

Mathematics!



A Story of Units! **Parent Handbook**

Grade 2
Module 8

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 to recognize and draw categories of polygons with specified attributes: the number of sides, corners, and angles. 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. 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*.

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. 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.

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, (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., $15 + 15 + 15 = 45$, or 45 minutes. They also use their understanding of skip-counting by fives and tens to tell time on an analog clock. 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.

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

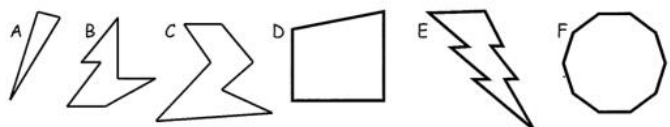
Familiar Terms and Symbols

- 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 $\frac{1}{24}$ of a day)
- Minute (unit for measuring time, equivalent to 60 seconds, $\frac{1}{60}$ 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)

Lesson 1

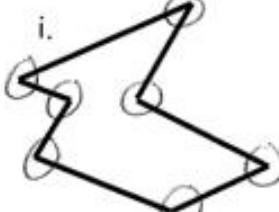
Objective: Describe two-dimensional shapes based on attributes.

Study the shapes below. Then answer the questions.



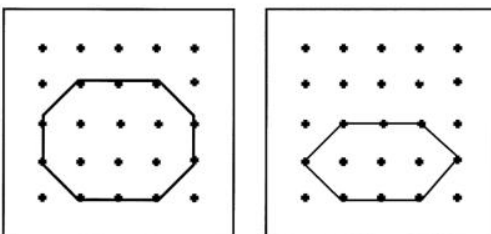
a. Which shape has the most sides? E
 b. Which shape has 3 more angles than shape C? F
 c. What shape has 3 fewer sides than shape B? D
 d. How many more angles does shape C have than shape A? 4
 e. Which of these shapes have the same number of sides as angles? all

i.



7 sides
7 angles

Ethan said the two shapes below are both six-sided figures but just different sizes. Explain why he is incorrect.



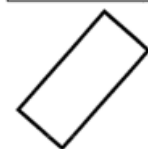
They are not both 6 sided. One figure has 6 sides and the other has 8 sides.

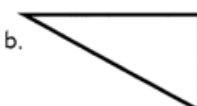
Lesson 2


Objective: Build, identify, and analyze two-dimensional shapes with specified attributes.



Count the number of sides and angles for each shape to identify each polygon. The polygon names in the word bank may be used more than once.

Hexagon Quadrilateral Triangle Pentagon

a.  quadrilateral

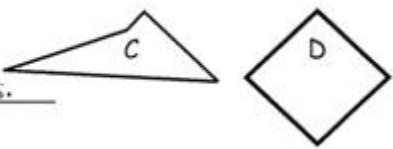
b.  triangle

c.  pentagon

	Example 1	Example 2
a. Triangle <u>1</u> lines were added. There are <u>3</u> total sides.		

4. Explain why both polygon C and D are quadrilaterals.

They both have 4 sides and 4 angles.



Lesson 3

Objective: Use attributes to draw different polygons including triangles, quadrilaterals, pentagons, and hexagons.

1. Use a straightedge to draw the polygon with the given attributes in the space to the right.

a. Draw a polygon with 3 angles.

Number of sides: 3
Name of polygon: triangle



b. Draw a five-sided polygon.

Number of angles: 5
Name of polygon: pentagon



2. Use your straightedge to draw 2 new examples of each polygon that are different from those you drew on the first page.

a. Triangle



b. Pentagon

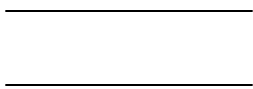


Lesson 4

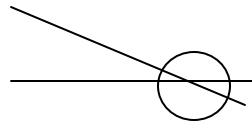
Objective: Use attributes to identify and draw different quadrilaterals including rectangles, rhombuses, parallelograms, and trapezoids.

Parallel lines are lines that will that never meet or intersect. They are always the same distance apart.

These lines are parallel



These lines are not parallel



Right Angles or Square Angles are 90 degrees.

This is a right or square angle



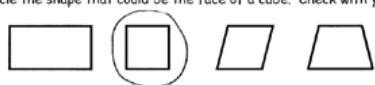
These angles are not a right or square



Lesson 5

Objective: Relate the square to the cube, and describe the cube based on attributes.

1. Circle the shape that could be the face of a cube. Check with your ruler.







2. What is the most precise name of the shape you circled? Square


3. How many faces does a cube have? 6


4. How many edges does a cube have? 12

5. How many corners does a cube have? 8


6. Draw 6 cubes, and put a star next to your best one.

First cube 	Second cube 
Third cube 	Fourth cube 


Fifth cube 

Sixth cube 

7. Connect the corners of the squares to make a different kind of drawing of a cube. The first one is done for you.



8. Derrick looked at the cube below. He said that a cube only has 3 faces. Explain why Derrick is incorrect.

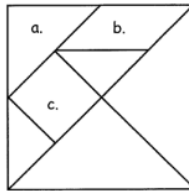


Derrick can only see three faces of the cube but there are 3 more he can't see.

Lesson 6

Objective: Combine shapes to create a composite shape; create a new shape from composite shapes.

1. Identify each polygon labeled in the tangram as precisely as possible in the space below.

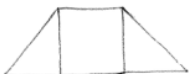
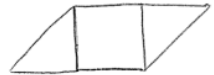




a. triangle

b. parallelogram

c. square





2. Use the square and the two smallest triangles to make the following polygons. Draw them in the space provided.

a. A quadrilateral with 1 pair of parallel sides. 	b. A quadrilateral with no square corners. 
c. A quadrilateral with 4 square corners. 	d. A triangle with 1 square corner. 

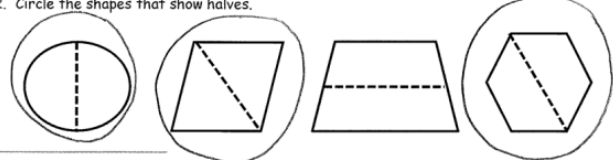
Lesson 7

Objective: Interpret equal shares in composite shapes as halves, thirds, and fourths.


1. Solve the following puzzles using your tangram pieces. Draw your solutions in the space below.

a. Use the two smallest triangles to make one larger triangle.	b. Use the two smallest triangles to make a parallelogram with no square corners.
	
c. Use the two smallest triangles to make a square.	d. Use the two largest triangles to make a square.
	
e. How many equal shares does the large triangle in Parts (a-d) have? <u>2</u>	f. How many halves make up the large triangle in Parts (a-d)? <u>2</u>

2. Circle the shapes that show halves.



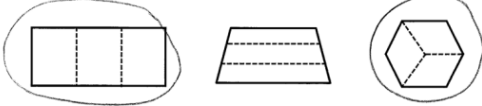
3. Show how 3 triangle pattern blocks form a trapezoid with one pair of parallel lines. Draw the shape below.



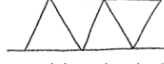
a. How many equal shares does the trapezoid have? 3

b. How many thirds are in the trapezoid? 3

4. Circle the shapes that show thirds.



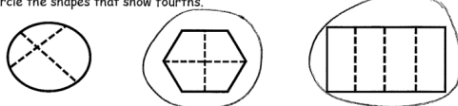
5. Add another triangle to the trapezoid you made in Problem 3 to make a parallelogram. Draw the new shape below.



a. How many equal shares does the shape have now? 4

b. How many fourths are in the shape? 4

6. Circle the shapes that show fourths.

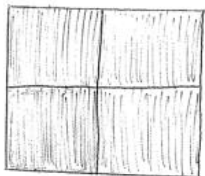


Lesson 8

Objective: Interpret equal shares in composite shapes as halves, thirds, and fourths.

Use 4 pattern block squares to make one larger square.

a. Draw a picture of the square formed in the space below.



- b. Shade 1 small square. Each small square is 1 fourth (half / third / fourth) of the whole square.
- c. Shade 1 more small square. Now, 2 fourths (halves / thirds / fourths) of the whole square is shaded.
- d. And, 2 fourths of the square is the same as 1 half (half / third / fourth) of the whole square.
- e. Shade 2 more small squares. 4 fourths is equal to 1 whole.

1. Use one pattern block to cover half the rhombus.

- a. Identify the pattern block used to cover half of the rhombus. triangle
- b. Draw a picture of the parallelogram formed by the 2 halves.



2. Use one pattern block to cover half the hexagon.

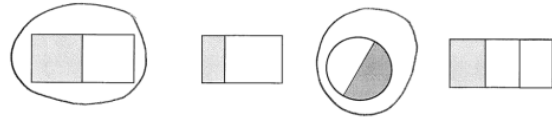
- a. Identify the pattern block used to cover half of a hexagon. trapezoid
- b. Draw a picture of the hexagon formed by the 2 halves.



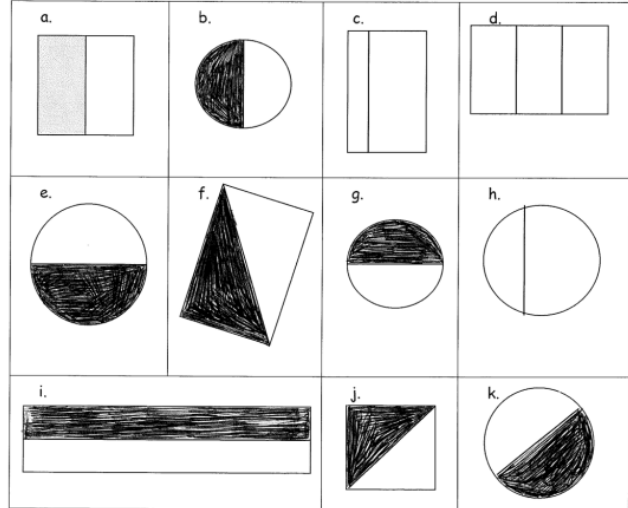
Lesson 9

Objective: Partition circles and rectangles into equal parts, and describe those parts as halves, thirds, or fourths.

1. Circle the shapes that have 2 equal shares with 1 share shaded.



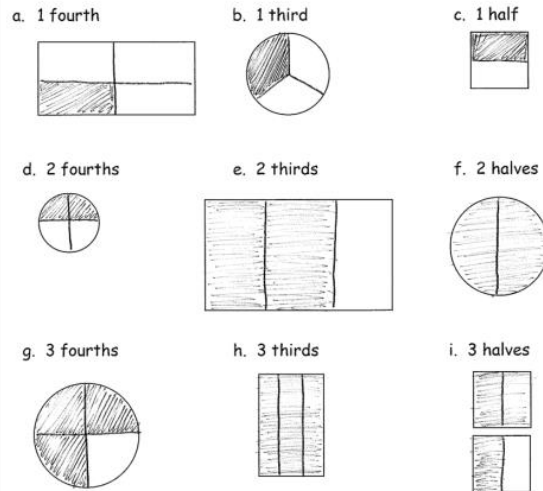
2. Shade 1 half of the shapes that are split into 2 equal shares. One has been done for you.



Lesson 10

Objective: Partition circles and rectangles into equal parts, and describe those parts as halves, thirds, or fourths.

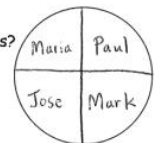
Partition and shade the following shapes as indicated. Each rectangle or circle is one whole.



Split the pizza below so that Maria, Paul, Jose, and Mark each have an equal share. Label each student's share with his or her name.

b. What fraction of the pizza was eaten by each of the boys?
1 fourth

c. What fraction of the pizza did the boys eat altogether?
3 fourths



Lesson 11

Objective: Describe a whole by the number of equal parts including 2 halves, 3 thirds, and 4 fourths.

What fraction do you need to color to shade 1 whole?

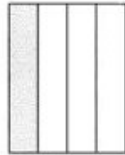


2 thirds

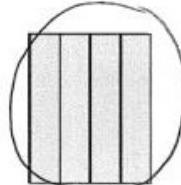


1 half

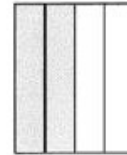
Circle the shape above that has a shaded area that shows 1 whole.



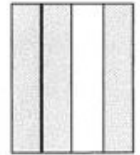
1 fourth



4 fourths



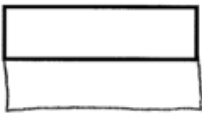
2 fourths



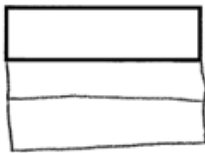
3 fourths

Draw to complete each shape.

a. This is 1 half.
Draw 1 whole.



b. This is 1 third.
Draw 1 whole.



Lesson 12

Objective: Recognize that equal parts of an identical rectangle can have different shapes.

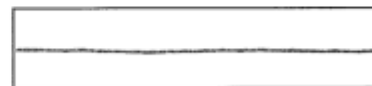
Cut out the circle.

- Cut the circle in half.
- Rearrange the halves to create a new shape with no gaps or overlaps.
- Cut each equal share in half.
- Rearrange the equal shares to create a new shape with no gaps or overlaps.
- Draw your new shape from Part (d) below. One half is still shaded!



Partition the rectangles in 2 different ways to show equal shares.

a. 2 halves




Lesson 13

Objective: Construct a paper clock by partitioning a circle into halves and quarters, and tell time to the half hour or quarter hour.


Write the time shown on each clock.

a.




6:00

b.




6:15

c.




3:30

d.




9:30


a. Tell what fraction of each clock is shaded in the space below using the words *quarter, quarters, half, or halves*.




quarter



1 half
2 quarters



3 quarters

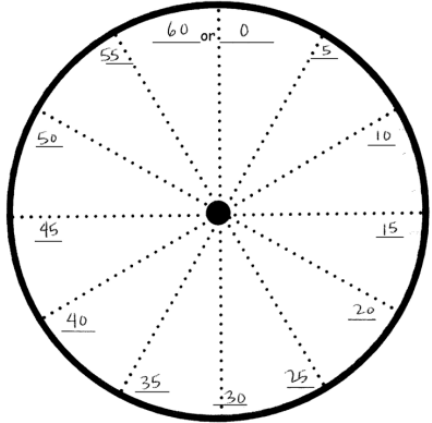


2 halves


Lesson 14

Objective: Tell time to the nearest five minutes.


Fill in the missing numbers on the face of the clock to show the minutes.



Draw the hour and minute hands on the clocks to match to correct time.



3:05



3:35

Lesson 15

Objective: Tell time to the nearest five minutes; relate *a.m.* and *p.m.* to time of day.

Choose whether the activity below would happen in the a.m. or the p.m.

- a. Waking up for school AM / PM
- b. Eating dinner AM / PM
- c. Reading a bedtime story AM / PM
- d. Making breakfast AM / PM
- e. Having a play date after school AM / PM
- f. Going to bed AM / PM
- g. Eating a piece of cake AM / PM
- h. Eating lunch AM / PM

Lesson 16

Objective: Solve elapsed time problems involving whole hours and a half hour.

How much time has passed?

- a. 6:30 a.m. → 7:00 a.m. 30 minutes
- b. 4:00 p.m. → 9:00 p.m. 5 hours
- c. 11:00 a.m. → 5:00 p.m. 6 hours
- d. 3:30 a.m. → 10:30 a.m. 7 hours
- e. 7:00 p.m. → 1:30 a.m. 6 hours and 30 minutes

f.  5 hours

Marcus took a road trip. He left on Monday at 7:00 a.m. and drove until 4:00 p.m. On Tuesday, Marcus drove from 6:00 a.m. to 3:30 p.m. How long did he drive on Monday and Tuesday?

9 hours + 9 hours 30 mins
18 hours and 30 mins