Answers - Coordinates and translation

Year: Year 4

Answer to Question 1

a. Point A is 3 across and 5 up: **(3, 5)**.
b. Point B is 6 across and 2 up: **(6, 2)**.
c. Point C is 0 across and 4 up: **(0, 4)**.
d. Point D is 7 across and 7 up: **(7, 7)**.
e. Point E is 5 across and 0 up: **(5, 0)**.

Answer to Question 2

a. R (0, 3) is on the vertical axis and T (6, 0) is on the horizontal axis: **R and T**.
b. The biggest x-coordinate is 7: point **Q**.
c. The biggest y-coordinate is 6: point **P**.
d. No two points share a y-coordinate and no two share an x-coordinate in the list, so **there is no such pair**.

Answer to Question 3

a. **(1, 3)**: it has the x of (1, 1) and the y of (5, 3).
b. **(7, 2)**: x of (7, 6) and y of (2, 2).
c. **(0, 0)**: x of (0, 4) and y of (4, 0).
d. **(8, 5)**: x of (8, 2) and y of (3, 5).

Answer to Question 4

a. Same y, so horizontal: $6 - 1 =$ **5 units**.
b. Same x, so vertical: $7 - 1 =$ **6 units**.
c. $9 - 0 =$ **9 units**.
d. Width $8 - 2 = 6$, height $4 - 1 = 3$. Perimeter $2 \times (6 + 3) =$ **18 units**. Area $6 \times 3 =$ **18 square units**.

Answer to Question 5

a. (3, 4) 2 right and 1 up: $x = 3 + 2 = 5$, $y = 4 + 1 = 5$. New point **(5, 5)**.
b. (5, 2) 3 left and 4 up: $x = 5 - 3 = 2$, $y = 2 + 4 = 6$. New point **(2, 6)**.
c. (6, 7) 5 down: $x = 6 + 0 = 6$, $y = 7 - 5 = 2$. New point **(6, 2)**.
d. (1, 1) 6 right and 6 up: $x = 1 + 6 = 7$, $y = 1 + 6 = 7$. New point **(7, 7)**.

Answer to Question 6

a. x changes from 2 to 7 and y from 3 to 5: **5 right and 2 up**.
b. x changes from 6 to 2 and y from 6 to 2: **4 left and 4 down**.
c. x changes from 1 to 1 and y from 7 to 3: **4 down**.
d. x changes from 8 to 3 and y from 1 to 4: **5 left and 3 up**.

Answer to Question 7

a. The smallest x-coordinate is 2, so the **cave** (2, 7).
b. From (3, 2) to (8, 3): 5 right and 1 up, which is 6 squares, or **60 paces**.
c. From (6, 5) to (2, 7): **4 left and 2 up**.
d. From (4, 6) to the palm tree (6, 5): 2 across and 1 down, 3 squares. To the cave (2, 7): 2 across and 1 up, 3 squares. They are the **same** distance, 3 squares.

Answer to Question 8

a. (3, 2) is in the list, so it is a **hit** on the big ship.
b. (2, 3) is not in the list (it is across 2, up 3, a different square), so it is a **miss**.
c. The two squares (6, 5) and (6, 6) have the same x, so the ship is **vertical**.
d. She must call **(2, 2), (3, 2) and (4, 2)** (all three).

Answer to Question 9

a. The same row means the same y-coordinate (3): **Bea**.
b. The same column means the same x-coordinate (2): **Cal**.
c. The corner has the x of Bea (5) and the y of Cal (6): **(5, 6)**.
d. $x = 2 + 3 = 5$ and $y = 3 + 2 = 5$, so Ali sits at **(5, 5)**.

Answer to Question 10

a. $(1 + 4, 1 + 3) =$ **(5, 4)**.
b. Left 2: (3, 4). Up 2: (3, 6). Right 5: **(8, 6)**.
c. From (8, 6) to (1, 1): 7 left and 5 down: **left 7, down 5**.
d. $4 + 3 + 2 + 2 + 5 =$ **16 squares**.

Answer to Question 11

a. Same y, so $4 - 1 =$ **3 squares**.
b. Same x, so $6 - 2 =$ **4 squares**.

c. Same y, so 8 − 4 = **4 squares**.
d. 3 + 4 + 4 = 11 squares. 11 × 200 = **2 200 m** (2.2 km).

Answer to Question 12

a. A′ = (1 + 3, 1 + 2) = **(4, 3)**; B′ = (4 + 3, 1 + 2) = **(7, 3)**; C′ = (1 + 3, 3 + 2) = **(4, 5)**.
b. The opposite movement: **3 left and 2 down**.
c. From (4, 3): x = 4 + 2 = 6 and y = 3 − 1 = 2. A″ = **(6, 2)**.
d. Base AB = 4 − 1 = 3 and height AC = 3 − 1 = 2. Half of 3 × 2 = **3 square units**. A translation does not change the area.

Answer to Question 13

a. Length 7 − 1 = **6 m**, width 5 − 1 = **4 m**.
b. 2 × (6 + 4) = **20 m**.
c. Garden 6 × 4 = **24 m²**. Pond: (5 − 3) × (4 − 2) = 2 × 2 = **4 m²**.
d. 24 − 4 = **20 m²**.

Answer to Question 14

a. From (2, 2) to (5, 2): **3 squares** to the right.
b. From (5, 2) to (8, 5): **3 right and 3 up**.
c. 3 + 3 + 3 = **9 squares**.
d. Going up first from (5, 2) he passes (5, 3), (5, 4) and (5, 5), which is where the dragon is. Going right first he moves along y = 2 to (8, 2) and then up to (8, 5), and the dragon at (5, 5) is not on this route. So **right first** avoids the dragon.

Answer to Question 15

a. D has the x of A (2) and the y of C (4): **(2, 4)**.
b. Width 7 − 2 = 5 and height 4 − 1 = 3. Perimeter 2 × (5 + 3) = **16 units**. Area 5 × 3 = **15 square units**.
c. Subtract 1 from each x and add 3 to each y: A′ **(1, 4)**, B′ **(6, 4)**, C′ **(6, 7)**, D′ **(1, 7)**.
d. The width is 5 and half of 5 is **2.5 units**.
e. Yes, the halves are identical (mirror images). The rectangle has **2** lines of symmetry.

Answer to Question 16

a. 3 across and 2 up: 3 + 2 = **5 squares**.
b. A to B: 6 − 2 = 4. B to C: 7 − 3 = 4. C to D: 6 − 1 = 5. Total 4 + 4 + 5 = **13 squares**.
c. 5 + 13 = 18 squares. 18 × 100 = **1 800 m**.
d. D (7, 1) to (0, 0): 7 + 1 = **8 squares**.
e. 18 + 8 = 26 squares. 26 × 8p = 208p = **£2.08**.

Answer to Question 17

a. Vertical (same x): (2, 1)–(2, 7), (4, 7)–(4, 3), (7, 3)–(7, 1). Horizontal (same y): (2, 7)–(4, 7), (4, 3)–(7, 3), (7, 1)–(2, 1).
b. Sides: 6 + 2 + 4 + 3 + 2 + 5 = **22 units**. (Check: 2 × (5 + 6) = 22.)
c. Tall part: 2 × 6 = 12. Foot: 3 × 2 = 6 (from x = 4 to 7 and y = 1 to 3). Total **18 square units**.
d. Subtract 2 from x and 1 from y: **(0, 0), (0, 6), (2, 6), (2, 2), (5, 2), (5, 0)**.
e. All coordinates are between 0 and 8, so **yes**; the letter now touches the axes.

Answer to Question 18

a. x: 1 to 6 is 5 right; y: 5 to 7 is 2 up. **5 right and 2 up**.
b. x: 1 to 6 is 5 right; y: 5 to 3 is 2 down. **5 right and 2 down**.
c. H to V: 5 + 2 = 7 squares. V to B: 9 − 6 = 3 squares. Total **10 squares**.
d. L (6, 7) → (6 − 2, 7 − 4) = **(4, 3)**. The path goes across from (1, 5) to (6, 5) and then down to (6, 3), so (4, 3) is **not** on the path.
e. 10 × 50 = **500 m**.

Answer to Question 19

a. (1, 1) is 4 from the line, so its reflection is 4 on the other side: **(9, 1)**. (1, 4) → **(9, 4)**. (3, 6) is 2 from the line → **(7, 6)**.
b. Going round: (1, 1), (9, 1), (9, 4), (7, 6), (3, 6), (1, 4).
c. The width is 9 − 1 = **8 units**.
d. The whole flag has **1** line of symmetry (x = 5).
e. The top corners (3, 6) and (7, 6) become **(6, 8) and (10, 8)**.

Answer to Question 20

a. The other corners are at (6, 2) and (2, 6): **B (6, 2)** and **D (2, 6)**.
b. Side 6 − 2 = **4**. Area 4 × 4 = **16 square units**.
c. If we do not need the sides to be parallel to the axes, there is only one square with those two opposite corners, because the diagonals of a square cross in the

middle at 90° and are equal. Here the diagonal AC goes up-right, so the other diagonal goes up-left through (4, 4), and its ends are (2, 6) and (6, 2). So the answer is **no**, only one square.