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GRADE K • MODULE 6

Analyzing, Comparing, and Composing Shapes

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Grade K • Module 6

Analyzing, Comparing, and Composing Shapes

OVERVIEW

The kindergarten chapter of *A Story of Units* comes to a close with another opportunity for students to explore geometry. Throughout the year, students have built an intuitive understanding of two- and three-dimensional figures by examining exemplars, variants, and non-examples. They have used geometry as a context for exploring numerals as well as comparing attributes and quantities. To wrap up the year, students further develop their spatial reasoning skills and begin laying the groundwork for an understanding of area through composition of geometric figures.

Topic A begins with students applying their knowledge of attributes to analyze two- and three-dimensional shapes from the real world and construct models using straws and clay (K.G.5). “Let’s use the straws to make the sides of the rectangle, and we’ll stick the straws together at each corner using clay!” Students use their understanding of ordination to third to share and communicate the systematic construction of flats and solids. “First, I cut four straws to be the same length. Second, I made a square by placing the four straws so they look like a frame. Third, I connected the sides at the corners with four little clay balls” (K.CC.4d).

As in Module 2, students explore the relationship between flats and solids, this time using flats to build solids. “I made my square into a cube. First, I made another square the same size. Second, I attached the two squares with four straws the same length.” They also apply their knowledge of ordinal numbers to describe the relative position of shapes within a set (K.CC.4d). “The yellow circle is first, and the red square is tenth.”

The lessons of Topic B focus on composition and decomposition of flat shapes (K.G.6). Students begin by using flats to compose geometric shapes. “I put two triangles together to make a square.” They then decompose shapes by covering part of a larger shape with a smaller shape and analyzing the remaining space. “When I cover part of my square with this triangle, I can see another triangle in the empty space.”

As they build competence in combining and composing shapes, students build toward more complex pictures and designs. Students progress through stages as they build competence in combining shapes to form

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1 This descriptive image plus further clarification is found in the Geometry progressions document, p. 7.
pictures: beginning with trial and error and gradually considering the systematic combination of components. “This square fits here because the corners match the puzzle.” The culminating task of this module is set up as a Math Olympics, a celebration of student learning from the whole year. Students complete tasks related to number, measurement, operations, and geometry.

Composition and decomposition of geometric figures reinforce the idea that smaller units can combine to form larger units. This concept, central to A Story of Units, underlies not only area concepts but also the base ten number system. Students leave this module and the kindergarten year prepared to tackle the mathematical concepts of first grade and beyond.

Focus Grade Level Standards

Count to tell the number of objects.²

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

d. Develop understanding of ordinal numbers (first through tenth) to describe the relative position and magnitude of whole numbers.

Analyze, compare, create, and compose shapes.³

K.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

² Ordinality is introduced in the context of constructing and manipulating shapes. The balance of this cluster is addressed in Modules 1 and 5.
³ K.G.4 is addressed in Module 2.
K.G.6 Compose simple shapes to form larger shapes. For example, “Can you join these two triangles with full sides touching to make a rectangle?”

Foundational Standards

PK.CC.6 Identify “first” and “last” related to order or position.
PK.G.3 Analyze, compare, and sort two- and three-dimensional shapes and objects, in different sizes, using informal language to describe their similarities, differences, and other attributes (e.g., color, size, and shape).
PK.G.4 Create and build shapes from components (e.g., sticks and clay balls).

Focus Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them. Students persist in their use of trial and error until they begin to use the attributes of a puzzle to determine which shape fits into an open space. “The empty space has a long side like my triangle. Let’s see if my triangle fits.”

MP.4 Model with mathematics. Students use shapes to create pictures of common objects and use straws and clay to create models of two- and three-dimensional objects in their environment.

MP.6 Attend to precision. Ordinal numbers provide students with vocabulary to precisely describe the spatial organization of ten shapes in a straight line.

MP.7 Look for and make use of structure. Students make use of their understanding of a shape’s attributes to build three-dimensional from two-dimensional shapes.
## Overview of Module Topics and Lesson Objectives

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<th>Standards</th>
<th>Topics and Objectives</th>
<th>Days</th>
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<td><strong>A</strong> K.CC.4d K.G.5 K.G.2 K.G.4</td>
<td><strong>Building and Drawing Flat and Solid Shapes</strong>&lt;br&gt;Lesson 1: Describe the systematic construction of flat shapes using ordinal numbers.&lt;br&gt;Lesson 2: Build flat shapes with varying side lengths and record with drawings.&lt;br&gt;Lesson 3: Compose solids using flat shapes as a foundation.&lt;br&gt;Lesson 4: Describe the relative position of shapes using ordinal numbers.</td>
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<td><strong>B</strong> K.G.6 K.G.1 K.G.4</td>
<td><strong>Composing and Decomposing Shapes</strong>&lt;br&gt;Lesson 5: Compose flat shapes using pattern blocks and drawings.&lt;br&gt;Lesson 6: Decompose flat shapes into two or more shapes.&lt;br&gt;Lesson 7: Compose simple shapes to form a larger shape described by an outline.&lt;br&gt;Lesson 8: Culminating task—review selected topics to create a cumulative year-end project.</td>
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<td><strong>End-of-Module Assessment: Topics A–B</strong></td>
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<tr>
<td><strong>Total Number of Instructional Days</strong></td>
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Terminology

New or Recently Introduced Terms

- First, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth (ordinal numbers)

Familiar Terms and Symbols

- Above, below, beside, in front of, next to, behind (position words)
- Circle
- Cube (three-dimensional shape)
- Cylinder (three-dimensional shape)
- Face (two-dimensional side of a solid)
- Flat (two-dimensional shape)
- Hexagon (flat figure enclosed by six straight sides)
- Rectangle (flat figure enclosed by four straight sides)
- Solid (three-dimensional shape)
- Cone (three-dimensional shape)
- Sphere (three-dimensional shape)
- Square (flat figure enclosed by four straight, equal sides)
- Triangle (flat figure enclosed by three straight sides)

Suggested Tools and Representations

- Pattern block activity cards or attribute block activity cards
- Three-dimensional shapes: cone, sphere, cylinder, and cube
- Two-dimensional shapes: circle, hexagon, rectangle, square, and triangle

Scaffolds

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.”

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4 These are terms and symbols students have seen previously.
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.
## Assessment Summary

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<td>End-of-Module Assessment Task</td>
<td>After Topic 8</td>
<td>Constructed response with rubric</td>
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<tr>
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<td>Collaborative project: Review selected topics to create a cumulative year-end project.</td>
<td>K.G.6</td>
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**Topic B**

**Composing and Decomposing Shapes**

**K.G.6, K.G.1, K.G.4**

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<th>Focus Standard:</th>
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<th>Compose simple shapes to form larger shapes. For example, “Can you join these two triangles with full sides touching to make a rectangle?”</th>
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<td>Coherence -Links from:</td>
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Thus far students have considered shapes independently, rather than in conjunction with other shapes. Topic B expands students’ thinking about shape by introducing the notion that simple shapes can be combined to compose larger shapes (K.G.6). This supports A Story of Units’ overarching theme, that smaller units can be used to make a larger unit. “These two triangles make a square! These two squares make a rectangle!”

In Lesson 5, students use pattern blocks as templates to compose other shapes and pictures. For example, they make a rectangle from two squares and use a square and a triangle to make a pentagon or “house” shape.

Lesson 6 has students explore how to decompose a flat shape into two or more flats. For example, students find that a rectangle can be decomposed into two triangles, two squares, or even a square and two smaller rectangles. Students record their explorations by drawing the hidden shapes within a larger shape. The Problem Set extends puzzle work as students combine shapes to complete pattern block templates of increasing complexity (see Geometry progressions document, p. 7).

This leads into Lesson 7 wherein students cut a square to form simple three-piece puzzles and intuitively use geometric motions such as flips, turns, and slides as they work to solve one another’s puzzles. Lesson 8 hosts the Math Olympics, a culminating task that celebrates student learning from the whole year. Students complete tasks related to measurement, operations, and geometry.
A Teaching Sequence Towards Mastery of Composing and Decomposing Shapes

Objective 1: Compose flat shapes using pattern blocks and drawings. (Lesson 5)

Objective 2: Decompose flat shapes into two or more shapes. (Lesson 6)

Objective 3: Compose simple shapes to form a larger shape described by an outline. (Lesson 7)

Objective 4: Culminating task—review selected topics to create a cumulative year-end project. (Lesson 8)
Lesson 5

Objective: Compose flat shapes using pattern blocks and drawings.

Suggested Lesson Structure

- Fluency Practice (13 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (7 minutes)
- Total Time (50 minutes)

Fluency Practice (13 minutes)

- Sprint: Core Fluency K.OA.5 (9 minutes)
- Finish Line K.CC.4d (4 minutes)

Sprint: Core Fluency (9 minutes)

Materials: (S) Core Fluency Sprint A, B, C, or D from GK–M6–Lesson 2

Note: This activity continues students’ progress toward mastery of the required fluency for kindergarten.

 Decide on a core fluency skill in which students would benefit from extra practice: addition, subtraction, or mixed addition with subtraction within 5. Select the Sprint that is most appropriate for the class from the Core Fluency Sprints in GK–M6–Lesson 2.

Follow the procedure outlined in GK–M6–Lesson 2.

Finish Line (4 minutes)

Materials: (T/S) Personal white board (turned to landscape orientation), 10 linking cubes

Note: This activity gives students practice in using ordinal numbers to describe relative position.

T: (Distribute linking cubes as 10-sticks.) How many cubes do you have? (Give students time to count if necessary.)
S: 10.
T: Pretend that your 10-stick of cubes is a little train. (Have students orient their trains the same way by giving them a point of reference in the classroom.) Put your finger on the first cube.
S: (Touch the first cube.)
T: Let’s use our number order words as we touch each cube. Ready?
Lesson 5: Compose flat shapes using pattern blocks and drawings.

Date: 11/14/13

S: First, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth.

T: Good. Now break apart your cubes so none are connected. (Give students a moment to do this.) This time I want you to pretend that they are little people running in a race! The start line is the edge of your personal board. The finish line is the opposite side of your board. Watch me make my people run. (Demonstrate how to make cubes run.)

T: On your mark, get set, go!
S: (Move the cubes around as if running.)
T: Stop! The race is over. (Do not allow students to change the position of the cubes at this point.) Get out your marker. Listen carefully to what I want you to do. Circle the first runner.
S: (Circle the cube that is closest to the finish line.)
T: Make an X next to the tenth runner.
S: (Make an X next to the cube that is farthest from the finish line.)
T: Underline the fifth runner.
S: (Underline the fifth cube.)
T: Now point and show your partner who is first, second, and so on.

Have students clear their boards and play again alone or with a partner. Give instructions to mark different ordinal positions each time.

Have students change the location of the finish line so that they can describe the position of the runners relative to it.

**Application Problem (5 minutes)**

Materials: (S) Personal white boards

Listen carefully to my instructions. You are going to draw a house!

- First, draw a square to make the big part of your house.
- Second, use a triangle to make a roof.
- Third, use a shape of your choice for a door.
- Fourth, find somewhere in your picture where you can use two more squares or rectangles.
- Fifth, use a circle somewhere in your scene.
- Sixth, find a place where you could draw a hexagon in your scene.

Take another minute to finish your scene with more shapes and details. Don’t forget to draw yourself!

Now show your picture to your partner. Tell her about each of your shapes. Do your houses look alike? How did you use shapes differently in your pictures?

Note: The activity of creating a scene using a number of assigned shapes is an opportunity for students to
practice drawing the shapes. It also will serve as an anticipatory set for composition with shapes in today’s lesson. Circulate during the activity to see if there are students who still need help drawing any of the basic shapes.

**Concept Development (25 minutes)**

Materials: (S) Pattern blocks, personal white board, recording sheet

T: Find two squares in your pattern block box. How do you know they are squares?

S: They each have four sides. → The sides are all the same length. → They have corners like an L. → They look like the face of a cube!

T: Place the squares on your board. See if you can make a different rectangle from your squares. (Pause.) Tell me about your work.

S: I put them right next to each other. → Now two of the sides are long! → It is a different rectangle now.

T: I like how you put your squares together so that the edges are fully touching. While you hold your pattern blocks down, trace your new shape with your marker. Hold up your boards to show me your work! (Pause.)

T: Put your squares back inside your new shape outline. I wonder what would happen if we added another square?

S: I think it would just get longer. → I think it might be another rectangle. → I have a different idea!

T: Try it and see! Trace your new shape. (Pause.)

S: I have a longer rectangle now. → I decided to put my square on top! → I don’t have a rectangle anymore. I have an L. → Now it looks like a building!

T: Turn and talk to your partner about your drawings. (Pause.)

T: Take out one more square. Can you use the four small squares to make a larger square?

S: Yes. I put two next to each other and two on top. → All of my squares are touching in the corners.

T: How do you know that you built a square?

S: It looks like a carpet square. → Four sides and four corners. → All the sides are the same. The corners are like an L.

T: Let’s try another one. Take a square and a triangle out of your pattern block box. On your board, find a way to put their sides together to make a new shape. (Pause.) Tell me about your work.

S: I made a house shape! → It looks like the one we made in our drawing
Lesson 5: Compose flat shapes using pattern blocks and drawings.

Date: 11/14/13

NOTES ON MULTIPLE MEANS OF REPRESENTATION:
In order to facilitate the partner share after students create their own new shapes, give English language learners a review of key vocabulary needed to tell about their new shapes: sides, corners, and straight lines, etc.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes.

Student Debrief (7 minutes)

Lesson Objective: Compose flat shapes using pattern blocks and drawings.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions MP.6
below to lead the discussion.

- In your Problem Set, what did you think about when you were arranging your pattern blocks to make new shapes?
- What if you had left spaces in between the blocks?
- Look around the classroom. Can you see anything that is made out of different shapes?
- How did you choose names for the shapes you created? (Many students will name shapes after a real world object they resemble, but look for some students to start naming based on attributes.)
- How does our work with the pattern blocks remind you of when you drew your house at the beginning of the lesson?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 5:
Compose flat shapes using pattern blocks and drawings.

Date: 11/14/13

I Can Make New Shapes!
Name _______________________________ Date _______________

Choose 4 shapes to create a new shape in Box 1. Give the same 4 shapes to your partner. Have your partner create a different shape in Box 2.
Choose 5 shapes to create a new shape in Box 3. Give the same 5 shapes
to your partner. Have your partner create a different shape in Box 4.

3

4

Subtract.

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\begin{align*}
5 - 1 &= 5 - 2 = 5 - 3 = 5 - 4 = \\
\end{align*}
\]
Lesson 5: Compose flat shapes using pattern blocks and drawings.

Use your pattern blocks to help you solve the problem.

Use 2 blocks to make a rectangle. Trace your blocks to show your rectangle.
Lesson 5:
Compose flat shapes using pattern blocks and drawings.

Date: 11/14/13

Match each group of shapes on the left with the new shape they make when they are put together.
Lesson 6
Objective: Decompose flat shapes into two or more shapes.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)

Total Time (50 minutes)

Fluency Practice (12 minutes)

- Sprint: Make 10 K.OA.4 (12 minutes)

Sprint: Make 10 (12 minutes)

Materials: (S) 2 copies of the Make 10 Sprint per student

Note: This Sprint maintains students’ knowledge of making 10 from GK–Module 4.

T: It’s time for a Sprint!

Briefly recall previous Sprint preparation activities, and distribute Sprints facedown.

T: Take out your pencil and one crayon of any color. For this Sprint, you are going to write the missing number needed to make 10. (Demonstrate one example if needed.)

Continue to follow the Sprint procedure as outlined in GK–M4–Lesson 3. Have students work on the Sprint for a second time. Continue to emphasize that the goal is simply to do better than the first time and celebrate improvement.

Application Problem (5 minutes)

Materials: (S) Personal white boards

You are going to be a detective today!

- First, look around the classroom to see if you can find things made of more than one shape, like we did yesterday.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:
Encourage English language learners to use the words in their native language to name the shapes they find in the classroom. For instance, a native Spanish speaker can say triángulo and rectángulo instead of triangle and rectangle. Ask the student to share with the class, and then ask everyone else to say the English word as well.
Lesson 6: Decompose flat shapes into two or more shapes.

Date: 11/14/13

- Second, draw it on your personal board.
- Third, use your marker to show the shapes inside.

If necessary, give hints about items such as tiles, bricks, windowpanes, and so on. Encourage students to look for and highlight the shapes within shapes on their boards.

T: Turn and talk to your partner about the hidden shapes that you found!

Note: Careful observation of shapes in the environment serves as the basis for today’s decomposition lesson.

Concept Development (25 minutes)

Materials: (S) Scissors, shape sheet template, pattern blocks, recording sheets from yesterday’s lesson

T: What do you see on your paper?
S: We have different shapes! I see squares, rectangles, and triangles.
T: Cut out your shapes and talk about them with your friends. (Allow time for activity and discussion.)
T: Hold up your gray square. Hold up your white triangle. Put your white triangle on your gray square, making two of the sides match. What do you notice?
S: When I put the white triangle on, it leaves an empty space like another triangle! There are two triangles now!
T: Yes! You made your square into two triangles. Find your gray rectangle and your square. What happens if we cover as much as we can of the gray rectangle with the square?
S: I have two squares now! I have a square in the middle and two little rectangles on the ends.
T: You found more shapes inside your rectangle, didn’t you? Hold up your white and gray triangles. Put them together. What shapes can you make with them?
S: A square that is the same as the big square with the dotted line! A bigger triangle. This one that looks like a diamond (parallelogram).
T: Fold your gray triangle on the dotted line. What do you notice?
S: It’s still a triangle, but now it is smaller. When I unfold it, I see two little triangles inside.
T: Now look at your white rectangle with the dotted line. Fold it on the dotted line.
S: Now I have two rectangles! They are smaller but when I unfold it I see the big rectangle again.
T: Is there another way you could fold it?
S: Yes! When I fold it the other way and then unfold it again, I have four rectangles in all! I left mine folded and folded again. Now I have a square.
Lesson 6: Decompose flat shapes into two or more shapes.

Date: 11/14/13

T: Now take your large gray square and fold it on the dotted line. What shapes do you see?

S: Two triangles! → And they are the same size and shape as the white and gray triangle!

T: You found a lot of little shapes inside other ones. What does this make you think of?

S: It’s like inside one thing is another that is smaller. → It’s like folding napkins for dinner. They start square and then make a rectangle. → Or triangle. → It’s like our numbers! → We found number pairs hiding inside big numbers. These are shapes hiding in bigger shapes.

T: Excellent thinking. Just like we can break our numbers into smaller parts, we can make smaller shapes out of bigger shapes too.

T: Yesterday you made some wonderful new shapes on your recording sheet. Today, you are going to trade sheets with your partner to see if you can use pattern blocks to fill in the new shapes that she made. If you need help... ask your partner! You can take turns being the teacher! (Allow time for partner work and discussion.)

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Provide pattern blocks for each student to use while completing the Problem Set.

Note: Look for additional pattern block activity cards at education stores or online to challenge students who finish the Problem Set quickly. These make great center activities during assessments.

Student Debrief (8 minutes)

Lesson Objective: Decompose flat shapes into two or more shapes.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How did you decide which pattern blocks you needed to fill in the shapes in the Problem Set?
- Did you and your neighbor use the same blocks?
- Do you think there are shapes hiding inside your pattern blocks, too? Give me an example. How can you use this to help you find more than one way to fill in the big shapes?
Lesson 6: Decompose flat shapes into two or more shapes.

How is finding hidden shapes inside other shapes like what we did yesterday? (In the previous lesson, students put shapes together to make new shapes.)

How is finding hidden shapes inside a bigger shape like finding hidden numbers inside a bigger number?

Could you think of something at home that is made out of more than one shape and tell us about it?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students. Allow students to use pattern blocks to solve.
Write the number of dots needed to make 10 dots.

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Number correct:
Trace to show 2 ways to make each shape. How many shapes did you use?

I used ___ shapes.

I used ___ shapes.

I used ___ shapes.

I used ___ shapes.

I used ___ shapes.
Fill in each shape with pattern blocks. Trace to show the shapes you used.

How many different ways can you cover the sun with pattern blocks?
Draw 2 shapes used to build the rectangle.

Draw 2 shapes used to build the house.
Cut out the triangles at the bottom of the paper. Use the small triangles to make the big shapes. Draw lines to show where the triangles fit. Count how many small triangles you used to make the big shapes.

This big triangle is made with ____ small triangles.

This hexagon is made with ____ small triangles.
Lesson 6: Decompose flat shapes into two or more shapes.

Date: 11/14/13
Lesson 7

Objective: Compose simple shapes to form a larger shape described by an outline.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)
- Total Time (50 minutes)

Fluency Practice (12 minutes)

Getting Ready for First Grade! (12 minutes)

Materials: (S) Folders, baggies, personal white boards, copies of Sprints, personal Rekenreks (made in GK–Module 5), and other consumable fluency materials

Generate a conversation about the necessity of practicing math over the summer to maintain skills students have learned in kindergarten. Emphasize the importance of getting ready for first grade, and tell students that they will get some things today to take home and use over the summer. Tell students that you will send home a letter telling parents and families how they can help.

Select materials in advance based on individual student’s needs. Take into consideration the amount of support students can be expected to receive at home, and choose activities that can be done somewhat independently. Distribute copies of Sprints and Fluency Problem Sets. Demonstrate how to use them in a personal board, so that they can be used multiple times over the summer.

You may wish to enlist the help of parents or older students to assemble students’ materials into packets. Hold students’ packets until tomorrow so that they can share them with guests at the culminating activity!

Application Problem (5 minutes)

Materials: (S) Personal white board, ruler

T: Pretend it is your teacher’s birthday! Draw a big rectangle on your personal board to show a delicious pretend chocolate cake.
Lesson 7: Compose simple shapes to form a larger shape described by an outline.

Date: 11/14/13

T: Now, use your ruler and draw lines to show how you would slice it to serve his or her friends. Where would you draw the lines? How many pieces did you make?

T: Compare your cake to your partner’s. Did you both do it the same way? Who has more pieces?

Note: Thinking about decomposing the rectangle in the problem leads the way to the creation of square puzzles in today’s lesson.

Concept Development (25 minutes)

Materials: (S) Ruler, shape template, scissors, pattern blocks, personal white board, envelope to contain student puzzle pieces (optional)

T: What do you see on your paper?

S: I see four shapes! \(\text{→}\) Two are colored (or grey), and two are white. \(\text{→}\) There are two squares and two rectangles.

T: Yes! Today you are going to be puzzle makers! Your first job is to cut the paper down the dotted line. Then cut out your colored (or grey) shapes. Leave the white ones, because you are going to use those for puzzle frames. (Allow time for cutting.)

T: Use your ruler to draw two lines through your square, just like you did in the cake problem. Make sure that your lines go from edge to edge. (Pause.) Do you see some new shapes inside your square now?

S: I have three shapes! \(\text{→}\) I made rectangles. \(\text{→}\) I made four new shapes. \(\text{→}\) I have little squares. \(\text{→}\) I have four triangles!

T: Use your pencil to put your initials inside each of your new shapes. Now, cut the new shapes apart with your scissors. You are making a puzzle! (Allow time for cutting.)

T: Mix up your puzzle pieces! Now, trade your puzzle pieces with your partner. Try to put his square back together. Use the frame on your paper to help you. (Allow time for practice and experimentation. Circulate to listen to the mathematical language being used. Encourage students to describe unfamiliar shapes by focusing on the number of sides and corners.) Tell me about your work.

S1: I can’t figure this one out. The triangle won’t fit inside the square.

T: Could you move the triangle to make it fit?

S1: I can turn it around. That doesn’t work.

T: Think about another way to move it.

S1: I can turn it over. That works!

T: You needed to flip it! I like how you kept trying until you found a way to solve the puzzle.
Lesson 7:
Compose simple shapes to form a larger shape described by an outline.

Date: 11/14/13

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Challenge your above grade level students by offering them tangram puzzles to solve. You can give them tangram manipulatives and outlines to solve the more simple puzzles or you can download and give students printable tangrams like the ones found at http://www.museumofplay.org/flash-games/tangrams/. Students who finish their work early can form teams to solve the more challenging puzzles together.

S: I got the square back together! → I had to flip this piece over to make it fit. → I had to turn this one around!
T: Great job! Trade with another partner and try again! (Allow time for more experimentation.)
T: Let’s make another puzzle! This time, use your ruler to draw two lines through your rectangle. Make sure that your lines go from edge to edge. Remember to put your initials in each of the new shapes before you cut them apart.

Repeat the activity with the rectangle, again circulating to observe precision in the language during the discussion of the shapes. Allow students to try solving a few different puzzles. In the spirit of MP.1, allow the students to struggle and persevere, to experience the joy of the accomplishment without interference.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes.

Student Debrief (8 minutes)

Lesson Objective: Compose simple shapes to form a larger shape described by an outline.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How many shapes did Carlos have after he cut? How did you know which shapes to circle?
- How many shapes did India have after she cut? How did you know which shapes to circle?
- We all started with the same square, but all of your puzzles were different. Why is that?
Everyone drew two lines, but some people ended up with three pieces and some people had four pieces. Why?

How did you know how to put your partner’s puzzle together?

Did you have to do anything to the shapes to make them fit into your puzzle? (Look for students to describe turns, flips, and slides.)

How is the birthday cake drawing like the rectangle puzzle that you made?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 7:
Compose simple shapes to form a larger shape described by an outline.

Date: 11/14/13

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Lesson 7 Fluency Template

Name ___________________________ Date _______________

My Plan to Get Ready for 1st Grade Math

This is a picture of someone who can help me practice.

This is a picture of where I will practice.

This is ME getting ready for 1st grade!
Lesson 7: Compose simple shapes to form a larger shape described by an outline.

Date: 11/14/13

NYS COMMON CORE MATHEMATICS CURRICULUM

Lesson 7 Fluency Template

Name ________________________________

My Sprint Progress Log

Practice your number sentences and Sprints on your personal board. Ask an adult to time you. Keep track of how you improve over the summer.

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Are you getting better at your number sentences?
Name ________________________________  Date _________________

Glue your puzzles into the frames.

Glue puzzle here

Glue puzzle here

Draw some of the shapes that you had after you cut your rectangles.
Carlos drew 2 lines on his square. You can see his square before he cut it. Circle the shapes Carlos had after he cut.

India drew 2 lines on her rectangle. You can see her rectangle before she cut it. Circle the shapes India had after she cut.
If you drew 2 straight lines inside the gray rectangle, what shapes might you find? Circle them.
Using your ruler, draw 2 straight lines edge to edge through the shape. The first one has been started for you. Describe the new shapes you made to an adult.
Lesson 7: Compose simple shapes to form a larger shape described by an outline.

Date: 11/14/13
Lesson 8

Objective: Culminating task—review selected topics to create a cumulative year-end project.

Suggested Lesson Structure

- Fluency Practice (5 minutes)
- Concept Development (40 minutes)
- Student Debrief (5 minutes)
- Total Time (50 minutes)

Fluency Practice (5 minutes)

- My Favorite Fluency (5 minutes)

My Favorite Fluency (5 minutes)

Materials: (S) Summer materials from previous lesson

Note: Today’s activity is a fluency celebration.

Using their Getting Ready for First Grade packets, students practice their favorite fluency activity, or teach it to a guest attending the Math Olympics. If available, invite Pre-K students to learn a fluency activity from their older kindergarten buddies.

Application Problem

There will be no Application Problem today in order to allow more time for the cumulative project.

Concept Development (40 minutes)

Materials and Note: Today’s lesson is a celebratory Math Olympics. There are activities set up in five different “events” or stations around the classroom through which small groups of students rotate, for seven minutes each. At each station, the students have paper, pencils, and markers in addition to many copies of the half-page recording sheets. (Some students may be able to complete more than one at each station in the time allotted.) Teachers might wish to supply popcorn, ribbons, or small prizes for the participants during the end of the lesson Student Debrief celebration. The students use the materials they create at the stations to make a book reviewing some of the main concepts that they learned this year.
In addition to the recording sheets and writing tools, individual station materials are as follows:

A. Make-10 Mania: Linking cube 10-sticks
B. Five-Group Frenzy: Digit cards 1–20
C. Shape Shifters: Pattern blocks and markers
D. The Weigh Station: 2 pan balances, bags of pennies, mystery bag of small objects to weigh
E. Awesome Authors: Large foam die, linking cubes to serve as addition support if necessary

Fun signs for the individual stations may be made up in advance, if desired. It is suggested that, if possible, older students, parents, administrators, or community volunteers be enlisted to help oversee the individual events in the Math Olympics. That way, the following lengthy explanation can be omitted and students can instead receive the directions for a particular station upon arrival.

T: We are going to have a special Math Olympics celebration today! You are going to use many of the things that you learned to make your own math book to take home for the summer. We have several special stations set up today. (Demonstrate.)

T: (Station A, Make Ten Mania.) Here, you break apart 10-sticks and create number bonds and number sentences showing different ways to make 10. Find as many different pairs as you can and write them on the recording sheets.

T: (Station B, Five-Group Frenzy.) Here, you choose digit cards, write the numbers in your best penmanship, and show them on recording sheets the 5-group way. In the last box, show your number in another way, too!

T: (Station C, Shape Shifters.) Here, you choose up to 5 pattern blocks, make a shape with them on your paper, and trace the outline. If you have time, you trade with a friend and see if you can fill in their outline with the blocks!

T: (Station D, The Weigh Station.) Here you choose an object from the mystery bag. After you’ve held it and tested its weight with your hands, guess how many pennies are the same weight as your object. Then, check your guess and record your work! If you have time, you can weigh more...
Lesson 8: Culminating task—review selected topics to create a cumulative year-end project.

- Which station did you find to be the most challenging? Why?
- Which station did you like best today? Why?
- What was the best thing about math this year?
- What are you looking forward to learning about next year?
- Let’s have some popcorn!
Name ___________________________ Date ________________

A. **Make 10 Mania:** Show how you made 10!

B. **Five-Group Frenzy:** Write the number, draw the number in the 5-group way, and draw the number in any other configuration.
C. Shape Shifters: Choose 5 pattern blocks and create a shape. Trace your shape, then trade with a partner.

D. The Weigh Station: Choose an object. Guess how many pennies are the same weight as the object. Then, see if you guessed correctly! Draw a picture of the object, and write how many pennies it weighs.
E. **Awesome Authors**: Roll the die. Use the number to create an addition or take-away sentence. Draw a picture, number bond, and number sentence. Share your story with a friend.