# Positions on a 2-D grid

# National Curriculum attainment target

- Describe positions on a 2-D grid as coordinates in the first quadrant
- Describe the position of a point on a grid as coordinates in the first quadrant

## Previous related lessons

Unit 2, Week 3, Lesson 3; Unit 11, Week 3, Lesson 1

## Prerequisites for learning

Pupils need to:

• understand that the term 'coordinates' is applied to a pair of numbers which denote the exact position of the intersection of two lines in a grid of squares

#### Vocabulary

vertical, horizontal, diagonal, x-coordinate, y-coordinate, vertex, reflect

## Future related lesson

None

Lesson objective

#### Success criteria

- Pupils can:
- plot specified points and join them to make a 2-D shape



# **Getting Started**

• Choose an activity from Geometry – Position and direction.

Collins Connect
Year 4, Unit 11, Week 3

# Teach

h II.

- Briefly review, with examples, the coordinate reference system in Lesson 1 of this Unit.
- Display: the Coordinates tool. Set the x and y axes to start at 0 and end at 9.
- Plot and label the points A (2, 4) B (4, 4) C (4, 2) and say: These points are the three vertices of a square.
- Ask: Who can give me the coordinates of the fourth vertex D? (2, 2)
- Draw lines to complete the square.
- Ask: What do you notice about the digits that form the coordinates for the four vertices of the square? Can you describe the pattern to the class? Elicit that for points A (2, 4) and C (4, 2) the digits are reversed, and that the remaining two coordinates for points B and D have two fours or two twos.
- Say: The square ABCD is half of a 2-D shape. Point to the side BC and say: The side BC is lying along a vertical line of symmetry.
- Ask: If I reflect the square, which is the half shape in this mirror line, what will the whole shape be? (rectangle) What are the new points for A and D? (A (6, 4) and D (6, 2))
- Repeat, as above, by reflecting the square horizontally and vertically along sides AB, AD and DC.
- Clear the plot area.

- Plot and label the points P (3, 6) Q (6, 6) and R (6, 3). Draw lines to complete the triangle.
- Ask: What name do we give to this triangle? (right-angled isosceles triangle)
- Reflect the triangle in a line of symmetry which lies along side PQ and then along side QR. Elicit that each reflection of the half shape produces a larger right-angled isosceles triangle.
- Clear the reflections in sides PQ and QR but keep the original triangle PQR.
- Point to the side PR and say: Imagine a diagonal line of symmetry which lies alongside PR. In your head reflect the triangle in the mirror line.
- Ask: What shape do you see? (square)
  - Say: Tell your partner the coordinates for the reflection of point Q. (3, 3) Label this point S.
  - Ask: How we can use reflection to transform the square PQRS into a rectangle that will fit into our grid? Who found a different way? Establish that the square can be reflected alongside SR to give the reflected points (3, 0) and (6, 0): or alongside PS to give the reflected points (0, 3) and (0, 6).

Individualised Learning

Refer to Activity 3 from the Learning activities on page 429.

- Pupil Book 4C: Page 38: Coordinates of shapes
  - Resources: Resource 14: 6 × 6 coordinate grids (per child), ruler (per child), red pencil (per child), squared paper or coordinateplotting ICT tools (Challenge 3)

# Plenary

#### Resources

the Coordinates tool (per class)

- Display the Pupil Book page.

- Display: the Symmetry tool and Slide 1. Draw a graph around the Symmetry tool so that you can map to co-ordinates of the shapes. Using the Coordinates tool, take each shape in turn and ask questions such as: What is the name of the half shape? Of the whole shape? Can you explain to the class how you found the coordinates of the 1 / 2 / 3 vertices, so that you could reflect the shape in the line of symmetry? Which half shapes have right angles? How can you use this fact to help you draw the whole shape? How can you check that that you have correctly reflected the shape?
- Say: Look at grid c. Tell your partner which x-coordinate the reflected vertex of the point must have. (4)