Grade 1 Mathematics, Quarter 2, Unit 2.1

Expanding the Concept of Time to the Half Hour as it Relates to Number

Overview

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

Content to be learned

- Tell what time it is to the hour and half hour on an analog clock.
- Read the time to the hour and half hour on a digital clock.
- Write the time to the hour and half hour.

Mathematical practices to be integrated

Use appropriate tools strategically.

- Use a digital clock appropriately.
- Use an analog clock appropriately.

Look for and make use of structure.

- Make connections or relationships – patterns.
- Analog clock.
- Digital clock.

Essential questions

- How do we measure how much time has passed?
- How are the analog clock and the digital clock used to measure time?
- How is time shown on a digital clock similar and different from the way time is shown on an analog clock?
- How do we record the half hour?
- How do we record the hour?

Written Curriculum

Common Core State Standards for Mathematical Content

Measurement and Data 1.MD

Tell and write time.

1.MD.3. Tell and write time in hours and half-hours using analog and digital clocks.

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.

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

Prior to first grade, children have had experience using numbers to quantify objects. This concept is extended in quantifying time. Younger children have experience talking about the size of objects. This concept may play into comparing periods of elapsed time. Young children may have exposure to other

tools that measure time such as calendars. Young children have had a great deal of experience with time intervals as they wait for events in their life to occur i.e, t.v shows, meals, birthdays, etc..

Current Learning

In first grade, students work with the concept of equality. This concept is extended as children explore the relationship of minutes to hours. First grade children accurately record time values in terms of numeral representations. This is incorporated by interpreting time on a digital and analog clock as well as recording time. Students in grade 1, tell time as part of their daily routine. They relate the skill of telling time to their daily schedule: when it is time to go to lunch, itinerant teachers, recess, and to go home

Future Learning

In grade2 students begin to read and write time to the nearest five minute interval. They relate time to morning and evening. In grade 3, students solve problems involving time. They add and subtract time intervals to the minute and they begin to represent these results in data format.

Additional Findings

Principles and Standard for School Mathematics states, "Teachers should guide students' experiences by making the resources available. When students use calendars and sequence stories they are using measures of time in a real way. Opportunities arise throughout the school day for teachers to focus on time and its measurement through short conversations. For example, 'Look at the clock. It's one o'clock-time for gym!' The process of measurement, in principle, for measuring any attribute: choose a unit, compare that unit to the object, and report the number of units." (pp. 104–105)

Grade 1 Mathematics, Quarter 2, Unit 2.2

Relating Addition and Subtraction Using Benchmark Numbers

Overview

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

Content to be learned

- Find the number that is 10 more or 10 less than a given number without counting.
- Given a number sentence, explain how to arrive at the answer.
- Provide an addition or subtraction sentence (equation) to show reasoning.

Mathematical practices to be integrated

Attend to precision.

- Accurately explain reasoning.
- Use models to accurately represent numerical values.

Look for and make use of structure.

- Look for patterns in addition/subtraction.

Essential questions

- How would you find the number that is 10 more / 10 less than *x?*
- What equation would you use to show how you arrived at your answer?
- How would you use manipulatives, number lines, and/or drawings to find the number that is 10 more/10 less than *x*?

Written Curriculum

Common Core State Standards for Mathematical Content

Number and Operations in Base Ten 1.NBT

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

1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

Operations and Algebraic Thinking 1.OA

Add and subtract within 20.

1.OA.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

Common Core Standards for Mathematical Practice

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.

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 gained understanding of the base ten system. They learned that the number 10 is composed and decomposed and they explored the result of adding 10 to numbers 0 through 9.

Kindergarteners used manipulatives, drawings, and equations to explore numbers 11–19 in terms of place value.

Current Learning

In grade 1, students begin to refer to10 as a counting unit. Their understanding of place value leads to an efficient method for addition and subtraction based on base 10. First-grade students understand that the number in the tens place is significant in determining the relationship between numbers and number sequence. First-graders use the base ten system to add and subtract within 100. They also use concrete materials and drawings to make connections between their written work and explanations of place value.

Future Learning

In future grades, the concept of base ten as a unit is expanded to 100s and 1,000s. Students continue to use these units to add and subtract efficiently. Students become proficient in determining the value of a number and its place in a counting sequence based on the position of numerals 0–9 within the number (946 is greater than 496).

Students become fluent in 2-digit addition and subtraction using concrete materials to make connections between their written work and explanations of place value through 1000. In grade 3, students use their understanding of place value to round numbers to the nearest 10 or 100. The base ten system becomes important in multiplication of one-digit numbers with multiples of 10. In grade 4, students use the base ten system to multiply and divide with multi-digit numbers. Students also begin to understand the roll of the comma in reading numbers to 1,000,000 and the decimal point.

Additional Findings

According the Progressions (commoncoretools.wordpress.com), students' work in the base ten system is integrated into counting and computation. The understanding of the base ten system allows any multi-digit computation to be reduced to a collection of single-digit computations.

Grade 1 Mathematics, Quarter 2, Unit 2.3

Subtracting Multiples of 10

Overview

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

Content to be learned

- Subtract ten from multiples of ten in the range of 10-90. (90-10=, 90-20= etc…)
- Apply knowledge of "tens" in a two-digit number as meaning one, two, three, four, five, six, seven, eight or nine tens and (0) ones.
- Choose an appropriate tool (hundreds chart, base ten blocks, numbers lines and/or drawings) to represent their strategies.
- Explain mathematical reasoning in written form, not necessarily an equation.

Mathematical practices to be integrated

Reason abstractly and quantitatively.

- Students generalize their understanding of subtracting ones to subtracting tens.
- Recognize that the pattern in subtracting ones correlates to subtracting tens.
- Choose an appropriate tool to model their reasoning.
- Transfer that same reasoning to a variety of other tools (number line to hundreds chart or base ten blocks to a hundreds chart).
- Explain their reasoning in a written format (drawings, words, or possibly a numerical equation).
- Use multiple tools to check for accuracy.

Model with mathematics.

- Choose an appropriate tool to model their reasoning.
- Transfer that same reasoning to a variety of other tools (number line to hundreds chart or base ten blocks to a hundreds chart).
- Explain their reasoning in a written format (drawings, words , or possibly a numerical equation).
- Use multiple tools to check for accuracy.

Essential questions

- What tools would you use to model subtracting a set of 10 from *x?*
- What do you know about adding sets of 10 that can help you subtract sets of 10?
- What patterns do you recognize?
- How can you use what you know about subtracting "ones" to subtract "tens"?
- How can use drawings or writing to explain your thinking?

Written Curriculum

Common Core State Standards for Mathematical Content

Number and Operations in Base Ten 1.NBT

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

1.NBT.6 Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), 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 and explain the reasoning used.

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.

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.

Clarifying the Standards

Prior Learning

In kindergarten, students learn that 10 ones is a unit of 10. In exploring the numbers 11-19, Kindergartners recognize that these numbers are represented by a unit of ten and some more ones. They represent this concept using manipulatives and drawings. Students may begin to recognize counting patterns through daily routines such as recording the date on calendars, daily attendance, and tracking how many days the students have been in school.

Current Learning

Students in grade 1, continue to recognize the unit called *ten*. As they decompose and compose the numbers 11–19, they recognize these numbers as "a ten and some ones." They become more efficient in adding and subtracting within the base ten system. Students use the relationship of adding and subtracting when they see that 60–50 as an unknown addend in an addition problem $50 + x = 60$. Students can explain their reasoning in mental calculations as they recognize that subtracting a unit of ten is 1less ten than before, similar to subtracting ones. Students represent the operation of subtracting tens through concrete objects and drawings. Students are not expected to compute differences of two-digit numbers other than multiples of tens.

Future Learning

In grade 2, students work with computations involving numbers through 1000. They are fluent with subtraction with numbers to 100, including numbers other than multiples of ten. They transfer their knowledge of subtracting ones and tens to subtracting 100s.

Students continue to represent their thinking using manipulatives and drawings. In grade 3, multiplication is the focus of students working with base 10 system. The strategies used to subtract using the base ten system leads to algorithms taught in later grades.

Additional Findings

According to *Principles and Standards for School Mathematics* (pp. 78–79), children do not posses or are unable to use a quantity understanding of multi-digit numbers. Instead children view numbers as single digits side by side. They see the number 827 as "8", "2", "7" and not 8 groups of one hundreds, two groups of tens, and seven single ones. Children make many different errors in adding and subtracting multi digit numbers and many students who add and subtract correctly cannot explain how they got their answers.

According to the Progressions for the Common Core State Standards in Mathematics (draft) commoncoretools.wordpress.com, students work in the base-ten system is intertwined with their work on counting and cardinality, and with the meanings and properties of addition, subtraction, multiplication, and division.

Grade 1 Mathematics, Quarter 2, Unit 2.4

Understanding Equality

Overview

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

Content to be learned

- Understand that the equal symbol indicates a relationship—that the quantities on each side are equivalent.
- Determine if equations (addition/subtraction) are true or false.

Mathematical practices to be integrated

- Look for and make use of structure.
- Model with mathematics.
- Look for and express regularity in repeated reasoning.

Essential questions

- What does the equal symobol mean?
- How can you explain whether a number sentence is true or false?

Written Curriculum

Common Core State Standards for Mathematical Content

Operations and Algebraic Thinking 1.OA

Work with addition and subtraction equations.

1.OA.7 Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*

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.

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 identified whether the number of objects in one group was greater than, less than, or equal to the number of objects in another group by using matching and counting strategies. They also decomposed numbers less than or equal to 10 into pairs in more than one way (e.g., by using objects or drawings), and recorded each decomposition by drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

Current Learning

In grade 1, students express their understanding of the meaning of the equal sign. Students understand that the equal symbol indicates a relationship—that the quantities on each side are equivalent. Students should have numerous experiences (including concrete and semi-concrete representations) to develop an understanding of the concept of equivalence (e.g., using the notion of balance). Students apply their understanding of equivalence to determine if equations involving addition and subtraction are true or false.

Future Learning

In grade 2, students will compare two- and three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons. Students will also 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).

Additional Findings

According to the Grade 1 Mathematics—Curriculum Framework, interchanging the language of "equal to" and "the same as" as well as "not equal to" and "not the same as" will help students grasp the meaning of the equal sign. Students should understand that equality means "the same quantity as." In order for students to avoid the common pitfall that the equal sign means "to do something" or that the equal sign means "the answer is," they need to be able to:

- express the meaning of the equal symbol
- accept sentences other than $a + b = c$ as true ($a = a$, $c = a + b$, $a = a + 0$, $a + b = b + a$)
- know that the equal sign represents a relationship between two equal quantities
- compare expressions without calculating

These skills are hierarchical in nature and need to be developed over time. Experiences determining if equations are true or false help students develop these skills. Initially, students develop an understanding of the meaning of equality using models. However, the goal is for students to reason at a more abstract level. At all times, students should justify their answers, make conjectures (e.g., if you add a number and then subtract that same number, you always get zero), and make estimations. Students should have a solid foundation of the key skills listed above, so that they can begin to rewrite true/false statements using the symbols, < and > in grade 2.

According to www.commoncoretools.wordpress.com, students work in the base ten system is integrated into counting and computation.

Grade 1 Mathematics, Quarter 2, Unit 2.5

Exploring the Attributes of Shapes

Overview

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

Content to be learned

- Describe defining attributes (number of sides, closed figure) of shapes.
- Describe non-defining attributes of shapes (color, size, orientation) For example: the color of a triangle does not make the shape a triangle.
- Build and Draw shapes based on defining attributes.
- Understand that composite/3-D shapes are made from 2-D shapes.
- Create composite/3-D shapes.

Mathematical practices to be integrated

Model with mathematics.

- Draw pictures and use objects to illustrate mathematical concepts.
- Use words to describe shapes.

Look for and make use of structure.

- Use 2D shapes to create 3D shapes.

Essential questions

- What are attributes of polygons? (triangle, square, rectangle, rhombi, trapezoid, hexagon)?
- How can you compare these different shapes by at least two attributes?
- What are some real objects that are polygons/circles?

Written Curriculum

Common Core State Standards for Mathematical Content

Geometry **1.G**

Reason with shapes and their attributes.

1.G.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.

1.G.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.[4]

[4] Students do not need to learn formal names such as "right rectangular prism."

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.

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 identify and describe shapes. Students also analyze, compare, create, and compose 2-dimensional shapes from other objects or shapes. Kindergarteners recognize and name shapes in their environment. They describe the position of shapes such as over, above, under, etc. Students should also be able to distinguish between 2-D and 3-D shapes.

Current Learning

In grade 1, students are distinguishing between defining and non-defining attributes of shapes. Students are building and drawing shapes based on their defining attributes. At this level, students are composing 3-D shapes using the understanding that they are made of 2-D shapes.

Future Learning

In grade 2, students' continue recognize and draw shapes based on their attributes. Students are given the number of angles and faces to describe shapes.

Additional Findings

The *Atlas of Science Literacy, Volume 2* (The Mathematical World cluster; Shapes map), states, "to make sense of the world, the human mind relies heavily on its perception of shapes and patterns. The artifacts around us and the familiar forms we see in nature can often be characterized in terms of geometric shapes" (p. 66).

According to *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics*, children compose and decompose plain and solid figures, thus building an understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine figures, they recognize them from different perspectives and orientations, describe their geometric attributes and properties, and determine how they are alike and different, in the process developing a background for measurement and initial understanding of such properties as congruence and symmetry.