Further investigations:

Show your child how to play “Penny Toss.” Predict how many times a penny will land on “heads” or “tails” if the penny is tossed 100 times. Make a chart, toss, and tally. How close was your child’s prediction?

Help your child make a chart showing the basic food groups. Tally how many servings of each food group he eats in one day. Is he eating in a healthy way?

How many times can your child jump rope? Let her set a goal for herself, record the number of jumps without missing, and make a bar graph. The horizontal axis would represent the trials, and the vertical axis (height of the bar) would represent the number of jumps. How many trials did it take for your child to meet her goal?

Ask your child to create a Venn diagram comparing two of his favorite places to eat.

Terminology:

Venn diagram: Venn diagrams use circles to show relationships among sets. Frequently these circles overlap. Each circle contains data from one of the sets being compared. If two or more sets contain the same data, these similarities show in the intersections of the circles.

Students will:

• Learn to ask appropriate questions to find out specific data
• Collect data
• Organize and record data using tallies, simple tables and charts, Venn diagrams, and bar graphs
• Group objects according to common properties

Classroom Cases:

1. This picture graph shows the number of insects the children saw during their fieldtrip.

<table>
<thead>
<tr>
<th>Number of Insects</th>
<th>2 insects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Julia</td>
<td></td>
</tr>
<tr>
<td>Charlie</td>
<td></td>
</tr>
<tr>
<td>Meagan</td>
<td></td>
</tr>
<tr>
<td>Baylie</td>
<td></td>
</tr>
</tbody>
</table>

Who saw the most insects?
Who saw the fewest?
How many more insects did Baylie see than Charlie?
How many insects did the children see altogether?
Be sure to tell how you figured out your answer.

Case Closed - Evidence:

Baylie saw the most insects and Charlie saw the fewest insects. This is because Baylie saw 10 and Charlie saw 4.
Baylie saw 6 more insects than Charlie, because 10 – 4 = 6.
The children saw 28 insects altogether because there are 14 bug symbols on the graph and each symbol stands for 2 insects, so 2+2+2+2+2+2+2+2+2+2+2+2+2+2+2 = 28.

2. Toss a 3 ounce paper cup 20 times.

a. Make a chart to tally the number of times the cup lands up, down, or on its side. Don’t forget to give your chart a title.

<table>
<thead>
<tr>
<th>Cup Toss</th>
<th>up 5</th>
<th>down 7</th>
<th>side 8</th>
</tr>
</thead>
</table>

The cup landed up 5 times. The cup landed down 7 times. The cup landed on its side 8 times. The cup landed on its side more times than up or down.

b. How many times did the cup land up? Down? On its side? Which way did the cup land most often?

Case Closed - Evidence:

3. Using the information you gathered from the Cup Toss, make a Bar Graph showing your results. Don’t forget to include a title for your graph, as well as labels for both the bottom and side of the graph.

<table>
<thead>
<tr>
<th>Cup Toss</th>
<th>up</th>
<th>down</th>
<th>side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of times it landed that way</td>
<td>9</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

4. Use a Venn diagram to show how you and your best friend are alike and different from each other.

Case Closed - Evidence:

Clues:

Some children think when reading a picture graph that the pictures always represent ONE; however, it is necessary to use the graph key to determine the value of the pictures used on the graph.

Book ‘em:

Lemonade for Sale by Stuart J. Murphy

Related Files:

www.ceismc.gatech.edu/csi
Further investigations:
Let your child count the change from your pockets or change purse.

Give your child play money and coins to go play shopping. Take turns being the sales clerk and customer. Model how to count back change to $1.00.

Give your child a budget of $2 or $3. Ask him to “spend” the money by estimating the prices of items in newspaper advertisements. The goal is to get as close to the budgeted amount as possible without going over.

Encourage your child to practice skip counting by 2’s, 5’s, 10’s, and 25’s.

Ask your child to draw a picture using circles, squares, triangles, and rectangles. You assign each shape a monetary value (1¢, 5¢, 10¢, 25¢), and ask your child to add the values to find out how much her picture is worth.

Terminology:
Digit: A symbol used to write a number (0, 1, 2, 3, 4, 5, 6, 7, 8, and 9)

Place Value: The value a digit has because of its position in a number

Place Value, Money, and Estimation

Students will:
- Use base ten blocks, diagrams, and number sentences to represent numbers up to 100.
- Write numbers in expanded form (327=300+20+7) using words and numerals
- Know a digit’s place and value when given a number (567: the six is in the tens place and has a value of 60)
- Count with pennies, nickels, dimes, quarters and dollar bills
- Make fair trades and count back change from a given amount of money

Classroom Cases:
1. Use base ten blocks to show the number 112.

Case Closed - Evidence:

2. Write “243” two different ways

Case Closed - Evidence:
200 + 40 +3 = 243
100 + 100 + 40 + 3 = 243

3. You want to buy a balloon that costs $.65. You have $1.00. Use coins to count back the change you get. Show the amount requiring the fewest coins and one other way.

Case Closed - Evidence:
1 dime, 1 quarter; 3 dimes, and 1 nickel

Clues:
When asked the value of the underlined digit in 562, your child may answer “tens” or “6 tens” rather than 60. “Tens” is the name of the place; 60 or “6 tens” tells the value. Children may recognize only one side of a coin.

Children often do not make the connection between “counting up” or “adding on” and counting back change. 10 + 3 would be 10, 11, 12, 13. Counting back change to $1.00 for something that costs 88¢ would be 89, 90, $1.00, that is, 2 pennies and 1 dime to make a dollar.

Book ‘em:
If You Made a Million by David M. Schwartz
Alexander, Who Used to Be Rich Last Sunday by Judith Viorst
Benny’s Pennies by Pat Brisson
A Chair for My Mother by Vera Williams
How the Second Grade Got $8,205.50 to Visit the Statue of Liberty by Nathan Zimelman

Related Files:
www.ceismc.gatech.edu/csi
Further investigations:
Ask your child, “What tool should I use to measure the length of a semi-truck?” You may want to give choices (inch, foot, yard, centimeter, meter) at first, but later let your child come up with the correct answer. Pose questions about other objects, large and small.

Draw a simple clock to show the time a special activity is happening. Your child can compare the practice clock or drawing to a real clock, knowing it is time when the two clocks match. Practice telling time to the nearest 5 minutes.

Set a timer to go off and ask your child to tell you the time.

Ask your child to make an estimate of the amount of time it will take to do simple everyday activities such as brush teeth or clean a bedroom. Then time the activity.

Help your child make a table of the week’s daily high and low temperatures. Highlight the high and low temperatures for the week. Find the difference between the daily high and low temperatures. Highlight the difference between the temperatures.

Challenge your child to estimate one minute. Using a timer, you say “start.” Your child should say “stop” when he thinks one minute has passed. Write down the number of seconds that passed. Let your child determine how close his estimate was. Change places and compare estimates.

Terminology:

Inch: a customary unit of length; 12 inches = 1 foot
Foot: a customary unit of length; 1 foot = 12 inches
Yard: a customary unit of length equal to three feet
Centimeter: a metric unit of length; 1/100 of a meter
Meter: the standard unit of length in the metric system

Estimate: to make an approximate or rough calculation, often based on rounding

Temperature: a measurement of how hot or cold something is; temperature is measured with a thermometer in degrees. Common temperature scales are Celsius (°C) and Fahrenheit (°F).

Thermometer: instrument for measuring temperature

Minute: unit of time equal to 60 seconds

Students will:

- Tell time to the nearest five minutes
- Learn that there are 60 minutes in an hour and 24 hours in a day and understand the relationship between hours and days
- Know the standard units for measuring length (inch, foot, yard, centimeter, meter) and compare the relationship of one unit to another
- Check by measuring to determine if estimates are accurate for length and temperature
- Use appropriate measuring tools
- Use mental math strategies to solve problems with numbers less than 1000
- Understand the value of reasonable estimates

Classroom Cases:

1. Tape two meter sticks end-to-end to the floor. Mark a starting place with tape. Estimate how far you think you can jump. Record your guess. Standing at the starting line, jump as far as you can. Ask a partner to mark where your toes land. How far did your jump? How close was your estimate?

Case Closed - Evidence:
I think I can jump 100 centimeters. I jumped 102 centimeters.

My estimate was off by 2 centimeters.

2. Choose a “pull-back” toy or “penny racer car”. Pull back your car and release; how far do you think your toy traveled? Make and record your estimate using centimeters and inches. Measure the distance it went in inches and centimeters. Record you results on a chart.

Case Closed - Evidence:

<table>
<thead>
<tr>
<th>Estimates</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 inches</td>
<td>100 centimeters</td>
</tr>
</tbody>
</table>

3. Use three paper cups. Put ice water in one, warm tap water in one, and cool tap water in the last one. Put your finger in the water of each cup. Estimate the temperature of each cup. Measure the temperature with a thermometer. Record your answers on a chart.

Case Closed - Evidence:

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice water</td>
<td>45 °F</td>
</tr>
<tr>
<td>Warm water</td>
<td>70 °F</td>
</tr>
<tr>
<td>Cool water</td>
<td>60 °F</td>
</tr>
</tbody>
</table>

4. How long will it take you to write the numbers in order from 1 to 100? Make an estimate and write it down. Start the timer and begin writing the numbers on the 100’s grid. Stop the timer when you are finished. How long did it take you? Were you faster or slower than your estimate? Now try the same activity, but put the numbers in order from largest to smallest.

Clues:
Students will often confuse the hour and minute hands on an analog clock (non digital), confuse inches and centimeters on a ruler, and forget to place the beginning of the measuring tool at the beginning of the object to be measured.

Book ‘em:

- Inch by Inch by Leo Lionni
- How Big is a Foot? by Rolf Myller
- The Biggest Fish by Shelia Keenan
- Moira’s Birthday by Robert Munsch
- Twelve Snails to One Lizard by Susan Hightower
- Ten Beads Tall by Pam Adams

Related Files:
www.ceismc.gatech.edu/csi
Take turns with your child writing riddles about real-life solid shapes. For example, “I am a rectangular prism. You use me to clean up. What am I?” Answer: a sponge.

Help your child make prisms or other solid shapes by using toothpicks and raisins or marshmallows.

Cut basic shapes from stiff cardboard. Make different types and sizes. Put the shapes in a small bag. Have your child stick her hand into the bag and choose a shape. She should describe as many properties as possible by feeling the shape, and name it if the name is known. Pull the shape out to see if she is correct.

**Terminology:**

**Plane figure:** Flat figures that have 2 dimensions (length and width); 2nd grade plane figures include triangles, squares, rectangles, trapezoids, quadrilaterals, pentagons, hexagons, and irregular polygons.

**Polygon:** A closed shape (no gaps or openings) that lies in a plane and is made up of 3 or more straight sides and angles.

**Parallel:** Lines that lie in the same plane and are the same distance apart at all points.

**Trapezoid:** A quadrilateral with two parallel sides.

**Quadrilateral:** A four-sided polygon.

**Pentagon:** A five-sided polygon

**Hexagon:** A six-sided polygon

**Regular Polygon:** A polygon in which all the sides are equal and all the angles are equal

**Irregular Polygon:** A polygon that has angles and sides of different sizes.

**Solid figure:** A three dimensional (3-D) figure (length, width and height); 2nd grade solid figures include prisms, pyramids, cylinders, cones, and spheres.

**Sphere:** A three-dimensional figure that is perfectly round like a ball.

** Apex:** The highest point at the top of a shape

**Pyramid:** A solid shape with a polygon as a base and triangular faces that taper to a point (apex)

**Prism:** A solid shape that takes its name from the shape of its base

**Vertices:** The corners of a geometric figure. The singular form of vertices is **vertex**.

**Case Closed - Evidence:**

<table>
<thead>
<tr>
<th>Solid shape</th>
<th>Shape name</th>
<th># of faces (A face is a flat surface)</th>
<th># of vertices (A vertex is where three or more faces meet.)</th>
<th># of edges (An edge is where two faces meet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangular prism</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Cube</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Cone</td>
<td>1</td>
<td>0</td>
<td>1 curved edge</td>
<td></td>
</tr>
<tr>
<td>Square pyramid</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

My number of faces is 12 minus 6. I have 2 more vertices than faces. All my edges are equal in length. Can you guess my name? (Answer: cube)

I have one point called an apex or vertex. My face is round and sometimes you may say I am good to eat. What am I? (Answer: cone)

2. Place a deck of geometric shape cards face down on the table. The first player draws a card and describes the shape. The first child to identify the shape correctly takes the card. Continue until all the cards have been drawn.

**Case Closed - Evidence:**

Sam: This shape has four sides and four vertices. All the sides are the same size. Karen: I think the shape is a square. Karen is correct, so she takes the card.

**Book’em:**

- **Listen to a Shape** by Marcia Brown
- **Circles, Triangles, and Squares** by Tana Hoban
- **Color Zoo** by Lois Ehlert
- **The Greedy Triangle** by Marilyn Burns
- **Three Pigs, One Wolf, and Seven Shapes** by Grace Maccarone
- **Shapes in Nature** by Judy Feldman
- **The Village of Round and Square Houses** by Ann Grifalconi
1. Kim’s dog had eight puppies. Five of the puppies are dark brown, the rest of them are white. What fraction of the puppies is dark brown? What fraction of the puppies is white?

Case Closed - Evidence:
There are 8 puppies in all so \( \frac{5}{8} \) of the puppies are dark brown and \( \frac{3}{8} \) of the puppies are white.

2. You and your two best friends are going to share a chocolate bar. How could you share the chocolate bar so everyone has an equal share? What fraction of the chocolate bar would each person get to eat? Use pictures, words and numbers to explain your answer.

Case Closed - Evidence:
Since there are three of us altogether, there would need to be three equal shares. That means that the denominator will be 3. Each one of us would get one share, so the top number, the numerator, will be 1. Each of us will get 1/3 of the chocolate bar.

3. Your big brother bought a pizza. He said you can have either 2/3 or 3/6 of the pizza. Which would you choose? Why? Use pictures, words, and numbers to explain your answer.

Case Closed - Evidence:
I love pizza, so I would choose to eat \( \frac{2}{3} \) of it because \( \frac{2}{3} > \frac{3}{6} \).

Further investigations:
Drop a handful of pennies (or other coins) on a table. Ask your child, “How many coins landed heads-up? How many coins landed tails-up? What fraction of the total coins is heads-up? What fraction is tails-up?”

Make a favorite recipe with your child. Help your child do the measuring. Try these No-Bake Cookies:
3 ½ tablespoons butter
4 tablespoons golden syrup
4 ounces semisweet chocolate, chopped
2 ¾ cups cornflakes cereal
In a saucepan over low heat, combine the butter, golden syrup and chocolate. Cook and stir until butter and chocolate have melted and everything is well blended. Mix in the cornflakes cereal. Drop by heaping spoonfuls onto waxed paper or a buttered baking sheet. Place in the refrigerator until set, about 15 minutes.

Make a pan of brownies and let your child share them equally with your family or friends. Ask your child what fraction of the total batch each person will get.

Empty a small bag of M&M’s, Skittles, or other type of candy on a table. Allow your child to estimate what fractions of the candies are red, yellow, green, orange, and brown. Help him separate the colors and determine the correct fraction for each color.

Terminology:
Denominator: the bottom number of a fraction that tells how many equal parts are in a whole or set
Numerator: the top number of a fraction that tells how many of the equal parts are being described
Third: one of three equal parts
Sixth: one of six equal parts
Eighth: one of eight equal parts
Tenth: one of ten equal parts

Related Files:
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Parts of a Whole
Students will:
Second Grade 5 of 7
- Identify and represent the fractional parts of a whole or of a set
- Recognize that the denominator determines the number of equal sized pieces that make up a whole, and represent this concept
- Recognize that the numerator determines how many pieces of the whole are being referred to in the fraction, and represent this concept
- Represent and compare fractions with easy denominators of 3, 6, 8, and 10 using concrete and pictorial models

Classroom Cases:
1. Kim’s dog had eight puppies. Five of the puppies are dark brown, the rest of them are white. What fraction of the puppies is dark brown? What fraction of the puppies is white?

Case Closed - Evidence:
There are 8 puppies in all so \( \frac{5}{8} \) of the puppies are dark brown and \( \frac{3}{8} \) of the puppies are white.

2. You and your two best friends are going to share a chocolate bar. How could you share the chocolate bar so everyone has an equal share? What fraction of the chocolate bar would each person get to eat? Use pictures, words and numbers to explain your answer.

Case Closed - Evidence:
Since there are three of us altogether, there would need to be three equal shares. That means that the denominator will be 3. Each one of us would get one share, so the top number, the numerator, will be 1. Each of us will get 1/3 of the chocolate bar.

3. Your big brother bought a pizza. He said you can have either 2/3 or 3/6 of the pizza. Which would you choose? Why? Use pictures, words, and numbers to explain your answer.

Case Closed - Evidence:
I love pizza, so I would choose to eat \( \frac{2}{3} \) of it because \( \frac{2}{3} > \frac{3}{6} \).

Book ‘em:
Eating Fractions by Bruce McMillan
Fraction Action by Loreen Leedy
Fraction Fun by David A. Adler
Gator Pie by Louise Mathews
Further investigations:
With your child, make a set of number cards (0-9). Each player draws four number cards and arranges the cards to make two two-digit addends. Players find the sums. The player with the highest sum wins the round. Keep score by using tally marks. The player who has the most tally marks in 10 minutes is the winner.

```
  51  36
+ 27  + 44
```

Ask your child to write a story problem that has an answer of “72”.

Discuss this problem with your child: You buy two candy bars and pay the clerk $2.00. How much do you think each candy bar costs if you get 25 cents change?

Hint: There is more than one right answer!

Use addition to check the answer.

```
17 + 4 + 2 + 16 = 20 + 17 + 2 = 20 + 19
```

Identity Property for Addition:

Ex. (15 + 7) + 6 = 15 + (7 + 6)

Identity Property for Multiplication:

Ex. a x 1 = a

Inverse operations: the inverse operation for addition is subtraction; the inverse operation for subtraction is addition

Terminology:

Commutative Property: in addition and multiplication, numbers may be added or multiplied in any order.

Ex. 98 + 12 = 12 + 98

Associative Property: in addition and multiplication, numbers may be grouped in different ways.

Ex. (15 + 7) + 6 = 15 + (7 + 6)

Identity Property for Addition: zero added to a number is the number itself

Identity Property for Multiplication: a number multiplied by one is the number itself

Join: to put together (add)

Separate: to take apart (subtract)

Difference: the amount that remains after one quantity is subtracted from another

Inverse operations: the inverse operation for addition is subtraction; the inverse operation for subtraction is addition

Numeration with Computation

Students will:

- Using regrouping add and subtract two whole numbers containing up to three digits each with regrouping
- Use inverse operations to solve problems
- Solve problems using mental math strategies
- Simplify problems using the commutative, associative, and identity properties of addition

Classroom Cases:

1. Use addition or subtraction to represent 210 in at least 3 ways.

Case Closed - Evidence:

200 + 10
100 + 100 + 10
300 – 90

2. Tammy sold 267 boxes of cookies. Roxie sold 45 less than Tammy, and Karly sold 16 more than Tammy. How many boxes of cookies did Roxie and Karly sell? Use pictures, words, or numbers to show your strategy. Use inverse operations to check your answers.

Case Closed - Evidence:

<table>
<thead>
<tr>
<th>Girl</th>
<th>Boxes of Cookies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tammy</td>
<td>267</td>
</tr>
<tr>
<td>Roxie</td>
<td>267 - 45 = 222</td>
</tr>
<tr>
<td>Karly</td>
<td>267 + 16 = 283</td>
</tr>
</tbody>
</table>

Roxie sold 45 less than Tammy so my problem would be 267 – 45 = 222 boxes of cookies. I can check my answer by adding 222 + 45. I should get 267.

Karly sold 16 more than Tammy so my problem would be 267 + 16 = 283 boxes of cookies. I can check my answer by subtracting 283 – 16 = 267.

3. Ron’s brother gave him his sports card collection. Ron counted 389 baseball cards and 154 basketball cards. How many cards does Ron’s collection have in all?

Case Closed - Evidence:

<table>
<thead>
<tr>
<th>Ron’s Cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>389</td>
</tr>
<tr>
<td>154</td>
</tr>
</tbody>
</table>

Ron has 543 sports cards.

4. Maria baked cookies yesterday. The recipe said it would produce 12 dozen cookies. Maria’s dough only yielded 135 cookies. How many more cookies should Maria’s batch have provided according to the recipe’s claim?

Case Closed - Evidence:

Maria should have gotten 144 cookies because 12 dozen is 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 which is 144. Since 144 – 135 = 9, Maria baked 9 cookies less than the recipe claimed. Maybe her cookies were bigger than usual.

5. Replace the squares with numbers that make the number sentences true:

   7 + 9 = 9 + □
   13 + (7 + 11) = (13 + □) + □
   17 + 4 + 2+ 16= 20 + □ + □ = 20 + □

Case Closed - Evidence:

<table>
<thead>
<tr>
<th>□ □ □</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>17</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>19</td>
</tr>
</tbody>
</table>

Book ‘em:

12 Ways to Get to 11 by Eve Mirriam
Annie’s One to Ten by Annie Owen
The Philharmonic Gets Dressed by Karla Kuskin
Pondlarker by Fred Gwynne
Cats Add Up! by Dianne Ochiltree
Mental Math in the Primary Grades by Jack A. Hope, Larry Leutizinger, Barbara J. Reys, and Robert E. Reys

Related Files:

www.ceismc.gatech.edu/csi
1. Use a number cube and the shapes below to multiply. Roll the number cube and choose that number of one shape. How many vertices (corners) do you have altogether? Write equations and sentences for your multiplication and repeated addition problems.

**Case Closed - Evidence:**

3 x 5 = 15
5 + 5 + 5 = 15
Three groups of five equal fifteen.

2. Use one number cube, number cards 1-25, beans, and pipe cleaners or wikki stix (wax covered string that can be shaped and reshaped) for this activity. Draw a number card and count out that many beans. Roll the number cube. Use the wikki stix or pipe cleaners to make that many circles. Put an equal number of beans in each circle. Do you have any left over? Use words and numbers to tell about what you have done.

**Case Closed - Evidence:**

11 ÷ 5 = 2 and 1 left over. Eleven divided into five equal shares will be two in each share with one left over.

3. Pick a flashcard from the pile. Make block trains to show the multiplication problem two ways.

**Case Closed - Evidence:**

2 x 4 = 8
2 groups of 4
4 x 2 = 8
4 groups of 2

**Clues:**

Make your own “Fact Family” multiplication/division flashcards by cutting poster board into triangles. Write a multiplication fact on each card by putting the product (answer) on the top and each factor on a bottom corner. By placing your hand over the number in a different corner you create a new fact for that family. Using these flashcards will help your child learn the relationship between multiplication and division.