

S2.4

Coordinates

objectives

- Recognise positions; read and plot coordinates in the first quadrant.
- Find coordinates of points determined by geometric information.
- Solve problems and investigate in shape, space and measures.
- Explain and justify methods and conclusions.

starter

Vocabulary

right
left
top
bottom
above
below
diagonally opposite

Resources

mini-whiteboards

Say that this lesson is about finding and describing positions. Ask pupils to write the words CAT and DOG in two columns, side by side.

C	D
A	O
T	G

- Q Which letter is between D and G?
- Q Which letter is to the right of A? To the left of G?
- Q Which letter is directly above O? Directly below A?
- Q Which letter is diagonally opposite T?

Tell the class to close their eyes. Say that you are going to give them two more words, and will then ask some questions. You want them to think of the answers in their heads but not say them aloud. Say, pausing briefly at the end of each sentence:

*Imagine the words COW and HEN in two columns, side by side, printed in the air in front of you. COW is on the left and HEN is on the right.
Which letter is directly above the E? Which letter is directly below the O?
Which letter is to the left of the H? Which letter is to the right of the W?
Which letter is diagonally opposite N?*

Tell pupils to open their eyes. Repeat the last questions for them to answer. (If pupils have difficulty visualising, repeat the activity, but this time allow them to keep their eyes open and to sketch the information on their whiteboards.)

main activity

Vocabulary

grid, grid lines
horizontal axis (*x*-axis)
vertical axis (*y*-axis)
coordinates
origin

Resources

mini-whiteboards
cm squared paper
OHTs S2.4a, S2.4b,
S2.4c
ITP *Coordinates*
(optional)

Show **OHT S2.4a**. Point to the *grid lines* and explain that lines drawn like this are called a *grid*. Point to the numbers and say that the lines are labelled to help describe positions of things on the grid – as, for example, on a map. Point out the *horizontal axis* and *vertical axis*. Say that the horizontal numbers tell us how far along, and the vertical numbers tell us how far up.

- Q Look along the horizontal axis to the line at 4. What places are on it?
(the mine and the gallows)
 - Q Look up the vertical axis to the line at 3. What places are on it?
(the camp and the swamp)
- Repeat for other lines.
- Q Look at the treasure. How far is it along? (1 unit) How far is it up? (5 units)

Explain that the position 'one along, five up' is written as (1, 5) and that 1 and 5 are called the *coordinates* of the point where the treasure is. Write (1, 5) and *coordinates* on the board. Repeat for other positions.

Clean the board and ask pupils to look at the map.

Q What place is at (3, 6)? (the beach)

Repeat for other coordinates.

Show **OHT 2.4b**. Tell pupils that the horizontal axis is known as the *x-axis*, and the vertical axis as the *y-axis*. The axes should always be labelled. Point out the labels on the OHT. Explain that the coordinates are always listed in the same order, first the *x-coordinate*, then the *y-coordinate*. In the pair (3, 5), for example, the *x-coordinate* is 3, and the *y-coordinate* is 5. Say that the point where the axes cross each other is the point (0, 0) and is called the *origin*.

Point to a corner of one of the squares, and ask:

Q What is the *x*-coordinate of this point? And the *y*-coordinate?

Ask pupils to write on their whiteboards the coordinates of the other three corners of the square. Repeat with the other square.

Give out centimetre squared paper. Ask pupils to use their rulers and to draw and label two axes, each from 0 to 8. Then ask them to draw a square of their own, and to label each of the corners with the coordinates.

Q Three of the corners of a square are at (0, 3), (0, 5) and (2, 5). Where is the fourth corner? (2, 3)

Q Three of the corners of a square are at (6, 3), (8, 5) and (6, 7). Where is the fourth corner? (4, 5)

Ask pupils to discuss the next question in pairs. Tell them that there is more than one possible answer.

Q Where are the other two corners of a square, if two of the corners are at (4, 2) and (4, 6)? [(0, 2) and (0, 6), or (8, 2) and (8, 6), or (2, 4) and (6, 4)]

You could, if you wish, support this section of the lesson by using the ITP *Coordinates*, downloaded from www.standards.dfes.gov.uk/numeracy. Select options and ask questions to consolidate pupils' understanding.

Show **OHT 2.4c**. Explain that grid lines are not always drawn, as in this diagram. Work through the questions on the OHT with the class. After each question, ask pupils to explain how they worked out the answer.

other tasks

Springboard 7 Unit 8

Unit 8 section 2: Triangles and coordinates

Star challenge 2: Plotting pictures

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Unit 8 section 3: Fun with coordinates

1 Coordinates

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Star challenge 4: The treasure map

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Star challenge 5: More picture puzzles

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plenary

Resources
OHT S2.4d

Show **OHT S2.4d**. Point out the spot on the top corner of each tile.

- Q On tile 3, what are the coordinates of the corner with a spot? (5, 6)
- Q On tile 4, what are the coordinates of the corner with a spot? (7, 8)
- Q On tile 10, what are the coordinates of the corner with a spot? (19, 20)
Explain how you worked out your answer.
- Q One pupil said: 'One tile in the pattern has a spot in the corner at (50, 50).' Explain why the pupil is wrong. (the x -coordinate of a corner with a spot is always one less than the y -coordinate)

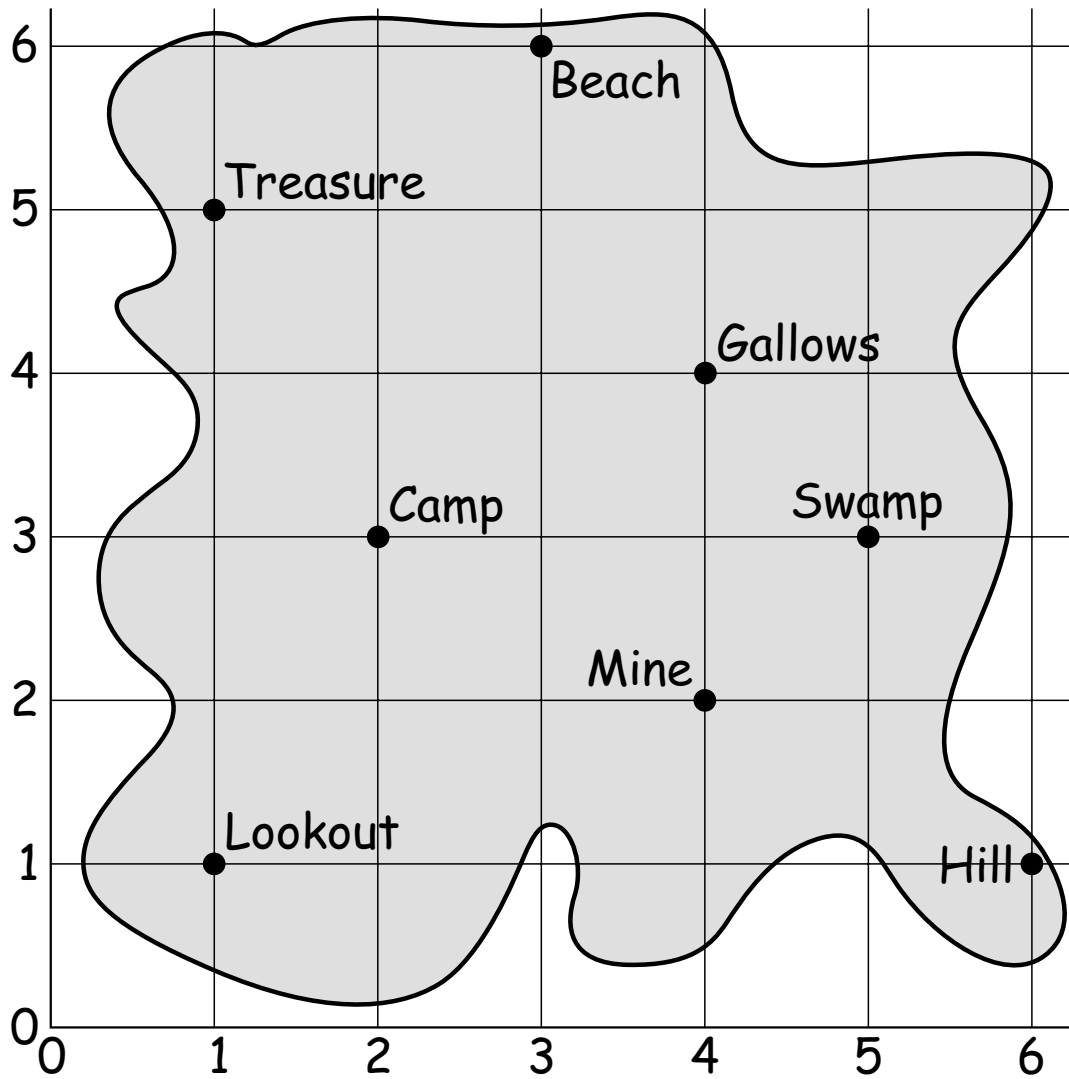
Point out the x on each tile. Draw a table on the board. Invite pupils to fill in the coordinates of the corners with a x .

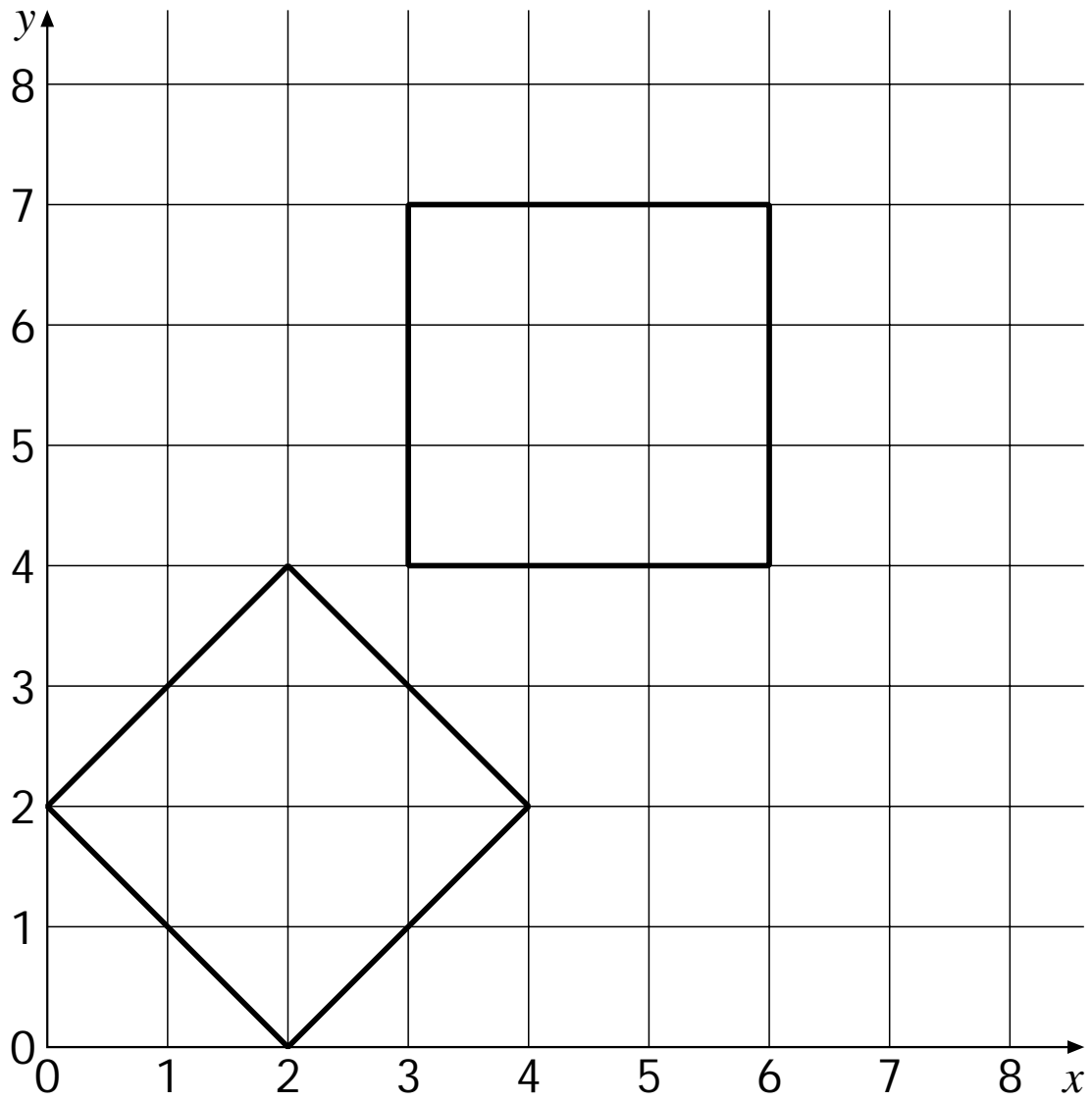
Tile number	Coordinates of the corner with a x
1	(.....,)
2	(.....,)
3	(.....,)
4	(.....,)

- Q On tile 7, what are the coordinates of the corner with a cross on? (14, 13)
- Q Which tile has a cross in the corner at (24, 23)? (tile 12)

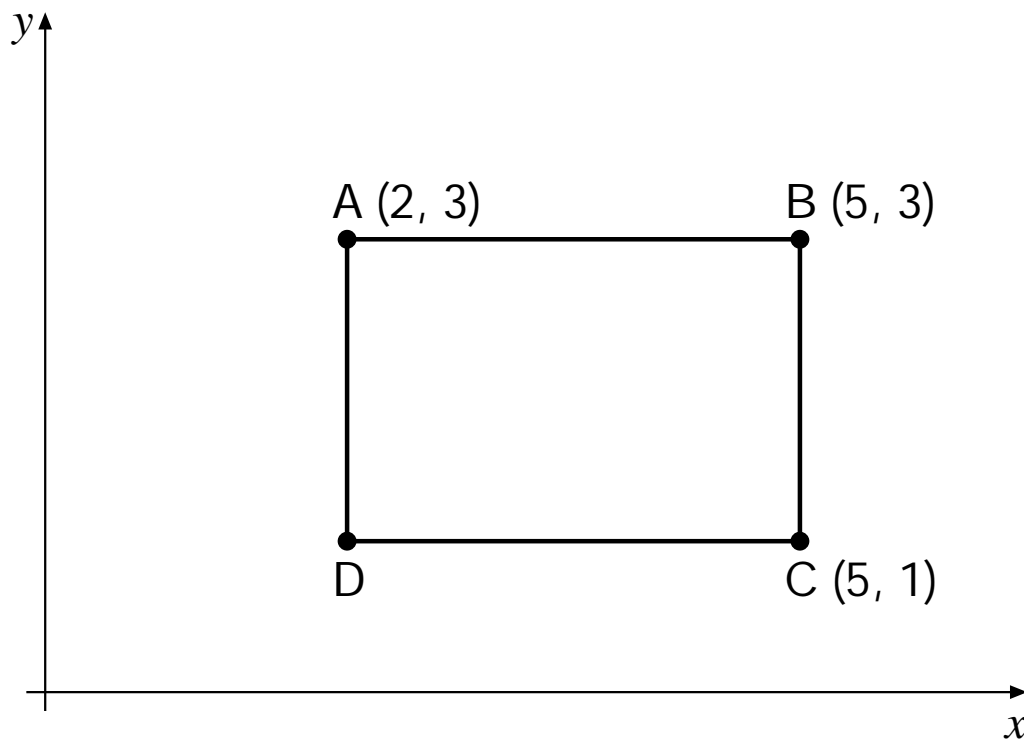
Remember

- The horizontal axis is the x -axis.
- The vertical axis is the y -axis.
- A pair of coordinates is written as (x, y) .





Look at the diagram.



The point K is halfway between points B and C.

What are the coordinates of point K? (..... ,)

The point H is halfway between points A and B.

What are the coordinates of point H? (..... ,)

Shape ABCD is a rectangle.

What are the coordinates of point D? (..... ,)

Here are some tiles on a grid, in a continuing pattern.

Each tile is numbered and marked in the top corner with a \bullet and the right corner with a \times .

