independent Variable	Rule/Function:	*y*, Output, Range, Dependent Variable
	$y = 2x + 3$	11
		15

3.

x, Input, Domain, Independent Variable	Rule/Function:	*y*, Output, Range, Dependent Variable
	$y = \frac{1}{5}x - 2$	13
60		

4.

x, Input, Domain, Independent Variable	Rule/Function:	*y*, Output, Range, Dependent Variable
21	$y = \frac{1}{3}x + 6$	
		10

5.

x, Input, Domain, Independent Variable	Rule/Function:	*y*, Output, Range, Dependent Variable
6		20
8		24

Independent Practice (PA.A.1.1)   Name _____

Complete each function table.

6.	x, Input, Domain, Independent Variable	Rule/Function:	y, Output, Range, Dependent Variable
	60		9
	28		1

7.	x, Input, Domain, Independent Variable	Rule/Function:	y, Output, Range, Dependent Variable
	5		9
	9		21

8.	x, Input, Domain, Independent Variable	Rule/Function:	y, Output, Range, Dependent Variable
	27		16
	24		15

Identify the independent and dependent variables in the following scenarios.

9. The Hall Family Reunion is being held at Beaver's Bend State Park in Broken Bow, Oklahoma. Each cabin can sleep 12 people, and 68 family members have committed to attend.

_____

10. Frederick Elementary is going on a trip to Quartz Mountain State Park in Lone Wolf, Oklahoma. Each bus holds a maximum of 35 students, and requires 3 adult chaperones for monitoring. There are 165 students attending the trip.

_____
_____

Find the missing value and identify it as an independent or dependent variable.

11. Find the value y for the function $y = \frac{1}{4}x + 5$, given that $x = 60$. Are you finding the independent or dependent variable for the function?

_____

12. Find the value of x for the function $y = 6(x - 4)$, if y has a value of 18. Are you finding the independent or dependent variable for the function?

_____

13. Find the value y for the function $y = \frac{1}{3}x - 8$, given that $x = 21$. Are you finding the independent or dependent variable for the function?

_____

14. Find the value of x for the function $y = -2(x + 7)$, if y has a value of 20. Are you finding the independent or dependent variable for the function?

_____

15. The Chief Drive-In Theatre in Chickasha charges $15 per vehicle. The CREW from Word Alive Church in Lawton took a group and paid $105. How many vehicles did they take? Are you finding the independent or dependent variable?

_____

Independent Practice (PA.A.1.1)   Name _____

Find the missing value and identify it as an independent or dependent variable.

16. The Toy and Action Figure Museum in Pauls Valley, Oklahoma charges a $7 entrance fee. The Bledsoe family took 3 adults and 5 children. What was the total cost for them to enter the museum? Are you finding the independent or dependent variable?

_____

Determine if the given situation is a function.

17. Every person that enters the University of Oklahoma's girl's sporting events in the month of October received a free pink shirt in honor of Breast Cancer Awareness month.

_____

18. The farther away an object is the smaller it appears.

_____

Solve.

19. Lucille and her family are going to an Oklahoma City Thunder game. The distance from her house to the Cox Center is 90 miles. If her dad drives at a constant speed of 75 miles per hour with no stops, how long will it take them to get there? use $d = rt$. Identify the dependent and independent variables.

_____

20. Lucille and her brother both had free tickets that they won at school. Her parents paid a total cost (*c*) of $80.00 for their two adult tickets (*a*) and parking (*p*), which was $15, how much was each ticket? Use $c = 2a + p$. Identify the dependent and independent variables.

_____

Continuous Review   (PA.A.1.1)   Name _____

Write as one power.

1. $m^4 \times m^5 =$

   _____

2. $\dfrac{b^7}{b^3} =$

   _____

Write in correct scientific notation.

3. $17.06 \times 10^5 =$

   _____

Solve and write answer in correct scientific notation.

4. $\dfrac{(9 \cdot 10^{-2})(2 \cdot 10^{-2})}{(0.6 \cdot 10^{-2})} =$

   _____

Identify each addend or factor as rational or irrational, solve, and identify the sum or product as rational or irrational.

5. $\sqrt{169} + 3.6 =$

   _____

6. $\sqrt{50} \cdot 2 =$

   _____

Simplify the radical.

7. $\sqrt{243} =$

   _____

Identify which two whole numbers the root would come between.

8. $\sqrt{85} =$

_____

Solve.

9. Coach Dunn took her basketball girls to run up Mt. Scott for preseason training. Sammi was the first to the top followed by Allison and then Mariah. Their times were written out of order as 80 minutes (Allison), 52 minutes (Sammi), and $1\frac{1}{2}$ hours (Mariah). Using the initial of their first name, put them in order on the number line.

<div align="center">

60 minutes   120 minutes

◄──────┼──────────────────┼───────────────────┼──►
0   1 hour   2 hours

</div>
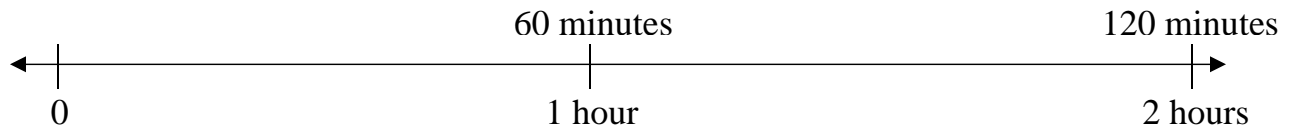
10. Mrs. Bledsoe's science class took a virtual field trip to Beaver's Bend in southeastern Oklahoma. They looked at Cottonwood trees in four locations and created this table.

Location	Average Rainfall	Average Height
1	1.3 inches	7.3 meters
2	3.6 inches	9.8 meters
3	4.7 inches	10.4 meters
4	2.8 inches	8.5 meters

Jim's group made the following statement:
> The amount of rainfall is dependent on the height of the tree in that the taller the tree the more it would rain.

Do you agree with this statement? If not, correct it.

_____
_____

Oklahoma State Testing Program
8th Grade Mathematics Formula Sheet

UNIT CONVERSIONS

1 foot = 12 inches

1 yard = 3 feet

1 mile = 5280 feet

1 mile = 1760 yards

1 meter = 100 centimeters

1 meter = 1000 millimeters

1 pound = 16 ounces

1 ton = 2000 pounds

1 kilogram = 1000 grams

1 cup = 8 fluid ounces

1 pint = 2 cups

1 quart = 2 pints

1 gallon = 4 quarts

AREA

Square	$A = s^2$	Parallelogram	$A = bh$
Rectangle	$A = lw$	Circle	$A = \pi r^2$
Triangle	$A = \frac{1}{2}bh$	Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$

CIRCUMFERENCE

Circle $C = \pi d$ or $C = 2\pi r$

VOLUME

Rectangular Prism	$V = Bh$ or $V = lwh$	Right Cylinder	$V = Bh$ or $V = \pi r^2 h$

SURFACE AREA

Rectangular Prism $S = 2B + Ph$ or $S = 2lw + 2lh + 2wh$

Cylinder $S = 2\pi rh + 2\pi r^2$

LINEAR EQUATIONS

Slope-intercept	$y = mx + b$	Slope formula	$m = \frac{y_2 - y_1}{x_2 - x_1}$
Point-slope	$y - y_1 = m(x - x_1)$	Direct Variation	$y = kx$

OTHER

$d = rt$ Pythagorean Theorem $a^2 + b^2 = c^2$

OKLAHOMA STATE DEPARTMENT OF
EDUCATION
— CHAMPION EXCELLENCE —

A

addition: to join two or more numbers or quantities to get one number called the sum, or total

algebraic expression: mathematical phrase combining number and variables and may include operations and grouping signs, an expression does not contain equality or inequality symbols, however both sides of an equation or inequality is an expression

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

associative property: of addition states $(a + b) + c = a + (b + c)$, of multiplication states $(a \cdot b) \cdot c = a \cdot (b \cdot c)$ for this operation the addends or factors remain the same order, but change who they associate with first

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

B

base: the number or variable representing the factor being multiplied

base area: the area of the base

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

C

calculate: to work something out, a mathematical operation

calculator: electronic device used for making mathematical calculations

central tendency: typical value for the probability distribution, the most common measures of central tendency are mean (average), median (middle data point), and mode (data point that occurs most often)

classify: arrange in categories by characteristics

cm²: a cm raised to the second power which is indicated by a small 2 to its upper right

cm³: a cm raised to the third power which is indicated by a small 3 to its upper right

coefficient: number the variable is multiplied by

commutative property: of addition states $a + b = b + a$, of multiplication states $a \cdot b = b \cdot a$, for this operation the addends or factors move around or commute

compare: show how two or more items are alike

consecutive positive numbers: positive numbers that follow one another, without gaps, from least to greatest

constant: number that does not change

contrast: show how two or more items are different

coordinate plane: plane in which a point is represented using two coordinates that determine the precise location of the point
cylinder: a three-dimensional figure with two parallel congruent circles as bases and two parallel lines

D
data: a collection of information gathered by observation, questioning, or measurements often organized in graphs or charts
data point: element in a data set
data set: separate elements of related data
decomposition: breaking apart of a three-dimensional figure into its two dimensional sides
delete: remove
dependent events: events that can only occur if something else occurs first
dependent variable/range: the set of all "output" or possible after substituting the domain or the quantity that is affected when the input or independent variable is changed
diagram: simplified drawing or sketch
distributive laws: states that $a(b + c) = (a \cdot b) + (a \cdot c)$, for this operation multiplying a number by a sum is the same as multiplying the number by each addend and then adding the products
divide: to divide, or division, is sharing or grouping into equal parts
dynamic software: software that can be used in the classroom for mathematics

E
equal: to have the same value
equations: number sentence that use the equal sign, it may or may not have mathematical operations $(1 + 2 = 3)$
equivalent algebraic expressions: two algebraic expressions are said to be equivalent if one can be obtained from the other using the properties of operations, such as commutative, associative, and distributive properties, as well as by representing numbers in the expressions in different but equivalent forms
equivalent numerical expressions: two numerical expressions are said to be equivalent if one can be obtained from the other using the properties of operations, such as commutative, associative, and distributive properties, as well as by representing numbers in the expressions in different but equivalent forms
estimate: make an approximate calculation
experimental probability: ratio of the number of times an event occurs to the total number of trials

exponent: the number or variable that indicates how many times the base is used as a factor, e.g., in $4^3 = 4$ x 4 x 4 = 64, the exponent 3, indicating that 4 is repeated as a factor three times

expressions: a mathematical phrase that combines operations, numbers, and/or variables

F
formulas: a group of mathematical symbols that express a relationship or that is used to solve a problem

function: a rule that assigns to every element of one set (the domain, x, input) exactly one element of another set (the range, y, output), often thought of as an "input/output" rule, as in every input determines an output (usually according to mathematical operations performed on the output)

G
graph: visual diagram used to represent statistical information or functions and equations

graphical properties: slope, x-intercept, y-intercept

H
height: measurement from top to bottom

I
independent events: events that can occur separately no matter what else occurs

independent variable: the set of "input" or argument values for which the function is defined or the quantity whose value is changed

inequalities: occur when things aren't equal, there are 4 types of inequalities: a is less than b ($a<b$), a is greater than b ($a>b$), a is less than or equal to b ($a \leq b$), or a is greater than or equal to b ($a \geq b$)

insert: add to a set

intercepts: geometrically, where a graph intersects an axis in a Cartesian plane

interpret: explain the meaning of information

irrational: cannot be expressed as a ratio of whole numbers or a decimal that is finite

L
label: term identifying the data on the axis

limited: a set number

line of best fit: straight line drawn through the center of a group of data points plotted on a scatter plot

linear: in a straight line, the exponent of the variable term (x) is a one (first power)

linear equations: equation that can be written in the form $Ax + By + C = 0$ where A and B cannot both be 0. The graph of such an equation is a line

linear function: a function (f) is linear if can be written in the form $f(x) = mx + b$

linear inequality: a linear function that contains one of four inequality symbols: less than ($<$), greater than ($>$), less than or equal to ($\leq$), greater than or equal to ($\geq$)

M

mean: measure of center in a set of numerical data, computed by adding the values in the set and dividing by the number of values in the set

measurements: use of standard units to determine size or quantity such as length, breadth, height, area, mass or weight, volume, fluid volume, capacity, temperature, and time

median: measure of center in a set of numerical data that appears at the center of the sorted data set when an odd number of vales are in the set or the mean of the two center data points when the data set has an even number of values

multiplication: a mathematical operation where a number is added to itself a number of times

multiply: mathematical operation where a number is added to itself a number of times

N

natural number: number that occurs naturally, known as counting numbers, 1,2,3…

nets: a two-dimensional representation of a three-dimensional figure constructed of polygons, such that if a fold were made on certain edges of the net and appropriate sides were "glued" together, the resulting figure would be the original three-dimensional figure

number line: a line in which numbers are marked

numbers: an arithmetical value, expressed by a word, symbol, or figure, representing a quantity and used in counting and making calculations and for showing order in a series or for identification

O

order of operations: order of operations - convention adopted to perform mathematical operations in a consistent order:

> 1. perform all operations inside grouping symbols and/or above and below a fraction bar in the order of Steps 2, 3, and 4
> 2. find the value of any powers or roots
> 3. multiply, including division from left to right; add, including subtraction, from left to right

origin: point where the *x* and *y* axes meet, (0, 0)
outlier: data point that is far outside a representative range of the data set

P
perfect square: a number that is a whole number when squared, that is, a number that can be expressed as n^2 for *n* a whole number
perfect square root: a square root that is a whole number
π (Pi): irrational number that is derived by finding the constant ratio of the circumference to the diameter of a circle
point: defined position in space, represented by an ordered pair *(x,y)* in a coordinate plane
population: whole set of individuals, items, or data from which a statistical sample is drawn
prediction: what is believed to be most likely based on data
properties of operations: rules that set down particular properties in relation to operations on numbers
proportional relationship: relationship in which two quantities vary directly with one another, such that if one item is doubled the other is doubled, also known as a direct variation, the equation for a linear function of such a relationship is $y = mx$ and the graph produced crosses through the origin (0, 0), in this equation, *m* is the slope of the line, also known as the unit rate, the rate of change, or the constant of proportionality of the function
Pythagorean Theorem: for any right triangle, the sum of the square of the lengths of the legs equals the square of the length of the hypotenuse

R
random: without any order or pattern
rate of change: ratio between the change in the dependent variable relative to the corresponding change in the independent variable
rational: expressed as a ratio of whole numbers or a decimal that is finite
rational number system: consists of rational numbers, integers, whole numbers, and natural numbers
rational numbers: number expressible in the form *a/b or -a/b, a* and *b* are both whole numbers
real number system: set of numbers consisting of all rational and irrational numbers
rectangular prism: a three-dimensional object constructed from three pairs of parallel congruent rectangles (called faces) that share common edges and form an enclosed space

right cylinder: a cylinder with circular bases with axis joining the centers of the bases perpendicular to the planes of the two bases

right triangle: three-sided shape that has one right angle, 90°

S

sample: subset of individuals, items, or data drawn from a population to make statistical conclusions of the population

scatterplot: graph in the coordinate plane representing data from two variables

scientific notation: a widely-used floating point system in which numbers are expressed as products consisting of a number between 1 and 10 multiplied by an appropriate power of 10

slope: measure of the steepness of a line in a Cartesian plane, found by determining the constant rate of change in the y-coordinate per 1-unit change in the x-coordinate, $\Delta x / \Delta y$, $(y_2-y_1)/(x_2-x_1)$, when in standard form it is (-A)/B. when in slope-intercept form it is m

solution: value that makes an equation or inequality true

spreadsheet: displays a table of data points displayed in cells and arranged in column and rows

square root: number when multiplied by itself gives the original number ■ symbol $\sqrt{}$

standard notation: the normal way of writing numbers

straight line: a line with no bends or curves, shortest distance between two points

substitution: the exchange of two or more items, such as a given value for a variable

surface area: total measure of the area of the faces of a prism; or the area of all sides

symbol: commonly used to represent values, equality, operations, grouping, and mathematical terms

T

table: mathematical information organized in columns and rows

three dimensional: having length, width or breadth, and height

title: term that defines what the graphic, in this case scatterplot, is representing

two dimensional: having length and width or breadth

V

variable: letter or symbol that represents a quantity that can change or that may take on different values

volume: measurement of the amount of space within a closed three-dimensional shape

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

Y
y-axis: vertical axis in the Cartesian plane
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

Z
zero: the number 0, sometimes used as a place holder, nothing, none, nil, naught
π (Pi): irrational number that is derived by finding the constant ratio of the circumference to the diameter of a circle

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