Shapes and Shares

Unit 13 Overview: 11 lessons

Students name flat shapes by their sides and angles (triangles, quadrilaterals, pentagons and hexagons, whatever they look like), draw shapes from clues on dot paper, and count the faces, edges and vertices of solids. Then they cut circles and rectangles into halves, thirds and fourths, and learn that equal shares of the same whole are the same size but need not be the same shape. Six lessons are taught in 2nd grade in some states only: right angles, sixths and eighths, comparing unit fractions, lines of symmetry, perimeter and area.

THE UNIT, DAY BY DAY

Day 1	**Pre-Check**	What students already know, before the first lesson.
Day 2	**13.1** Flat shapes: sides and angles	I can name a shape by its sides and angles.
Day 3	**13.2** Draw shapes from clues	I can draw a shape that fits a clue.
Day 4	**13.3** Solid shapes: faces, edges and vertices	I can count the faces, edges and vertices of a solid.
Day 5	**13.4** Right angles, smaller and larger ★	I can compare angles to a right angle.
Day 6	**13.5** Halves, thirds and fourths	I can cut shapes into halves, thirds and fourths.
Day 7	**13.6** Same size, different shapes	I can see that equal shares can be different shapes.
Day 8	**13.7** Sixths and eighths ★	I can name sixths and eighths.
Day 9	**13.8** Compare unit fractions ★	I can compare unit fractions.
Day 10	**13.9** Lines of symmetry ★	I can find a line of symmetry.
Day 11	**13.10** Perimeter: the distance around ★	I can find the perimeter of a shape.
Day 12	**13.11** Area: cover with squares ★	I can find the area by counting squares.
Day 13	**Unit Review**	The review, to go over together.
Day 14	**Unit Test**	Form A; Form B (other numbers) is for a retest.

★ Taught in 2nd grade in some states. Skip these lessons if yours teaches them in another grade; animalmath.com/standards shows your state's list.

GET READY FOR THE UNIT

- Pattern blocks, an index card for each student (to check square corners) and square dot paper
- Solid shapes or real things: a number cube, a cereal box, a tent-shaped box, a pyramid; stickers to mark faces and vertices
- Same-size paper circles, squares and rectangles to fold and cut, crayons and scissors
- For the state lessons: paper strips to fold, counters, square tiles, grid paper, string and rulers

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

PRINTABLE **Unit Review**: the day before the test

EXIT TICKET **Exit Tickets**: one a lesson, four to a page

PRINTABLE **Unit Test**: Forms A and B, with keys

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Shapes and Shares

Lesson 13.1: Flat shapes: sides and angles

GOAL Students count the sides and angles of flat shapes and name them by the count (3 a triangle, 4 a quadrilateral, 5 a pentagon, 6 a hexagon), whatever their look, size or turn.

I can name a shape by its sides and angles.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Hold up pattern blocks one at a time. Students show with fingers how many sides each one has.
2. **Teach** (10 min) Hold up a paper trapezoid. Dot each angle as you count: 4. Trace the sides: 4, so it is a quadrilateral, like the square and the dart. The house has 5 of each: a pentagon. The chevron has 6 sides and 6 angles: a hexagon, though it looks nothing like the yellow block.

   > **Say:** "I count the sides and the angles. The number tells me the name."

3. **Try it together** (10 min) Pairs count the sides and angles of the blocks and paper shapes and sort them under the four names. Turn a triangle upside down: still a triangle. Why does the chevron go with the hexagons?
4. **Practice** (15 min) Students count and name the shapes on sheet 1 of 2D Shapes: Sides and Angles, sort them on sheet 2 and find the odd one out on sheet 3. Early finishers do the riddles on sheet 5.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.1** and circle a face beside the "I can" line. The first shape has 5 angles; 4 means the one that points in was missed. The L and the stretched shape are both hexagons.

Need help? Trace the sides of pattern blocks with a finger first, with the word bank on the desk. The Shapes Quiz (1st grade) is for review.

Ready for more? Draw a pentagon that does not look like a house, or a hexagon with a corner that points in.

GET READY

- Pattern blocks for each pair
- Paper shapes: a trapezoid, a dart, a house, a chevron (a thick V)
- A word bank: triangle, quadrilateral, pentagon, hexagon

WORDS TO USE

side: a straight line on the edge

angle: where two sides meet

quadrilateral: any shape with 4 sides

pentagon, hexagon: 5 sides, 6 sides

ASK

- How did you keep track of the angles you counted?
- Is a square a quadrilateral? Why?
- Can a hexagon look like a letter V?

WATCH FOR

Counts an angle twice or skips one. Dot the first angle and go around one way back to the dot.

Says only squares and rectangles are quadrilaterals. Count the trapezoid's sides together: 4, so it is one too.

Misses an angle that points in. Trace the outline and stop at every turn, in or out.

ON ANIMAL MATH

PRINTABLE **2D Shapes: Sides and Angles**: sheets 1-3, then sheet 5 for early finishers

TOOL **Pattern Blocks**: drag out each block and count its sides and angles

QUIZ **Shapes Quiz**: the Flat Shapes level

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.1

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Shapes and Shares

Lesson 13.2: Draw shapes from clues

GOAL Students read a clue (sides or angles, and sometimes square corners), draw a shape that fits it on dot paper with straight lines, check it against the clue and name it.

I can draw a shape that fits a clue.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Riddles: "I have 4 sides and 4 square corners, and all my sides are equal. What am I?" (a square) Then "I have 6 angles." (a hexagon)
2. **Teach** (10 min) Show the clue "5 sides, only 2 square corners". On dot paper, draw a bottom side 4 dots long and a side straight up 2 dots from each end: 2 square corners. Join both tops to a dot above the middle: 5 sides, and the other 3 angles are not square. Test them with a card and name it: a pentagon. Then draw another shape that fits.

   > **Say:** "I read the clue, I join dots with straight lines, and I check my shape against every part of the clue."

3. **Try it together** (10 min) Read a clue; pairs draw a shape on dot paper and hold it up. How many different shapes fit "5 sides"? Then try "4 sides, 4 square corners" (only squares and rectangles fit). Each pair writes a clue for another.
4. **Practice** (15 min) Students draw the shapes from the clues on sheet 4 of 2D Shapes: Sides and Angles and name each one, then draw the squares and rectangles on sheet 4 of Right Angles in Squares and Rectangles.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.2** and circle a face beside the "I can" line. Any shape that fits a clue is right, not only the key's. Count each drawing's sides and test its corners with a card: a rectangle has 4 square corners, so it does not fit the first clue.

Need help? Build the shape with straws or pattern blocks first, then copy it onto the dots one side at a time.

Ready for more? Draw two different shapes for "6 sides and 2 square corners", or write a clue with three parts for a partner.

GET READY

- Square dot paper for each student
- Index cards, to draw lines and check corners
- Clue cards: "5 sides", "6 angles", "3 sides, only 1 square corner"

WORDS TO USE

clue: what the shape must have

square corner: an angle that fits the corner of a card exactly

equal sides: sides that are the same length

ASK

- Does your shape fit every part of the clue? Show me.
- Can two different shapes fit the same clue?
- Where are the square corners in your shape?

WATCH FOR

Draws curved or wobbly lines between dots. Go straight from dot to dot along the edge of an index card.

Gets the sides right but not the square corners. Test each corner with a card and mark the square ones.

Leaves a gap where the last side should close the shape. Shapes are closed: join the last corner back to the first dot.

ON ANIMAL MATH

- PRINTABLE **2D Shapes: Sides and Angles**: sheet 4
- PRINTABLE **Right Angles in Squares and Rectangles**: sheet 4
- PRINTABLE **Dot Paper and Isometric Paper**: sheet 1 (dot paper) or sheet 6 (geoboard dots), to draw more
- MAKER **Graph Paper**: Paper Type Square Dots, Square Size 1/2 Inch
- EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.2

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Shapes and Shares

Lesson 13.3: Solid shapes: faces, edges and vertices

GOAL Students count the faces, edges and vertices of cubes, prisms and pyramids, name the shape of each face, and know a cube by its 6 square faces.

I can count the faces, edges and vertices of a solid.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Mystery bag: a student feels a solid and tells about it ("flat faces", "a point", "curved"). The class guesses the shape.
2. **Teach** (10 min) Hold up a triangular pyramid. Put a sticker on each face as you count: 4 faces, all triangles. Run a finger along each edge: 6 edges. Put a dot on each vertex: 4. Then draw it on the board with its back edge dashed: a dashed line is an edge at the back that we cannot see, so count it too.

   > **Say:** "A face is flat. An edge is where two faces meet. A vertex is a corner where edges meet."

3. **Try it together** (10 min) Groups count the faces, edges and vertices of each solid with stickers and fill in a class chart. Ask: which two have 6 faces? (the cube and the box) How are they different? (the cube's faces are all squares)
4. **Practice** (15 min) Students name the shapes on sheet 1 of 3D Shapes: Faces, Edges and Vertices, count faces, edges and vertices on sheet 2 and circle the face shapes on sheet 3. Early finishers compare shapes on sheet 4 and solve the riddles on sheet 5.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.3** and circle a face beside the "I can" line. A cube has 6 faces, 12 edges and 8 vertices; 9 edges or 7 vertices means the dashed back edges were left out. Only the triangular prism has 6 vertices.

Need help? Count on a real solid with stickers before the drawings, one kind at a time. The Shapes Quiz (1st grade) is for review: it names solids but never counts edges.

Ready for more? Find a solid at home with 5 faces, and count its edges and vertices.

GET READY

- Solid shapes, or real things: a number cube, a cereal box, a tent-shaped box, a pyramid
- A triangular pyramid: a 4-sided die, or one folded from paper
- Small stickers to mark faces and vertices

WORDS TO USE

face: a flat side of a solid

edge: where two faces meet

vertex (vertices): a corner where edges meet

cube: a solid with 6 square faces

ASK

- How do you keep track of the edges you counted?
- What shape are the faces of a cube? Of a pyramid?
- Which has more vertices, a cube or a pyramid?

WATCH FOR

Counts only the edges and vertices in front. Turn the real solid in your hands; in a drawing, count the dashed edges too.

Calls a vertex a face. Touch a face with a flat hand and a vertex with one finger: flat is a face, pointed is a vertex.

Counts the same edge twice. Count the top edges, then the bottom ones, then the sides.

ON ANIMAL MATH

PRINTABLE **3D Shapes: Faces, Edges and Vertices**: sheets 1-3, then sheets 4-5 for early finishers

QUIZ **Shapes Quiz**: the Solid Shapes level

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.3

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Shapes and Shares

Lesson 13.4: Right angles, smaller and larger

GOAL Students check angles with an index card: a right angle fits its corner exactly, a smaller angle covers the card, a larger one leaves a gap. They mark and count right angles in shapes.

I can compare angles to a right angle.

About 45 minutes

★ Taught in 2nd grade in some states

THE LESSON

1. **Warm up** (5 min) Right angle hunt: students find square corners in the room (a book, a window, the board) and check them with a card.
2. **Teach** (10 min) Open the brad strips a little and fit the card in: a side goes over the card, so it is smaller than a right angle. Open them to match the card: a right angle. Wider: a gap, so it is larger. Then test each corner of a paper right triangle: 1 right angle, marked with a small square, and 2 smaller.

   > **Say:** "If my card fits exactly, it is a right angle. If a side covers the card, it is smaller. If there is a gap, it is larger."

3. **Try it together** (10 min) Pairs test the corners of the paper shapes with their cards: right, smaller or larger? Then one partner opens the brad strips and the other calls it before checking with the card.
4. **Practice** (15 min) Students circle smaller or larger on sheet 2 of Right Angles and mark the right angles in shapes on sheet 3. Early finishers count square corners on sheet 1 of Right Angles in Squares and Rectangles.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.4** and circle a face beside the "I can" line. The hexagon has 2 right angles, at the bottom. Only the two wide angles are larger; a student who also circles the right angle thinks "right angle" means "big".

Need help? Start with yes or no on sheet 1 of Right Angles, matching the brad strips to the card first.

Ready for more? Draw a smaller and a larger angle on dot paper, or a shape with exactly 3 right angles.

GET READY

- An index card for each student
- Paper shapes: a rectangle, a right triangle, a hexagon
- Two card strips joined with a brad

WORDS TO USE

right angle: a square corner: it fits the corner of a card

smaller than a right angle: a side goes over the card

larger than a right angle: there is a gap by the card

ASK

- How do you know this is a right angle?
- Is this angle smaller or larger? How did the card show you?
- Does turning a shape change its right angles?

WATCH FOR

Judges an angle by how long its sides are. Side length does not matter: look only at the opening.

Says a turned right angle is not one. Fit the card in: it still fits exactly.

Holds the card corner on the angle but not along a side. Line the card up with one side first, then look at the other.

ON ANIMAL MATH

PRINTABLE **Right Angles**: sheets 2-3, and sheet 1 for help

PRINTABLE **Right Angles in Squares and Rectangles**: sheet 1, for early finishers

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.4

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Shapes and Shares

Lesson 13.5: Halves, thirds and fourths

GOAL Students cut circles and rectangles into 2, 3 or 4 equal shares, name them halves, thirds and fourths, and call one share one half, one third or one fourth.

I can cut shapes into halves, thirds and fourths.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Show shapes cut into 2, 3 and 4 pieces. Thumbs up for equal shares, thumbs down for not equal.
2. **Teach** (10 min) Fold a paper rectangle in half: 2 equal shares, halves. Fold one in three like a letter: thirds. Fold one in half twice: fourths. Color one share of each and name it: one half, one third, one fourth. Then cover a hexagon with 3 blue rhombuses: each is one third.

   > **Say:** "Two equal shares are halves, three are thirds, four are fourths."

3. **Try it together** (10 min) Pairs fold same-size rectangles into halves, thirds and fourths, color one share of each and compare: which is biggest? (one half) Then they cut a circle into thirds with a Y from the middle.
4. **Practice** (15 min) Students name the shares on sheet 2 of Halves, Thirds and Fourths and draw the cuts on sheet 3. Early finishers sort shares on sheet 1 or do sheets 2-4 of Thanksgiving Pie Fractions.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.5** and circle a face beside the "I can" line. The shaded share is one third. Fourths of the circle need two lines through the middle dot, crossing at square corners.

Need help? Fold and color paper first; start with halves and fourths, then thirds. The Equal Shares Quiz has halves and fourths, no thirds.

Ready for more? Cut a rectangle into thirds two ways, or a square into fourths three ways.

GET READY

- Same-size paper circles and rectangles
- Crayons and scissors
- Pattern blocks: hexagons and blue rhombuses

WORDS TO USE

equal shares: pieces all the same size

half, third, fourth: one of 2, 3 or 4 equal shares

ASK

- How many equal shares? What are they called?
- Is one third bigger or smaller than one half?
- How can you check that the shares are equal?

WATCH FOR

Calls any 3 pieces thirds. Thirds are the same size: stack the pieces to check.

Cuts a circle into thirds with lines straight across. Start at the middle and draw 3 lines out, like a Y.

Thinks a fourth is bigger than a third because 4 > 3. Lay a fourth on a third of the same rectangle: more shares, smaller shares.

ON ANIMAL MATH

- PRINTABLE **Halves, Thirds and Fourths**: sheets 2-3, then sheet 1 for early finishers
- PRINTABLE **Thanksgiving Pie Fractions**: sheets 2-4, for early finishers
- PRINTABLE **Identify Fractions - Circles**: for more (it writes shares as numbers, like 2/3)
- MAKER **Basic Fractions**: Denominator Range Up to Fourths, Shape Type Mixed (it writes shares as numbers, like 1/3)
- TOOL **Pattern Blocks**: Shape to Fill Hexagon: 3 blue rhombuses make thirds
- QUIZ **Equal Shares Quiz**: the Halves and Fourths level
- EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.5

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Shapes and Shares

Lesson 13.6: Same size, different shapes

GOAL Students see that equal shares of one whole can be different shapes if they are the same size, and that 2 halves, 3 thirds or 4 fourths make the whole.

I can see that equal shares can be different shapes.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Cut one paper sandwich in half straight down, the other corner to corner. Whose half is bigger, Mia's or Leo's?
2. **Teach** (10 min) Draw the sandwich on grid paper, 4 squares on a side. Mia's rectangle half covers 8 small squares. Leo's triangle half covers 6 whole squares and 4 halves, which make 2 more: 8. Same size, different shapes. Then cut a long rectangle in half three ways: across, up and down, corner to corner. Halves every time.

   > **Say:** "Equal shares are the same size. They do not have to be the same shape."

3. **Try it together** (10 min) Pairs cut same-size squares into halves two ways and fourths three ways (a plus, 4 strips, corner to corner), and check the shares match by cutting one to fit on another. Count each whole back: 4 fourths.
4. **Practice** (15 min) Students circle the squares cut into halves and fourths and solve the sandwich story on sheet 4 of Halves, Thirds and Fourths, and build wholes on sheet 5. Early finishers do sheets 1 and 6 of Thanksgiving Pie Fractions.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.6** and circle a face beside the "I can" line. The three strips and the strip with the rest cut in half are both thirds; circling only the strips means "equal shares must look alike".

Need help? Cut and stack the pieces before judging pictures.

Ready for more? Find a fourth way to cut a square into fourths, and show that its shares are the same size.

GET READY

- Same-size paper squares, 4 for each pair
- Scissors and crayons
- Two paper "sandwiches" (squares) and grid paper

WORDS TO USE

same size: they cover the same space

same shape: they look alike

whole: all the shares put back together

ASK

- Are these shares the same shape? Are they the same size?
- How could you show that a triangle half and a rectangle half are the same size?
- How many thirds make one whole?

WATCH FOR

Says shares that look different cannot be equal. Cut one to fit on the other: the same space means the same size.

Says shares are equal because there are 3. The count is not enough: each must be the same size.

Writes 1 for how many thirds make a whole. Count the shares: the whole is all 3 thirds.

ON ANIMAL MATH

PRINTABLE **Halves, Thirds and Fourths**: sheets 4-5

PRINTABLE **Thanksgiving Pie Fractions**: sheets 1 and 6

QUIZ **Equal Shares Quiz**: the Equal or Not level

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.6

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Shapes and Shares

Lesson 13.7: Sixths and eighths

GOAL Students name and write fractions to eighths shaded in a circle, a rectangle, a strip or a set of counters: 5 of 8 equal parts is five eighths, 5/8.

I can name sixths and eighths.

About 45 minutes

★ Taught in 2nd grade in some states

THE LESSON

1. **Warm up** (5 min) Cover a yellow hexagon with green triangles. How many? (6) Each triangle is one sixth of the hexagon.
2. **Teach** (10 min) Fold a paper strip in half three times and open it: 8 equal parts, eighths. Shade 5 and write 5/8: 8 equal parts make the whole, and we shaded 5. Read it "five eighths". Show 6 counters with 1 red: 1/6 of the set. Fold a strip in three, then in half: sixths.

   > **Say:** "The bottom number tells how many equal parts make the whole. The top number tells how many parts we are counting."

3. **Try it together** (10 min) Pairs fold strips into sixths and eighths, shade some parts and trade: the partner writes and reads the fraction. Then pairs set out 6 or 8 counters, turn some over and write the fraction that is red.
4. **Practice** (15 min) Students write the shaded fractions and their names on sheet 1 of Unit Fractions to Eighths, read strips and sets on sheet 2 and count parts to make wholes on sheet 3. Early finishers draw the whole on sheet 4 or do Fractions to Eighths.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.7** and circle a face beside the "I can" line. A student who writes 1/7 for the rectangle put the unshaded parts on the bottom. The circle is 5/6; the counters are 3/8, though the shaded ones are not side by side.

Need help? Fold a paper strip for each fraction and shade it before reading the pictures.

Ready for more? How many eighths make 1 whole? How many make 2 wholes? Count them on two strips, one eighth at a time.

GET READY

- Paper strips the same length, to fold
- Two-color counters
- Pattern blocks: hexagons and triangles

WORDS TO USE

sixths: 6 equal parts of a whole

eighths: 8 equal parts of a whole

fraction: a number like 5/8 for parts of a whole

ASK

- How many equal parts make the whole? Where does that number go?
- How many parts are shaded?
- Are these parts equal? How do you know?

WATCH FOR

Writes shaded over unshaded (1/5 for 1 of 6). The bottom number counts all the parts.

Calls parts that are not equal sixths or eighths. Check first that the parts are the same size.

Reads 5/8 as "five eights". Say "five eighths" together, and write the word beside the number on the board.

ON ANIMAL MATH

- PRINTABLE — **Unit Fractions to Eighths**: sheets 1-3, then sheet 4 for early finishers
- PRINTABLE — **Fractions to Eighths**: for more practice (it has fifths and sevenths too)
- MAKER — **Basic Fractions**: Denominator Range Up to Eighths, Shape Type Mixed (it also makes fifths and sevenths)
- TOOL — **Pattern Blocks**: Shape to Fill Hexagon: 6 green triangles make sixths
- EXIT TICKET — **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.7

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Shapes and Shares

Lesson 13.8: Compare unit fractions

GOAL Students compare unit fractions of the same whole with models and with >, < and =, see that more equal parts make smaller parts, and put three in order.

I can compare unit fractions.

About 45 minutes

★ Taught in 2nd grade in some states

THE LESSON

1. **Warm up** (5 min) Would you rather have 1/2 or 1/4 of the same pizza? Students vote, then you cut the two paper pizzas to check.
2. **Teach** (10 min) Lay a strip folded in fourths over one folded in thirds. Shade one part of each: 1/3 is longer than 1/4, so 1/3 > 1/4. The same whole cut into more parts makes smaller parts. Then show why the wholes must match: 1/2 of the small cookie is less than 1/4 of a pizza.

   > **Say:** "When the wholes are the same size, more parts means smaller parts. 1/4 is less than 1/3."

3. **Try it together** (10 min) Pairs use the fraction wall to compare pairs of unit fractions and write >, < or =, then put 1/3, 1/8 and 1/2 in order from least to greatest. Ask: which unit fraction on the wall is the least? (1/8)
4. **Practice** (15 min) Students write signs for the circles on sheet 2 of Comparing Unit Fractions, use the fraction wall on sheet 3 and put fractions in order on sheet 4. Early finishers solve the stories on sheet 5.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.8** and circle a face beside the "I can" line. A student who writes 1/2 < 1/3 thinks a bigger bottom number means a bigger fraction. The order is 1/6, 1/4, 1/3: the most parts first.

Need help? Keep the fraction wall on the desk and shade the two parts before writing a sign, as on sheet 1.

Ready for more? Put all five unit fractions in order from least to greatest, or write a story where 1/2 is less than 1/4 (two different wholes).

GET READY

- Paper strips the same length, folded
- A Fractions Reference wall for each pair
- Two same-size paper pizzas and a small cookie

WORDS TO USE

unit fraction: one equal part of a whole, like 1/4

greater than, less than: more than, smaller than: > and <

same whole: wholes the same size, so their parts can be compared

ASK

- Which is bigger, one half or one fourth of the same strip? Why?
- What happens to the parts when we cut the whole into more of them?
- Why do the wholes need to be the same size?

WATCH FOR

Says 1/4 > 1/3 because 4 > 3. Lay the two strips side by side and compare the parts.

Turns the sign the wrong way. The open side of > or < faces the greater fraction.

Compares parts of wholes that are not the same size. Use strips or circles the same size, and say "of the same pizza".

ON ANIMAL MATH

PRINTABLE **Comparing Unit Fractions**: sheets 2-4, then sheet 5 for early finishers (sheet 1 for help)

PRINTABLE **Fractions Reference**: the fraction wall, one for each pair

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.8

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Shapes and Shares

Lesson 13.9: Lines of symmetry

GOAL Students find lines of symmetry, lines that fold a shape into two halves that match exactly: they tell if a dashed line is one and draw one.

I can find a line of symmetry.

About 45 minutes

★ Taught in 2nd grade in some states

THE LESSON

1. **Warm up** (5 min) Show a butterfly and a hand print. Fold each down the middle: do the halves match?
2. **Teach** (10 min) Fold a paper heart down the middle: the halves match, so the fold is a line of symmetry. Fold a rectangle corner to corner: the corners stick out, so the diagonal is not one. Fold it across the middle instead: it matches. Then draw a dashed line down the middle of a paper letter T and check it with a fold.

   > **Say:** "A line of symmetry folds a shape into two halves that match exactly."

3. **Try it together** (10 min) Pairs fold the paper shapes every way they can and draw each fold that is a line of symmetry. Compare: the rectangle has 2, the square 4, the T 1, the triangle with 3 different sides none. Hold a mirror on a line to see the other half.
4. **Practice** (15 min) Students circle yes or no on sheet 1 of Symmetry in Everyday Objects, draw a line of symmetry on each picture on sheet 2 and finish the half pictures on sheet 3. Early finishers draw every line on sheet 4 or try Lines of Symmetry.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.9** and circle a face beside the "I can" line. The lines on the house and the diamond are lines of symmetry; the trapezoid with 2 square corners has none. The arrow's only line runs along its middle, from tail to tip.

Need help? Fold paper cut-outs before judging pictures, and hold a mirror on the line to see if the half makes the whole.

Ready for more? Find all the lines of symmetry of a square (4) and of the yellow hexagon (6), or draw a picture with exactly 2.

GET READY

- Paper shapes to fold: a heart, a letter T, a rectangle, a square, a triangle with 3 different sides
- A small mirror for each pair (optional)

WORDS TO USE

line of symmetry: a fold line where the two halves match exactly

match: the same size and shape, with nothing sticking out

fold: bend the paper so one half lies on the other

ASK

- If you fold on this line, will the halves match? How do you know?
- Can a shape have more than one line of symmetry?
- Which letters of your name have a line of symmetry?

WATCH FOR

Says a rectangle's diagonal is a line of symmetry. Fold it corner to corner: the corners stick out, so the halves do not match.

Draws a line that cuts two same-size pieces that do not match. Fold it: the halves must lie exactly on each other.

Draws a crooked line by hand. Use a ruler, and check by folding a paper copy.

ON ANIMAL MATH

PRINTABLE **Symmetry in Everyday Objects**: sheets 1-3, then sheet 4 for early finishers

PRINTABLE **Lines of Symmetry**: for more (a 3rd grade pack)

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.9

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Shapes and Shares

Lesson 13.10: Perimeter: the distance around

GOAL Students find the perimeter of a shape, the distance all the way around it, by counting unit lengths on grid paper and by adding the lengths of its sides, and write the unit.

I can find the perimeter of a shape.

About 45 minutes

★ Taught in 2nd grade in some states

THE LESSON

1. **Warm up** (5 min) Students walk around the tape rectangle and count their steps. Does everyone get the same count? Why not? (steps are different sizes)
2. **Teach** (10 min) Draw a rectangle 5 squares long and 3 wide on grid paper. Put a finger on a corner and count each unit length along the edge until you are back: 16 units. Then show a rectangle labeled 6 cm and 3 cm. Write all four sides, since opposite sides are the same: 6 + 3 + 6 + 3 = 18 cm.

   > **Say:** "Perimeter is the distance all the way around. I add every side, and I write the unit."

3. **Try it together** (10 min) Pairs build shapes with square tiles, trace them on grid paper and count the units around. Then they measure the sides of a book with a ruler and add them. Ask: do 4 tiles always make the same perimeter? (no: a row of 4 is 10 units around, a 2 by 2 square is 8)
4. **Practice** (15 min) Students count the units around shapes on sheet 1 of Perimeter, add the side lengths on sheet 2 and find rectangle perimeters on sheet 3. Early finishers solve the word problems on sheet 5.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.10** and circle a face beside the "I can" line. The rectangle is 22 cm: a student who writes 11 added only two sides, one who writes 28 found how many squares would cover it. The tile shape is 12 units around.

Need help? Walk a finger or a small toy around the shape, counting out loud, with a dot on the starting corner.

Ready for more? Draw two different shapes on grid paper that are both 14 units around.

GET READY

- Square tiles and grid paper
- Rulers and string
- A rectangle marked with tape on the floor, its sides whole feet

WORDS TO USE

perimeter: the distance all the way around a shape

unit: what we measure in: centimeters, inches, feet or grid lengths

side: one straight part of the edge

ASK

- Where did you start counting? How do you know you went all the way around?
- Which sides of a rectangle are the same length?
- Why do we write the unit?

WATCH FOR

Counts the squares inside instead of the lengths around. Run a finger along the edge and count the lines, not the squares.

Adds only the sides that have numbers. A rectangle has 4 sides: write the length of each one before adding.

Forgets the unit. Perimeter is a length: write cm, inches or units after the number.

ON ANIMAL MATH

PRINTABLE **Perimeter**: sheets 1-3, then sheet 5 for early finishers

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

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.10

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Shapes and Shares

Lesson 13.11: Area: cover with squares

GOAL Students find the area of a rectangle by covering it with unit squares, with no gaps and no overlaps, and counting them, one at a time and by rows: 3 rows of 6 is 6 + 6 + 6 = 18 square units.

I can find the area by counting squares.

About 45 minutes

★ Taught in 2nd grade in some states

THE LESSON

1. **Warm up** (5 min) How many sticky notes will cover this book? Students guess, then one covers it: no gaps, no overlaps.
2. **Teach** (10 min) Cover a card with square tiles in 3 rows of 6, edges touching. Count them one by one: 18. Then count by rows: 6, 12, 18. Draw it on grid paper and shade the squares: 18 square units. Show a cover with gaps and one with tiles on top of each other, and why their counts are wrong.

   > **Say:** "Area is how many squares cover the shape, with no gaps and no overlaps. I can count them row by row."

3. **Try it together** (10 min) Pairs cover cards and books with tiles, count the rows and the squares in a row and record "2 rows of 4 is 8 square units". Then each pair builds a shape that is not a rectangle with 9 tiles and traces it.
4. **Practice** (15 min) Students count the squares in rectangles on sheet 1 of Area by Counting Squares and in shapes on sheet 2, then draw shapes with a given area on the grid on sheet 4.
5. **Exit ticket** (5 min) Students do **Exit Ticket 13.11** and circle a face beside the "I can" line. The rectangle is 2 rows of 6, 12 square units; a student who writes 16 counted the lengths around the edge. The L shape has 10 squares.

Need help? Cover the shape with real tiles first, then take them off one at a time, counting.

Ready for more? Draw two different rectangles that each have an area of 16 square units on grid paper.

GET READY

- Square tiles (or paper squares) for each pair
- Grid paper with 1 inch squares
- Index cards and books to cover

WORDS TO USE

area: how many unit squares cover a shape

square unit: one square used to measure area

row: a line of squares going across

ASK

- How many rows are there? How many squares in each row?
- What happens to the count if there are gaps?
- Can two shapes that look different have the same area?

WATCH FOR

Counts some squares twice. Count row by row and tick each square, or say the row totals: 6, 12, 18.

Leaves gaps or overlaps when covering. Push the tiles edge to edge, with none on top of another.

Counts the lengths around (the perimeter). Area counts the squares inside: touch the middle of each square as you count.

ON ANIMAL MATH

PRINTABLE **Area by Counting Squares**: sheets 1-2 and 4

MAKER **Graph Paper**: Paper Type Square Grid, Square Size 1 Inch

EXIT TICKET **2nd Grade Shapes and Equal Shares Exit Tickets**: Exit Ticket 13.11

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