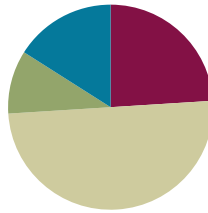


Lesson 3

Objective: Compose solids using flat shapes as a foundation.

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)

- Color by Answer Addition **K.OA.5** (6 minutes)
- Color by Answer Subtraction **K.OA.5** (6 minutes)

Color by Answer Addition (6 minutes)

Materials: (S) Color by answer addition (Fluency Template 1), crayons

Note: This activity gives students an opportunity to practice the core fluency of addition within 5 and calls students' attention to the patterns within the chart.

After giving clear instructions and demonstrating a few problems as needed, allow students time to work independently. Early finishers can analyze the patterns they see within the chart.

Color by Answer Subtraction (6 minutes)

Materials: (S) Color by answer subtraction (Fluency Template 2), crayons

Note: This activity gives students an opportunity to practice the core fluency of subtraction within 5 and calls students' attention to the patterns within the chart.

Conduct as above.

Application Problem (5 minutes)

Materials: (S) Geoboard and rubber bands per pair (or dot paper, markers, and ruler if geoboards are not available)

You have a challenge today! Work with your partner. On your geoboard, make a shape with three sides. Now, leave your shape on your board, and let your partner make a three-sided shape as well. Do they look the same? Name the shapes. Remove your shapes from the geoboard.

Now, make a shape with four sides. Have your partner make another four-sided shape. Do they look alike? Name the shapes. Remove your shapes from the geoboard.

Try it with five sides! Then, six! How far can you and your partner go?

Note: Reviewing the construction of a variety of flat shapes serves as the anticipatory set for extending a flat shape into a solid in today's lesson.

**NOTES ON
MULTIPLE MEANS
OF ENGAGEMENT:**

Students working below grade level benefit from extra practice creating a variety of three- and four-sided shapes. Give them extended time with a geoboard, or make time for using interactive technology such as that found at

<http://www.mathlearningcenter.org/web-apps/geoboard/>

Concept Development (25 minutes)

Materials: (T) Set of geometric solids (S) 12 coffee stir sticks, small ball of clay

Part 1: Review the attributes and names of solids.

T: (Hold up each solid as a review exercise.) What do we call this solid?

S: A cone!

T: How did you know?

S: It looks like an ice cream cone. → It looks like the orange cones in the lunch area.

T: What is special about a cone? Talk to your partner.

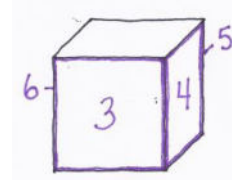
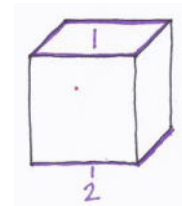
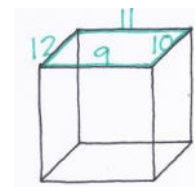
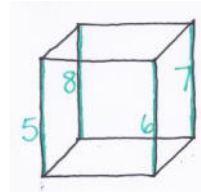
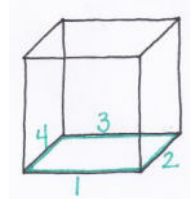
S: It has a circle on the bottom. → It rolls funny, not in a straight line like a ball. → It kind of looks like a triangle when you look at it from the side. → It's flat on the bottom, smooth and round in the middle, and pointy on the top.



Continue reviewing the other solids, asking students to explain how they knew the name of the solid and to describe its attributes.

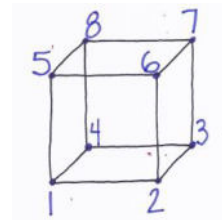
Part 2: Construct a cube.

- T: In our last lesson, you made some great shapes out of your straws! I want to use some of the squares you constructed to make a new shape like one of our solids. Does anyone have any ideas?
- S: Maybe we could make something like a cube! → You could use one square to be on the bottom like the floor of a room. → Some of the others could be like the faces. We need one for the top, too.
- T: Look at the cube we already have. (Hold it up.) How many squares will I need to use? Let's count together.
- S: 1, 2, 3, 4, 5, 6.
- T: Let's use this one as the bottom of the cube. Now, I will use some of your other squares for the sides. (Demonstrate.) What does it look like now?
- S: It looks like a box. → It is still open, though.
- T: What if I trace one of the squares on my paper and cut it out? (Demonstrate.) I will attach it to one of the squares. (Cover one side of the skeleton with the paper to create a face, and hold the shape up for observation.) What do you notice?
- S: It fits. → We still need more faces to close it up!
- T: I will trace and cut some more. (Demonstrate with the remaining 5 faces to create a cube.)
- T: Let's double-check. How many faces do we have? First, let's count the faces on the top and bottom. Say what we are counting.
- MP.7** S: (Point and touch.) 1 face, 2 faces.
- T: Second, let's count the ones around the middle. This is our third face, so start at the number...?
- S: 3.
- T: Go.
- S: 3 faces, 4 faces, 5 faces, 6 faces.
- T: Have we counted all of the faces? Did we miss any? How many faces are there on the cube?
- S: 6 faces.
- T: Now, count the edges for me. First, we'll count the ones on the bottom. I'll start with this one.
- S: (Touch as they count.) 1 edge, 2 edges, 3 edges, 4 edges.
- T: Second, let's count the edges in the middle. Start at the number after 4.
- S: 5 edges, 6 edges, 7 edges, 8 edges.
- T: Third, let's count the ones at the top. How many edges have we counted so far?
- S: 8.
- T: So, the next edge we count will be number...?
- S: 9.

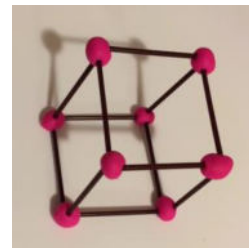
**Counting Faces****Counting Edges**

MP.7

- T: Count when I touch.
- S: 9 edges, 10 edges, 11 edges, 12 edges.
- T: Are there any more edges?
- S: No!
- T: Tell your partner how we counted. What did we do first, second, and third?
- S: First, we counted the edges on the bottom. Second, we counted the ones in the middle. And third, we counted the edges on the top.
- T: Let's count them once more without stopping and without saying what we are counting.
- S: (Touch systematically as students count.) 1, 2, ..., 11, 12.
- T: Now, count the corners. (Repeat the same process with the corners, having them count the corners on the bottom and then the top, saying what they are counting.)
- T: It is time to make a shape like this on your own. Begin by making a square out of your straws for the bottom. Make another one for the top, too. (Allow time for students to work.)
- T: What do we need now?
- S: We need to make the edges. Let's stick straws into the corners of our bottom squares so they are poking up. → They will look like table legs. → Then, we can put on the top!
- T: Please finish your shapes. (Allow time for students to construct the shape. Circulate to observe understanding, and offer support as necessary.)
- T: You have made wonderful shapes! Hold them up. What do you notice about them?
- S: They look like little boxes! → They are the same on every side.
- T: Work with your partner to count the faces, edges, and corners of your pretend cube like we did earlier.
- T: (Circulate and support the counting, which is challenging for kindergarten students.) What shapes are the invisible faces?
- S: They are all squares.
- T: I wonder what would happen if we put two of these shapes together. With your partner, see what you can create if you use more than one.
- S: Now, ours is taller, like a building! → Ours looks like a train.
- T: What are the shapes of the new invisible faces?
- S: Squares. → Rectangles!
- T: Wait for my signal. How many corners do you have now? Count them using our system. (Signal and give students sufficient time to count.)
- S: 8 corners.
- T: How many faces? (Give students time to count.)
- S: 6 faces!



Counting Corners



- T: How many edges? (Give students time to count.)
S: 12 edges!
T: Great work. Take a minute to compare your new shape with another pair's.
S: (Compare shapes.)

Problem Set (10 minutes)

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

Student Debrief (8 minutes)

Lesson Objective: Compose solids using flat shapes as a foundation.

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 Student Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.



Any combination of the questions below may be used to lead the discussion.

- How many squares did you trace on your Problem Set before you started cutting? What did you have to do to make a cube out of all the squares you traced?
- What two shapes did you trace to make your cylinder? (Circle and rectangle.) What happened to the rectangle when you cut and folded the paper to make the cylinder? Could we say that a rectangle is a face of a cylinder? Why or why not? (No. Faces are flat. Once we roll up the rectangle to make a cylinder, it is no longer flat.) What about the circle? Is a circle a face of the cylinder?
- When you counted the faces of your cube, how did you keep track of your count? How did you make sure that you didn't count any face twice?
- Describe a cube to me. Tell me about its faces, edges, and corners.
- Describe a cylinder to me. Tell me about its faces, edges, and corners.

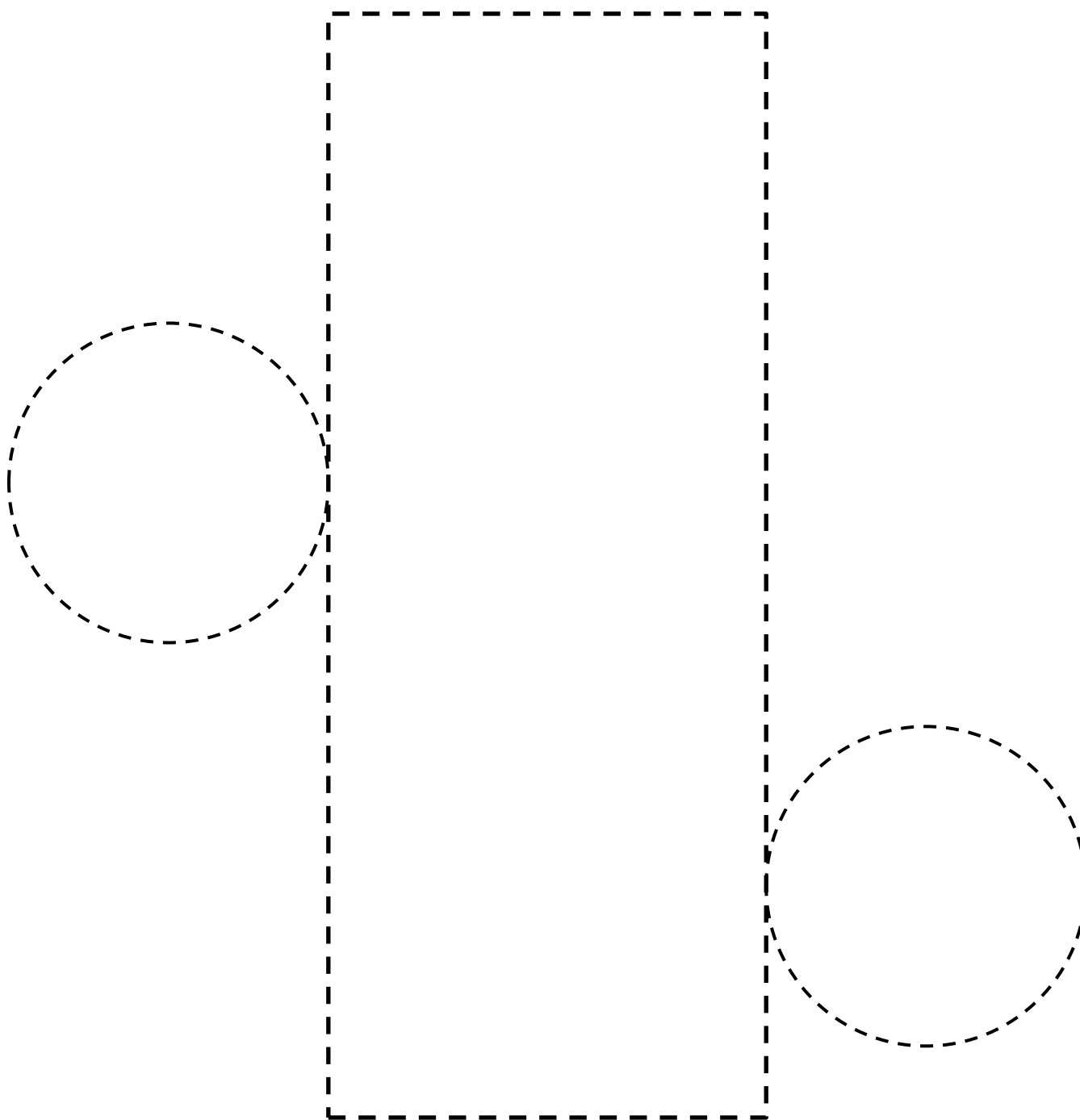
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

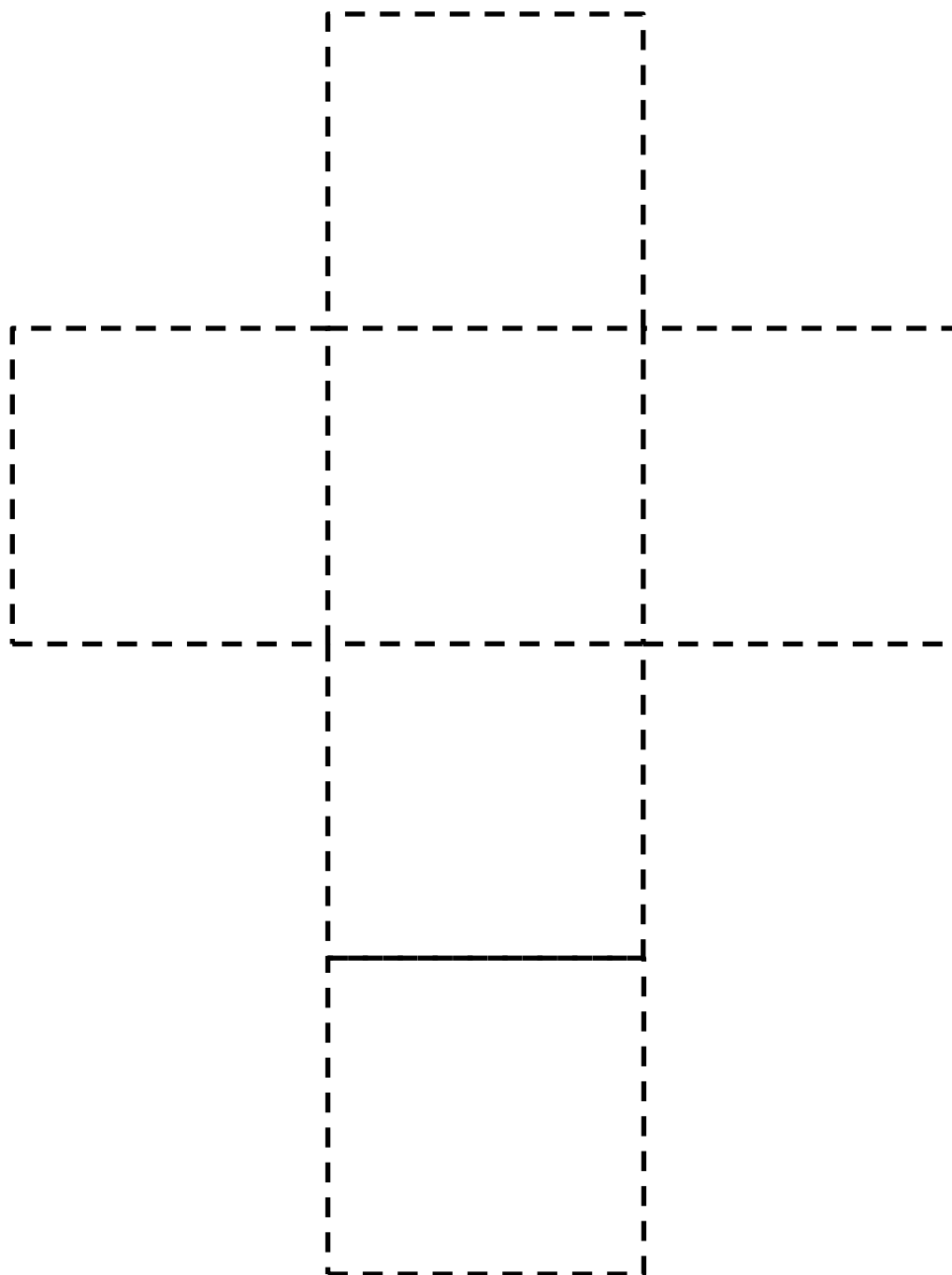
Name _____

Date _____

Trace the circles and rectangle. Cut out the shape. Fold and tape to create a cylinder.



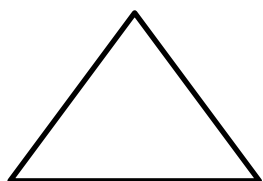
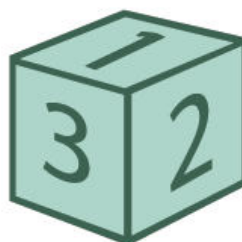
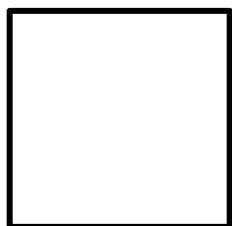
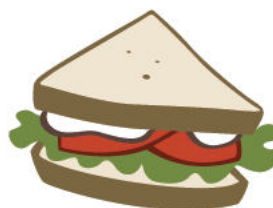
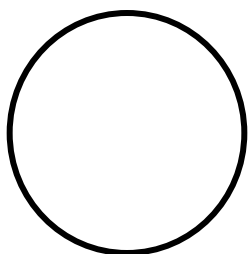
Trace the squares. Cut out the shape. Fold and tape to create a cube.



Name _____

Date _____

Draw a line from the flat shape to the object that has a face with that flat shape.



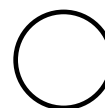
Name _____

Date _____



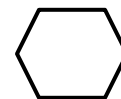
Draw something that is a cylinder.

Circle the flat shape you can see in a




Draw something that is a cube.

Circle the flat shape you can see in a





Draw something that is a cone.

Circle the flat shape you can see in a .



Draw a 3-dimensional solid. Draw one of your solid's faces. Tell an adult about the shapes you drew.

Note to Family Helpers: Your child knows how to name some 3-dimensional solids: cylinders, cones, cubes, and spheres. You can often find these 3-D shapes around the house in objects such as soup cans, ice cream cones, boxes, and balls. For the last question, it is acceptable for your student to find and draw a different type of 3-D solid. Talk about the number of edges, corners, and faces on the object.

Name _____

Date _____

Add. Color the blocks using the code for the total.

1—RED

2—ORANGE

3—YELLOW

4—GREEN

5—BLUE

$0 + 1$	$1 + 1$	$2 + 1$	$3 + 1$	$4 + 1$
$0 + 2$	$1 + 2$	$2 + 2$	$3 + 2$	
$0 + 3$	$1 + 3$	$2 + 3$		
$0 + 4$	$1 + 4$			
$0 + 5$				

color by answer addition

Name _____ Date _____

Subtract. Color the blocks using the code for the difference.

0—PURPLE

1—RED

2—ORANGE

3—YELLOW

4—GREEN

5—BLUE

1 - 0	2 - 0	3 - 0	4 - 0	5 - 0
1 - 1	2 - 1	3 - 1	4 - 1	5 - 1
	2 - 2	3 - 2	4 - 2	5 - 2
		3 - 3	4 - 3	5 - 3
			4 - 4	5 - 4
				5 - 5

color by answer subtraction