

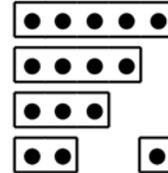
Composing and Decomposing Shapes (K.G.6)

Lesson 4

Objective: Describe the relative position of shapes using ordinal numbers.

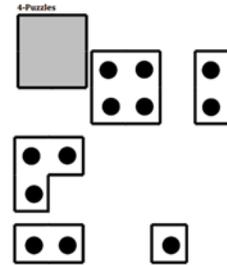
Make a Shape to Find Hidden Numbers in 4 (4 minutes)

Materials: (S) 4-dot puzzle cards (pictured below), plus extra 1-dot and 2-dot pieces per student

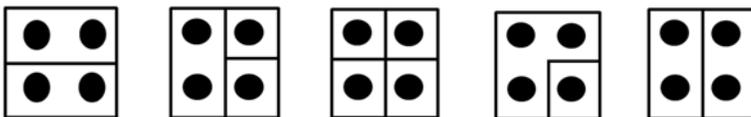


Note: This activity combines students' knowledge of embedded numbers and part-whole thinking, and previews composition of shapes.

- T: (Distribute the 4-dot array card.) Raise your hand when you know how many dots. Ready?
S: 4.
T: Raise your hand when you know the name of this shape. Ready?
S: Square.
T: Very good. We're going to use puzzle pieces to make a square, and at the same time, show different ways to make 4. Here is one way you could do it.
T: How many dots are on this puzzle piece? (Hold up one of the 2-dot rectangle pieces.)
S: 2.
T: And on this one? (Hold up the other 2-dot rectangle.)
S: 2.
T: On the whole puzzle? (Replace the piece and point to indicate the entire puzzle.)
S: 4.
T: So then, what numbers are hiding in 4?
S: 2 and 2.
T: What shapes did I use to make the square?
S: 2 rectangles.
T: Do you see other puzzle pieces I could use to make a square that has 4 dots?
S: Yes!
T: Give it a try! (Distribute additional pieces and allow students to work for some time, then allow them to confer with a partner. Circulate and ask students to identify the hidden numbers in 4, and the name and quantity of the shapes they used to compose the square.)



More possibilities:



Variation: Have students work with a friend to make a rectangle that is not a square.

Make a Shape to Find Hidden Numbers in 5 (4 minutes)

Materials: (S) 5-dot puzzle cards (pictured at right), plus extra 1-dot and 2-dot pieces per student

Repeat the process laid out in the previous activity, but this time use the 5-dot puzzle cards. Invite students to combine puzzle pieces with up to four friends to have fun making numbers to 20.

Lesson 5

Objective: Compose flat shapes using pattern blocks and drawings.

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.



MP.6

S: I made a house shape! → It looks like the one we made in our drawing before! → I think mine looks like a rocket ship.

T: Trace your pattern blocks to show your new shape. (Pause.) Hold up your boards to show me your work! (Briefly observe to ensure understanding and to see which students might need additional support with the tracing activity.)

T: Now, you are going to get a chance to make up your own new shapes! Work with your partner, taking turns to be the shape artist.

- First, choose two shapes from your pattern block box.
- Second, put them together to make a new shape.
- Third, trace your shape on your recording sheet.
- Fourth, tell your partner about your new shape. How many sides does it have? How many corners? What would you name your new shape?

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.

Allow time for exploration and composition of new shapes. Listen to the conversations to observe precision in the descriptive language such as *sides*, *corners*, *straight lines*, and so on. If time permits and students demonstrate ability, they may choose to use three shapes at a time.

T: Would anyone like to hold up their recording sheet and share one of their new shapes?

S: Mine looks like a bird! → I made a snowman shape. → I made a person!

Note: Save student recording sheets for additional work in tomorrow’s lesson.

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 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?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 5 Problem Set K•6

Name Shelley Date 5-31-14

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.

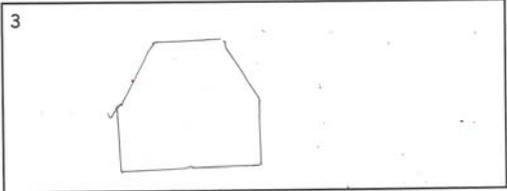
COMMON CORE Lesson 5: Compose flat shapes using pattern blocks and drawings. Date: 10/14/13 engage^{ny} 6.B.7

- 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?

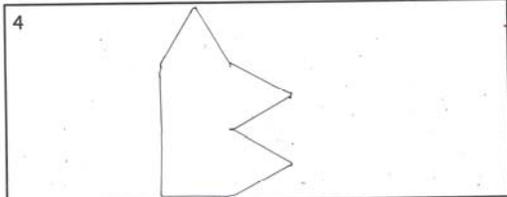
NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 5 Problem Set

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.

5 - 1 = 4 5 - 2 = 3 5 - 3 = 2 5 - 4 = 1

COMMON CORE Lesson 5: Date: 10/18/13

Compare flat shapes using pattern blocks and drawings.

engage^{ny} 6.B.8

© 2013 Great Minds. All rights reserved. www.greatminds.org

Lesson 6

Objective: Decompose flat shapes into two or more shapes.

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.
- 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 I and then unfold it again, I have four rectangles in all! → I left mine folded and folded again. Now I have a square.

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

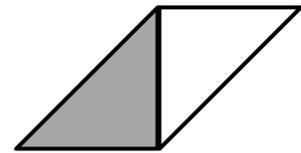
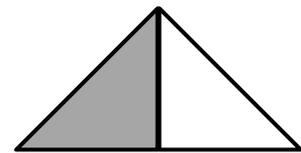
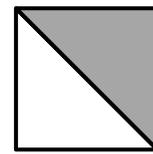
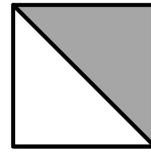
S: Two triangles! → And they are the same size and shape as the white and gray triangle!

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



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Give above grade level students pattern blocks to use in creating different shapes. Challenge them by asking them to be sure to use at least one of each of the pattern blocks (including the orange square and the light rhombus) and to make sure not to leave any gaps in their design. Have them describe their designs with a partner.

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.

- 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?
- 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?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 6 Problem Set K-6

Name NUHAD Date 6-1-14

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

I used 3 shapes.

I used 2 shapes.

I used 4 shapes.

I used 5 shapes.

I used 1 shapes.

I used 3 shapes.

COMMON CORE Lesson 6: Decompose flat shapes. Date: 10/18/13 engage^{ny} 6.B.6

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 6 Problem Set K-6

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?

COMMON CORE Lesson 6: Decompose flat shapes. Date: 10/18/13 engage^{ny} 6.B.7

Lesson 7

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

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.
- 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)

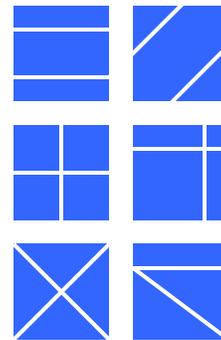
Materials: (S) Ruler, shape template, scissors, pattern blocks, personal white board, envelope to contain student puzzle pieces (optional)

- T: What do you see on your paper?
- S: I see four shapes! → Two are colored (or grey), and two are white. → 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! → I made rectangles. → I made four new shapes. → I have little squares. → 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.



NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Help English language learners discuss their work with a partner by providing them with sentence starters such as, "I have more pieces because...." The sentence starters will not only help them communicate but will also hold students accountable for staying on topic.



MP.1

- 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.
- 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.

Student Debrief (8 minutes)

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

- 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?



**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.

NYC COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set 6-3

Name Ananya Date 6-2-14

Glue your puzzles into the frames.

Draw some of the shapes that you had after you cut your rectangles.

COMMON CORE Lesson 7: Compose simple shapes to form a larger shape described by an outline. engageNY 6-3

NYC COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set 6-3

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.

COMMON CORE Lesson 7: Compose simple shapes to form a larger shape described by an outline. engageNY 6-3