

## UNIT 14 *Loci and Transformations*

## Mental Tests

### Mental Test 14.1

1. How many lines of symmetry square does a square have? (4)
2. What is the order of rotational symmetry of a  $2\text{ cm} \times 3\text{ cm}$  rectangle? (2)
3. In a scale drawing, drawn to a scale of 1 in 100, what is the true length of a line of length 4 cm? (4 m)
4. A square, of side length 4 cm, is enlarged with scale factor 2.5. What is the new length of the side? (10 cm)
5. The point  $(2, 2)$  is reflected in the  $y$ -axis. What are the new coordinates of the point?  $(-2, 2)$
6. The point  $(1, 3)$  is reflected in the  $x$ -axis. What are the new coordinates of the point?  $(1, -3)$
7. Describe the locus of a point which is always 5 cm from the origin, O.  
(Circle, centre O, radius 5 cm)
8. A line of length 10 cm is enlarged with scale factor  $\frac{1}{2}$ . What is its new length? (5 cm)

### Mental Test 14.2

1. How many lines of symmetry square does an equilateral triangle have? (3)
2. If a scale drawing of a line of length 6 cm represents a length of 12 metres, what is the scale of the drawing? (1 in 200)
3. If the side of a square of length 3 cm is enlarged to 9 cm, what is the scale factor of the enlargement? (3)
4. The point  $(1, 1)$  is reflected in the  $y$ -axis. What are the new coordinates of the point?  $(-1, 1)$
5. If a line of length 9 cm becomes 6 cm after enlargement, what is the scale factor of this enlargement?  $\left(\frac{2}{3}\right)$
6. The point  $(4, 0)$  is reflected in the line  $y = x$ . What are the new coordinates of the point?  $(0, 4)$
7. The point, P, with coordinates  $(2, 3)$  is rotated  $90^\circ$  anticlockwise about the origin. What are the new coordinates of the point?  $(3, -2)$

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**Mental Test 14.3**

1. The line OA, where A is the point (2, 1), is rotated about the origin through  $180^\circ$ .
  - (a) What are the new coordinates of A? (-2, -1)
  - (b) The new position of A is now reflected in the  $x$ -axis.  
What are the coordinates of A now? (-2, 1)
  
2. The point with coordinates (4, 0) is reflected in the line  $y = x$ .  
What are the new coordinates of the point? (0, 4)
  
3. The length of a line was 10 cm. After an enlargement, its length is 15 cm.  
What is the scale factor of this enlargement?  $\left(\frac{3}{2}\right)$
  
4. The square with coordinates (0, 0), (1, 0), (1, 1) and (0, 1) is enlarged with scale factor  $-2$ . What are the transformed coordinates of the point (1, 1)? (-2, -2)
  
5. Triangles ABC and PQR are similar. If the length of AB is 6 cm, PQ is 12 cm and BC is 8 cm, what is the length of QR? (16 cm)

**Mental Test 14.4**

1. The point, A, with coordinates (1, 3) is reflected in the  $y$ -axis.
  - (a) What are the new coordinates of A? (-1, 3)
  - (b) The new line, OA, is now rotated about the origin through  $180^\circ$ .  
What are the new coordinates of A? (1, -3)
  
2. The point with coordinates (4, 1) is reflected in the line  $y = x$ .  
What are the new coordinates of the point? (1, 4)
  
3. The length of a line is 10 cm. After an enlargement its length is 5 cm.  
What is the scale factor of this enlargement?  $\left(\frac{1}{2}\right)$
  
4. The square with coordinates (0, 0), (1, 0), (1, 1) and (0, 1) is enlarged with scale factor  $-3$ .  
What are the transformed coordinates of the point (0, 1)? (0, -3)
  
5. Triangles ABC and PQR are similar. If the length of AB is 5 cm and PQ is 10 cm, what is the ratio of their areas? (1 : 4)