

Area

Unit 4 Overview: 8 lessons

Students learn what area is: how many unit squares cover a flat shape with no gaps and no overlaps. They count square units, name them (square centimeters, square inches, square feet, square meters) and draw shapes with a given area. Then they see that a covered rectangle is rows of squares, so its area is the rows times the squares in a row, and that the side lengths give the same two numbers: length times width. They solve area stories, one with a missing side, split a rectangle into two parts to multiply (the break apart strategy of the facts unit, now as area), and find the area of shapes made of two rectangles. Area comes right after the facts so the times tables get used, and before perimeter, so the two can be told apart later.

THE UNIT, DAY BY DAY

Day 1	Pre-Check	What students already know, before the first lesson.
Day 2	4.1 What area is	I can find an area by counting unit squares.
Day 3	4.2 Square units	I can find an area and name its square unit.
Day 4	4.3 Draw a shape with an area	I can draw a shape with a given area.
Day 5	4.4 Tile a rectangle	I can multiply the rows by the squares in a row.
Day 6	4.5 Multiply the side lengths	I can multiply the side lengths to find an area.
Day 7	4.6 Area stories	I can solve area stories.
Day 8	4.7 Split a rectangle to multiply	I can split a rectangle into two parts to find its area.
Day 9	4.8 Shapes made of rectangles	I can find the area of a shape made of rectangles.
Day 10	Unit Review	The review, to go over together.
Day 11	Unit Test	Form A; Form B (other numbers) is for a retest.

GET READY FOR THE UNIT

- Square tiles (1 inch) for each pair, about 30, and centimeter cubes
- Square grid paper in 1 centimeter and 1 inch squares (the Graph Paper maker prints both)
- Sticky notes, rulers, scissors and tape
- Chart paper for anchor charts: area, square units, length times width, split and add
- Whiteboards and dry erase markers

HOW EACH LESSON GOES

- 1. Warm up** (5 min)
- 2. Teach** (10 min)
- 3. Try it together** (10 min)
- 4. Practice** (15 min)
- 5. Exit ticket** (5 min): a quick check on the lesson.

Each lesson page ends with the Animal Math sheets, makers, tools and quizzes for it. “Sheet 3” is the third worksheet of a pack; a color pack prints each sheet again in black and white.

CHECKING AS YOU GO

PRINTABLE	Pre-Check: Day 1, with a key	EXIT TICKET	Exit Tickets: one a lesson, four to a page
PRINTABLE	Unit Review: the day before the test	PRINTABLE	Unit Test: Forms A and B, with keys



Area

Lesson 4.1: What area is

GOAL Students learn that area is how much flat space a shape covers, measured by the unit squares that cover it with no gaps and no overlaps, and find an area by counting the squares.

About 45 minutes

I can find an area by counting unit squares.

THE LESSON

- 1 Warm up (5 min)** Hold up two notebooks of different sizes. Ask which one covers more of the desk and how we could show it. Take ideas, then cover each with sticky notes and count.
- 2 Teach (10 min)** Cover a 3 by 3 paper square with tiles, but leave one space empty. Ask: is it covered? Fix the gap. Then lay one tile on top of two others: an overlap, which counts that space twice. Cover it right, edge to edge, and count 9 tiles: the area is 9 square units. Draw an L of 5 squares on grid paper and count again: the shape does not have to be a rectangle.
Say: "Area is how many unit squares cover a shape. The squares touch edge to edge, with no gaps and no overlaps."
- 3 Try it together (10 min)** Partners cover paper shapes with tiles and count them. Then show three coverings of the same rectangle on the board, one with a gap, one with an overlap and one right, and vote on the right one.
- 4 Practice (15 min)** Students do sheets 1-3 of Area by Counting Squares: rectangles, other shapes, then which area is greater. Early finishers make two shapes of 9 tiles each.
- 5 Exit ticket (5 min)** Students do **Exit Ticket 4.1** and circle a face beside the "I can" line. On question 1, look for the first rectangle circled; the second has a square on top (an overlap) and the third has a gap. On question 2, look for 7 square units; 6 or 8 means a square was missed or counted twice, so ask them to mark each square as they count.

Need help? Give real tiles to place on the shape and slide off one at a time while counting.

Ready for more? Make three different shapes from 11 tiles that touch edge to edge. Which has the greatest area? (They all cover 11 squares.)

ON ANIMAL MATH

PRINTABLE

Area by Counting Squares: sheets 1-3

QUIZ

Area and Perimeter Quiz: the Count Squares level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.1

GET READY

- About 20 square tiles for each pair
- Paper rectangles and L shapes to cover
- Sticky notes

WORDS TO USE

area: how many squares cover a flat shape

unit square: a square that is 1 on each side; it covers 1 square unit

gap: a space left empty

overlap: two squares on top of each other

ASK

- Is this shape covered? How do you know?
- Why can we not leave a gap?
- Do two shapes with the same area have to look the same?

WATCH FOR

Counts the lines or the corners instead of the squares. Have them put a dot in each square as they count it.

Says a covering with a gap is fine. Show that the gap is part of the shape too. Ask what covers that part.

Thinks a bigger looking shape has more area. Cover both and count. A long thin shape can have the same area as a short wide one.

Area

Lesson 4.2: Square units

GOAL Students measure area in standard square units (square centimeters, square inches, square feet, square meters) and in made-up units, and always write the unit with the number.

About 45 minutes

I can find an area and name its square unit.

THE LESSON

- 1 Warm up** (5 min) Cover the same index card with 1 inch tiles and with sticky notes. Ask why the counts are different when the card did not change.
- 2 Teach** (10 min) Build a 3 by 3 square of centimeter cubes and one of inch tiles. Both are 9 squares, but one is 9 square centimeters and the other 9 square inches: the unit tells the size of each square. Show a square foot and a square meter taped on the floor for big areas. Write each area with its unit.
Say: "The number tells how many squares. The unit tells which squares. Area units always say square."
- 3 Try it together** (10 min) On centimeter grid paper, partners trace shapes the teacher calls (an L of 6, a T of 5) and write each area in square centimeters. Then they guess which unit fits: a stamp, a desk, a classroom floor.
- 4 Practice** (15 min) Students do sheet 5 of Area by Counting Squares: areas in square inches, square centimeters and square feet, each written with its unit. Early finishers find the area of a book cover in square inches with tiles.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 4.2** and circle a face beside the "I can" line. On question 1, look for 6 square centimeters; 6 centimeters or 6 alone means the unit was not named. On question 2, look for 10 square inches circled; 10 inches means a length unit, and 10 square feet means the legend was not read.

Need help? Lay a real centimeter cube or inch tile on one square of the drawing before writing the unit.

Ready for more? Find two shapes, one in square inches and one in square centimeters, with the same number but different sizes.

GET READY

- Centimeter cubes and 1 inch tiles
- Centimeter and inch grid paper
- A 1 foot square cut from paper, and a meter stick

WORDS TO USE

square centimeter: a square 1 centimeter on each side

square inch: a square 1 inch on each side

square foot: a square 1 foot on each side; it covers a floor tile

ASK

- Which unit would you use for a floor? For a stamp?
- What is the difference between a centimeter and a square centimeter?

WATCH FOR

Writes cm or inches for an area. Ask what the squares are. A centimeter is a length; a square centimeter covers space.

Uses big units for a small shape. Hold up a square foot next to the shape. How many would fit?

ON ANIMAL MATH

PRINTABLE

Area by Counting Squares: sheet 5

MAKER

Graph Paper: Paper Type Square Grid, Square Size 1 Centimeter

QUIZ

Area and Perimeter Quiz: the Count Squares level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.2

Area

Lesson 4.3: Draw a shape with an area

GOAL Students draw shapes with a given area on grid paper, find that one area can make many shapes, and draw a rectangle and a shape that is not a rectangle with the same area.

About 45 minutes

I can draw a shape with a given area.

THE LESSON

- 1 Warm up** (5 min) Give each pair 6 tiles. How many different rectangles can you make? (1 by 6 and 2 by 3.)
- 2 Teach** (10 min) On the board grid, draw a rectangle with an area of 6: 2 rows of 3. Then 1 row of 6: same area, different shape. Now draw a shape that is not a rectangle with an area of 6: an L of 4 and 2. Count the squares each time and color them, so the count is easy to check.
Say: "Any shape that covers 6 squares has an area of 6 square units. I count the squares to check."
- 3 Try it together** (10 min) Call an area (16 square units). Pairs draw a rectangle and a shape that is not a rectangle, then trade papers and count each other's squares. Show a few on the board: 4 by 4, 2 by 8, an L.
- 4 Practice** (15 min) Students draw the shapes on sheet 4 of Area by Counting Squares. Early finishers draw three different shapes with an area of 11 squares.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 4.3** and circle a face beside the "I can" line. On question 1, look for 14 squares in a rectangle (2 by 7 or 1 by 14); 14 squares in an L is right in area but not a rectangle. On question 2, look for 7 squares in any shape that is not a rectangle; count them with the student.

Need help? Build the shape with tiles first, then trace each tile on the grid.

Ready for more? Draw a rectangle and a shape that is not a rectangle, each with an area of 25.

GET READY

- Square grid paper (1 centimeter) and colored pencils
- Square tiles for each pair

WORDS TO USE

area: the number of squares the shape covers

rectangle: four square corners; rows of the same length

not a rectangle: any other shape: an L, a T, steps

ASK

- How many squares does your shape cover?
- Can you make a different shape with the same area?
- Is your shape a rectangle? How do you know?

WATCH FOR

Draws squares that touch only at a corner.

Squares must share a whole side. Slide a tile to show it.

Counts the dots or lines of the grid. Color each square as it is counted.

Draws a rectangle when asked for a shape that is not one. Ask if every row has the same number of squares. Move one square.

ON ANIMAL MATH

PRINTABLE

Area by Counting Squares: sheet 4

MAKER

Graph Paper: Paper Type Square Grid, Square Size 1 Centimeter

QUIZ

Area and Perimeter Quiz: the Count Squares level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.3

Area

Lesson 4.4: Tile a rectangle

GOAL Students see a covered rectangle as rows of squares, so its area is the number of rows times the squares in each row, even when only some squares are drawn.

About 45 minutes

I can multiply the rows by the squares in a row.

THE LESSON

- 1 Warm up** (5 min) Show an array of 2 rows of 8 dots. Students write $8 + 8 = 16$ and $2 \times 8 = 16$.
- 2 Teach** (10 min) Tile a rectangle with 5 rows of 10 squares. Count one row (10), then the rows (5): 5 rows of 10 is $5 \times 10 = 50$ square units. Then draw a rectangle with only the first row and the first column filled in: the row shows 6 squares across, the column shows 6 rows down, so the area is $6 \times 6 = 36$. We do not need every square drawn to know how many there are.
Say: "I count the rows and the squares in one row. Rows times squares in a row is the area."
- 3 Try it together** (10 min) Pairs build rectangles with tiles (2 rows of 8, 3 rows of 3) and write rows of squares, then the times fact. Then show partly drawn rectangles on the board and find the areas together.
- 4 Practice** (15 min) Students do sheets 1 and 2 of Area of Rectangles: count the rows and squares in a row and multiply, then rectangles with only some squares drawn. Early finishers write the times fact for a square of 10 rows of 10.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 4.4** and circle a face beside the "I can" line. On question 1, look for 3 rows of 10, $3 \times 10 = 30$ square units (10×3 is right too); 12 means only the drawn squares were counted. On question 2, look for $8 \times 7 = 56$ square units, in either order; 15 means the numbers were added.

Need help? Use tiles and say each row's count out loud before writing the times fact.

Ready for more? Find the area of a rectangle with 10 rows of 10 squares, then one with 8 rows of 10.

GET READY

- Square tiles for each pair
- Grid paper
- A rectangle on the board with only its first row and column of squares drawn

WORDS TO USE

row: the squares across, side by side

squares in a row: how many squares go across

multiply: a fast way to add equal rows

ASK

- How many squares are in one row? How many rows?
- Why can we multiply instead of counting every square?
- Does 2×8 give the same area as 8×2 ?

WATCH FOR

Counts only the squares that are drawn. Have them draw the missing lines, or lay tiles, then multiply.

Adds the rows and the squares in a row. Build the rectangle with tiles: 5 and 10 is 15, but count the tiles.

Counts the corner square twice when finding rows. Count the rows on the left side only, top to bottom.

ON ANIMAL MATH

PRINTABLE

Area of Rectangles: sheets 1-2

MAKER

Multiplication Arrays: Equation Type Multiplication, Maximum Factor Up to 10

QUIZ

Area and Perimeter Quiz: the Multiply Sides Level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.4



Area

Lesson 4.5: Multiply the side lengths

GOAL Students find the area of a rectangle from its side lengths: the length tells how many squares fit in a row, the width how many rows, so the area is length times width in square units.

About 45 minutes

I can multiply the side lengths to find an area.

THE LESSON

- 1 Warm up** (5 min) Show a rectangle 2 rows of 6 tiles and ask for its area two ways: counting and multiplying (12).
- 2 Teach** (10 min) Draw a rectangle 10 cm long and 8 cm wide on centimeter grid paper. Show that 10 squares fit along the length and 8 rows fit down the width. Then erase the grid and label only the sides: 10 cm and 8 cm. Area = $10 \times 8 = 80$ square centimeters. Write the unit with square.
Say: “The length tells the squares in a row and the width tells the rows. Length times width is the area.”
- 3 Try it together** (10 min) Pairs measure two paper rectangles with a ruler (a 6 inch square, a card 10 cm by 5 cm), label the sides and multiply; check one by tiling it. Then multiply labeled sketches on the board for big things: a rug 2 ft by 6 ft, a garden 5 m by 5 m.
- 4 Practice** (15 min) Students multiply the side lengths on sheet 3 of Area of Rectangles, writing each area with its square unit. Early finishers find the sides of a rectangle with an area of 100 square inches.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 4.5** and circle a face beside the “I can” line. On question 1, look for $10 \times 7 = 70$ square feet, in either order; 17 means the sides were added, and 34 means they went around the outside. On question 2, look for 20 square meters and 16 square inches; 12 or 8 means the sides were added.

Need help? Draw the grid lines inside the rectangle from the side lengths, then count the rows.

Ready for more? A square has an area of 49 square feet. How long is each side?

GET READY

- Rulers and centimeter grid paper
- Paper rectangles with whole number sides in centimeters and inches
- Square tiles

WORDS TO USE

length: how long the rectangle is

width: how wide the rectangle is

side length: how long one side is, in centimeters, inches, feet or meters

ASK

- Which side tells the squares in a row?
- What unit goes with an area in centimeters?
- Why is the area not $10 + 8$?

WATCH FOR

Adds the side lengths. Tile the rectangle, or draw the grid inside, and count the rows.

Writes centimeters, not square centimeters. Ask what the area counts: squares. Say “square centimeters”.

Adds all four sides. That goes around the edge. Area covers the inside.

ON ANIMAL MATH

PRINTABLE

Area of Rectangles: sheet 3

QUIZ

Area and Perimeter Quiz: the Multiply Sides level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.5

Area

Lesson 4.6: Area stories

GOAL Students solve stories about the area of rugs, gardens and floors by multiplying the length and width, and find a missing side by thinking of the missing factor.

About 45 minutes

I can solve area stories.

THE LESSON

- 1 Warm up** (5 min) Quick facts with a blank: $5 \times ? = 50$, $? \times 7 = 49$, $8 \times ? = 16$.
- 2 Teach** (10 min) Read: A sandbox is 5 feet long and 5 feet wide. What is its area? Sketch the rectangle, label the sides and multiply: 25 square feet. Then: A garden has an area of 16 square meters. It is 8 meters long. How wide is it? Sketch it with 16 square meters inside and a ? for the width: $8 \times ? = 16$, so the width is 2 meters. The answer is a side, so it is in meters, not square meters.
Say: "I sketch the shape and label what I know. Then I multiply, or think of the missing factor."
- 3 Try it together** (10 min) Solve two stories together with sketches: a poster 10 inches long and 5 inches wide; a rug with an area of 49 square feet that is 7 feet long. Ask whether each answer is an area or a side.
- 4 Practice** (15 min) Students solve the stories on sheet 5 of Area of Rectangles, writing each answer with its unit. Early finishers write their own area story with a missing side for a partner.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 4.6** and circle a face beside the "I can" line. On question 1, look for 90 square meters; 19 means the sides were added. On question 2, look for 4 meters; 30 means 10 was taken from 40, and 400 means 40 was multiplied by 10.

Ready for more? A garden has an area of 100 square meters. List every whole number length and width it could have.

GET READY

- Whiteboards and markers
- Grid paper for sketches
- Story cards

WORDS TO USE

area: the space a floor, rug or garden covers

missing side: a side we do not know yet

unknown factor: the number that goes in the blank: $8 \times ? = 16$

ASK

- What do you know? What do you need to find?
- Is the answer an area or a side? What unit?
- How can a times fact help you find the missing side?

WATCH FOR

Multiplies the area by the side for a missing side. Sketch it: $8 \times ? = 16$. Which number times 8 makes 16?

Writes square meters for a side length. A side is a length. Only an area is in square units.

Need help? Sketch every story as a rectangle and write the numbers on it before choosing what to do.

ON ANIMAL MATH

PRINTABLE

Area of Rectangles: sheet 5

QUIZ

Area and Perimeter Quiz: the Multiply Sides Level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.6



Area

Lesson 4.7: Split a rectangle to multiply

GOAL Students split a rectangle into two smaller rectangles, find each area with a fact they know and add the parts: $7 \times 7 = 7 \times 5 + 7 \times 2 = 35 + 14 = 49$. It is the break apart strategy, now shown as area.

About 45 minutes

I can split a rectangle into two parts to find its area.

THE LESSON

- 1 Warm up** (5 min) Solve 7×5 and 7×2 , then ask what 7×7 is.
- 2 Teach** (10 min) Draw a 7 by 7 square of squares on grid paper. Draw a line after 5 columns: one part is $7 \times 5 = 35$, the other $7 \times 2 = 14$. Add them: 49, the same as 7×7 . Then show a rectangle with only its side lengths, 10 and 5 + 2: write $10 \times 5 = 50$ and $10 \times 2 = 20$, then $50 + 20 = 70$.
Say: "I split the rectangle into two parts I can find easily. Then I add the two areas."
- 3 Try it together** (10 min) Pairs cut a paper rectangle (8 by 10 squares) into two parts with one straight cut, find each part's area and add. Compare cuts: everyone gets 80, whatever the cut.
- 4 Practice** (15 min) Students split and add on sheet 4 of Area of Rectangles, then the area models on sheet 3 of Break Apart to Multiply. Early finishers find two other splits of the 8 by 10 rectangle.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 4.7** and circle a face beside the "I can" line. On question 1, look for 48, 16 and $48 + 16 = 64$. On question 2, look for $9 \times 7 + 9 \times 2$ circled; $9 \times 7 + 2$ means the 2 was not multiplied by the 9 rows.

Need help? Shade the two parts in two colors and write each part's fact inside it.

Ready for more? Split a 10 by 10 square three ways and show that each gives 100.

GET READY

- Grid paper and colored pencils
- Paper rectangles to cut
- Scissors

WORDS TO USE

split: cut into two parts with a line

break apart: make a hard fact from two easier facts

add the parts: the two areas together make the whole

ASK

- Why split after 5 columns?
- Does a different split change the area?
- Which two facts do you know that make this one?

WATCH FOR

Multiplies only one part and adds the other side length. Shade each part and ask how many rows each one has.

Adds the side lengths of the parts. Each part is a rectangle too. Rows times squares in a row.

ON ANIMAL MATH

- PRINTABLE** **Area of Rectangles:** sheet 4
- PRINTABLE** **Break Apart to Multiply:** sheet 3
- QUIZ** **Area and Perimeter Quiz:** the Shapes Made of Rectangles level
- EXIT TICKET** **3rd Grade Area Exit Tickets:** Exit Ticket 4.7

Area

Lesson 4.8: Shapes made of rectangles

GOAL Students find the area of a shape made of rectangles by splitting it into two rectangles, finding each area and adding them, on a grid and from side lengths.

About 45 minutes

I can find the area of a shape made of rectangles.

THE LESSON

- 1 **Warm up** (5 min) Show an L shape on grid paper. Ask: is it a rectangle? How could we find its area?
- 2 **Teach** (10 min) Draw an L made of a rectangle 3 wide and 4 tall with a rectangle 2 wide and 2 tall beside its bottom. Draw a line where they meet: $3 \times 4 = 12$ and $2 \times 2 = 4$, so the area is $12 + 4 = 16$ square units. Count the squares to check. Then label the outside sides only, and find the missing lengths first: the bottom is 5 and the tall part is 3 wide, so the short part is 2 wide.
Say: "I split the shape into two rectangles, find each area, then add."
- 3 **Try it together** (10 min) Pairs split the same L shape two different ways (across and down) and compare totals. Then find the area of a shape from side lengths only, as a class.
- 4 **Practice** (15 min) Students find the areas on sheets 1-5 of Area of Composite Shapes: shapes on grids first, then shapes with side lengths and room plans. Early finishers draw a T shape and find its area.
- 5 **Exit ticket** (5 min) Students do **Exit Ticket 4.8** and circle a face beside the "I can" line. On question 1, look for $10 + 4 = 14$ square units, in either order. On question 2, look for 23 square feet, split either way ($14 + 9$ or $15 + 8$); 35 means 7×5 was found as if the shape were a whole rectangle.

Ready for more? Draw a shape made of three rectangles with an area of 30 square units.

GET READY

- Grid paper and colored pencils
- L shapes cut from grid paper
- Rulers

WORDS TO USE

shape made of rectangles: a shape like an L or a T that two rectangles make

split: draw a line to make two rectangles

total area: the two areas added together

ASK

- Where can you draw a line to make two rectangles?
- Is there another way to split it? Is the area the same?
- Which side length do you need to find first?

WATCH FOR

Multiplies the two longest sides. Shade the missing corner: the shape is not a whole rectangle.

Counts a side twice when splitting. Color each rectangle and label its own length and width.

Need help? Cut the paper shape into two rectangles, find each area, then put the shape back together.

ON ANIMAL MATH

PRINTABLE

Area of Composite Shapes: sheets 1-5

QUIZ

Area and Perimeter Quiz: the Shapes Made of Rectangles level

EXIT TICKET

3rd Grade Area Exit Tickets: Exit Ticket 4.8