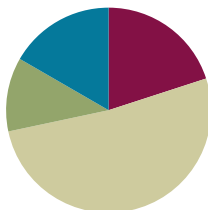# Lesson 5

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

Suggested Lesson Structure

- ■ Fluency Practice   (12 minutes)
- ■ Application Problem   (7 minutes)
- ■ Concept Development   (31 minutes)
- ■ Student Debrief   (10 minutes)
- **Total Time**   **(60 minutes)**

Fluency Practice (12 minutes)

- ▪ Rename for the Smaller Unit **2.NBT.1**   (3 minutes)
- ▪ Sprint: Subtraction Patterns **2.OA.2, 2.NBT.5**   (9 minutes)

Rename for the Smaller Unit (3 minutes)

Note: This fluency activity reviews using place value understanding to rename units in preparation for subtraction with chips and the algorithm during Fluency Practice in Lessons 7 and 8.

- T: (Write 1 hundred = _____ tens.)
- T: I'm going to give you a number in unit form. I want you to rename 1 of the hundreds for 10 tens and then tell me how many hundreds, tens, or ones. Ready?
- T: Say the number sentence.
- S: 1 hundred = 10 tens.
- T: (Write 1 hundred 1 ten = _____ tens.) Say the number sentence.
- S: 1 hundred 1 ten = 11 tens.
- T: (Write 2 hundreds = 1 hundred _____ tens.) Say the number sentence.
- S: 2 hundreds = 1 hundred 10 tens.
- T: (Write 2 hundreds 1 ten = 1 hundred _____ tens.) Say the number sentence.
- S: 2 hundreds 1 ten = 1 hundred 11 tens.
- T: (Write 2 hundreds = 1 hundred 9 tens _____ ones.) Say the number sentence.
- S: 2 hundreds = 1 hundred, 9 tens, 10 ones.

Continue with the following possible sequence: 1 hundred 3 tens; 2 hundreds 3 tens; 3 hundreds 4 tens; and 5 hundreds 7 tens.
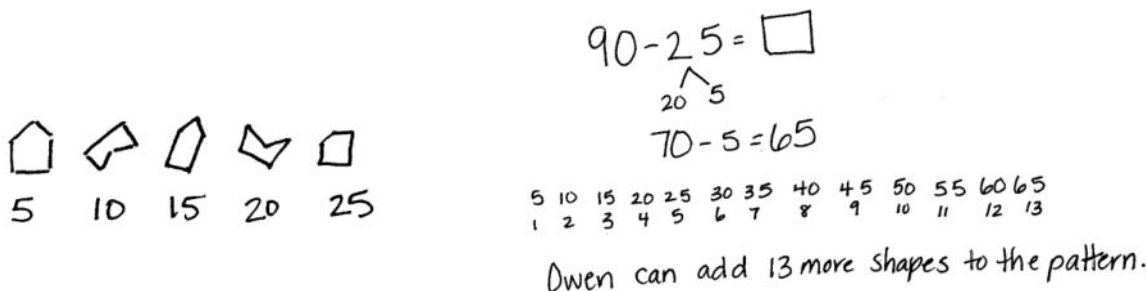
Sprint: Subtraction Patterns (9 minutes)

Materials: (S) Subtraction Patterns Sprint

Note: Students practice subtraction in order to gain mastery of the sums and differences within 20 and identify relationships with higher numbers.

Application Problem (7 minutes)

Owen had 90 straws to create pentagons. He created a set of 5 pentagons when he noticed a number pattern. (Draw on the board, as shown below.) How many more shapes can he add to the pattern?

$$90 - 25 = \Box$$
$$20 \quad 5$$
$$70 - 5 = 65$$

5 10 15 20 25 30 35 40 45 50 55 60 65
1   2   3   4   5   6   7   8   9   10   11   12   13

5   10   15   20   25

Owen can add 13 more shapes to the pattern.

Note: In this two-step *put together/take apart* problem, students see a pattern of five-sided polygons. Students may begin by using repeated addition or skip-counting by fives to see that Owen used 25 straws.

Concept Development (31 minutes)

Materials: (T) Cube (S) 1 bag of 50 toothpicks per 4 students, adhesive material (e.g., sticky tack, mini marshmallows, gumdrops), 2 pieces of 8½" × 11" white paper

Note: Although precision is not emphasized in Part 2 of the Concept Development, it is essential that students use pencils for the activity. A step-by-step procedure for drawing the cube is illustrated in the lesson.

Arrange desks so that students are sitting in groups of four. Distribute a bag of toothpicks and an adhesive material for constructing a cube to each group, as well as 1 piece of 8½" × 11" white paper per student.
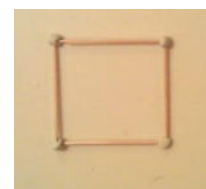
Part 1: Constructing a Cube

- T: Watch as I use four toothpicks to build a square. (Build a square as shown above.)
- T: It's your turn. Use four toothpicks and some sticky tack to build a square! (Allow time to work.)
- T: Using words we have learned in the past week, describe your square to your partner.
- S: It has four straight sides that are the same length. → It is a special rectangle. → It has four square corners. → It can be called lots of different names: a polygon, a quadrilateral, a rectangle, a parallelogram, a square, and a trapezoid, too! → It has two pairs of parallel sides.

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T: Good recall! A square can also be used to build a solid shape that has equal edges.

T: Here is a **cube**. (Hold up a cube.) What shape are the faces of this cube?

S: Squares!

T: I want to build a cube with toothpicks. How many would I need?

S: I don't know. → We need to count to find out. → Lots.

T: Let's count the edges to find out. (Count the edges, marking each one as you go.)
     First, we'll count the edges on the bottom: 1 edge, 2 edges, 3 edges, 4 edges.
     Now, the edges around the middle: 5 edges, 6 edges, 7 edges, 8 edges. Now,
     those around the top: 9 edges, 10 edges, 11 edges, 12 edges.

T: How many edges does a cube have?

S: Twelve edges!

T: Can we use this square that we already built to construct our cube?

S: Yes!

T: Talk to your partner. How many more toothpicks do we need to build the cube?

S: $12 - 4 = 8$. → Eight more toothpicks. → 4 and 8 is 12, so 8 more.

T: Get eight more toothpicks and some more sticky tack, and see if you
     can use your square to make a cube that looks like my cube.

S: (Work.)

T: (Circulate to support students who need it.)

T: Great job! Let's take a look at our cubes. How can we figure out how
     many corners our cube has?

S: We can count the sticky tack pieces we used.

T: Good. Do that now. Count the ones on the bottom
     first and then the ones on the top. How many corners
     does a cube have?

S: Eight corners!

T: This toothpick cube looks like it's missing something.
     In fact, I'm going to call it a skeleton cube. What is it
     missing?

S: The sides! → The faces!

T: Yes. Let's use paper to create faces for our cubes.
     Earlier you said that the faces are squares. How can
     we make squares that are the right size?
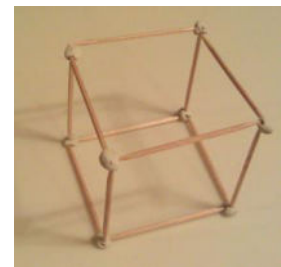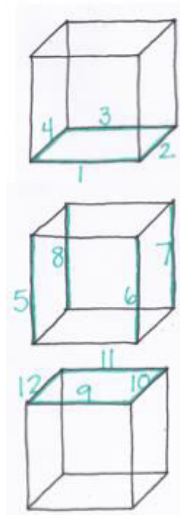
S: We can trace the bottom of the cube. → We can
     measure.

T: Let's trace the bottom of our cubes. Make enough squares to cover all of the faces.

S: (Work.)

T: (Circulate to help students who need it.)

T: How many squares did it take to make the cube?

**NOTES ON
MULTIPLE MEANS
OF REPRESENTATION:**

Support English language learners'
comprehension by holding a cube (if
possible) or a picture of a cube and
pointing to the faces, corners, and
edges as they are mentioned during
the lesson.

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S: Four around the sides, one on top, and one on bottom. → Six!

T: Good. With six square faces, our cubes would be complete.

T: Hmm. So, we know that a cube has six square faces and eight corners.

T: Do you remember when we figured out how many toothpicks we needed to build our cube? How many toothpicks did we need?

S: Twelve!

T: That's right. We can call the toothpicks edges. The cube has twelve edges.

T: Tell your partner the attributes you know about a cube.

S: It has eight corners. → It has six faces that are squares. → It has twelve edges. → Since each face is a square, the sides are all the same length.

T: Now that we know the attributes of a cube and can build a cube, let's try drawing one.

Part 2: Drawing a Cube

Distribute 1 piece of 8½" × 11" white paper to each student. Instruct the class to fold the paper in half twice so that they have eight sections, four on the front and four on the back.

T: With your pencil, but without a straightedge, draw the best square you can in the middle of the first section on your paper.

T: You've already drawn one face of a cube! Now, watch carefully, and follow me as we draw some more.

Step 1:   Start at the middle of the top edge, but a little above, and draw a straight line parallel to the top edge and about the same length.

Step 2:   Make a square corner with the right side parallel to the right edge.

T: So far, what do you see?

S: I see a square and a square corner. → The front face of the cube.

MP.6

T: Okay. Keep watching, and do as I do!

Step 3:   Draw three lines to connect the three corners of the square face to the endpoints and corner of the lines you drew.

T: What do you see now?

S: I see a square and two parallelograms. → I see three faces of a cube. → I see a cube, but I can't see all the parts. → I see a cube, too, but since it's not a flat shape, some of the faces are hiding.
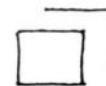
T: Bravo! You have drawn a cube! But you're right. Some of the faces are hiding; we can only see three of them, even though we know there are six.

T: For the next few minutes, practice drawing a cube in each section on your paper. It will become much easier with practice! (Allow students time to work. Circulate and provide guidance.)

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

If students struggle to understand why they can only see three faces in their cube drawings, show them an actual cube. Position the cube so that they can only see three faces. This helps them understand that they are drawing the cube from a certain point of view.

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T: Take a look at all the cubes you've drawn! Put a star next to your best one. I am noticing that each of your cubes looks better and better every time you draw a new one! Well done!

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Note: The length of the lesson may prevent completion of the Problem Set today. However, print a few copies for early finishers.

Student Debrief (10 minutes)

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

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.

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

- Look at each parallelogram in Problem 1. Could it be the face of an actual **cube**? Why or why not? Could it represent the face of a cube in a drawing?
- Look at the cubes your partner drew. Tell your partner which one you like the best and why.
- A square has four sides and four angles. Does a cube have the same number of faces, corners, and edges? (No. A cube has six faces, eight corners, and twelve edges. They are all different.)
- Tell your partner how the cube you built and the cube you drew are alike. How are they different?

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- ▪ Was it easier to count and see the faces, corners, and edges on the toothpick cube or on the one you drew? Why?

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.

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A

Number Correct: _____

Subtraction Patterns

1.	8 – 1 =		23.	41 – 20 =	
2.	18 – 1 =		24.	46 – 20 =	
3.	8 – 2 =		25.	7 – 5 =	
4.	18 – 2 =		26.	70 – 50 =	
5.	8 – 5 =		27.	71 – 50 =	
6.	18 – 5 =		28.	78 – 50 =	
7.	28 – 5 =		29.	80 – 40 =	
8.	58 – 5 =		30.	84 – 40 =	
9.	58 – 7 =		31.	90 – 60 =	
10.	10 – 2 =		32.	97 – 60 =	
11.	11 – 2 =		33.	70 – 40 =	
12.	21 – 2 =		34.	72 – 40 =	
13.	61 – 2 =		35.	56 – 4 =	
14.	61 – 3 =		36.	52 – 4 =	
15.	61 – 5 =		37.	50 – 4 =	
16.	10 – 5 =		38.	60 – 30 =	
17.	20 – 5 =		39.	90 – 70 =	
18.	30 – 5 =		40.	80 – 60 =	
19.	70 – 5 =		41.	96 – 40 =	
20.	72 – 5 =		42.	63 – 40 =	
21.	4 – 2 =		43.	79 – 30 =	
22.	40 – 20 =		44.	76 – 9 =	

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Lesson 5: Relate the square to the cube, and describe the cube based on attributes.

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B

Number Correct: _____

Improvement: _____

Subtraction Patterns

1.	7 – 1 =			23.	51 – 20 =	
2.	17 – 1 =			24.	56 – 20 =	
3.	7 – 2 =			25.	8 – 5 =	
4.	17 – 2 =			26.	80 – 50 =	
5.	7 – 5 =			27.	81 – 50 =	
6.	17 – 5 =			28.	87 – 50 =	
7.	27 – 5 =			29.	60 – 30 =	
8.	57 – 5 =			30.	64 – 30 =	
9.	57 – 6 =			31.	80 – 60 =	
10.	10 – 5 =			32.	85 – 60 =	
11.	11 – 5 =			33.	70 – 30 =	
12.	21 – 5 =			34.	72 – 30 =	
13.	61 – 5 =			35.	76 – 4 =	
14.	61 – 4 =			36.	72 – 4 =	
15.	61 – 2 =			37.	70 – 4 =	
16.	10 – 2 =			38.	80 – 40 =	
17.	20 – 2 =			39.	90 – 60 =	
18.	30 – 2 =			40.	60 – 40 =	
19.	70 – 2 =			41.	93 – 40 =	
20.	71 – 2 =			42.	67 – 40 =	
21.	5 – 2 =			43.	78 – 30 =	
22.	50 – 20 =			44.	56 – 9 =	

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Lesson 5: Relate the square to the cube, and describe the cube based on attributes.

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Name _____   Date _____

1. Circle the shape that could be the face of a cube.
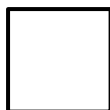
2. What is the most precise name of the shape you circled? _____
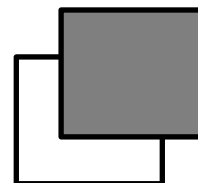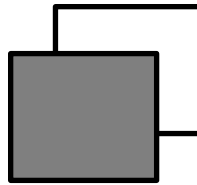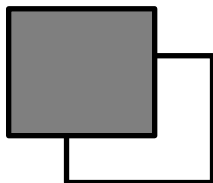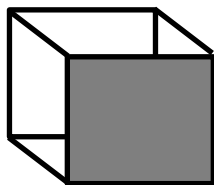
3. How many faces does a cube have? _____

4. How many edges does a cube have? _____
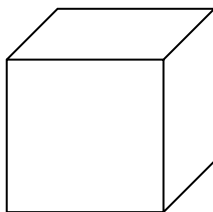
5. How many corners does a cube have? _____

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.
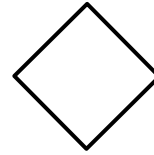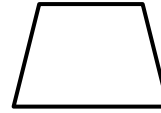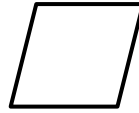
_____

_____

_____

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Name _____   Date _____

Draw 3 cubes. Put a star next to your best one.

Lesson 5:   Relate the square to the cube, and describe the cube based on attributes.

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Name _____ Date _____

1. Circle the shapes that could be the face of a cube.
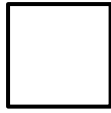
2. What is the most precise name of the shape you circled? _____

3. How many corners does a cube have? _____

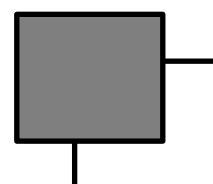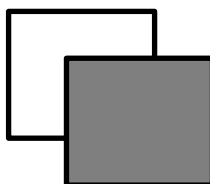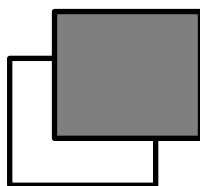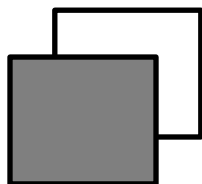4. How many edges does a cube have? _____
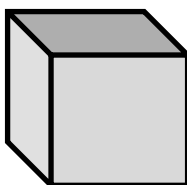
5. How many faces does a cube have? _____

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

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7. Connect the corners of the squares to make a different kind of drawing of a cube.

8. Patricia used the image of the cube below to count 7 corners. Explain where the 8th corner is hiding.

_____

_____

_____

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