MATHEMATICS

In Grade 5, your child will focus on three critical areas. The first is developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions). Your child will also focus on extending division to two-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations. The third focus area is developing an understanding of volume. Activities in these areas include:

- Finding a common denominator and creating equivalent fractions for given fractions or mixed numbers.
- Multiplying a fraction or whole number by a fraction and interpreting the product.
- Creating visual models to divide a whole number by a unit fraction.
- Reading, writing, and comparing decimals to thousandths using base-ten numerals, number names, and expanded form.
- Placing decimals on a number line to demonstrate an understanding of value.
- Using number lines that show tenths, hundredths, and thousandths.
- Dividing a whole number dividend with up to four digits by a two-digit divisor using any appropriate strategy.
- Finding the volume of different rectangular prism/cubes by counting unit cubes and applying the formulas for volume.

Your child can use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

- Know the importance of grouping symbols.
- Connect to properties of addition and multiplication.
- Evaluate expressions by solving within parentheses first, within brackets second, and within the braces last.
- Evaluate, create, and write numerical expressions.

RESOURCES

HELP AT HOME

- Have your child describe a situation where doing things in a certain order is important (e.g., putting socks on before putting on shoes).
- Write a problem on a card. Then write the same problem on another card with grouping the symbols in a different location. Have your child solve both problems and compare answers and describe why the answers vary.
- Encourage your child to pay attention to order and minor errors.

Your child can write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.

- Represent a word problem or real-world situation as a numeric expression.
- Write a problem in various equivalent expressions.
- Interpret numerical expressions.

HELP AT HOME

- Play a matching game. Write a verbal expression on one card. Have your child match to as many possible numerical expressions as possible (e.g., Write "add 5 and 2, multiply by 7" on a card. It would match with the cards that have these solutions "(5 + 2) x 7; 7(5 + 2); or 7(2 + 5)").
- Help your child list as many words as possible that mean add, subtract, multiply, divide.

Your child can generate two numerical patterns using two given rules and identify apparent relationships between corresponding terms. Your child can also form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.

- Create real-world and mathematical problems which require graphing points in Quadrant I of a coordinate grid.
- Interpret coordinate values of points in the content of the situation.
- Calculate terms of ordered pairs given a rule to follow.
- Explain the relationship between two sets of patterns.

HELP AT HOME

- Play the "Input/Output" game. Think of a rule (e.g., add 7), and ask your child to say a number (e.g., 4), which is the input. Reply with the number that follows the rule (e.g., 4 + 7 = 11), which is the output. Have your child record the input and output in a table. Continue creating inputs and outputs until he is able to determine the rule. Next, have your child graph the input/output number pairs as coordinates on a graph. Have your child explain the pattern. Play the game again with a new rule. To complete the game, have the child compare the two graphs and explain how and why they differ.

RESOURCES

INPUT	OUTPUT
4	11
8	15
13	20
21	28

SAMPLE INPUT/OUTPUT TABLE

Use input/output tables to help your child determine the rule between two numbers. The rule for this table is "add 7," therefore, 7 has been added to each input to determine the output.

Your child can recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

- Tell what value each digit holds in a multi-digit number.
- Explain the patterns of the base-ten system.
- Write an expression for a multi-digit number to show the quantity of each digit.
- Explain why dividing by 10 is equivalent to multiplying by 1/10.

HELP AT HOME

- Use money to explain that $1(ones place value) × 10 = $10 (tens place value) and that a dime (tenths place value) is 1/10 of $1. It takes 10 dimes to equal $1. It takes 10 $1 to equal $10. Explain that since a dime ($.10) is 1/10 of $1, that you can multiply $0.10 by 10 and also get $1. Continue this activity with various place values. Encourage your child by telling him this is a skill he will use daily.

Your child can explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Your child can also use whole number exponents to denote powers of 10.

- Explain how the patterns of the powers of ten relate to numbers being multiplied by them.
- Explain 10^2 is the same as multiplying by 10 x 10 and the product of this is 100.
- Explain why the problem 6.2×10^2 is the same as 6.2 x 100.
- Use patterns and reasoning to place a decimal in a product or quotient.

HELP AT HOME

- Use a place value table to relate exponents on powers of 10 to the number of zeroes in the answer. (See page 22 for an example of a place value table.)
- Remind your child that each time a decimal is moved, a place value is increased or decreased.

Your child can read, write, and compare decimals to thousandths. Your child can read and write decimals to thousandths using base-ten numerals, number names, and expanded form.

- Convert numbers to word form and expanded form.
- Compare the decimal amount in the various forms and with varying decimal place values.

VOCABULARY

STANDARD FORM: 354
EXPANDED FORM: 300 + 50 + 4
WORD FORM: three hundred fifty-four

HELP AT HOME

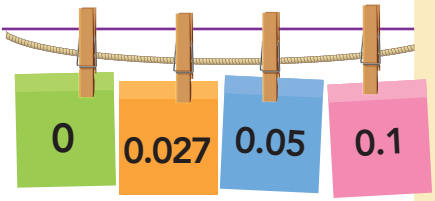
- Have your child write checks to practice writing numbers in word form.
- Use money from a board game to show examples such as: $342 = 3 × $100 + 4 × $10 + 2 × $1. Use the coins to demonstrate $0.35 = 3 × $0.10 + 5 × $.01.

Your child can read, write, and compare decimals to thousandths. Your child can also compare two decimals to thousandths based on meanings of the digits in each place using >, =, and < symbols to record the results of comparisons.

- Explain decimal equivalence by using visual models and/or fractional equivalence.
- Place decimals on a number line to demonstrate an understanding of value. Use number lines that show tenths, hundredths, and thousandths.
- Explain that tenths are placed between whole numbers, hundredths are placed between tenths, and thousandths are placed between hundredths....

VOCABULARY

DECIMAL EQUIVALENCE is the decimal form of a number.



HELP AT HOME

- Make a set of three cards with the same number written as a decimal, written in word form, and an illustration. Make several sets using various numbers with decimals. Mix them up. Have your child pull two cards and determine if he needs to put <, =, or > in between the cards.
- Create a clothesline made of yarn and clothespins to put numbers in order from least to greatest on a number line. Use the same cards from the first activity above to place in order on the clothesline.
- Help your child realize that just because there are more digits in a number with a decimal it does not mean the value is larger (e.g., 3.456 will be to the left of 3.5 on the clothesline).

RESOURCES

PLACE VALUE TABLE

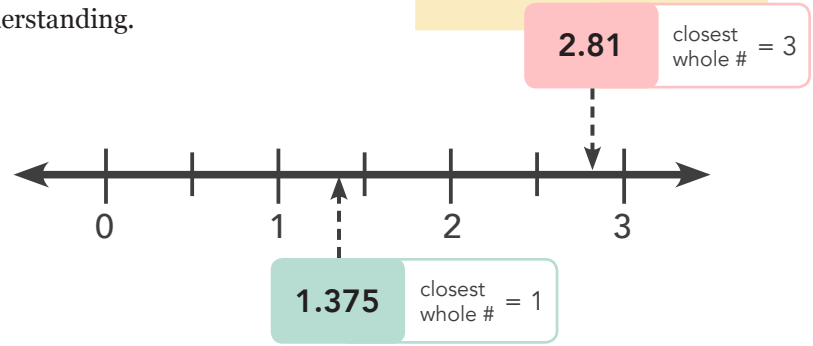
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	.	Tenths	Hundreths	Thousandths
						3	.	4	5	6

Your child can use place value understanding to round decimals to any place.

- Place decimals on a number line.
- Use the number line to determine the benchmark number the original number is closest to on the line.
- Explain that when given a base-ten decimal number, it can be placed between two benchmark numbers. Be able to cite the benchmark numbers that a given base-ten decimal falls between.
- Round a decimal number to any given place using place value understanding.

HELP AT HOME

- Tape a number line on the floor. Have your child hold a card with a decimal number written on it and stand where the number would be on the number line. Then have your child step to the whole number that the decimal number is closest to on the line. Have your child explain if the number was rounded up or if it stayed the same as the whole number.



Your child can fluently multiply multi-digit whole numbers using the standard algorithm.

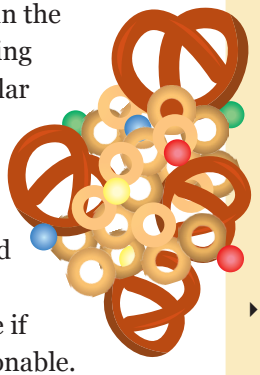
- Explain each of the steps in the standard multiplication problem and how place value plays an important role in each step.
- Explain how the partial products in the standard algorithm relate to the place value of the digits being multiplied.
- Complete all of the steps in the standard algorithm with the corresponding place values lined up appropriately.
- Adhere to precision and determine the reasonableness of the final product based on the numbers multiplied.
- Complete the standard algorithm fluently to multiply multi-digit numbers.

HELP AT HOME

- Write a multiplication problem (e.g., 25 × 38). Have your child write each number in expanded form (20 + 5) × (30 + 8). Your child will multiply the numbers that are in the same place value (20 × 30 = 600) then multiply the numbers in the ones place value (5 × 8 = 40), then mix it up (20 × 8 = 160 and 30 × 5 = 150). Find the sum of all of the products (600 + 40 + 160 + 150 = 950).
- Your child writes a multiplication problem (e.g., 42 × 78). Have him multiply 70 (40 + 2), then 8(40 + 2). Then add the products (2800 +140 + 320 + 16 = 3,276).

Your child can find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Your cihld can illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

- Divide a whole number dividend with up to 4 digits by a 2-digit divisor using any appropriate strategy.
- Use multiple strategies for multi-digit division. Area models illustrate a connection to multiplication, partial quotients make a connection to place value, and concrete models demonstrate the decomposition needed in the standard algorithm.
- Illustrate and explain the solution strategy using equations, rectangular arrays, and/or area models.
- Reason with the value of the dividend and the value of the divisor to determine if the quotient is reasonable.



HELP AT HOME

- Make snack mix. Pour a large number of Cheerios in a big bowl. Ask your child to divide the Cheerios into groups of 32, and determine how many individual sandwich bags will have 32 Cheerios. Continue the above activity with peanuts, pretzels, and candies. Your child can use the number of sandwich bags to work backwards (multiply) to determine how many total of each item to start with so the bags will be equal (e.g., If there are 10 bags of 32 Cheerios, and your child wants 12 pretzels in each bag, then 10 × 12 = 120 pretzels needed to complete snack mix).
- Use the above activity to build on standard algorithm for larger numbers.
- Use money from a board game to divide large numbers. For example, begin with $28,356. Divide the money between 12 people. Your child will have to break down (rename) various amounts to be able to divide evenly.

Your child can add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Your child can relate the strategy to a written method and explain the reasoning used.

- Use number lines, concrete models, or visual models to illustrate addition, subtraction, multiplication, or division of decimal numbers.
- Apply knowledge of fraction multiplication and division to perform decimal operations.
- Use reasoning to place the decimal in a sum, difference, product, or quotient.
- Explain how the placement of the decimal in an answer is related to the value of the numbers calculated.
- Determine which method or strategy is appropriate for the given problem.

HELP AT HOME

- While shopping, let your child add the prices of each item to determine the pretax amount of the bill.
- Use a dime to remind your child that 1/10 is the same value as $.10, thus 1/10 of $5 is $.50, just as $.10 × $5 is also $.50.
- Explain how the decimal placement affects the answer.

Your child can add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

- Find a common denominator and create equivalent fractions for given fractions or mixed numbers.
- Place a fraction or mixed number on a number line and then increase or decrease it in value from this position to perform an adding or subtracting operation.
- Use bar models, or visual models, to represent the adding and subtracting of fractions or mixed numbers with unlike denominators.

HELP AT HOME

- Use dominoes to make fractions. For example, if the domino has 4 dots on one end and 5 dots on the other it will equal 4/5. Choose two dominoes and have your child find the LCM (least common multiple) for each denominator. (The LCM and the LCD (least common denominator) will be the same number.) Using the LCD, have him make equivalent fractions for each fraction. Using the new fractions, have your child add or subtract the numerators and keep the common denominator.
- Have your child check to make sure a fraction is in lowest terms. If not, simplify it by using the GCF (greatest common factor) between the numerator and denominator.

RESOURCES

The **LEAST COMMON MULTIPLE (LCM)** of two numbers is the smallest number that they both divide evenly into. One good way to find the least common multiple of two numbers is to multiply both numbers by 1,2,3,4,5... and then find the first multiple that appears in both lists.

MULTIPLES OF 3

3 6 9 12 (15) 18 21...

MULTIPLES OF 5

5 10 (15) 20 25 30 35...

LCM= 15

The **GREATEST COMMON FACTOR (GCF)** of two numbers is the highest number that divides exactly into two or more numbers.

FACTORS OF 12

1 2 3 (4) 6 12

FACTORS OF 16

1 2 (4) 8 16

GCF = 4

Your child can solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators (e.g., by using visual fraction models or equations to represent the problem). Your child can sse benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

- Create equivalent fractions for given fractions or mixed numbers.
- Find a common denominator for given fractions or mixed numbers.
- Solve word problems involving addition and subtraction of fractions with like or unlike denominators.
- Use a bar model, equations, or number line to represent adding or subtracting of fractions with unlike denominators.
- Relate fractions to benchmark fractions (0, ½, 1) to determine if a solution is reasonable.

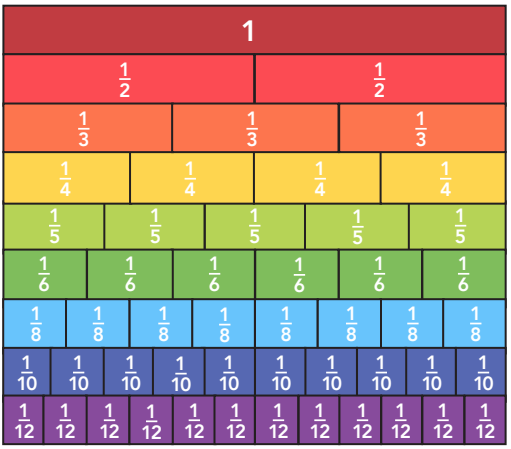
HELP AT HOME

- Help your child make fraction bars. Compare them randomly.
- Have your child add or subtract the fractions he created on the bars. Have him determine if his answer is reasonable by comparing to 0, ½, or 1.

RESOURCES

FRACTION BARS

Cut strips of construction paper in equal lengths. Fold one strip in half and cut at the fold. This will give you ½ fraction bars. Write ½ on each of the two bars. Repeat this process with the other strips, changing the amount of times you fold and cut the paper to create different fractions.



Your child can interpret a fraction as division of the numerator by the denominator. Your child can solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers (e.g., by using visual fraction models or equations to represent the problem).

- Contextualize and decontextualize word problems involving division.
- Produce visual models to justify a division of a fraction.
- Write an equation to represent the division shown in a visual model.
- Estimate the size of the quotient (part) before dividing.

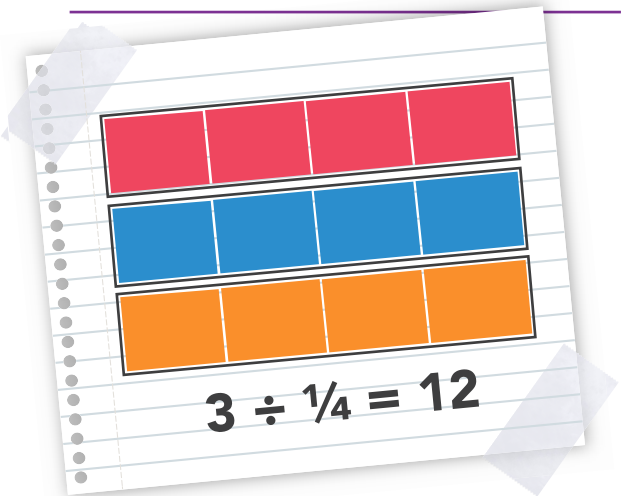
HELP AT HOME

- Draw three bars. Have your child divide each into ¼ pieces. The result is 12 smaller pieces. Therefore 3 ÷ ¼ = 12. Have your child write the equation represented in the visual model he just created (e.g., 3 ÷ ¼ = 12). Repeat this activity with varying number of bars and divisions.

VOCABULARY

CONTEXTUALIZE and **DECONTEXTUALIZE** refer to breaking a word or situation down based on surrounding words to help you understand the problem.

A **QUOTIENT** is the answer to a division problem.



Your child can apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

- Multiply a fraction or whole number by a fraction and interpret the product.
- Use visual fraction models and number lines to show the steps used in solving a problem involving multiplication by a fraction.
- Use benchmarks to estimate the product and determine if the solution is reasonable.
- Contextualize and decontextualize problems by creating word problems and/or equations that represent different multiplication situations and models.

HELP AT HOME

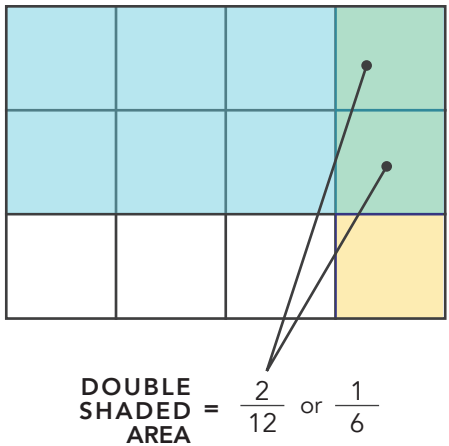
- Have your child draw a 4 by 3 array. Instruct him to shade in 2/3 of it. This shows that 12 × 2/3 = 8.
- Create real-world situations involving fractions for your child to solve (e.g., Makenzie made 5 cakes. Each cake required 1/4 cup of oil. How much oil did she use?).

Your child can apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. Your child can find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Your child can also multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

- Find the area of a rectangle with fractional side lengths using unit squares of the appropriate unit fraction side lengths.
- Find and explain the relationship between the fractional side lengths of the square unit and the fractional side lengths of the rectangle.
- Show that counting the square units used to tile the rectangle and multiplying the side lengths of the rectangle produce the same answer (similar to finding the area of a rectangle with whole number side and lengths).

HELP AT HOME

- Have your child draw a 4 × 3 array (rectangle). Have him shade two rows of the 4 and shade one of the 3 columns. The shaded array shows 2/4 × 1/3. Thus the area that is double shaded equals 2/12 or 1/6 of the large array. Create more examples like this.



Your child can interpret multiplication as scaling (resizing) by comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

- Compare the size of a product of two fractions to the size of one of the factors, without performing the indicated multiplication.
- Make use of the structure of multiplication with whole numbers, and apply this knowledge to predict an outcome for multiplication of fractions.
- Use benchmark fractions to determine if a solution is reasonable.

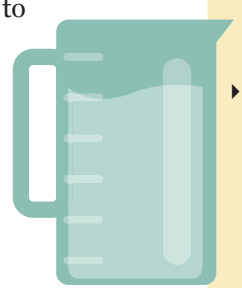
LARGER	SMALLER
10 × 8	7 × ¼
4 × 12	¾ × 2
11 × 11	5 × ½
6 × 7	9 × ⅔

HELP AT HOME

- Give your child a multiplication problem and let him predict if the product will be larger or smaller than both of the factors. Use whole numbers multiplied with whole numbers along with whole numbers multiplied with fractions. Then let your child actually solve the problem to see if his prediction was correct. Have your child make a table with "larger" on one side and "smaller" on the other. Next have him put the problems under the proper heading. Have him explain a pattern he recognizes with the factors compared to the answer (e.g., larger or smaller products). Extend this activity to include fractions multiplied with fractions.

Your child can solve real-world problems involving multiplication of fractions and mixed numbers (e.g., by using visual fraction models or equations to represent the problems).

- Solve real-world multiplication problems involving fractions and mixed numbers by creating a visual model or equation to solve.
- Make use of patterns to solve problems. Use prior knowledge of multiplying by fractions (proper or improper) to solve problems.
- Apply an understanding of the Distributive Property to solve problems.



HELP AT HOME

- Have your child fill a measuring cup 2/3 full and pour it into a large measuring bowl. Repeat this three times. Then let your child measure to determine how much is in the large bowl. This demonstrates $2/3 \times 3 = 2$ cups.
- Have your child multiply $7 \times 5\ 2/3$ by first rewriting $5\ 2/3$ as $5 + 2/3$. Then he will multiply each part by 7 and add the products together (e.g., $7(5) + 7(2/3) = 35 + 14/3$; this will then become $35 + 4\ 2/3$, thus the final answer is $39\ 2/3$.)

VOCABULARY

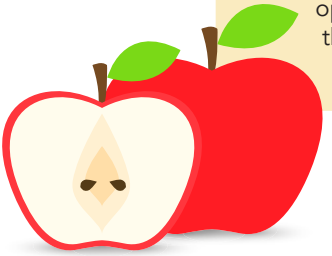
The **DISTRIBUTIVE PROPERTY** lets you find a sum by multiplying each addend separately and then add the products.

Your child can apply previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Your child can interpret division of a unit fraction by a non-zero whole number and compute such quotients.

- Create visual models and divide unit fractions by whole numbers.
- Reason through a division problem.
- Interpret division of a unit fraction by a non-zero whole number and compute quotients. Create a word problem to represent division of a unit fraction by a non-zero whole number.

HELP AT HOME

- Cut an apple in half. Now ask your child if one half can be divided between 4 people. Then cut each half of the apple into 4 equal pieces. This shows ½ ÷ 4= 1/8. Each person would get 1/8 slice of the apple. Use this opportunity to show that 1/8 is smaller than ½.



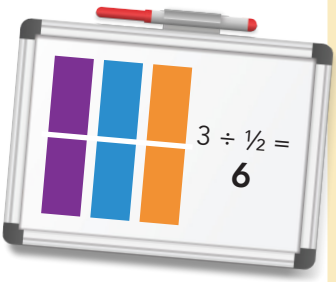
Your child can apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Your child can interpret division of a whole number by a unit fraction, and compute such quotients.

- Create visual models to divide a whole number by a unit fraction.
- Make meaning of a problem.
- Create word problems to represent division problems.
- Draw visual fraction models (bar/circles) using appropriate number of wholes to find out how many of the given unit fraction are found in the whole.

RECIPROCAL REMINDER

2/3 would have a reciprocal of 3/2 because the numerator and denominators are flip-flopped.

FRACTION	RECIPROCAL
3/8	8/3
5/6	6/5
1/3	3/1 = 3
19/7	7/19



HELP AT HOME

- On a chalkboard or dry-erase board, draw a bar. Have your child divide it into 6 equal sections. This shows that 1 ÷ 6 is 1/6. There are 6 smaller sections in 1 bar. Another example would be for your child to draw 3 bars and divide each into 2 equal sections (or ½). The result will be 6 smaller spaces total. Thus 3 ÷ ½ = 6.
- Make a set of cards with a story problem about dividing a whole item into parts on one card. (e.g., Mary had 7 candy bars. She cut each candy bar into equal pieces that were 1/10 the size of the original candy bar. How many people could get a piece of the candy bar?) Then have your child diagram and solve the problem on a chalkboard or dry-erase board. (The diagram would be 7 bars, divided into 10 equal spaces. The solution would be 70). This would be a good time to remind your child that a number multiplied with the reciprocal of the second number is equivalent to dividing the numbers.

Your child can apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Your child can solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.

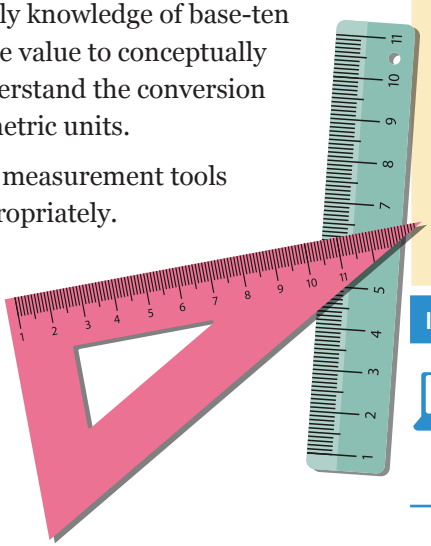
- Solve real-world problems involving division of unit fractions by non-zero whole numbers.
- Solve real-world problems involving division of whole numbers by unit fractions.
- Use visual fraction models and equations to represent word problems and solve them.
- Use prior knowledge of patterns in dividing fractions and whole numbers to reason through problems.
- Use benchmark fractions to estimate quotients and determine the reasonableness of solutions.

HELP AT HOME

- Help your child determine how much snack mix 2 children would get from 3/4 cup of snack mix if evenly divided. Create more examples for your child using items in your pantry or refrigerator. Let your child create some situations for you to solve.
- Do similar activities as above, but have your child estimate the solution before solving (e.g., will each person get closer to 1 whole cup or ½ cup?).

Your child can convert among different sized standard measurement units with a given measurement system, and use conversions in solving multi-step real-world problems.

- Solve multi-step real-world problems using various units of measurement (within the same system).
- Explain equivalents within a given measurement system.
- Use knowledge of whole numbers, fractions, and decimals to compare/convert units of measurement within a system.
- Use visual models for conversions and solve measurement problems.
- Apply knowledge of base-ten place value to conceptually understand the conversion of metric units.
- Use measurement tools appropriately.



HELP AT HOME

- Using a ruler, have your child measure the length of an item. Have him determine how long it is in centimeters. Then remind your child there are 10 millimeters in each centimeter, so have your child multiply by 10 to determine the number of millimeters long the item is. Point out to your child that the size of the object didn't change, just the units you measured in changed. This is a good time to review 1/10 of a number.
- Now have your child do a similar activity with inches and feet. Discuss that these conversions are not based on units of 10, but various bases.

INTERNET RESOURCES

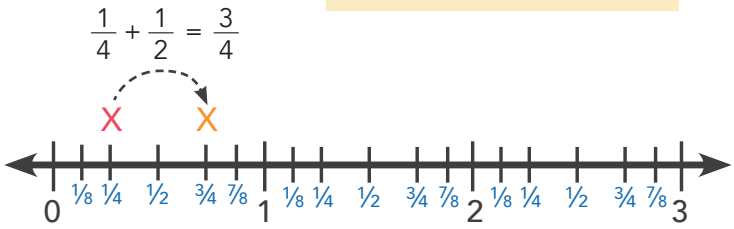
Worksheets for converting metric values to standard English value can be found on the Internet.

Your child can make a line plot to display a data set of measurements in fractions of a unit (½, ¼, ⅛). Your child can use operations on fractions to solve problems involving information presented in line plots.

- Collect real-world data using fractions (½, ¼, ⅛) and create a line plot to display the results visually.
- Use the results of the line plot to make observations and/or inferences about the data.
- Answer questions using a line plot that has already been created.
- Use fraction operations of addition, subtraction, multiplication, and division to solve real-world problems using line plots.
- Find the mean (average) of a set of data by leveling off the line plot and redistributing the data equally.

HELP AT HOME

- Create problems with equal distribution (e.g., Six containers are the same size. One container is ½ full, another is 1/3 full, another is 1/8 full, and the remaining ones are 1/6 full. How much liquid would be in each container if the liquid were distributed equally?).
- Create a line plot with whole numbers, ½, 1/4, and 1/8 marked on the line plot.
- Use the line plot to answer real-world questions (e.g., How much is 1/4 tsp of vanilla plus ½ tsp of vanilla?).



Your child recognizes volume as an attribute of solid figures and understands concepts of volume measurement. A cube with side length of 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

- Explain the concept of volume.
- Provide examples in the real-world that represent a measure of volume.
- Describe the difference between square units and cubic units.
- Make connections between exponents and the relationship they have with square units and cubic units.
- Explain how the unit cube is used to find the volume of an object.
- Select the appropriate unit cube to use to measure a three-dimensional space.

HELP AT HOME

- Help your child name examples all around your home in which volume can be measured.
- Have your child compare a square to a cube. Recognize the difference between a two-dimensional and a three-dimensional figure.
- Using building blocks to make different towers, have your child determine how many cubic units the tower is by counting the blocks. Write the unit answer using the exponent 3 because it has 3 dimensions (length, width, and height).
- Have your child determine how many building blocks will fit in a cereal box.

square cube

Your child can recognize volume as an attribute of solid figures and understands concepts of volume measurement.

- Explain that when finding volume, unit cubes must be packed without gaps or overlays inside a three-dimensional space.
- Understand the total number of |unit cubes (n) packed into a three-dimensional figure equals the volume of the figure.
- Look at examples of different sized prisms packed with unit cubes, some packed with no gaps or overlays and others packed in an unorganized manner, and explain which examples accurately represent the volume of the prism.

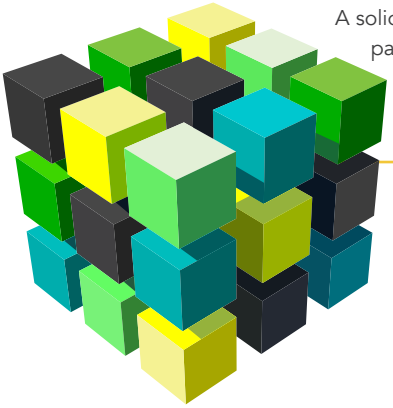
HELP AT HOME

- Have your child determine how many building blocks will fit into a cereal box when neatly stacked. Then have him determine how many building blocks will fit into the same cereal box when not neatly stacked, but put in randomly. Discuss which is the best way to determine the volume of the cereal box. Last, have your child find the volume of the cereal box.
- Try the activity with different containers.

VOCABULARY

VOLUME

A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n unit cubes.



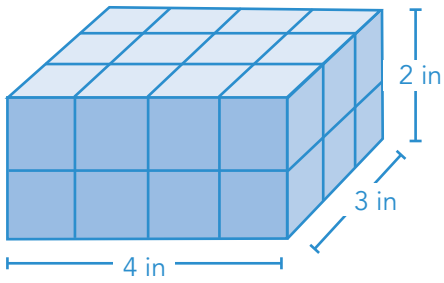
Your child can relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. Your child can find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Your child can also represent threefold whole-number products as volume (e.g., to represent the associative property of multiplication).

- Pack real-world prisms/cubes with unit cubes such as inch cubes, centimeter cubes, and improvised cubes.
- State the volume of a given prism/cube based on how many unit cubes it holds.
- Calculate the volume of real-world rectangular prisms by counting the unit cubes used for lengths, width, and height and multiplying them to get the total number of unit cubes in the volume.
- Use addition to determine the number of unit cubes or volume in a 3-dimensional shape.
- Solve real-world problems using the concepts related to volume.

HELP AT HOME

- Have your child fill a box with unit cubes stacked neatly to determine how many cubes the container will hold.
- Have your child measure the length, width, and height of the container in inches. Have him multiply the length and width to determine the area of the base. Then multiply the height to determine the volume.

VOLUME



VOLUME = Length × Width × Height

VOLUME = 4 in × 3 in × 2 in

VOLUME = 24 in^3

Your child can relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. Your child can apply the formulas V = l x w x h (volume = length x width x height) and V = B x h (volume = base x height) for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

- Discover the formulas for volume based on his knowledge of packing unit cubes into three-dimensional figures and counting the cubes.
- Explain the different formulas.
- Find the volume for real-world problems using rectangular prisms with whole number side lengths.

HELP AT HOME

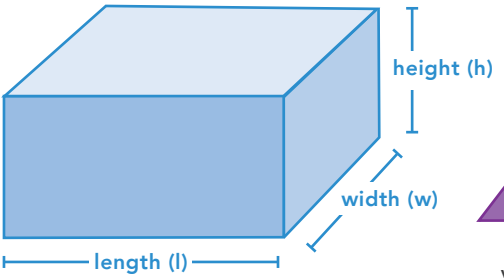
- Review the formulas for area with your child.
- Compare the two different formulas with your child. Discuss how they are similar and situations where he would want to use each. The formula V = l × w × h (volume= product of length, width, and height) would be used to find the volume of a rectangular prism. The formula V = B × h (volume= product of the area of the base and the height) would be used to find the volume of any prism.

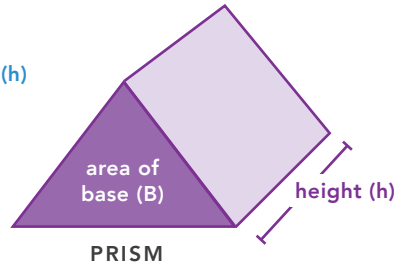
FORMULA REMINDERS

b = base
B = area of a base

RESOURCES

RECTANGULAR PRISM
VOLUME = l × w × h





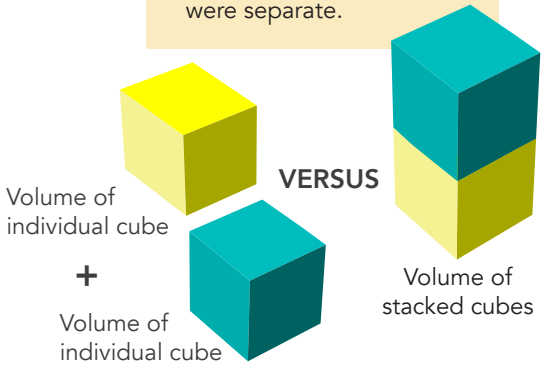
PRISM
VOLUME = B × h

Your child can relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume. Your child can recognize volume as addition. Your child can also find the volume of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.

- Find the volume of different rectangular prisms/cubes by counting cubes and applying the formulas for volume.
- Combine two different rectangular prisms/cubes and determine the total volume of the combined prisms. Explain that if two prisms are combined, the total volume of one prism is added to the volume of the second prism.
- Find the volume of combined rectangular prisms by decomposing them into separate figures, finding the volume of each, and then compose the figures back together.

HELP AT HOME

- Have your child find the volume of two crates stacked on top of each other. Then break them apart and have him find the volume of each, and the sum of the two individual volumes. Compare the volume when they were one whole to the volume when they were separate.



Your child can use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called coordinates. Your child can understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y coordinate).

- Identify the different parts of the coordinate grid. Know and understand the following: origin, x axis, y axis, ordered pair, and quadrant I, point/coordinate.
- Place a point on the correct coordinate when given an ordered pair.
- Identify the correct ordered pair when given a point in a quadrant.
- Explain how to correctly move and locate points within quadrant I.

HELP AT HOME

- Use tape to make a grid on the floor. The grid needs to be a pair of perpendicular lines that intersect at a point (0,0).
- Call off the terms: origin, x axis, y axis, ordered pair, quadrant 1, and point/coordinate and see how fast your child can step on that location on the grid or tell you what the term means.
- Have your child step 2 units to the right and 3 units up (2,3) and place a small toy at that location. Then have your child place a toy somewhere else on the grid and explain how he arrived at that coordinate from the beginning point, or the origin.

RESOURCES

COORDINATE PLANE GRAPH

For an example of a coordinate plane graph, see page 47.

Your child can represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

- Locate points (coordinates) and follow directions based on a coordinate grid that has been contextualized using a real-world example.
- Use maps, pictures, and drawings with a coordinate grid imposed upon it to create real-world math problems that involve locating and graphing points within quadrant 1.
- Create quadrant I using an x axis and y axis and graph points within quadrant I that relate to real-world data. Connect the points in order to look for structure/patterns in the data. This leads to the creation and interpretation of line graphs.

HELP AT HOME

- Using a map or atlas, have your child to determine what is located at given points (coordinates).
- List towns and coordinates along a given road (horizontal or vertical) and discuss what pattern the coordinates or points have in common.

Your child can understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

- Classify and name a polygon when given the attributes without a visual picture.
- Sort polygons, especially quadrilaterals, into different subcategories by explaining the criterion used to sort the polygons.
- Compare and contrast the different polygons.
- Justify, explain, and debate the categorizing of different types of polygons.

HELP AT HOME

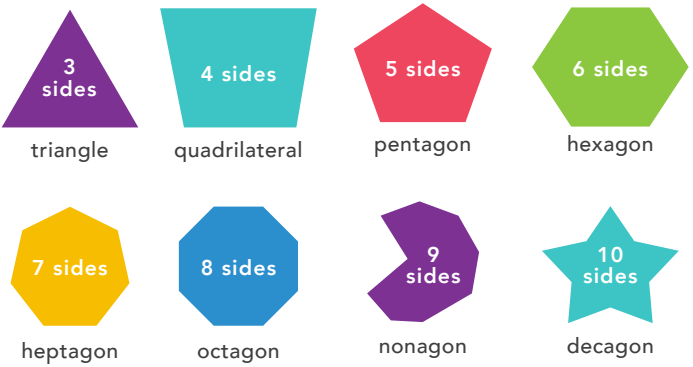
- Play "What am I?" Read off clues (attributes) about a polygon. Your child will guess what polygon you are describing.
- Cut polygons out of paper. Your child will sort the polygons into different groups based on their similar (or same) attributes. Have your child explain why he grouped them the way he did.

ATTRIBUTES

Examples of attributes include side length, angle size, how many sides, etc.

RESOURCES

A **POLYGON** is a simple closed shape made up of straight line segments only. Polygons are classified according to the number of sides they have.



Your child can classify two-dimensional figures in a hierarchy based on properties.

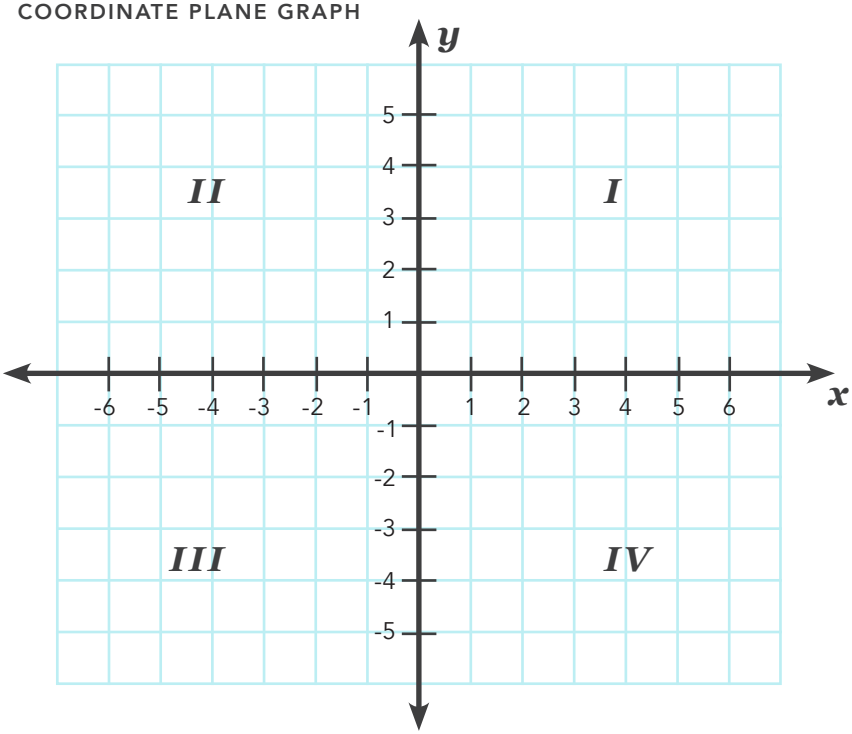
- Classify, draw, and name the polygon when given the attributes without a visual picture.
- Explain why squares are unique among quadrilaterals.
- Create a hierarchy of polygons, such as quadrilaterals, sorted with those with the most attributes and narrowing down to those with the fewest attributes.

HELP AT HOME

- List all the attributes of polygons on individual cards. Have your child put the cards in order from most attributes to least. Then have him name each polygon described on the cards.

RESOURCES

COORDINATE PLANE GRAPH



NOTE: ***x*** = x axis and ***y*** = y axis. Roman numerals ***I, II, III*** and **IV** indicate the quadrants. The origin is the center (where the x axis and y axis meet on this diagram).