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GRADE 2 • MODULE 8

Time, Shapes, and Fractions as Equal Parts of Shapes

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NOTE: Student sheets should be printed at 100% scale to preserve the intended size of figures for accurate measurements. Adjust your copier or printer settings to *actual size* and set page scaling to *none*.

Grade 2 • Module 8

Time, Shapes, and Fractions as Equal Parts of Shapes

OVERVIEW

In Module 8, the final module of the year, students extend their understanding of part–whole relationships through the lens of geometry. As students compose and decompose shapes, they begin to develop an understanding of unit fractions as equal parts of a whole.

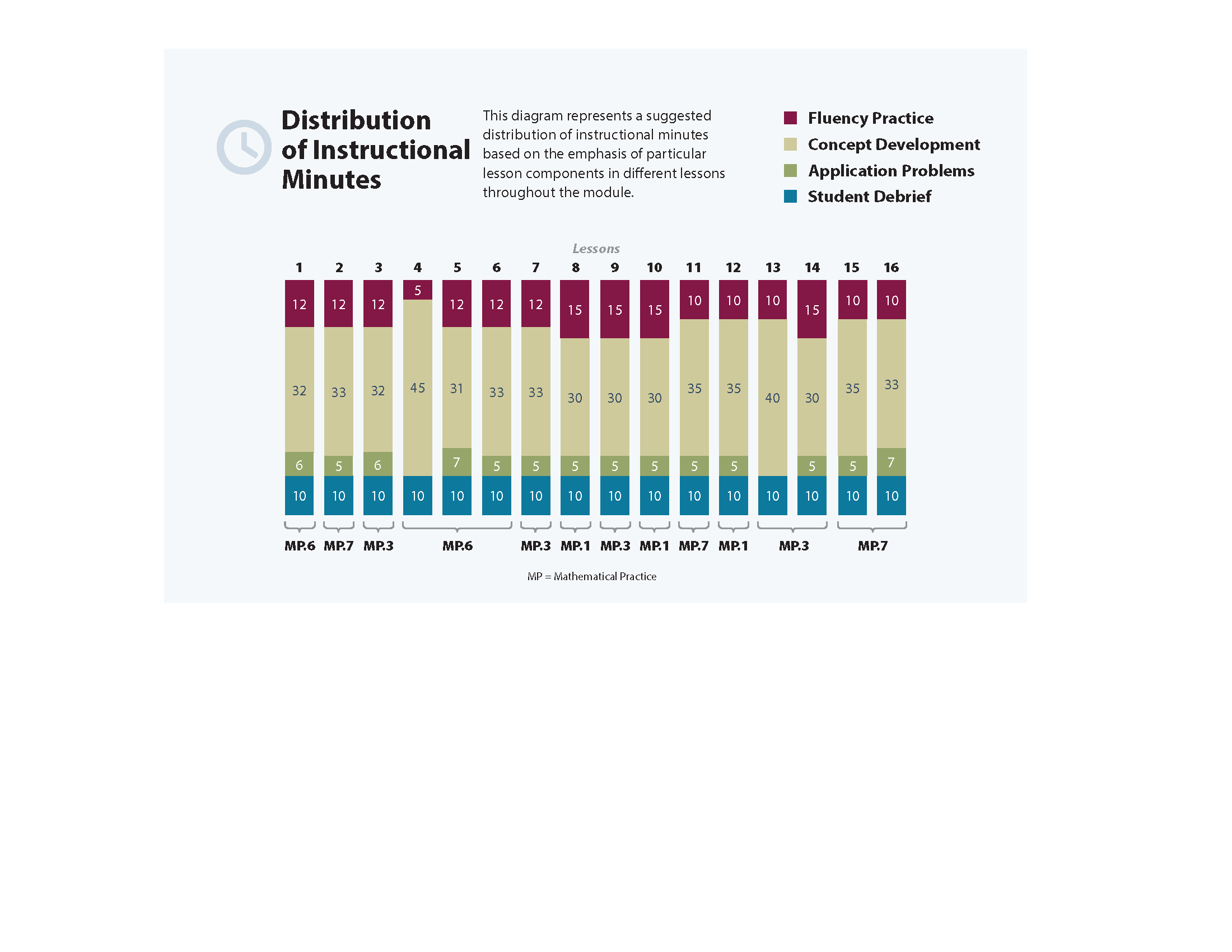
In Topic A, students build on their prior knowledge of a shape’s defining attributes (**1.G.1**) to recognize and draw categories of polygons with specified attributes: the number of sides, corners, and angles (**2.G.1**). For example, students see that a rectangle has four straight sides, four right angles, and opposite sides with equal length. Students then relate the square, a special rectangle, to the cube by building a cube from six congruent squares. They describe the cube in terms of its attributes, counting the number of edges, faces, and corners (**2.G.1**). Once students are able to describe and analyze polygons and the cube according to their attributes in Topic A, they are ready to combine shapes and build composite shapes in Topic B.

Topic B opens with students using a tangram, a set of seven shapes that compose a square,to create a new shape. Students see that they can arrange two-dimensional shapes to create a new whole, or composite, shape, which can become part of an even larger whole. As students progress through the topic, they build and partition shapes by combining two or more smaller shapes and relating the parts to the whole. For example, they use different pattern blocks to show that a regular hexagon might be composed of two trapezoids or three rhombuses. One might say, “This hexagon is made from two identical trapezoids, or two equal parts.” This allows for interpreting equal shares of a whole as a fraction, as students name the equal parts *halves*, *thirds*, or *fourths* (**2.G.3**).

Next, in Topic C, students decompose circles and rectangles into equal parts and describe them as halves (a half of), thirds (a third of), and fourths (a fourth of) or quarters (**2.G.3**). For example, students see that a circle can be partitioned into four quarter-circles, or parts, which can be described as fourths. They learn to describe the whole by the number of equal parts, e.g., one whole circle is composed of 4 fourths. Finally, students decompose a rectangle into four parts that have equal area but different shapes (**2.G.3**).

The module closes with Topic D, where students apply their understanding of partitioning the whole into halves and fourths to tell time to the nearest five minutes (**2.G.3**, **2.MD.7**), using both analog and digital clocks. They construct simple clocks and see the relationship to partitioning a circle into quarters and halves, thereby decomposing 60 minutes. For example, 3 fourths of the circle can be interpreted as 3 intervals of 15 minutes, e.g., 15 + 15 + 15 = 45 (**2.NBT.5, 2.NBT.6**), or 45 minutes. They also use their understanding of skip-counting by fives and tens to tell time on an analog clock (**2.NBT.2**). Finally, they apply their learning by calculating time intervals of hours and half hours and close the year determining the time interval in days before they are third-graders.

The Mid-Module Assessment follows Topic B, and the End-of-Module Assessment follows Topic D.

Focus Grade Level Standards

Work with time and money.[[1]](#footnote-1)

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

Reason with shapes and their attributes.[[2]](#footnote-2)

2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (Sizes are compared directly or visually, not compared by measuring.)

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.

Foundational Standards

1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks. Recognize and identify coins, their names, and their values.

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. (Students do not need to learn formal names such as “right rectangular prism.”)

1.G.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves, fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

2.NBT.2 Count within 1000; skip-count by 5s[[3]](#footnote-3)3, 10s, and 100s.

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.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Focus Standards for Mathematical Practice

MP.1 **Make sense of problems and persevere in solving them.**  Students are encouraged to persevere when arranging shapes to create specific composite shapes, when recomposing the pieces into different shapes, and when creating even larger shapes from composite shapes. When students partition composite shapes (e.g., circles and rectangles) into equal shares, they ask themselves, “How can I look at this differently?” Students organize their thinking through drawing, and they see, for example, that a circle can be described in terms of halves, thirds, or fourths.

MP.3 **Construct viable arguments and critique the reasoning of others.** Students use drawings and precise language to describe and analyze shapes, and they defend their reasoning as to what makes a quadrilateral, for example, a rhombus. Students also discuss the partitioning of a composite shape (e.g., a hexagon) and relate the different parts, or shares, to halves, thirds, and fourths. They make connections between fraction concepts and telling time, explaining the connection between their work with halves and quarters to the analog clock.

MP.6 **Attend to precision.** Students describe and analyze various two-dimensional shapes by attending to their specific attributes. Students accurately draw shapes using their knowledge of attributes and rulers. Then, while working with a partner, students name and analyze their partner’s shape drawings by counting the number of sides or angles. Students also appropriately name parts of a whole using terms such as *halves, thirds,* and *fourths* or *quarters*.

MP.7 **Look for and make use of structure.** Students identify attributes, such as the number of sides and angles, in order to classify shapes such as triangles and quadrilaterals. They make use of the part–whole structure to understand that a whole unit can be partitioned into equal shares, or smaller units (e.g., each of 4 equal shares = a fourth of the whole). Students use their understanding of the partitioning of a circle to tell time to the quarter and half hour. Through previous fluency practice, students use the pattern of skip-counting by fives to tell time on an analog clock.

Overview of Module Topics and Lesson Objectives

| **Standards** | **Topics and Objectives** | | **Days** |
| --- | --- | --- | --- |
| **2.G.1**  2.MD.1 | A | Attributes of Geometric Shapes  Lesson 1: Describe two-dimensional shapes based on attributes.  Lesson 2: Build, identify, and analyze two-dimensional shapes with specified attributes.  Lesson 3: Use attributes to draw different polygons including triangles, quadrilaterals, pentagons, and hexagons.  Lesson 4: Use attributes to identify and draw different quadrilaterals including rectangles, rhombuses, parallelograms, and trapezoids.  Lesson 5: Relate the square to the cube, and describe the cube based on attributes. | 5 |
| **2.G.3**  2.G.1 | B | Composite Shapes and Fraction Concepts  Lesson 6: Combine shapes to create a composite shape; create a new shape from composite shapes.  Lessons 7–8: Interpret equal shares in composite shapes as halves, thirds, and fourths. | 3 |
|  |  | Mid-Module Assessment: Topics A–B (assessment ½ day, return ½ day, remediation or further applications 1 day) | 2 |
| **2.G.3**  2.G.1 | C | Halves, Thirds, and Fourths of Circles and Rectangles  Lessons 9–10: Partition circles and rectangles into equal parts, and describe those parts as halves, thirds, or fourths.  Lesson 11: Describe a whole by the number of equal parts including 2 halves, 3 thirds, and 4 fourths.  Lesson 12: Recognize that equal parts of an identical rectangle can have different shapes. | 4 |
| **2.MD.7**  **2.G.3**  2.NBT.2  2.NBT.5  2.NBT.6 | D | Application of Fractions to Tell Time  Lesson 13: Construct a paper clock by partitioning a circle into halves and quarters, and tell time to the half hour or quarter hour.  Lesson 14: Tell time to the nearest five minutes.  Lesson 15: Tell time to the nearest five minutes; relate *a.m.* and *p.m.* to time of day.  Lesson 16: Solve elapsed time problems involving whole hours and a half hour. | 4 |
|  |  | End-of-Module Assessment: Topics A–D (assessment ½ day, return ½ day, remediation or further applications 1 day) | 2 |
| Total Number of Instructional Days | | | **20** |

Terminology

New or Recently Introduced Terms

* a.m./p.m.
* Analog clock
* Angle (e.g., figure formed by the corner of a polygon)
* Digital clock
* Parallel (two lines on the same plane are parallel if they do not intersect)
* Parallelogram (quadrilateral with both pairs of opposite sides parallel)
* Polygon (closed figure with three or more straight sides, e.g., triangle, quadrilateral, pentagon, hexagon)
* Quadrilateral (four-sided polygon, e.g., square, rhombus, rectangle, parallelogram, trapezoid)
* Quarter past, quarter to
* Right angle (e.g., a square corner)
* Second (unit for measuring time)
* Third of (shapes), thirds (three equal shares)
* Whole
  + 2 halves
  + 3 thirds
  + 4 fourths

Familiar Terms and Symbols[[4]](#footnote-4)

**Cube**

* Attributes (characteristics of an object such as number of sides, angles, or faces)
* Cube (three-dimensional shape composed of six squares)
* Face (a two-dimensional side of a three-dimensional shape)
* Fourth of (shapes), fourths (four equal shares)
* Half of (shapes), halves (two equal shares)
* Half past (expression for 30 minutes past a given hour)
* Half hour (interval of time lasting 30 minutes)
* Hour (unit for measuring time, equivalent to 60 minutes or 1/24 of a day)
* Minute (unit for measuring time, equivalent to 60 seconds, 1/60 of an hour)
* O’clock (used to indicate time to a precise hour with no additional minutes)
* Two-dimensional shapes (familiar prior to Grade 2):
* Circle
* Half-circle
* Quarter-circle
* Hexagon (2 dimensional figure enclosed by six straight sides and six angles)
* Rectangle (2 dimensional figure enclosed by four straight sides and four right angles)
* Rhombus (2 dimensional figure enclosed by four straight sides of the same length)
* Square (rectangle with four sides of the same length)
* Trapezoid (2 dimensional figure enclosed by four straight sides with only one pair of parallel sides)
* Triangle (2 dimensional figure enclosed by three straight sides)
* Quarter of (shapes), quarters (4 equal shares)

Suggested Tools and Representations

* Cube: three-dimensional shape (real world examples such as a die, alphabet blocks, or a box)
* Geoboards
* Large instructional geared clock
* Pattern blocks
* Rulers
* Spaghetti
* Square tiles
* Student clocks, preferably those with gears which can provide the appropriate hour-hand alignment
* Toothpicks

Scaffolds[[5]](#footnote-5)

The scaffolds integrated into *A Story of Units* give alternatives for how students access information as well as express and demonstrate their learning. Strategically placed margin notes are provided within each lesson elaborating on the use of specific scaffolds at applicable times. They address many needs presented by English language learners, students with disabilities, students performing above grade level, and students performing below grade level. Many of the suggestions are organized by Universal Design for Learning (UDL) principles and are applicable to more than one population. To read more about the approach to differentiated instruction in *A Story of Units,* please refer to “How to Implement *A Story of Units*.”

Assessment Summary

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Administered** | **Format** | **Standards Addressed** |
| Mid-Module Assessment Task | After Topic B | Constructed response with rubric | 2.G.1  2.G.3 |
| End-of-Module Assessment Task | After Topic D | Constructed response with rubric | 2.MD.7  2.G.1  2.G.3 |

1. Focus on time. Money is addressed in Module 7. [↑](#footnote-ref-1)
2. 2.G.2 is addressed in Module 6. [↑](#footnote-ref-2)
3. 3 Use analog clock to provide a context for skip-counting by fives. [↑](#footnote-ref-3)
4. These are terms and symbols students have seen previously. [↑](#footnote-ref-4)
5. Students with disabilities may require Braille, large print, audio, or special digital files. Please visit the website,

   www.p12.nysed.gov/specialed/aim, for specific information on how to obtain student materials that satisfy the National Instructional Materials Accessibility Standard (NIMAS) format. [↑](#footnote-ref-5)