Grade 2 Mathematics, Quarter 3, Unit 3.1

Use Shapes and Their Attributes to Explore Fractions

Overview

Number of instructional days: 10 (1 day = 45–60 minutes)

Content to be learned

- Identify triangles, quadrilaterals, pentagons, hexagons and cubes.
- Draw shapes having specified attributes such as a given number of angles or a given number of equal faces.
- Partition circles and rectangles into two, three or four equal parts.
- Describe equal shares using words such as halves, thirds, half of, etc.
- Describe a whole as having two halves, three thirds, etc.
- Recognize that equal shares of identical wholes need not have the same shape.

Mathematical practices to be integrated

Model with mathematics.

- Draw pictures of geometric shapes.
- Draw pictures to show how shapes can be divided into halves, thirds and fourths.

Look for and make use of structure.

- Name/sort shapes based upon their attributes.
- Recognize wholes and parts of shapes
- Recognize that a shape such as a square could be divided into fourths in multiple ways.

Essential questions

- What are the attributes of a circle/triangle/rectangle/square?
- What are two ways these shapes are like?
- How can we divide this whole into two (three or four) equal parts?
- How do we know the pieces are the same size?
- What words can we use to name the parts of this shape?

Written Curriculum

Common Core State Standards for Mathematical Content

Geometry 2.G

Reason with shapes and their attributes.

2.G.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves, thirds, half of, a third of*, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.[5] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

[5] Sizes are compared directly or visually, not compared by measuring.

Common Core Standards for Mathematical Practice

2 Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

Clarifying the Standards

Prior Learning

In first grade, students considered which attributes (such as the number of sides) are defining and which attributes (such as color, orientation, and size) are not defining. They have built and drawn shapes. They composed and decomposed two-dimensional and three-dimensional shapes. They partitioned circles and rectangles into two or four equal parts and used the words half, fourth and quarter to name them.

Current Learning

In second grade, students will divide shapes into halves, quarters, and thirds. They will use these words and phrases to describe partitions of shapes into equal shares: half, halves, third(s), fourth(s), and quarter(s), half of, third of, quarter of. They will recognize and describe wholes as having two halves, three thirds, or four quarters. Their work with fractional parts of shapes will lead to an understanding that shapes can be divided into equal shares in multiple ways. Quarters of an identical polygon are still quarters and need not have the same shape. This work is reinforcement of work in first grade for halves and quarters and developmental for thirds. They will recognize the defining attributes of shapes and draw shapes having specified attributes such as a given number of sides. Second grades will be able to identify triangles, quadrilaterals, pentagons, hexagons and cubes.

*Routines: Continue to count coins, mentally add 1, 10 or 100 to a given number and practice addition and subtraction facts for fluency.

Future Learning

In third grade students will study fractions in the context of numbers and operations. They will build on the idea of portioning a whole into equal parts. They will use fractional numbers and build fractions from unit fractions (i.e., 3/4 is made of three 1/4 units). In grade 4 and 5, they will add and subtract fractions and work with equivalent fractions.

Additional Findings

Progressions for the Common Core State Standards in Mathematics states “Initially, students can use an intuitive notion of congruence (‘same size and same shape’) to explain why the parts are equal, e.g. when they divide a square into four equal squares or four equal rectangles. Students come to a more precise meaning for ‘equal parts’ as ‘parts with equal measurements.’ For example, when a ruler is partitioned into halves or quarters of an inch, they see that each subdivision has the same length.” (p. 3)

According to *Principles and Standards for School Mathematics,* in addition to work with whole numbers, young students should also have some experience with simple fractions through connections to everyday situations and meaningful problems, starting with the common fractions expressed in the language—such as “half”—that they bring to the classroom. At this level, it is more important for students to recognize when things are divided into equal parts than to focus on fraction notation. Second-graders should be able to identify three out of four equal parts (or three-fourths) of a folded paper that has been shaded and to understand that “fourths” means four equal parts of a whole. (p. 82)

Grade 2 Mathematics, Quarter 3, Unit 3.2

Explore Multiplication Using Concrete Models

Overview

Number of instructional days: 5 (1 day = 45–60 minutes)

Content to be learned

- Partition or build rectangles into rows and columns of equal size squares.
- Count to find the total number in a rectangular array.
- Write equations to express the total number of items found in an array as a sum of equal addends.
- Determine whether there are odd or even groups of objects (up to 20).
- Use pairing of objects or counting by 2 to determine odd or even.
- Express an even number as the sum of two equal addends.

Mathematical practices to be integrated

Model with mathematics.

- Build or draw arrays.
- Write an equation.

Look for and express regularity in repeated reasoning.

- Write equations as repeated addition of the same addend (5 + 5 + 5 + 5 = 20).

Essential questions

- What is the result of adding two even numbers?
- What is the result of adding two odd numbers?
- What would an array of (up to 25) look like? Is there another way to arrange the array?
- How many objects are in this array? What would an equation to show the total look like?

Written Curriculum

Common Core State Standards for Mathematical Content

Operations and Algebraic Thinking 2.OA

Work with equal groups of objects to gain foundations for multiplication.

2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Geometry 2.G

Reason with shapes and their attributes

2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

Common Core Standards for Mathematical Practice

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically

proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Clarifying the Standards

Prior Learning

First graders relate counting to addition and subtraction, for example counting by 2's for repeated addition. They also write equations to represent addition and subtraction.

Current Learning

Second graders draw and build arrays of square units and count to find the total number of squares. They work with arrays up to 5 columns by 5 rows. These arrays are models for multiplication and the sum of the squares are expressed as repeated addition of the same addend. Students also work with even and odd quantities of objects determining whether or not they are even or odd by counting by 2s or lining the objects in pairs.

Routines: Addition and subtraction facts to 20, using mental addition and subtraction strategies.

According to Bloom's Taxonomy, building and drawing arrays will be at the developmental level. Writing equations and working with even and odd numbers will be at the reinforcement level.

Future Learning

In grade 3 students focus on understanding the meaning and properties of multiplication and division and on finding products of single-digit multiplying and related quotients. (3.OA.1-7)

Additional Findings

Progressions for the Common Core State Standards in Mathematics (draft) describes levels in problem representation and solution: "Multiplication and division problem representations and solution methods can be considered as falling within three levels related to the levels for addition and subtraction. Level 1 is making and counting all of the quantities involved in a multiplication or division model. As before the quantities can be represented by objects or with a diagram, but a diagram affords reflection and sharing when it is drawn on the board and explained by a student. The grade 2 standards 2.OA.3 and 2.OA.4 are at this level but set the stage for level 2." (p. 25)

The Research Companion Principles and Standards for School Mathematics states, "how students understand a concept has important implications for what they subsequently can do and learn." (p. 95)

*Principles and Standards for School Mathematics s*tates that "representations make mathematical ideas more concrete and available for reflection. Students can represent ideas with objects that can be moved and rearranged. Such concrete representations lay the foundation for the later use of symbols." (p. 137)

Grade 2 Mathematics, Quarter 3, Unit 3.3

Apply Addition and Subtraction Strategies to Solve Problems

Overview

Number of instructional days: 10 (1 day = 45–60 minutes)

Content to be learned

- Simplify computations involving whole numbers to solve problems.
- Use mental strategies to solve number facts.
- Solve problems using a variety of strategies.
- Solve problems of different types including adding to, taking from, putting together, taking apart and comparing, with unknowns in all positions, e.g. by using drawings and equations with a symbol for the unknown number to represent the problem.

Mathematical practices to be integrated

Makes sense of problems and persevere in solving them.

- Consider similar problems to gain insight into its solution.
- Check their answers to problems using a different method.
- Plan a solution pathway.

Essential questions

- What strategies do you use to solve a 2-digit addition or subtraction problem?
- How can addition help you solve a subtraction problem?
- How can you communicate your thinking (about a given problem) using words, numbers and/or pictures?
- What does an equal sign tell you about the two sides of an equation?
- What number will make this number sentence true?
- How can we tell when a problem requires more than one operation?

Written Curriculum

Common Core State Standards for Mathematical Content

Number and Operations in Base Ten 2.NBT

Use place value understanding and properties of operations to add and subtract.

2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

2.NBT.7 Add and subtract ~~within 1000~~, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

Operations and Algebraic Thinking 2.OA

Represent and solve problems involving addition and subtraction.

2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1]

[1] See Glossary, Table 1.

Common Core Standards for Mathematical Practice

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does

this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

Clarifying the Standards

Prior Learning

In kindergarten, students worked with numbers 11–19 to gain foundations for place value. They composed and decomposed numbers from 11 to 19 and some further ones, (e.g., by using objects or drawings), and recorded each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8) and understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

In first grade, students understand that the two digits of a two-digit number represents amounts of tens and ones. Understand that the following are special cases: 10 can be thought of as a bundle of ten ones – called a ten. The numbers 11–19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, or nine tens, (and 0 ones). Compare two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <. They use place value to understand the properties of operations to add and subtract. Add within 100 with two digit and one digit numbers. Using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Given a two-digit number mentally find 10 more or 10 less. Subtract multiples of 10 in the range of 10–90.

Current Learning

Second graders fluently add and subtract within 100. They will also add up to four two-digit numbers using addition strategies. Students will add and subtract within 1000 using concrete models or drawings and/or strategies based on place value, properties of operations and the relationship between addition and subtraction. They will solve problems using an unknown to represent the problem. Finally, they will add and subtract within 100 to solve one- and two-step word problems. Keep in mind that second graders are expected to work with one-digit addends in two-step problems. Model how to use a symbol(a box or a question mark) for an unknown in an equation and begin to expect that they will start to use it in their equations.

According to Bloom's Taxonomy, solving equations with an unknown is at the developmental level. Adding and subtracting using their knowledge of base 10, adding and subtracting fluently within 100 and solving two-step problems are also at the developmental level.

Routines: Add and subtract facts up to 20 using mental strategies, count coins.

Future Learning

In third grade, students will solve two-step word problems using 4 operations. The major focus in grade 3 is multiplication so students' work with addition and subtraction is limited to maintenance of fluency within 1000 for some students and building fluency to within 1000 for others.

Additional Findings

According to *Progressions for the Common Core State Standards in Mathematics (draft)*, "students become fluent in two-digit addition and subtraction. Representations such as manipulative materials and drawings may be used to support reasoning and explanations about addition and subtraction with three-digit numbers." (p. 9)

Grade 2 Mathematics, Quarter 3, Unit 3.4

Represent and Interpret Data

Overview

Number of instructional days: 8 (1 day = 45–60 minutes)

Content to be learned

- Generate measurement data by measuring length of objects to the nearest whole unit or making repeated measurements.
- Create a line plot using whole numbers to represent data.
- Represent a data set with up to 4 categories using a picture graph and bar graph.
- Formulate conclusions from a given representations.
- Investigate and interpret a given representation (pictographs, line graphs, tables) to answer questions related to the data.
- Solve simple put-together, take-apart, and compare problems using presented in a bar graph.

Mathematical practices to be integrated

Construct viable arguments and critique the reasoning of others.

- Construct arguments using objects, drawings, diagrams and actions.
- Able to flow between contextual and non-contextual situations.
- Attend to the meaning of quantities.

Look for and make use of structure.

- Sort and organize data.
- Review organized data and construct "I noticed…" statements.

Essential questions

- How can you record data? How can you share your results with others?
- How can you display the data you collect?
- What conclusions can you draw from the set of data? What can you tell by studying the data?
- What questions can you create using the data?
- How can you determine what data to collect?
- How can you use the data to answer questions?
- How can you determine the best way to display the information/data collected?

Written Curriculum

Common Core State Standards for Mathematical Content

Measurement and Data **2.MD**

Represent and interpret data.

2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems[4] using information presented in a bar graph.

[4] See Glossary, Table 1.

Common Core Standards for Mathematical Practice

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

Clarifying the Standards

Prior Learning

In kindergarten, students described and compared measurable attributes. They described measurable attributes of objects, such as length or weight and described several measurable attributes of a single object. They directly compared two objects with a measurable attributes in common, to see which object has "more of"/ "less of" the attribute, and described the difference. Kindergarten students classified objects and counted the number of objects in each category. They classified objects into given categories; counted the numbers of objects in each category and sorted the categories by count.

In first grade, students measured lengths indirectly and by iterating length units. They ordered three objects by length and compared the lengths of two objects indirectly by using a third object. Students expressed the length of an object as a whole number of length units, by laying multiple copies of a shorter object end to end; understood that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. In first grade students represented and interpreted data by organizing, representing, and interpreting data with up to three categories; asked and answered questions about the total number of data points, how many were in each category, and how many more or less were in one category than in another.

Current Learning

Second graders measure lengths to generate a set of measuring data. For example, they may measure the length of their arm in centimeters or the height of a statue in inches. The resulting data will set a list of observations about the data collected. They are expected to use this data to make a line plot or dot plot. The scale will reflect the units of measurement used to collect data.

They will also arrange data in up to four categories in picture graphs or bar graphs. They will solve simple put-together, take-apart and compare problems using information from both bar/picture graphs and line plots.

According to Bloom's Taxonomy measuring using a standard tool is developmental. Representing and interpreting data with three categories is reinforcement and using a fourth category is developmental. Solving simple put-together, take apart, and compare problems using data is at the reinforcement level. Solving problems based on bar graphs is at the developmental level.

Routines: Add and subtract to 20 using mental strategies, counting coins.

Future Learning

In third grade students will solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. They will measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms, and liters. They will add, subtract, multiply, or divide to solve one-step word problems involving masses volumes that are given in the same units. Students will represent and interpret data by drawing scaled picture graph and a scaled bar graph to represent data set with several categories. They will solve one and two step "how many" and " many less" problems. They generate measurement data by measuring length using rulers marked with halves and fourths of an inch.

Additional Findings

The graphic representation of page 115 of *The Atlas of Science Literacy* shows the cognitive sequence for developing data analysis and graphic representation skills. The book also states, "The graphic display of numbers and relationships can be a powerful aid in discovering and communicating patterns not easily seen in tables and equations" (pp. 114–115).

Grade 2 Mathematics, Quarter 3, Unit 3.5

Tell Time to the Nearest 5 Minutes

Overview

Number of instructional days: 7 (1 day = 45–60 minutes)

Content to be learned

- Tell time using analog and digital clocks to the nearest 5 minutes using a.m. and p.m.

Mathematical practices to be integrated

Use appropriate tools strategically.

- (e.g., clocks)

Attend to precision.

- Use precision when reading and determining the meaning of symbols.
- Use specific units of measurement.
- Reason abstractly and quantitatively and make sense of quantities in measuring.

Essential questions

- How can you tell what time it is on the clock?
- How can you figure time to the nearest five minutes?
- What is the difference between an analog and digital clock?
- What is the difference between a.m. and p.m.?

Written Curriculum

Common Core State Standards for Mathematical Content

Measurement and Data **2.MD**

Work with time and money.

2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Common Core Standards for Mathematical Practice

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Clarifying the Standards

Prior Learning

In first grade, students identified the time to the hour and half-hour using analog and digital clocks. They wrote time in a digital format.

Current Learning

In second grade, students tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

According to Bloom's Taxonomy, telling time to the hour and half-hour is at the reinforcement level. Telling time to five minutes is at the developmental level.

Routines: Add and subtract within 100 using strategies based on place value, properties of operations and/or relationship between addition and subtraction.

Future Learning

In third grade, students will solve problems involving estimation of intervals of time. They will tell and write time to the nearest minute and measure time intervals in minutes. They will solve word problems involving addition and subtraction of time intervals in minutes, e.g. by representing the problem on a number line diagram.

Additional Findings

According to *Principles and Standards for School Mathematics*, students in grades K–2 should be developing concepts of time and the way it's measured. The measurement process is identical in principle for measuring any attribute. Students apply appropriate techniques, tools, and formulas to determine measurements.

"When students use calendars or sequence events in stories, they are using measures of time in a real context. Opportunities arise throughout the school day for teachers to focus on time and its measurement through short conversations with students." (p. 104)