Hold, Count, Describe Solid Shapes

Teacher		**Class**	Year 2
Subject	Maths	**Topic**	Properties of 3D shapes
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Pupils learn to name cubes, spheres, cylinders and cones. They handle shapes and count faces, edges and vertices.

Curriculum links

- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces [2]
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] [2]

Learning objectives

- Students will name cube, sphere, cylinder and cone by handling shapes.
- Students will count and describe faces, edges and vertices on shapes.

Success criteria

- I can name a cube, sphere, cylinder and cone.
- I can count faces, edges and vertices on a shape.

What students already know

Show a ball and a box. Ask: What shape is flat and what shape can you hold? Listen for 2-D is flat, 3-D you can hold.

Key words

face	a flat or curved surface you can touch [3]
edge	a line where two surfaces meet [3]
vertex	a corner point where lines meet [3]
cube	a solid box with six square faces [3]
cylinder	a solid like a tin with three surfaces [3]

Materials

- cloth bag
- cube block
- ball for sphere
- empty tin for cylinder
- cone and square-based pyramid for stretch
- small stickers for marking counted faces
- Slides 1-3, 6-7, 9-10, 12
- Video clip 1 (0:00–3:56) on Slide 6

Before the lesson

- Put cube block, ball and empty tin by the cloth bag, with square-based pyramid ready for stretch
- Cut small stickers for marking counted faces
- Test Video clip 1 (0:00–3:56) on Slide 6 and display Slides 1-3, 6-7, 9-10, 12
- Set out shapes for pairs to handle and name, including cube block, ball, empty tin and cone

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Lesson outline

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

To hook pupils and recall 3-D shape names through feeling and guessing.

YOU DO

1. Show Slide 1 and explain we will hold, count and describe solid shapes.
2. Say the hook: I have a sneaky shape hiding in this bag. Can your hands guess what it is without your eyes?
3. Invite a student to feel the ball in the bag without looking, then reveal it to the class.
4. Show Slide 2 and link the ball to sphere, rolls well and has no corners.

STUDENTS DO

1. Listen to the hook and watch the bag.
2. A student feels the hidden ball and describes what hands feel.
3. Whole class guesses, then says sphere and shows rolling hands.

Say: We are learning to hold, count and describe solid shapes. 3D shapes take up space and you can hold them and turn them. Put your hand in the bag and feel. Is it round or straight? Does it roll?

Ask: What shape is a ball? (A sphere.) · Does a sphere roll well and have corners? (It rolls well and has no corners, no vertices [3].)

Check understanding: Ask all to point to the sphere and show zero fingers for corners. If unsure, let them hold the ball again.

Support: Let a shy pupil peek at the ball first, then feel it again in the bag. **Stretch:** Ask quick guessers to whisper what 2-D shape they can see on the ball or box.

Use: Slides 1-2

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

To teach face, edge and vertex and model counting them on a cube.

YOU DO

1. Show Slide 7 and teach the words with actions: pat for face, trace arm for edge, tap head for vertex.
2. Show Slide 3 and read: A cube has 12 edges! Count all the lines.
3. Play Video clip 1 on Slide 6 and pause to count together.
4. Model with a cube block: touch each face, trace each edge, tap each corner and say numbers.

STUDENTS DO

1. Watch the clip and join in counting faces, edges and corners.
2. Repeat face, edge and vertex and copy the pat, trace and tap actions.
3. Count aloud with the teacher: 6 faces, 12 edges, 8 vertices.

Say: A face is a flat or curved surface on a 3-D shape [3]. An edge is where two faces meet [3]. A vertex is a corner where edges meet [3]. We touch each part once so we do not miss one or count twice.

Worked example: Cube: Touch the faces one by one. 1, 2, 3, 4, 5, 6. A cube has six square faces [3]. Trace the lines where faces meet. There are 12 edges [3]. Tap the corners where edges meet. There are eight vertices [3]. So cube = 6 faces, 12 edges, 8 vertices.

Ask: What is a face? (A flat or curved surface on a 3-D shape [3].) · How many edges and vertices does a cube have? (12 edges [3] and eight vertices [3].) · What is an edge? (Where two faces meet [3].)

Check understanding: All hold up fingers to show faces, then edges, then vertices for the cube: 6, 12, 8. Reteach any part most miss.

Support: Keep the cube in sight and point to the poster of words while counting slowly. **Stretch:** Ask who can predict the counts for a square-based pyramid before we meet it.

Use: Slides 3, 6-7; Video clip 1 (0:00–3:56)

22–45 min **Main activity** 23 min · Pairs

To handle shapes in pairs and describe them by faces, edges and vertices.

YOU DO

1. Show Slide 10 and model: Touch each face. Trace each edge. Tap each corner. Say the numbers.
2. Show Slide 9 and explain: Pick one shape. Count faces, then edges. Tap corners and say numbers.
3. Feel one shape in the cloth bag with the class, reveal the cube block, ball or empty tin, then count together by touching.
4. Send pairs to pick a shape, count, and hold up fingers to show faces then say the shape name.

STUDENTS DO

1. Feel a shape in the bag, then look at it with the class and count by touching.
2. In pairs pick the cube block, ball or empty tin and count faces, then edges, then vertices.
3. Hold up fingers to show the number of faces, then say the shape name and counts to the partner.

Say: Pick up one shape with your partner. First count the faces. A cylinder has three faces [3] and a sphere has just one face [3]. Then trace and count the edges. Then tap and count the corners. Say the numbers clearly.

Worked example: Empty tin, cylinder: Look for the flat circles. It has 2 flat faces and 1 curved face [12], so 3 faces in total [3]. Trace where faces meet. It has two edges [3]. Tap for corners. It has no vertices [12]. So cylinder = 3 faces, 2 edges, no vertices.

Ask: How many faces does your cylinder tin have? (Three faces [3].) · How many faces, edges and vertices does your cube have? (Six square faces [3], 12 edges [3], eight vertices [3].)

Check understanding: Visit pairs and ask each to point to one edge, one vertex and one face and say totals. Help any pair that skips or double counts.

Support: Let students keep the shape in sight while counting and put a small sticker on each face already counted. **Stretch:** Add a square-based pyramid for fast counters to describe next.

Use: Slides 9-10

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45–60 min **Plenary** 15 min · Whole class

To check naming and counts and fix mix-ups about round shapes.

YOU DO

1. Bring class back with cube, ball, tin and cone on the table.
2. Show Slide 12 and read each line: A cube has 6 faces. A sphere has corners. A cone has 1 corner.
3. Ask true or false with thumbs up or down, then touch the real shape to prove it.
4. Return to success lines and agree what we can do now.

STUDENTS DO

1. Vote true or false and point to the face, edge or vertex on the real shape.
2. Correct the false one aloud: a sphere has no vertices [11].
3. Say what they can do against the success lines with a partner.

Say: Let us check our learning. A cube has 6 faces is true because a cube has six square faces [3]. A sphere has just one face, zero edges and no vertices [3], so corners is false. A cone has one vertex [3], so one corner is true.

Ask: True or false? A cube has 6 faces. (True. Six square faces [3].) · True or false? A sphere has corners. A cone has 1 corner. (Sphere false, it has none [3]; cone true, it has one vertex [3].) · A square-based pyramid has how many faces, edges and vertices? (Five faces, eight edges and five vertices [3].)

Check understanding: Use thumbs for each true or false. If many miss the sphere, hold the ball again and show no straight edges or corners to feel.

Support: Show the real shapes on the table so pupils can point while they listen to the clues. **Stretch:** Ask confident pupils to give a slow clue using faces, edges or vertices for the class to guess.

Use: Slide 12

Common mistakes

Mistake	How to spot it	How to fix it
Saying a sphere has faces like a cube or has corners	Pupil counts flat sides on the ball or points to nowhere as a corner	Hold and turn the ball. Show it has just one face, zero edges and no vertices [3].
Mixing up edge and face	Pupil traces a flat side when asked for an edge	Remind: a face is a flat or curved surface [3], an edge is where two faces meet [3]. Trace the line, not the side.
Missing faces or counting one twice on cube or tin	Counts to 5 or 7 for a cube, or 2 for a cylinder	Mark each face with a sticker dot as you touch it. A cube has six square faces [3], a cylinder has three faces [3].

Support

- Keep real shapes in sight and put a sticker dot on each face counted
- Use pat, trace, tap actions and sentence frame: This is a ___ because it has ___

Stretch

- Describe a square-based pyramid with five faces, eight edges and five vertices [3]
- Predict the 2-D print, a circle on a cylinder and a triangle on a pyramid [2], before checking

For the LSE or teaching assistant

Stay with the main pairs table. Help pupils hold the shape still, point to each face for a sticker dot, and echo counts for cube 6, 12, 8 and cylinder 3, 2, 0.

Check for understanding

Question	Answer
A cube has how many faces, edges and vertices?	6 faces, 12 edges, 8 vertices
A sphere has how many faces, edges and vertices?	1 face, 0 edges, no vertices
A cone has how many vertices?	1 vertex

Homework

Find one box and one ball at home. Tell a grown-up their shape names and face numbers.

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