



ALPHA PLUS

TEACHER'S GUIDE

Math 2



SUCCESS **OAS**
with

Oklahoma Academic Standards

TEACHER'S GUIDE

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with

Math 2

Ensuring Student Success *with* Oklahoma Academic Standards

Written by Oklahoma Teachers for Oklahoma Teachers

Shannon Stewart



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SUCCESS *with* OAS



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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
2nd grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
1	2.N.1.1	Read, write, discuss, and represent whole numbers up to 1,000. Representations may include numerals, words, pictures, tally marks, number lines, and manipulatives.	1	1
2	2.N.1.2	Use knowledge of number relationships to locate the position of a given whole number on an open number line up to 100.	22	14
3	2.N.1.3	Use place value to describe whole numbers between 10 and 1,000 in terms of hundreds, tens, and ones. Know what 100 is in 10 tens, and 1,000 is 10 hundreds.	38	27
4	2.N.1.4	Find 10 more or 10 less than a given three-digit number. Find 100 more or 100 less than a given three-digit number.	53	36
5	2.N.1.5	Recognize when to round numbers to the nearest 10 and 100.	67	44
6	2.N.1.6	Use place value to compare and order whole numbers up to 1,000 using comparative language, numbers, and symbols (e.g., $425 > 276$, $73 < 107$, page 351 comes after page 350, 753 is between 700 and 800).	80	52
7	2.A.1.1	Represent, create, describe, complete, and extend growing and shrinking patterns with quantity and numbers in a variety of real-world and mathematical contexts.	94	61

OAS Mathematics
Table of Contents
2nd grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
8	2.A.1.2	Represent and describe repeating patterns involving shapes in a variety of contexts.	108	70
9	2.GM.1.1	Recognize trapezoids and hexagons.	119	77
10	2.GM.1.2	Describe, compare, and classify two-dimensional figures according to their geometric attributes.	131	84
11	2.GM.1.3	Compose two-dimensional shapes using triangles, squares, hexagons, trapezoids, and rhombi.	145	93
12	2.GM.1.4	Recognize right angles and classify angles as smaller as or larger than a right angle.	168	112
13	2.GM.3.1	Read and write time to the quarter-hour on an analog and digital clock. Distinguish between a.m. and p.m.	185	125
14	2.D.1.1	Explain that the length of a bar in a bar graph or the number of objects in a picture graph represents the number of data points for a given category.	198	134
15	2.D.1.2	Organize a collection of data with up to four categories using pictographs and bar graphs with intervals of 1s, 2s, 5s, or 10s.	213	144
16	2.D.1.3	Write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one.	227	153

OAS Mathematics
Table of Contents
2nd grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
17	2.D.1.4	Draw conclusions and make predictions from information in a graph.	241	162
18	2.N.3.1	Identify the parts of a set and area that represent fractions for halves, thirds, and fourths.	253	170
19	2.N.3.2	Construct equal-sized portions through fair-sharing including length, set, and area models for halves, thirds, and fourths.	268	181
20	2.N.2.1	Use the relationship between addition and subtraction to generate basic facts up to 20.	286	192
21	2.N.2.2	Demonstrate fluency with basic addition facts and related subtraction facts up to 20.	297	199
22	2.N.2.3	Estimate sums and differences up to 100.	308	206
23	2.N.2.4	Use strategies and algorithms based on knowledge of place value and equality to add and subtract two-digit numbers.	318	212
24	2.N.2.5	Solve real-world and mathematical addition and subtraction problems involving whole numbers up to 2 digits.	337	226
25	2.N.2.6	Use concrete models and structured arrangements, such as repeated addition, arrays and ten frames to develop understanding of multiplication.	351	235

OAS Mathematics
Table of Contents
2nd grade

Suggested Order	Strand Number	Strand Description	Teacher Guide Page Number	Student Book Page Number
26	2.N.4.1	Determine the value of a collection(s) of coins up to one dollar using the cent symbol.	370	247
27	2.N.4.2	Use a combination of coins to represent a given amount of money up to one dollar.	387	259
28	2.A.2.1	Use objects and number lines to represent number sentences.	405	272
29	2.A.2.2	Generate real-world situations to represent number sentences and vice versa.	421	283
30	2.A.2.3	Apply communicative and identify properties and number sense to find values for unknowns that make number sentences involving addition and subtraction true or false.	438	294
31	2.GM.2.1	Explain the relationship between the size of the unit of measurement and the number of units needed to measure the length of an object.	450	301
32	2.GM.2.2	Explain the relationship between length and the numbers on a ruler by using a ruler to measure lengths to the nearest whole unit.	465	313
33	2.GM.2.3	Explore how varying shapes and style of containers can have the same capacity.	481	324

Teacher's Guide

2.GM.1.2 Describe, compare, and classify two-dimensional figures according to their geometric attributes.

Real-World Connections

Students will be able to identify shapes by sight and attribute. Students will see shapes everywhere. Have them go on a scavenger hunt in the classroom to see how many shapes they can find.

Vocabulary

two-dimensional figures, geometric attributes, triangle, square, rectangle, rhombus, trapezoid, pentagon, hexagon, octagon, circle, angle, vertex

Modeling

Step 1: Discuss two-dimensional shapes.



The figure above is a **plane figure** because it lies on a flat surface. It has four sides and four corners. It is a **polygon** because it is a closed figure made up of straight sides, not curved sides. Two opposite sides are longer than the other two opposite sides. All of this makes up the characteristics of this shape. By knowing the characteristics, you can tell the shape's name. It is a **rectangle**.

Step 2: Discuss characteristics of shapes.

Each shape has its own characteristics that makes it different from other shapes. Just like you have characteristics that make you different from everyone else. Let's look at these two shapes.



circle



rectangle

Think about the characteristics of the above shapes. They are both plane figures as they lie on a flat surface. Both shapes are closed figures, which mean the shape is continuous or has no beginning or end. The rectangle has corners, **vertices**, while the circle does not. The rectangle is made of straight sides, **edges**, and is called a polygon. The circle is not a polygon.

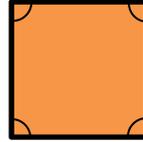
Teacher's Guide 2.GM.1.2

Step 3: Discuss sides and angles.

Look at the shapes below. They both are made of straight sides that meet at the corners which form an angle, or vertex. They both have four sides and four corners/**angles/vertices**. How are they different?



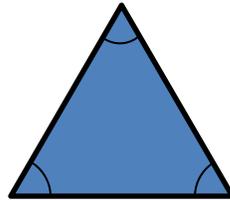
rectangle



square

Look at the square. All four of the sides in the square are the same. If you measured them, they would be the same. Now look at the rectangle. Are all the sides the same length? No, the sides opposite each other are **parallel** and are the same length.

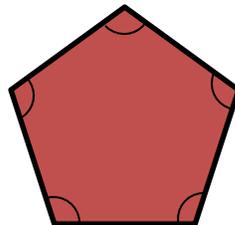
Step 4: Discuss a triangle.



triangle

How would you describe this figure? Did you remember to say that it was a plane figure and a polygon? How many sides and angles did you count? how is it different from a square or rectangle? The triangle gets its name from how many angles it has. *Tri* means three, so triangle means three angles/corners/vertices.

Step 5: Discuss a pentagon.



pentagon

This is another polygon. Count the number of sides and angles of this figure. It has five sides and five angles. *Penta* means five and *gon* mean angles. So, a **pentagon** has five angles.

Teacher's Guide 2.GM.1.2

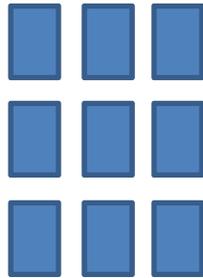
Extension Activities

See also Oklahoma State Department of Education's OAS objective wiki at <http://okmathframework.pbworks.com/w/page/112996312/2-GM-1-2> on PBworks®.

Shape Game

The teacher will call out a shape according to its attributes and the student will create the shape on their paper. For example, the teacher may say, "Create a shape that has three sides and three vertices."

After this activity, the students will work with their partners to play Shape Concentration. The students play concentration with two sets of cards (Shape Words and Shape Definitions). Place the cards in a 3x3 array.



Place the rest of the cards in a draw pile. Partners take turns turning over 2 cards at a time. If the cards match with either the shape or the name of the shape, the student keeps the cards. The empty spaces are filled with 2 cards from the draw pile. The partners continue playing until all the cards have been matched.

Answer Key 2.GM.1.2

Guided Practice

1. rhombus
2. pentagon
3. circle
4. rectangle
5. octagon
6. circle
7. hexagon
8. rectangle
9. octagon
10. square

Independent Practice

1. octagon
2. trapezoid
3. rhombus
4. circle
5. rectangle
6. pentagon
7. square
8. hexagon
9. triangle
10. square
11. pentagon
12. triangle
13. hexagon
14. trapezoid
15. rhombus
16. square, rectangle, rhombus, trapezoid
17. pentagon
18. octagon
19. triangle
20. hexagon

Answer Key 2.GM.1.2

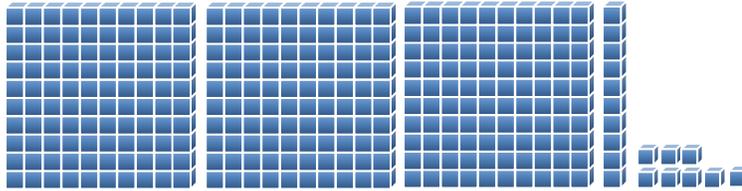
Continuous Review

1. (2.N.1.1) two hundred forty-five

2. (2.N.1.1)



3. (2.N.1.1)



4. (2.A.1.1) 15, 24, 33

5. (2.GM.1.1) 6

6. (2.GM.1.1) check for accuracy



7. (2.N.1.5) 130

8. (2.N.1.5) 300

9. (2.N.1.3) 90

10. (2.N.1.4) 868

2.GM.1.2 Describe, compare, and classify two-dimensional figures according to their geometric attributes.

Real-World Connections

Look all around you. Can you find these shapes in your classroom? How about outside your classroom? What shape is a stop sign?

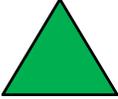
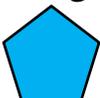
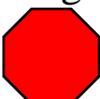
Vocabulary

two-dimensional figures	having two dimensions of length or width
triangle	a polygon with 3 sides
square	a 4-sided polygon with 4 right angles and all sides the same length.
rectangle	a 4-sided polygon with two sets of lines the same length.
rhombus	a 4-sided polygon with all sides the same length, opposite equal acute angles, and opposite equal obtuse angles.
trapezoid	a 4-sided polygon with 1 set of parallel lines.
pentagon	a 5-sided polygon
hexagon	a 6-sided polygon
octagon	a 8-sided polygon
circle	a closed curve with all sides the same distance from the center.
angle	a shape formed by two lines joining together.
vertex	a point where two lines meet.

Guided Practice (2.GM.1.2) Name: _____

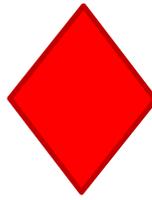
Name the shapes.

Examples

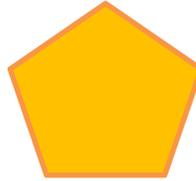
Polygon	Sides	Angles	Vertices
Triangle 	3	3	3
Square 	4	4	4
Rectangle 	4	4	4
Rhombus 	4	4	4
Trapezoid 	4	4	4
Pentagon 	5	5	5
Hexagon 	6	6	6
Octagon 	8	8	8
Circle 	0	0	0

Name the shapes.

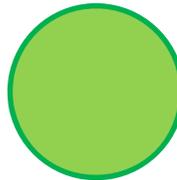
1. _____



2. _____



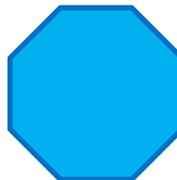
3. _____



4. _____



5. _____



6. What shape is a closed curve with all sides the same distance from the center? _____

7. What shape has 6 vertices? _____

8. What shape is a 4-sided polygon with 4 right angles, and 2 sets of lines the same length? _____

Guided Practice (2.GM.1.2) Name: _____

Answer the following problems.

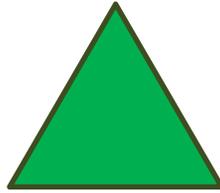
9. What shape has 8 angles? _____

10. What shape is a 4-sided polygon with 4 right angles and all sides the same length? _____

2.GM.1.2 Describe, compare, and classify two-dimensional figures according to their geometric attributes.

Identify the shapes.

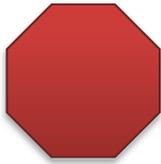
Example:



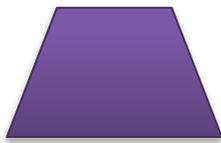
triangle

triangle	hexagon	square
pentagon	rectangle	circle
rhombus	trapezoid	octagon

1.



2.



3.



Independent Practice (2.GM.1.2)

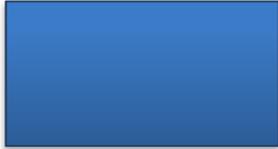
Name: _____

Identify the shapes.

4.



5.



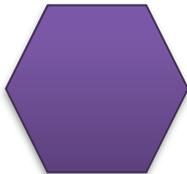
6.



7.



8.



9.



Independent Practice (2.GM.1.2) Name: _____

Answer the following problems.

Example: What shape has 5 vertices?
pentagon

hexagon	triangle	octagon
pentagon	trapezoid	square
rectangle	rhombus	trapezoid
rhombus	trapezoid	hexagon
triangle	pentagon	square

10. What shape has 4 right angles and all 4 sides equal?

11. What shape has 5 sides? _____

12. What shape has 3 angles? _____

13. What shape has 6 sides? _____

14. What shape has 1 set of parallel lines? _____

15. What shape is a 4-sided polygon with all sides the same length, two equal opposite acute angles, and two equal opposite obtuse angles?

16. List four 4-sided polygons.

Independent Practice (2.GM.1.2) Name: _____

Answer the following problems.

17. What shape has 5 angles? _____

18. What shape has 8 vertices? _____

19. What shape has 3 vertices? _____

20. What shape has 6 angles? _____

Answer the following problems.

1. Write the number 245 in word form.

2. Draw tally marks to represent the number 9.

3. Draw base 10 blocks to show the number 318.

4. Create a pattern using the rule add 9 starting at 15.

_____, _____, _____

5. A hexagon has how many sides? _____

6. Draw a trapezoid.

7. Round 134 to the nearest ten. _____

8. Round 293 to the nearest hundred. _____

9. What is the value of the 9 in 396? _____

10. What number is 100 more than 768? _____

A

addition: the process of combining two or more addends together to find the total sum

algorithm: a finite set of steps for completing a procedure

a.m.: any time in the morning that is between midnight and noon

analog clock: having to do with data represented by continuous variables, e.g., a clock with hour, minute, and second hands

angles: the amount of turning between two rays called arms meeting at a common endpoint called the vertex. An angle is measured in degrees

array: an orderly arrangement of objects into a rectangular configuration

area: the number of unit squares that can be contained within a flat figure

B

basic facts: addition, subtraction, multiplication, and division facts mainly using one or two-digit numbers

bar graph: a display of categorical data in which vertical or horizontal bars represent the count of a category

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

C

capacity: the maximum amount or number that can be contained or accommodated, e.g., a jug with a one-gallon capacity

cardinal numbers: a number denoting quantity (one, two, three, etc) as opposed to an ordinal number (first, second, third, etc)

cent symbol: equal to one hundredth of the base currency unit. e.g., 100 cents=1 dollar; symbol ¢

coin: a flat, round piece of metal used as money

combination of coins: a selection of coins without regard to order

commutative property: in addition and multiplication, numbers may be added or multiplied together in any order

compare: tells how two or more things are alike

compose: to compose numbers is to create new numbers using any of the operations with other numbers; to compose shapes is to join geometric shapes without overlaps to form new shapes

concrete models: hands-on materials as opposed to pictures, numbers, or words

counting number: a number used in counting objects. i.e., a number from the set $\{1,2,3,4,5,\dots\}$

D

data: a collection of information

denominator: the bottom number in a fraction that shows how many parts the whole is divided into

differences: the difference between two quantities or values involves subtraction; the smaller is subtracted from the larger

dime: a coin valued at 10 cents

digital clock: having to do with data that is represented in the form of numerical digits; providing readout in numerical digits, e.g., a digital watch

dollar: a currency unit; one hundred cents equals a dollar

E

equal to (=): a sign indicating two numbers are the same ($7=7$)

equal-sized portions: having the same amount or value

equation: a number sentence that uses the equal sign ($1+2=3$)

estimate: to make an approximate calculation, often based on rounding

F

fact family: the related number sentences for addition and subtraction that contains all the same numbers

fourth: one of four equal parts

fraction: a number that expresses parts of a whole or a set

G

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

H

halves: either of two equal parts

half hour: thirty whole minutes

hexagon: a polygon with six sides

hour: sixty whole minutes

hundreds: designates the place value of one hundred

I

identify: recognize and name

identity property: identity property for addition or identity property of zero; adding zero won't change a number

intervals: between two points or values; the word intervals may be used to describe: a line marked by end points and called a line segment, a time period between defined start and end times, or numbers between two specific values

L

length: distance from one end to another

less than: the relationship of one number being smaller than another number (<)

linear measurement: measurement along a line

M

manipulatives: materials (e.g., buttons, beans, egg and milk cartons, counters, attribute and pattern blocks, interlocking cubes, base 10 blocks, geometric models, geo-boards, fraction pieces, rulers, balances, spinners, dot paper) used to represent mathematical concepts, operations, and relationships

measure: use of standard units to figure out size or quantity in regard to: length, breadth, height, area, mass, weight, volume, capacity, temperature, and time

models: a mathematical representation for real-world or mathematical objects, properties, actions, or relationships

money: coins and bills used to pay for goods or services

more than: the relationship of one number being larger than another number ($>$)

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

N

nickel: a coin valued at 5 cents

nonstandard units: any unit or item that isn't a standard metric or customary unit which can be used to measure something

number line: a line in which numbers are marked

number sense: the understanding of number size, number representations, number operations, referents for quantities and measurement used in everyday situations

number sentence: a number sentence is a mathematical sentence written in numerals and mathematical symbols; a term which may be used instead of the word equation in elementary mathematics

numerals: a symbol or mark used to represent a number

numerator: the top number in a fraction that shows the number of equal parts that are described

O

one: a cardinal number, the next number after zero

ones: designates the place value of one

order: an arrangement of a set group of objects

P

p.m.: any time after midday that is between noon and midnight

parallel: the same distance apart, never touching

partition polygon: a process of dividing a polygon into parts or a set into smaller subsets

parts of a set: distinct objects that are part of a collection

pattern: a sequence or arrangement with some rule that determines the next term in the sequence

penny: a coin valued at one cent

pictograph: a graph that uses pictures to show quantities

place value: in a number, the value given to the place in which a digit appears

polygon: a closed, two-dimensional figure comprised of line segments connected end-to-end, and such that no two segments cross each other

position: the comparison of where something is related to another object or its surroundings

Q

quadrilateral: a four-sided figure having four straight sides

quantity: amount, number of, total, sum, size or extent; how much or how many

quarter: one fourth of four equal parts; a coin valued at *25 cents*

R

regular polygon: a regular polygon has all sides equal and all angles equal

repeated addition: the process of repeatedly adding the same number; used as a strategy for introducing multiplication

rhombus/rhombi: one of the quadrilateral families of polygons; a rhombus has four equal sides, opposite sides that are parallel, equal opposite angles, 2 acute and 2 obtuse

right angle: an angle whose measure is 90 degrees

round numbers: to change a number to the closest designated place value

S

sets: a set is a collection of like items

shapes: the form of an object

solve: solving an equation involves finding numerical values for all the variables that make the equation true

standard units: there are two main groups of standardized units: the metric system and US customary measures

square: a square is a quadrilateral with four equal sides and four right angles; opposite sides that are parallel; two diagonals that bisect at right angles and four lines of symmetry; a square is the only regular quadrilateral

subtraction: the process of finding the difference between two numbers

sum: the total amount when two or more numbers are added together

symbols: symbols and signs are commonly used to represent values, equality, operations, grouping, and mathematical terms

T

table: mathematical information organized in columns and rows

tally marks: a record of an amount

ten frames: a card or drawing of ten adjoining squares in two rows, used to assist with understanding of the place value system, counting and calculating

ten: a cardinal number, the next number after nine; the base number of our decimal system

tens: designates the place value of ten

thirds: one of 3 equal parts

three-dimensional shapes: having three dimensions of length, width, and height

time: continuum from past to present to future, the interval between two events or the duration of an event

trapezoid: a quadrilateral only having two sides that are parallel

triangle: a polygon with three sides

two-dimensional figures: a figure with two dimensions of length and width

two dimensional shapes: existing in 2 dimensions; having width and height

U

unit: a determinate quantity (as of length, time, heat, or value) adopted as a standard of measurement

V

value: in mathematics, the numerical worth or amount

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

W

whole: all of something; entire

whole numbers: the numbers 0,1,2,3,...

