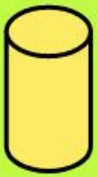
I Can Help My Child with Math-4real!

A Parent's Quick Guide to Engage on the Knows and Understandings of Mathematical Concepts and Operations

Book 1



T. S. Williams

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mathlaterly.com

Dedication

I want to thank all of my students-young and older-who have allowed me to guide them through this thing called *mathematics*. Too, I thank the parents who have put their trust in my ability to steer their children in a mathematical way. This book is for you.

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Why a Parent's Quick Guide?

This quick guide was made just for you. I repeat. This quick guide was made for you-not your son or daughter. I Can Help My Child with Mathematics-4Real! is not a math workbook. It is a tool based on a framework of questions to engage your child on the *Knows* and *Understandings* of math concepts. These questions guide learners to think about their prior knowledge before tackling a math problem or exercise.

I intentionally made this quick guide small enough to be kept inside a purse or a small bag. When not at home, it can be pulled out and used on the spot. Your child will ask for help, and when he or she does, you simply take out this quick guide, find the topic, and engage him or her by asking questions first. If your child has some misunderstandings, explain what he or she should know and understand about the concept or topic. **YOU** ask the questions and **STATE** the "knows" and "understandings", not your child, because children often rush through material they don't want to read. This way, you know that your son or daughter had a quick review of the concept or topic.

Finally, I purposely did not include any graphics so that you and/or your son or daughter will use tools to research the topic and write further notes and draw pictures. It puts the learning in your hands.

Keep in mind self-confidence plays a major role in how your child feels about doing mathematics. Here are some actions I want you to take:

- Do not talk about how you performed in mathematics in the past, whether you did it well or not when you were in school.
- Encourage your child to do puzzles.
- When checking your child's work, do not initially acknowledge a wrong answer, but ask *Why* or *How* he or she arrived at the answer, so that you can understand his or her thinking.
- Encourage number sense by having your son or daughter separate or combine numbers. For example, if you have 19 + 36, take 1 from 36 and make 19 into 20 and now have 20 + 35.
- When you are shopping and see a clearance or discounted item ask what it means.
- When you are shopping have your son or daughter estimate the total cost before you check out.

- Have your child refer to labels along the shelf to find the cost per unit when purchasing items at the grocery store.
- Explain and talk about the meaning of interest rates or finance charges as it pertains to household items and major purchases.

I want to encourage you to continue to expect that your child does his or her absolute best in mathematics-no matter what. Help your son or daughter identify his or her strengths and support him or her through mathematical challenges with words that boost self-esteem, and that reassure he or she can be a successful mathematician.

Sincerely,

T. S. Williams

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them. (**Keep on going!**)
2. Reason abstractly and quantitatively. (**Think what makes sense**.)
3. Construct viable arguments and critique the reasoning of others. (**Talk and explain**.)
4. Model with mathematics. (**Show your thinking**.)
5. Use appropriate tools strategically. (**Use the right tools**.)
6. Attend to precision. (**Check your work**.)
7. Look for and make use of structure. (**See the pattern or connection**.)
8. Look for and express regularity in repeated reasoning. (**See the pattern and connection**.)

FOUR-STEP PROBLEM-SOLVING PROCESS

1. Understanding the problem.
    a. Can you state the problem in your own words?
    b. What are you trying to find or do?
    c. What are the unknowns?
    d. What information do you obtain from the problem?
    e. What information, if any, is missing or not needed?
2. Devising a plan.
    a. Look for a pattern.
    b. Make a table or list.
    c. Make a diagram.
    d. Write an equation.
    e. Use guess and check.
    f. Work backward.
    g. Use direct reasoning.
    h. Use indirect reasoning.
    i. Examine related problems and determine if the same technique applied to them can be used for the current problem.
3. Carrying out the plan.
    a. Implement your strategy in step 2.
    b. Check each step of the plan as you proceed.
    c. Keep an accurate record of your work.
4. Looking back.
    a. Check the results.
    b. Interpret the solution. Does your answer make sense? Is it reasonable?
    c. Determine whether there is another way to find the solution.
    d. Might there be other related or general problems for which the strategy you used will work?

"Persist with the plan that you have chosen. If it continues not to work discard it and choose another. Don't be misled, this is how mathematics is done, even by professionals." - George Polya

OUR NUMBER SYSTEM

Ask
Tell me what you know about our number system?

Know
A numeration system is a collection of properties and symbols. Our Hindu-Arabic numeration system was created by the Hindus and introduced to Europe by the Arabs.

Understand

- All numbers are made from ten digits- 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
- Our number system is a **base 10** system.

Research Notes/Graphics of the Hindu-Arabic Number System:

PLACE VALUE

Ask
What do you know about place value?

Know
Place value is the basis of our number system. It is the value of a number based on its position in a number.

Understand

- Our number system is a **base 10** system.
- Place value is based on powers of 10.
- Each place is ten times the value of the place to its right. So, a digit in the tenths place is ten times greater than a digit in the thousandths place.
- A **place value chart** helps find and compare digits.
- Numbers to the left of the decimal are whole numbers while those to the right (decimal side) have a value less than 1.

Research Notes/Graphics on Place Value:

REAL NUMBERS

Ask
What are real numbers?

Know
The numbers we use every day are **real numbers**. We use them for real things like measuring and counting. All real numbers can be plotted on the number line.

Numbers were invented by people. Natural (counting) numbers came first. We have negative numbers so that there would be subtraction. Rational numbers provide answers to division problems. We have irrational numbers when the root of some numbers cannot be expressed as a ratio of two integers.

Understand

- **Whole numbers** {0, 1, 2, 3,…..} are real numbers.
- **Integers** {…-3, -2, -1, 0, 1, 2, 3, …} are real numbers.
- **Natural (counting) numbers** {1, 2, 3, …} are real numbers.
- **Decimals** are real numbers.
- **Fractions** are real numbers.
- **Mixed numbers** are real numbers.
- Whole numbers are also integers.
- Natural (counting) numbers are also whole numbers.
- Natural (counting) numbers are also integers.

<u>Research Notes/Graphics of the Real Number System:</u>

THE NUMBER LINE

Ask
Tell me what you know about the number line?

Know
All real numbers can be plotted on the **number line**. A number line can be constructed horizontally or vertically.

Understand

- A number line is never ending (infinite) in both directions.
- Zero is in the center with negative numbers to the left and positive numbers to the right.
- To add a positive number, count to the right.
- To subtract a negative number, count to the right.
- The more units you count to the right, the more positive, and thus greater, a value gets.
- To subtract a positive number, count to the left.
- To add a negative number, count to the left.
- The more you count to the left, the more negative, and thus smaller, the value gets.
- The closer a negative number is to zero, the greater it is because it is closer to the positive side. So, -6 is greater than -12 because -6 is closer to the positive side.

Research Notes/Graphics of the Number Line:

ABSOLUTE VALUE

Ask
What does absolute value mean?

Know
The **absolute value** of a number is its distance from zero on the number line. Absolute value is commonly used to compare the value of numbers.

Understand

- For all numbers except zero, the absolute value is a positive number.
- The symbol, "I I", which is two vertical bars, is used to represent absolute value.

Research Notes/Graphics of the Absolute Value:

INEQUALITY

Ask
What is an inequality?

Know
An **inequality** compares numbers.

Understanding

- An inequality makes a statement (sentence).
- An inequality statement is read from left to right.
- The symbol always points to the number with the smallest value.
- There are 4 inequality symbols: less than, less than or equal to, greater than, greater than or equal to.

Research Notes/Graphics and Statements of Inequality:

NUMBER PROPERTIES

Ask
Can you name some real number properties?

Know
Real **number properties** are accepted without proof and are used as starting points for working with numbers. There are 11 properties that apply to adding and multiplying.

Understand

- Identity Property of Addition: Adding 0 to a number does not change the number.
- Identity Property of Multiplication: Multiplying a number by 1 does not change the number.
- Commutative Property of Addition: The order in which you add two numbers does not change the sum.
- Commutative Property of Multiplication: The order in which you multiply two numbers does not change the product.
- Associative Property of Addition: The order in which you group three or more numbers does not change the sum.
- Associative Property of Multiplication: The order in which you group three or more numbers does not change the product.
- Inverse Property of Addition: When you add a number to its opposite, the sum is 0.
- Inverse Property of Multiplication: When you multiply a number by its reciprocal, the product is 1.
- Distributive Property: A rule for using addition and multiplication together.

- Closure Property of Addition: The sum of two real numbers is a unique real number.
- Closure Property of Multiplication: The product of two real numbers is a unique real number.

	Addition	Multiplication
Identity Property	A + 0 = A	A • 1 = A
Commutative Property	A + B = B + A	A • B = B • A
Associative Property	A + (B + C) = (A + B) + C	A • (B • C) = (A • B) • C
Inverse Property	A + (-A) = 0	A • 1/A = 1
Closure Property	X + Y = Unique Number	XY = Unique Number

Distributive Property	**a(b +c) = ab + ac or a(b – c) = ab - ac**

Research Notes/Graphics of Number Properties:

WHOLE NUMBERS

Ask

What is a whole number?

What are some ways we use whole numbers every day?

Know

Whole numbers are real numbers we use every day.

Understand

- The set of whole numbers is (0, 1, 2, 3, 4, …)
- Zero is the first whole number.
- There is no largest whole number. There is always one larger.
- Whole numbers are read from left to right.
- A whole number's value is determined by the position or place of the digit in the number.
- Whole numbers can be written in expanded form.
- You can write whole numbers in words.
- Whole numbers can be represented on the number line.

Research Notes/Graphics of Whole Numbers:

DECIMALS

Ask
What are decimal numbers?
What are some ways we use decimals every day?

Know
Decimals show parts of whole numbers.

Understand

- Use a decimal point to distinguish the whole number part of a number from the decimal part.
- Digits to the right of the decimal point are decimal places.
- Decimals can be written in expanded form.
- Decimals can be written in words.
- The number of possible decimal places is endless.
- Decimal place values decrease by a power of 10 as you go to the right.
- A decimal's value is determined by the position or place of the digit in a number.
- Decimals can be represented on the number line.

Research Notes/Graphics of Decimals:

FRACTIONS

Ask

What is a fraction?

Can you explain or show me the ways to represent a fraction?

Know

Fractions show parts of whole numbers.

Understand

- A fraction can be represented using 3 symbols: a fraction bar, the "÷" symbol, and as long division
- A fraction bar is used to represent a fraction as the ratio of two integers.
- Fractions can be represented on the number line.
- A fraction's value can be written in words.
- A proper fraction is a fraction whose numerator is smaller than the denominator.
- A large denominator means that the whole unit has been divided into smaller parts.
- A fraction is in simplest form when the only common factor the numerator and denominator have is 1.
- All fractions are ratios.

Research Notes/Graphics of Fractions:

MIXED NUMBERS

Ask

What is the difference between a fraction and a mixed number?
What is the process for renaming a mixed number as a fraction?

Know

A mixed number represents an integer **and** a proper fraction.

Understand

- A mixed number can be renamed as a fraction.
- A mixed number can be written as the sum of the its integer and proper fractional part.

Research Notes/Graphics of Mixed Numbers:

DIVISIBILITY RULES

Ask
Can you state a divisibility rule?

Know
Divisibility rules are used for mental arithmetic.

Understand

Divisibility Rules	
A number is divisible by	
2	If last digit is 0, 2, 4, 6, or 8
3	If the sum of the digits is divisible by 3
4	If the last two digits is divisible by 4
5	If the last digit is 0 or 5
6	If the number is divisible by 2 and 3
7	cross off last digit, double it and subtract. Repeat if you want. If new number is divisible by 7, the original number is divisible by 7
8	If last 3 digits is divisible by 8
9	If the sum of the digits is divisible by 9
10	If the last digit is 0
11	Subtract the last digit from the number formed by the remaining digits. If new number is divisible by 11, the original number is divisible by 11
12	If the number is divisible by 3 and 4

Research Notes on Divisibility Rules:

ADDITION

Ask
Why do we use addition?
What does it mean to add?
What are some words that mean addition?

Know
Addition is a mathematical operation.

Understand

- Addition is used when combining two or more groups of numbers or objects.
- The symbol "+" means to "add."
- Numbers that are added are called **addends**.
- When you add the result is called the **sum**.
- Addition is the inverse of subtraction.

Research Notes/Graphics on Addition:

SUBTRACTION

Ask
Why do we use subtraction?
What does it mean to subtract?

Know
Subtraction is a mathematical operation.

Understand

- Subtraction is used when taking away part of a group of objects or numbers.
- The symbol "-" means to "subtract."
- The number or object you get when you subtract is called the **difference**.
- Subtraction is the inverse of addition.

Research Notes/Graphics on Subtraction:

MULTIPLICATION

Ask
What is multiplication?
Tell me about a time when you had to multiply to solve a problem?

Know
Multiplication is a mathematical operation.

Understand

- Multiplication gives the product of two or more numbers.
- The symbol "x" and "•" means to multiply.
- There is no symbol when you multiply letters, so **ab** means a • b.
- Numbers that are multiplied are called **factors**.
- The answer when you multiply is called the **product**.
- Multiplication can be represented as repeated addition.
- Multiplication can be represented as repeated addition on a number line.
- Multiplication can be shown with arrays.
- Multiplication is the inverse of division.

Research Notes/Graphics on Multiplication:

DIVISION

Ask
What does it mean to divide 20 by 4?
Give me an example of a division problem?

Know
Division is a mathematical operation.

Understand

- Division means to break an object or number into equal-fractional parts.
- Division is represented in 4 ways using the "÷" symbol, a fraction bar, the long division symbol "_____", and sometimes with the "/" symbol.
- The number you are dividing into is the dividend.
- The number you are dividing by is the divisor.
- The answer when you divide is called the quotient.
- Usually, you are dividing by numbers other than zero.
- Division can be shown on the number line.
- Division can be represented in an array where the number of columns is the quotient.

Research Notes/Graphics on Division:

LEAST COMMON MULTIPLE

Ask
What is a multiple?
What is the definition of the least common multiple (LCM)?

Know
A **multiple** of a number is the product of that number and any nonzero whole number.

Understand
The **least common multiple** (LCM) of two or more numbers is the least (smallest) multiple that is common to all the numbers.

Research Notes/Graphics on the Least Common Multiple:

GREATEST COMMON FACTOR

Ask
What are factors?
What is the definition of the greatest common factor (GCF)?

Know
Factors are terms (variables and/or numbers) that are multiplied to arrive at a product. Remember, a product is the answer when you multiply.

Understand

- The **greatest common factor** (GCF) of two or more terms is the greatest (largest) term that is a factor of all the terms.
- The prime factorization of two or more terms can also be used to find the greatest common factor.

Research Notes/Graphics on the Greatest Common Factor:

EQUIVALENT FRACTIONS

Ask
What are equivalent fractions?

Know
Equivalent fractions are fractions that look different but have the same value.

Understand

- We use equivalent fractions to compute more efficiently and to make comparisons.
- It is easier to compare two or more fractions when they have the same denominator. This is why you rename fractions that you are comparing. Then you compare the numerators.
- Whenever you rename fractions using a common denominator, you create equivalent fractions.
- It is easier to add or subtract fractions when they have the same denominator. This is why we rename fractions with unlike denominators using a common multiple(denominator) so that they have a common(same) denominator. Then you compare the numerators.
- It is more efficient to multiply fractions when they are in simplest form (reduced to lowest terms). This is why we simplify fractions using the greatest common factor (GCF) to create equivalent fractions in lowest terms if necessary.
- Equivalent fractions can be made by multiplying the numerator **and** denominator by the same value, or by dividing the numerator **and** denominator by the same value.

<u>Research Notes/Graphics on Equivalent Fractions:</u>

PRIME FACTORIZATION

Ask
What is a prime number?
What is prime factorization? (Hint: Think about a factor tree)

Know
Prime factorization is to factor any natural number greater than 1 into its prime factors. A prime number is a number that only has 2 factors, 1 and itself.

Understand

- **Factoring** is undoing multiplication.
- Every natural number greater than 1 has a unique prime factorization.
- Prime factorization can be used to find the least common multiple (LCM) of 2 or more numbers.

Research Notes/Graphics on Prime Factorization:

PERCENTS

Ask
What does “percent” mean?
How do we use percentages in our daily lives?

Know
Percent means “out of 100” or “per hundred.” One hundred percent equals “the whole.”

Understand

- A percent is a relationship between two numbers.
- Every percent can be written as a fraction with a denominator of 100.
- A percent is also a ratio that compares a number to 100.

Research Notes/Graphics on Percent:

RATIOS

Ask
What is a ratio?

Know
A **ratio** is used to show a comparison between like or unlike quantities.

Understand

- A ratio is a multiplicative relationship between quantities.
- Every ratio can be written in fraction form.
- Equivalent ratios can be generated the same way you rename fractions, multiply or divide the numerator or denominator by the same number.
- Types of ratios are Part to Part, Part to Whole, and Whole to Part.
- Rates and unit rates are ratios that compare different quantities.

Research Notes/Graphics on Ratios:

PROPORTIONS

Ask
What do you know about proportions?

Know
A **proportion** is a statement (equation) that two ratios are equal.

Understand

- Equivalent ratios act like equivalent fractions.
- In a proportion, cross products are equal.
- There are different related methods for solving proportions.

Research Notes/Graphics on Proportions:

ROUNDING and ESTIMATION

Ask

Is an estimate an exact answer?
What is a strategy you can use to estimate?
Give me 2 examples when it is okay to use an estimate instead of an exact answer?

Know

We estimate in our daily lives. An **estimate** is not an exact answer.

Understandings

- An estimate is used with mental math to check answers.
- Learning to estimate is as important as knowing the exact answer.
- Use the words "**approximately equal to**" or its symbol (≈), or the word "about" when writing or stating an estimate.
- Estimation strategies are **round**ing, **front-end estimation**, and using **compatible numbers**.

Research Notes/Graphics on Rounding and Estimation:

POWERS and EXPONENTS

Ask

What is two to the fourth power look like?
What is its value?
How do you know?
Which part of the expression is the base?
Which part of the expression is the exponent?

Know

Use of an **exponent** represents repeated multiplication.

Understand

- An exponent tells you how many times the base is used as a factor.
- An expression that has a base and an exponent is called a **power**.
- Any number that can be written as a power is also called a power.

Research Notes/Graphics on Powers and Exponents:

LINES

Ask
Tell me what you know about a line?

Know
A **straight line** is the shortest distance between two points.

Understand

- A line is made up of never-ending points in both directions.
- A line can be named using any two points on it or by a lowercase letter. The two points are denoted with uppercase letters with the symbol of a line above them.
- A line intersects another line at exactly one point.
- In art, a line is the most basic design tool. It has length, width, tone, and texture. It may divide space, define a form, describe contour, or suggest direction.
- A line is a basic geometric concept, an idea that does not physically exist.

Research Notes/Graphics on Lines:

POINTS

Ask
Why do we use points on a map?

Know
A **point** shows location.

Understand

- A point does not have size.
- A point is named with a capital letter.
- A point is a basic geometric concept, an idea that does not physically exist.

Research Notes/Graphics on Points:

PLANES

Ask
What do we call a flat surface like a tabletop?

Know
A **plane** is a flat surface.

Understand

- A plane continues infinitely in all directions.
- A plane has length and width but does not have depth (thickness).
- A plane is a basic geometric concept, an idea that does not physically exist.

Research Notes/Graphics on Rays:

RAYS

Ask
What is a ray?
Explain what a ray looks like?
Can you draw me a ray?

Know
A **ray** is part of a line.

Understand

- A ray has a fixed starting point on one end and continues forever on the other end.
- A ray is named using the starting point (endpoint) and another point on the ray.

Research Notes/Graphics on Rays:

SEGMENTS

Ask
What is a segment?
Explain what a segment looks like?
Can you draw me a segment?

Know
A **segment** is part of a line.

Understand

- A segment has two endpoints.
- A segment is named by its endpoints.

<u>Research Notes/Graphics on Segments:</u>

ANGLES

Ask
What is an angle?
Can you draw me an angle?

Know
Angles are used in our daily lives. Architects and engineers use angles for designs, roads, and buildings. An angle is an essential feature of most every object.

Understand

- An angle is formed by two rays that share a common endpoint.
- The shared endpoint is called a vertex.
- An angle is classified by its angle measures-*acute*, *right*, *straight*, and *obtuse*-**and** its sides-*scalene*, *equilateral*, and *isosceles*.
- You use a protractor to measure angles in degrees.
- An angle is named by using the angle symbol "L" and 3 uppercase letters of which the second letter must represent the vertex and the other two letters is a point on each ray.
- An angle can also be named using a lowercase m along with the angle symbol and the uppercase letter representing the vertex.

Research Notes/Graphics on Angles:

POLYGONS

Ask
What is a polygon?

Know
Polygons are all around us. Some examples include signs, containers, graphics, and designs in construction.

Understand

- A polygon is a flat, two-dimensional closed figure with 3 or more sides that are line segments.
- A polygon's dimensions are length and width, but no depth (thickness).
- Polygons are classified by their sides.
- A polygon is classified as a **regular polygon** if all its sides are the same length **and** all of its angles are the same measure.

Research Notes/Graphics on Polygons:

QUADRILATERALS

Ask
What is a quadrilateral?
Name 4 quadrilaterals?

Know
A **quadrilateral** is a 4-sided polygon.

Understand

- Since a quadrilateral is also a polygon, it is a flat, two-dimensional closed figure with 4 sides that are line segments.
- A polygon's dimensions are length and width, but no depth (thickness).
- The sum of the measures of a quadrilateral's angles is 360 degrees.
- The most special (common) quadrilaterals are squares, rectangles, trapezoids, parallelograms, and rhombi.

Research Notes/Graphics on Quadrilaterals:

THE COORDINATE PLANE

Ask

What does a coordinate plane look like?
Can you draw a coordinate plane for me?
How many quadrants does the coordinate plane have?
What are coordinates?

Know

The **coordinate plane** is a grid that you can name any point on.

Understand

- The coordinate plane is also called the **Cartesian Plane.**
- A coordinate plane is formed by a vertical **and** horizontal number line.
- The horizontal number line is called the x-axis.
- The vertical number line is called the y-axis.
- The axes divide the coordinate plane into 4 parts called **quadrants**.
- The location of a point on the coordinate plane is given by an **ordered pair**.
- An ordered pair has an x-coordinate and a y-coordinate, "x" being the first value and "y" being the second value.
- The number lines intersect at the **origin**.
- The coordinates of the origin are (0, 0).

Research Notes/Graphics on The Coordinate (Cartesian) Plane:

GRAPHS

Ask
What is a graph?
Why do we use graphs?

Know
A **graph** is a visual picture of a data set.

Understand

- A graph can help you see relationships between data and/or patterns.
- **Data** in a graph can be used to make predictions.
- A **scale** and **intervals** must be selected for a graph.
- Scale is the units for an axis like miles, hours, minutes, etcetera.
- Intervals is the distance between values (tick marks) on a scale. For example, each interval might represent 5 miles (by 5's) or 2 hours (by 2's).
- The intervals do not have to be the same for each axis.

Research Notes/Graphics of Graphs:

PICTOGRAPH

Ask
What is a pictograph?

Know
A **pictograph** (picture graph) is used to show data.

Understand

- A pictograph uses symbols to represent data items.
- A pictograph uses a key or area to show the value of each picture or symbol.
- A pictograph is usually represented as a table with two columns and several rows. The first column states the topic or category, and the second column shows the title of the graph. The symbols are shown or drawn in each row according to the data gathered.
- A pictograph can also be constructed like a bar graph where the horizontal axis shows the categories, and the vertical axis is scaled or vice versa. The symbols are then drawn vertically above its category according to the data count.

Research Notes/Graphics of Pictographs:

BAR GRAPH

Ask
What is a bar graph?

Know
A **bar** graph uses vertical or horizontal bars to represent data.

Understand

- A bar graph represents data by categories.
- The categories can be shown on the horizontal axis and the scale on the vertical axis or vice versa.
- A double bar graph can compare two data sets.

Research Notes/Graphics of Bar Graphs:

LINE GRAPH

Ask
What is a line graph?
What is the difference between a bar graph and a line graph?

Know
A **line graph** uses a line to represent data.

Understand

- Data in a line graph shows change over a period of time.
- A double line graph can be used to compare changes in two data sets over a period of time.

Research Notes/Graphics of Line Graphs:

CIRCLE GRAPH

Ask
What is a circle graph or pie chart?

Know
A **circle graph** is shaped like a circle and data is shown as percentages. A circle graph is also called a pie chart.

Understand

- Each section or category of a circle graph represents a part or percentage of the whole.
- The percentages add up to 100.

Research Notes/Graphics of Circle Graphs:

THE METRIC SYSTEM

Ask

How many centimeters are in a meter?
How many milliliters are in a liter?
How many kilograms are in a gram?

Know

The metric system is a decimal system of measurement.

Understand

- The metric system has base units: **gram** for measuring mass, **liter** for measuring capacity, and **meter** for measuring length.
- Different units of mass, capacity, or length are obtained by multiplying a power of 10 times the base unit.
- Metric units are combined with the base units to name different units of mass, capacity, and length.

Prefix	Symbol	Factor
milli	m	0.001 one thousandths
centi	c	0.01 one hundredths
deci	d	0.1 one tenth
deka	da	10 ten
hecto	h	100 one hundred
kilo	k	1000 one thousand

This table gives units, their symbols, and their relationship to the gram

Unit	Symbol	Relationship to Base Unit
milligram	mg	0.001 g
centigram	cg	0.01g
decigram	dg	0.1 g
gram	**g**	**base unit**
dekagram	dag	10 g
hectogram	hg	100 g
kilogram	kg	1000 g

Research Notes on the Metric System:

US CUSTOMARY SYSTEM

Ask

How many inches are in a foot?
How many feet are in a yard?
How many ounces are in a cup?
How many cups are in a gallon?
How many pounds are in a ton?
How many centimeters are in a meter?
How many liters are in a kilometer?

Know

The United States is the only major industrialized nation that uses the **US customary system**. It is also called the English system of measurement. The United States uses both the metric system and US customary system.

Length	Capacity
1 foot (ft.) = 12 inches (in)	1 cup (c.) = 8 fluid ounces (fl. oz.)
1 mile (mi.) = 5280 feet (ft.)	1 pint (pt.) = 2 cups (c.)
1 yard (yd.) = 3 feet (ft.)	2 pints (pt.) = 1 quart (qt.)
1 mile (mi.) = 1760 yards (yd.)	4 quarts (qt.) = 1 gallon (g.)

Weight
1 pound (lb.) = 16 ounces (oz.)
1 ton (t.) = 2000 pounds (lbs.)

Research Notes/Graphics on the US Customary System:

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