Lesson 15

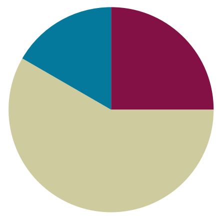
Objective: Apply knowledge of area to determine areas of rooms in a given floor plan.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

- Fluency Practice (15 minutes)
- Concept Development (35 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)



Fluency Practice (15 minutes)

- Group Counting **3.OA.1** (3 minutes)
- Multiply by 9 **3.OA.7** (7 minutes)
- Find the Area **3.MD.7** (5 minutes)

Group Counting (3 minutes)

Note: Group counting reviews interpreting multiplication as repeated addition.

Direct students to count forward and backward, occasionally changing the direction of the count.

- Threes to 43
- Sixes to 60
- Sevens to 70
- Eights to 80

Multiply by 9 (7 minutes)

Materials: (S) Multiply by 9 Pattern Sheet (1–5)

Note: This activity builds fluency with multiplication facts using units of 9. It works toward students knowing from memory all products of two one-digit numbers. See G3–M4–Lesson 2 for the directions for administration of a *Multiply By* pattern sheet.

T: (Write 5 × 9 = ____.) Let's skip-count by nines to find the answer. (Count with fingers to 5 as students count.)

S: 9, 18, 27, 36, 45. (Record on the board as students count.)

T: (Circle 45 and write 5 × 9 = 45 above it. Write 3 × 9 = ____.) Let's skip-count up by nines again. (Count with fingers to 3 as students count.)

S: 9, 18, 27.

T: Let's see how we can skip-count down to find the answer, too. Start at 45 with 5 fingers, 1 for each nine. (Count down with your fingers as students say numbers.)

S: 45 (5 fingers), 36 (4 fingers), 27 (3 fingers).

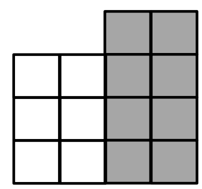
Repeat the process for 4 × 9.

T: (Distribute Multiply by 9 Pattern Sheet.) Let's practice multiplying by 9. Be sure to work left to right across the page.

Find the Area (5 minutes)

Materials: (S) Personal white boards

Note: This fluency reviews the relationship between side lengths and area and supports the perception of the composite shapes by moving from part to whole using a grid.



T: (Project the figure on the right.) On your boards, write a number sentence to show the area of the shaded rectangle.

S: (Write 4 × 2 = 8 square units or 2 × 4 = 8 square units.)

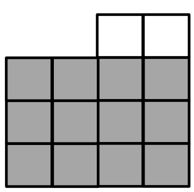
T: Write a number sentence to show the area of the unshaded rectangle.

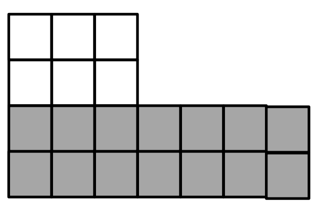
S: (Write 3 × 2 = 6 square units or 2 × 3 = 6 square units.)

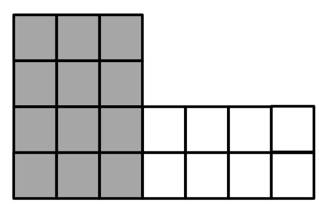
T: (Write __ sq units + __ sq units = __ sq units.) Using the areas of the shaded and unshaded rectangles, write an addition sentence to show the area of the entire figure.

S: (Write 8 sq units + 6 sq units = 14 sq units or 6 sq units + 8 sq units = 14 sq units.)

Continue with the figures below:







Concept Development (35 minutes)

Materials: (S) Problem Set, ruler

T: For the next two days, you are going to be architects. Today you are going to use a floor plan that your clients designed to find the area in square centimeters of each room in the house. Look at the floor plan. What will you need to do before you can find the areas?

A NOTE TO THE TEACHER:

This lesson is designed to be completed in two days. For early finishers, please refer to the optional activities suggested in G3–M4–Lesson 16.

S: We need to find the side lengths of each room. → We need to know the lengths and widths of the rooms.

T: Use your ruler to measure the side lengths of Bedroom 1 in centimeters. What is the length?

S: 5 cm.

T: What is the width?

S: 12 cm.

T: Write an expression to show how to find the area of Bedroom 1.

S: (Write 5 × 12.)

T: (Write *Multiply Side Lengths* on a chart labeled *Strategies We Can Use to Find Area.*) What strategy can you use to find the area since this fact is so large?

S: The break apart and distribute strategy!

T: (Add the strategy to the chart.) What about the rooms that aren't rectangles, how will you find their areas?

S: We can find the areas of smaller rectangles and add them together to get the area of a room that isn't rectangular. → Yeah, that's the break apart and add strategy we just learned. → Or, we might be able to find the area of a large rectangle and then subtract the area of a smaller rectangle.

T: (Add the strategies to the chart.) Look at the floor plan and use what we've learned about area to help you answer Problem 1. (Allow students time to answer Problem 1.) Work with a partner to find the areas of the rooms and the hallway in the floor plan. Record the areas and the strategy you use to find each area in the chart in Problem 2.

Problem Set (20 minutes)

Students should do their personal best to complete the Problem Set within the allotted 20 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 solve these problems using the RDW approach used for Application Problems.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Some students may benefit from a review of how to use a ruler to measure. Have them try the following:

- Place the zero end of the ruler against the line to be measured.
- Make sure the zero tick mark is lined up against the beginning of the side length.
- Read the last number on the ruler that is by the end of the side length.

To make measuring easier, try the tips below:

- Darken the lines to be measured.
- Outline the lines with glue to make a tactile model.
- Provide large print rulers.
- Give the option of using centimeter blocks to measure.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

To ease the task of constructing a response for Problems 3–5 of the Problem Set, allow English language learners and others to discuss their reasoning prior to writing. Discussions can be in first languages, if beneficial. Also provide English language learners with sentence frames, such as those given below.

The _____ has the biggest area. My prediction was right/wrong because_____.

There are/aren't enough tiles because _____.

Student Debrief (10 minutes)

Lesson Objective: Apply knowledge of area to determine areas of rooms in a given floor plan.

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.

- Explain to a partner your choice for the prediction you made in Problem 1. What have you learned about area that helped you make your prediction?
- What strategy did you use to find the area of the living room? Is there more than one way to break apart the living room into smaller rectangles? Explain two different ways to a partner.
- How many more tiles do your clients need to have enough tiles for the bathroom floor? If they buy another box of tiles, how many will be left over?

Name Gina Date

1. Make a prediction, which room looks like it has the biggest area?
I think the living room has the biggest area.

2. Record the areas and show the strategy you used to find each area.

Room	Area	Strategy
Bedroom 1	60 sq. cm	5 x 12 = 5 x (10 + 2) = (5 x 10) + (5 x 2) = 50 + 10 = 60
Bedroom 2	56 sq. cm	8 x 7 = 56
Kitchen	42 sq. cm	6 x 7 = 42
Hallway	24 sq. cm	3 x 8 = 24
Bathroom	25 sq. cm	5 x 5 = 25
Dining Room	28 sq. cm	4 x 7 = 28
Living Room	88 sq. cm	(6 x 10) + (4 x 7) = 60 + 28 = 88

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 15 Problem Set 3•4

3. Which room has the biggest area? Was your prediction right? Why or why not?
The living room has the biggest area. Yes, my prediction was right because when you add the areas of the small rectangles in the living room, they add up to more than any other room.

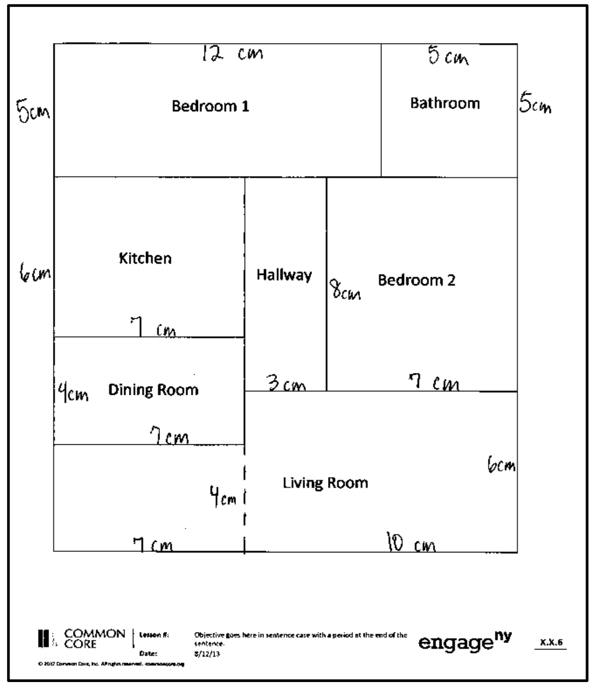
4. Your clients buy 3 boxes of square centimeter tiles. Each box has 8 tiles. Are there enough tiles to cover the entire bathroom floor? Explain your answer.
3 x 8 = 24
No, there aren't enough tiles. The area of the bathroom is 25 sq. cm and there would only be enough tiles for 24 sq. cm.

5. Find the side lengths of the house without using your ruler to measure them and explain the process you used.
Side lengths: 19 centimeters and 17 centimeters
I added the side lengths of the rooms to find the side lengths of the house, like this:
12 + 5 = 17
5 + 6 + 4 + 4 = 19

6. What is the area of the whole floor plan? How do you know?
Area = 323 square centimeters
I found the area of the house by adding the areas of the rooms.
60 + 56 + 42 + 24 + 25 + 28 + 88 = 323 sq. cm

Exit Ticket (5 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.



Multiply.

9 x 1 = ________	9 x 2 = ________	9 x 3 = ________	9 x 4 = ________
9 x 5 = ________	9 x 1 = ________	9 x 2 = ________	9 x 1 = ________
9 x 3 = ________	9 x 1 = ________	9 x 4 = ________	9 x 1 = ________
9 x 5 = ________	9 x 1 = ________	9 x 2 = ________	9 x 3 = ________
9 x 2 = ________	9 x 4 = ________	9 x 2 = ________	9 x 5 = ________
9 x 2 = ________	9 x 1 = ________	9 x 2 = ________	9 x 3 = ________
9 x 1 = ________	9 x 3 = ________	9 x 2 = ________	9 x 3 = ________
9 x 4 = ________	9 x 3 = ________	9 x 5 = ________	9 x 3 = ________
9 x 4 = ________	9 x 1 = ________	9 x 4 = ________	9 x 2 = ________
9 x 4 = ________	9 x 3 = ________	9 x 4 = ________	9 x 5 = ________
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9 x 4 = ________	9 x 2 = ________	9 x 4 = ________	9 x 3 = ________
9 x 5 = ________	9 x 3 = ________	9 x 2 = ________	9 x 4 = ________
9 x 3 = ________	9 x 5 = ________	9 x 2 = ________	9 x 4 = ________

Name ____ Date ____________________

1. Make a prediction: Which room looks like it has the biggest area?

2. Record the areas and show the strategy you used to find each area.

Room	Area	Strategy
Bedroom 1	_______ sq cm	
Bedroom 2	_______ sq cm	
Kitchen	_______ sq cm	
Hallway	_______ sq cm	
Bathroom	_______ sq cm	
Dining Room	_______ sq cm	
Living Room	_______ sq cm	

3. Which room has the biggest area? Was your prediction right? Why or why not?

4. Your clients buy 3 boxes of square centimeter tiles. Each box has 8 tiles. Are there enough tiles to cover the entire bathroom floor? Explain your answer.

5. Find the side lengths of the house without using your ruler to measure them and explain the process you used.

   Side lengths: __________ centimeters and __________ centimeters

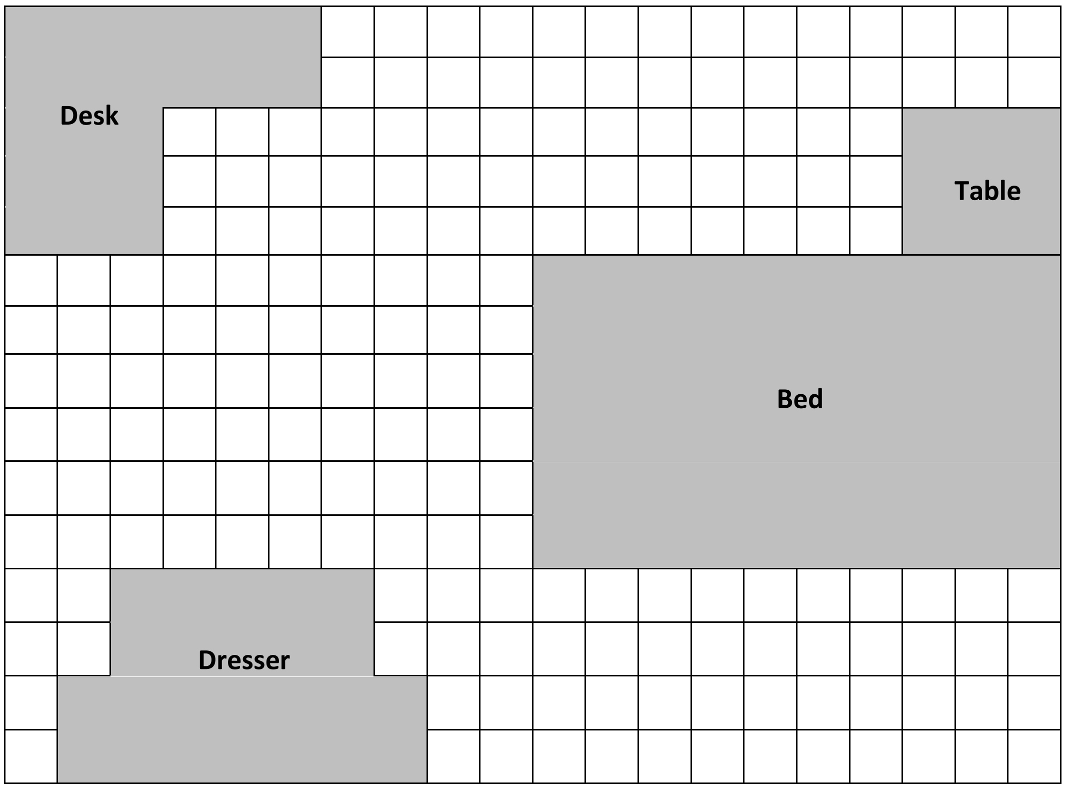
6. What is the area of the whole floor plan? How do you know?

   Area = __________ square centimeters

The rooms in the floor plan below are rectangles or made up of rectangles.

Name ____ Date _______________________

Jack uses grid paper to create a floor plan of his room. Label the missing measurements and find the area of the items listed below.



Name	Equations	Total Area
a. Jack's Room		________ square units
b. Bed		________ square units
c. Table		________ square units
d. Dresser		________ square units
e. Desk		________ square units

Name ____ Date ____________________

Use a ruler to measure the side lengths of each lettered room in centimeters. Then find the area. Use the measurements below to match and label the rooms with the correct areas.

Kitchen - 28 square centimeters

Porch – 32 square centimeters

Bathroom – 24 square centimeters

Garage – 72 square centimeters

Bedroom – 56 square centimeters

Hallway – 12 square centimeters