Sides, Corners and Mirror Lines

Teacher		**Class**	Year 2
Subject	Maths	**Topic**	Properties of 2D shapes
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Pupils learn sides, corners and vertical mirror lines of 2-D shapes. They count and fold paper shapes in pairs to test for matching halves.

Curriculum links

- identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line

Learning objectives

- Students will name triangle, square, rectangle and circle and count sides and corners.
- Students will describe 2-D shapes by number of straight sides and corners.
- Students will identify a vertical mirror line by folding shapes to match halves.

Success criteria

- I can count sides and corners to name triangle, square, rectangle and circle.
- I can describe a shape using its number of sides and corners.
- I can fold a shape to find its vertical mirror line.

What students already know

Hold up triangle, square and circle for 2 minutes. Ask names, how many sides, how many corners.

Key words

side	straight edge round a flat shape [2]
corner	pointy place where two edges meet [2]
triangle	flat shape with three edges and three points [2]
square	flat shape with four equal edges and four points [2][7]
mirror line	crease down the middle where halves match exactly [5]

Materials

- Slides 1-12 with projector
- Video clip 1 Y2 properties of 2-D shapes
- paper triangles, squares, rectangles, hearts
- small stickers
- chart paper and colouring pencils
- Worksheet page 1 copies
- mini whiteboards and pens

Before the lesson

- Print Worksheet page 1 copies for pairs
- Cut out paper triangles, squares, rectangles, hearts, one set per pair
- Pre-crease some shapes lightly down the middle
- Test Slide 6 Video clip 1 (0:00–5:00) plays with sound
- Set up chart headed Symmetrical with colouring pencils and stickers

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Lesson outline

0–10 min **Starter** 10 min · Whole class

Recall shape names and spark curiosity about folding to make matching halves.

YOU DO

1. Show Slide 1 Shape Detectives: Sides and mirror lines and welcome pupils as detectives.
2. Hold up a paper square and say the hook: If I fold this shape down the middle, will the two sides match exactly?
3. Show Slide 5 Vote now: Triangle, Square, Circle, Which shape would you draw? Take a hands-up vote.
4. Show Slide 4 Key words and teach side - straight line on a shape, corner - pointy place where sides meet, mirror line - fold where both halves match.

STUDENTS DO

1. Vote for Triangle, Square or Circle and say its name.
2. Repeat side, corner and mirror line with actions.
3. Predict which shape will match when folded.

Say: Today we are shape detectives. If I fold this shape down the middle, will the two sides match exactly? You will count sides and corners, then fold to test the mirror. Show me with fingers what you predict.

Ask: Which flat shapes do you already know? (Triangle, square, rectangle, circle.) · How can we count sides carefully? (Run a finger round the edge and count each straight side.)

Check understanding: Hands-up vote and choral repeat; if unsure of names, point to Slide 3 pictures and name together again.

Support: Show large card triangle and square side by side so pupils see 3 against 4. **Stretch:** Ask pupils to whisper to a partner how many corners they think a square has.

Use: Slides 1, 4–5

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10–22 min **Teaching** 12 min · Whole class

Model how to count sides and corners and how folding shows a vertical mirror line.

YOU DO

1. Show Slide 2: A circle has no corners! It is round all the way. Explain circles only have one curved side and circles have no corners [7].
2. Show Slide 3 cards: It has 3 sides. Triangle, It has 4 equal sides. Square, It has 2 long, 2 short sides. Rectangle, It is round with no corners. Model counting.
3. Play Video clip 1 on Slide 6 and count sides out loud and point to corners with the class.
4. Show Slide 7: A square folds to match! The fold is a line of symmetry. Fold a square down the middle to show two mirror-image halves [5].

STUDENTS DO

1. Count aloud with teacher and show numbers with fingers.
2. Point to corners on the screen shapes.
3. Call out match or not match for each fold demo.

Say: 2-D shapes are completely flat [2]. They have sides and corners, also called vertices [2]. A mirror line divides a shape into two mirror-image halves [5]. Watch my fold go straight down the middle.

Worked example: Square: touch and count sides 1, 2, 3, 4, then corners 1, 2, 3, 4. A square has 4 sides and 4 vertices [2]. Fold down the middle. Edges line up exactly. Two parts look same, so the fold is a vertical mirror line.

Ask: How many sides and corners has a triangle? (3 sides and 3 vertices [2].) · Why is a circle different from a triangle? (A circle is not a polygon because it does not have straight sides [2].) · How do we know the fold is a mirror line? (Both halves match exactly when folded.)

Check understanding: Mini whiteboards: draw 3 for triangle sides, 4 for square sides; reteach counting slowly if mixed.

Support: Trace straight edges with a finger together to feel straight against curved. **Stretch:** Ask why a square has the same number of sides and corners.

Use: Slides 2–3, 6–7, Video clip 1 (0:00–5:00)

22–47 min **Main activity** 25 min · Pairs

Test paper shapes for symmetry in a vertical line by folding and count sides and corners.

YOU DO

1. Show Slide 9 Your task: Fold paper shapes and count sides. Explain steps: Pick up one shape, Count sides and corners, Fold down middle to check.
2. Show Slide 10: Fold down the middle, Two parts look same, Line is straight down. Model with an isosceles triangle.
3. Give each pair paper triangles, squares, rectangles, hearts, Worksheet page 1 and stickers. Pairs count then fold each shape side-to-side to make a vertical crease.
4. Ask pairs to stick only symmetrical shapes on the chart and draw over the crease in colour to show the mirror line.

STUDENTS DO

1. Pick up one shape at a time, count sides and corners and say the name.
2. Fold down the middle and check if halves match exactly.
3. Record on Worksheet page 1 and stick symmetrical shapes on the chart.

Say: In pairs, pick up one shape. First count sides and corners. Then fold down the middle to check. If the edges line up exactly, it has a vertical mirror line. Record on Worksheet page 1.

Worked example: Triangle: count 3 sides and 3 corners. A triangle has 3 sides and 3 vertices [2]. Fold down the middle. Edges line up, two parts look same. Stick it on the chart, draw over the crease in colour and add a sticker.

Ask: How many sides and corners does your rectangle have? (4 sides and 4 corners, with 2 long sides and 2 short sides [7].) · Does your shape match when folded down the middle? (Yes, edges line up, two mirror-image halves [5], or no, they do not line up.)

Check understanding: Visit pairs, ask them to show the fold and say sides and mirror yes or no; remodel with a square if folding is wonky.

Support: Pre-crease some shapes lightly so children can fold on the dotted line and check the match.
Stretch: Ask children to predict symmetrical or not before folding, then fold to check.

Use: Slides 9–10, Worksheet page 1

47–60 min **Plenary** 13 min · Whole class

Review which shapes match when folded and how many sides they have.

YOU DO

1. Tidy shapes and bring class to carpet with chart.
2. Show Slide 11 Think, pair, share: Which shapes match when folded? Pairs discuss using chart.
3. Show Slide 12 Quick quiz, ask How many sides has a triangle? How many sides has a square? Has a circle got corners? Does a square match when folded?
4. Confirm answers 3, 4, No, Yes and link back to sides and vertical mirror line.

STUDENTS DO

1. Think, pair, share which shapes matched when folded and why.
2. Answer quiz with fingers and yes or no cards.
3. Point to the vertical mirror line on the chart shapes.

Say: Think, then tell your partner which shapes match when folded. Point to the vertical fold where halves meet. We are checking sides, corners and the mirror line together.

Worked example: Square quiz: How many sides has a square? 4. Has a circle got corners? No. Does a square match when folded? Yes, the fold down the middle makes two mirror-image halves [5].

Ask: Which shapes match when folded? (Square, rectangle and some triangles; circle folds to match but has no sides.) · How do you describe a square by sides and mirror? (4 straight sides and 4 corners, folds down the middle to match.)

Check understanding: Quick quiz answers on whiteboards; if circle corners confused, show Slide 2 again: A circle has no corners!

Support: Let pupils hold the folded shape while answering to see the matching halves. **Stretch:** Ask pupils to explain how they knew without unfolding, using sides and match.

Use: Slides 11–12

Common mistakes

Mistake	How to spot it	How to fix it
Saying a circle has corners or straight sides	Pupil counts round edge as sides or points to curve as corner	Trace together and restate circles only have one curved side and circles have no corners [7].
Miscounting sides by missing one or counting twice	Says triangle has 2 or 4 sides, square has 3 or 5	Mark each side with a dot as counted; check triangle has 3 sides and 3 vertices [2] and square has 4 sides and 4 vertices [2].
Thinking any fold is a mirror line even if halves do not match	Claims wonky fold or diagonal off-centre fold matches	Unfold and check edges line up; a line of symmetry divides a shape into two mirror-image halves [5].

Support

- Start with only triangles and squares to compare 3 against 4, then add rectangles and hearts.
- Pre-crease shapes lightly and use picture checklists to match without reading.

Stretch

- Offer two different hexagons, regular and long thin, to count and notice both have 6 sides [2].
- Ask pupils to predict symmetrical or not before folding, then fold to check.

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For the LSE or teaching assistant

Stay with main activity pairs needing fine-motor help; guide finger round edges to count, help fold on crease, prompt sentence My shape has __ sides and __ corners.

Check for understanding

Question	Answer
How many sides has a triangle?	3
Has a circle got corners?	No
Does a square match when folded down the middle?	Yes, it has a vertical mirror line

Homework

Find one square and one circle at home and tell a grown-up how many sides and corners each has.

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