

# Fully-worked Solutions

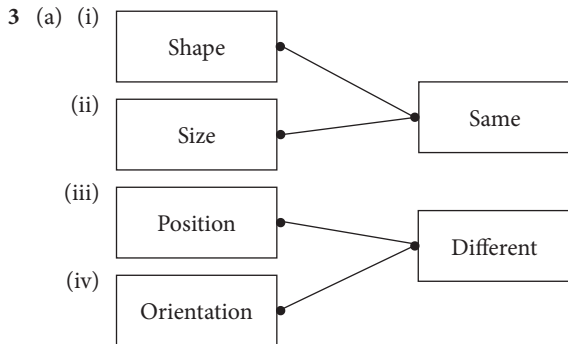
## Practice 11

### Formative Practice

- 1 A True  
B True  
C True  
D False

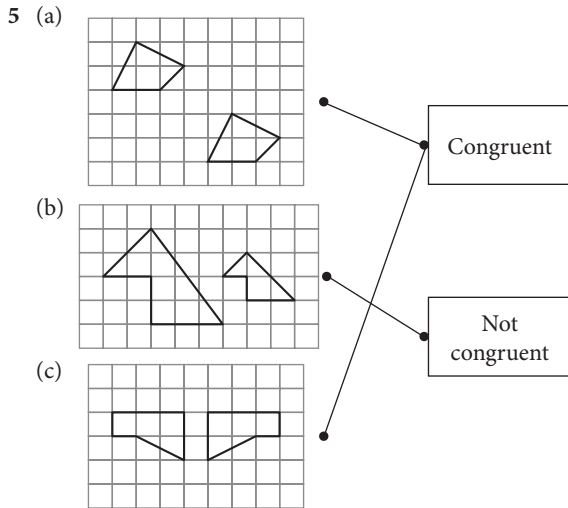
Answer: D

- 2 (a) Shape, Orientation  
(b) Size, Position

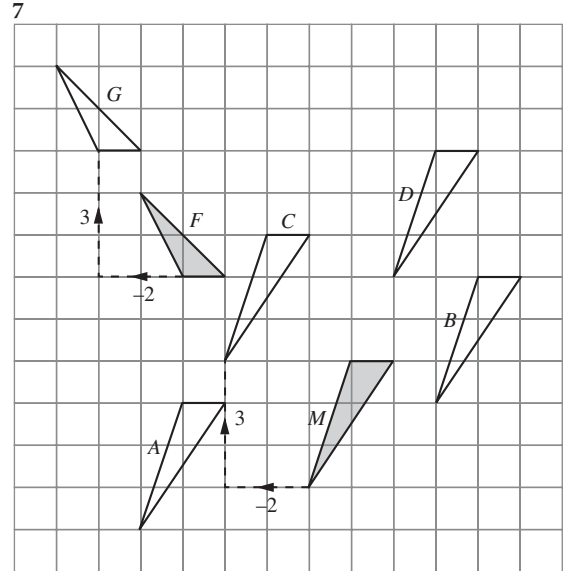


- (b) The correspondence of points  $P, Q$  and  $R$  with  $P', Q'$  and  $R'$  is one-to-one.

- 4 (a) ✓ (b) ✗ (c) ✓  
(d) ✓ (e) ✗ (f) ✗



- 6 (a) Similarity  
(b) Congruency

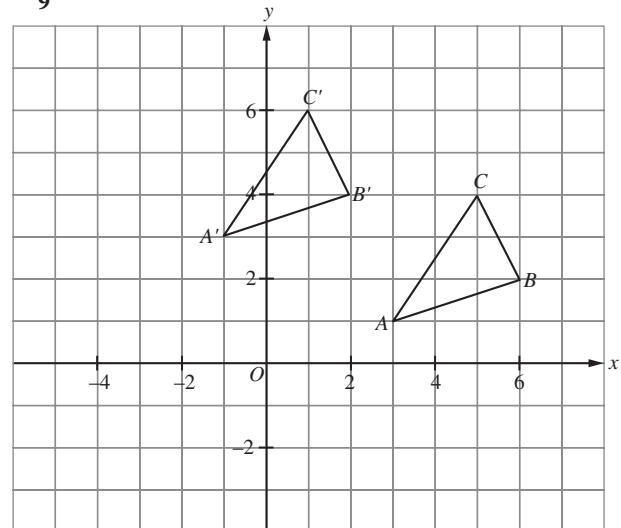


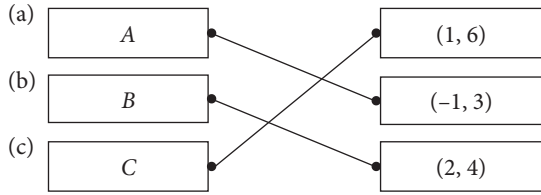
The translation is  $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ .

Triangle  $C$  is the image of triangle  $M$  under the same translation.

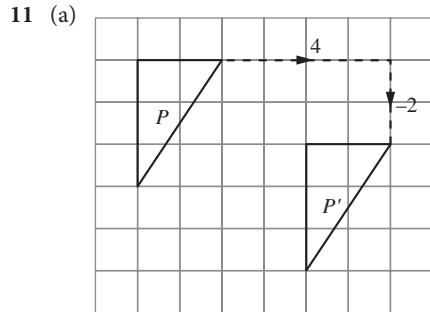
Answer: C

- 8 (a) No (b) Yes (c) Yes  
9

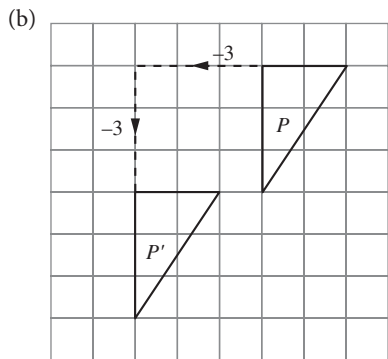




10 (a)  $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$  (b)  $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

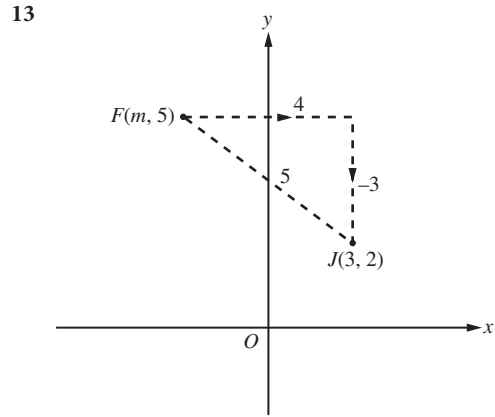


(i) Moves 4 units to the right followed by 2 units downwards.



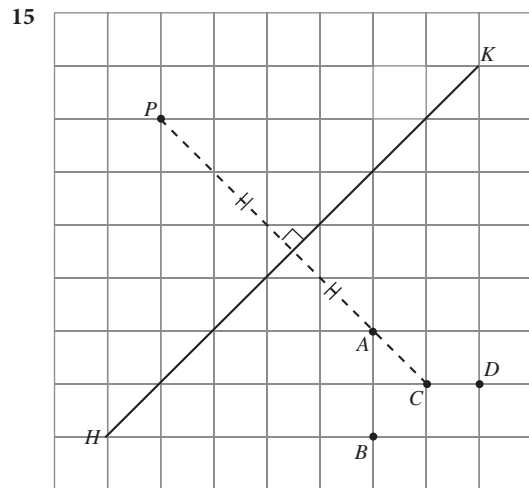
(ii) Moves 3 units to the left followed by 3 units downwards.

12  $\begin{pmatrix} -5 \\ a \end{pmatrix} + \begin{pmatrix} 3 \\ 5 \end{pmatrix} = \begin{pmatrix} b \\ 6 \end{pmatrix}$   
 $\begin{pmatrix} -5 + 3 \\ a + 5 \end{pmatrix} = \begin{pmatrix} b \\ 6 \end{pmatrix}$   
 $\begin{pmatrix} -2 \\ a + 5 \end{pmatrix} = \begin{pmatrix} b \\ 6 \end{pmatrix}$   
 $a + 5 = 6$   
 $a = 1$   
 $b = -2$



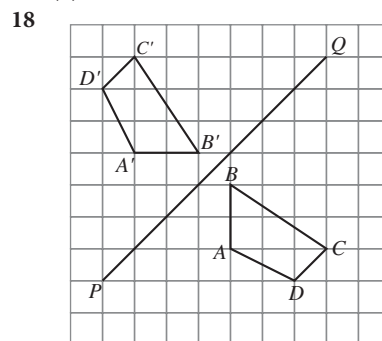
The translation is  $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ .

14 Figure A is the image of X under a reflection.  
 Answer: A

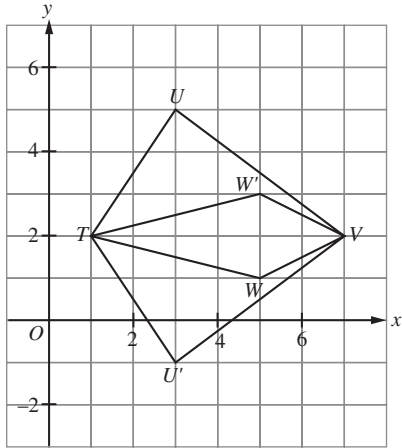


Point C is the image of point P under a reflection on the line HK.

- 16 (a) ✓ (c) ✓  
 17 (a) Reflection in the y-axis.  
 (b) Reflection in the x-axis.

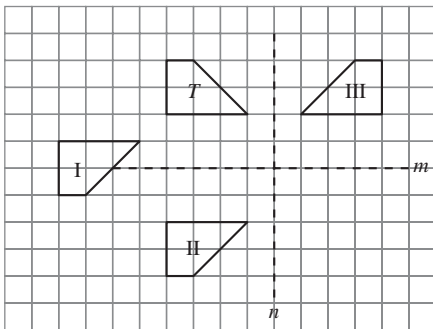


19



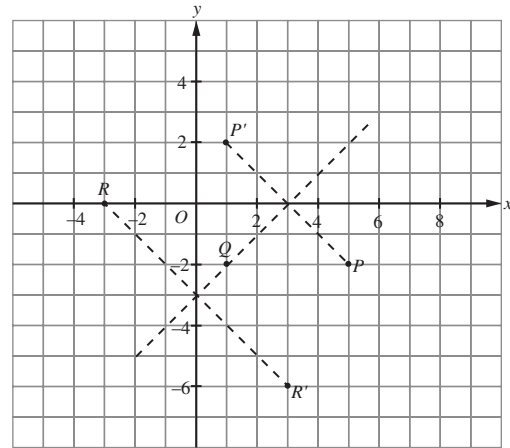
	Point	Image
(a)	T	(7, 2)
(b)	U	(5, 3)
(c)	V	(1, 2)
(d)	W	(3, -1)

20



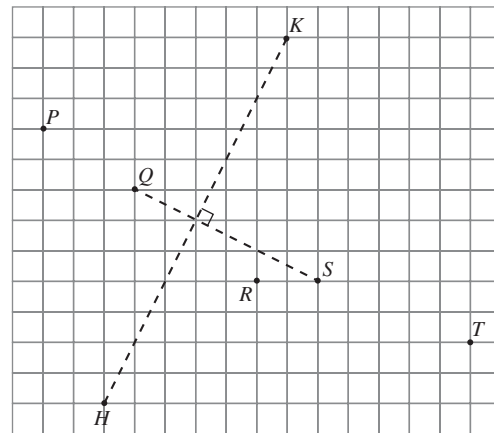
Trapezium II and trapezium III are images of trapezium  $T$  under a reflection in the lines  $m$  and  $n$  respectively.  
 $\therefore$  The images of trapezium  $T$  under a certain reflection are II and III.

21



The coordinates of the image of point  $R$  are  $(3, -6)$ .

22

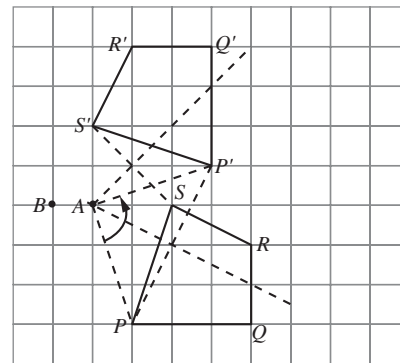


The axis of reflection is the line  $QS$ .

Answer: **B**

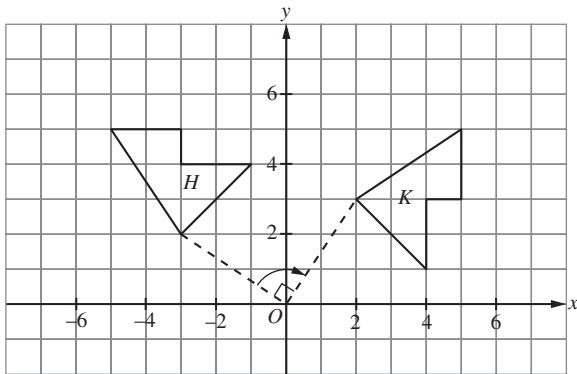
- 23 (a) Yes (b) No  
 (c) Yes

24



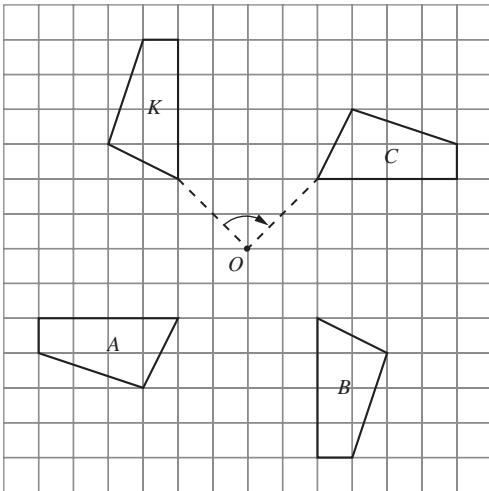
- (a) Centre of rotation is point  $A$ .  
 (b)  $\angle PAP' = \angle QAQ' = \angle RAR' = \angle SAS' = 90^\circ$   
 Angle of rotation is  $90^\circ$ .  
 (c) Direction of rotation is anticlockwise.

25



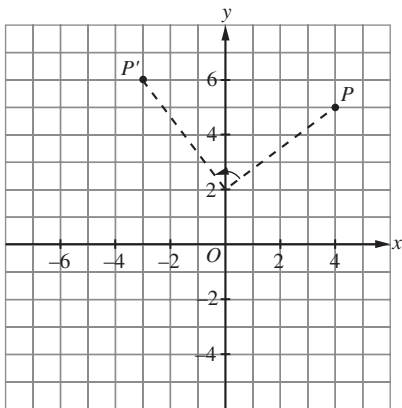
Answer: A

26



The image of quadrilateral K is quadrilateral C.

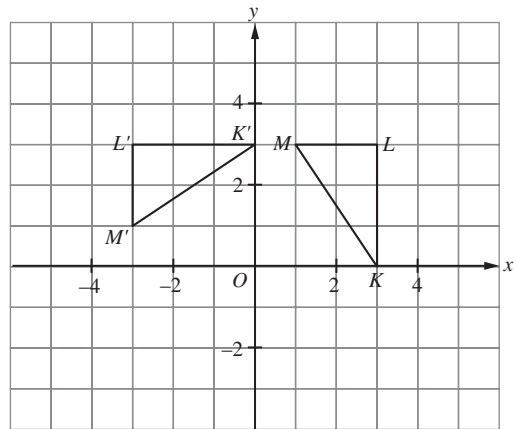
27



The coordinates of the image of point P are (-3, 6).

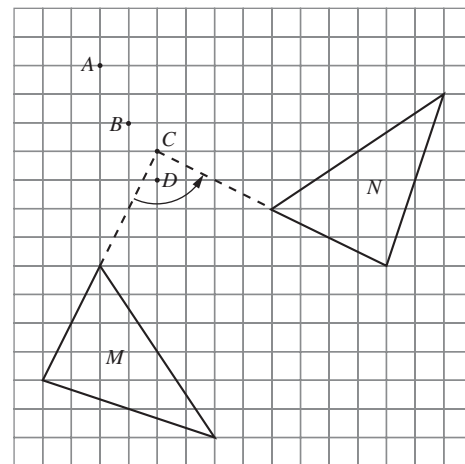
Answer: B

28



Point	Image
(a) K	(-3, 3)
(b) L	(-3, 1)
(c) M	(0, 3)

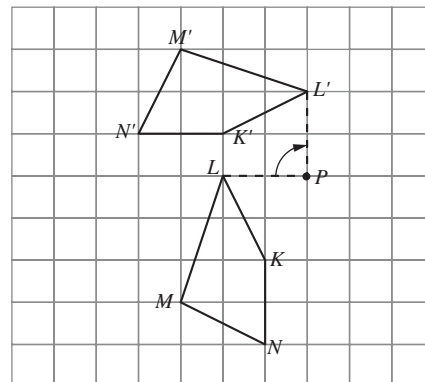
29



The centre of the rotation is C.

Answer: C

30

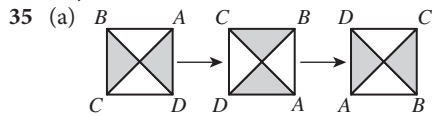


- A True
- B True
- C True
- D False

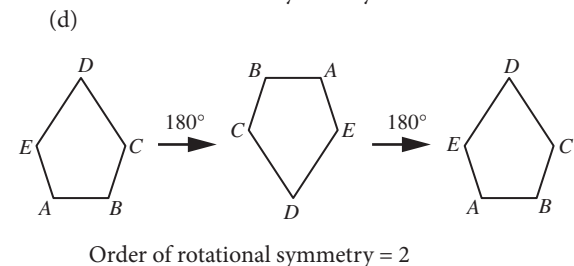
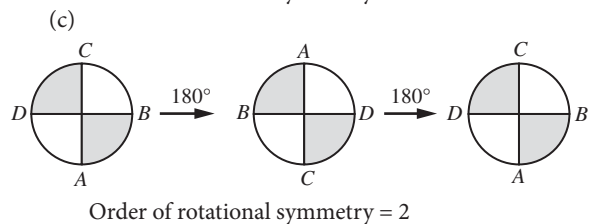
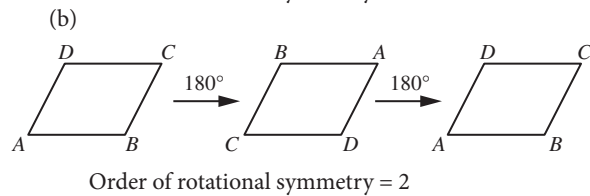
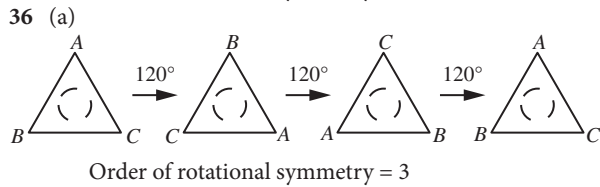
Answer: D

- 31 (a)  $PQ = P'Q'$ ,  $PR = P'R'$ ,  $QR = Q'R'$   
 (b) The distance between two points on the object and the image under the transformation is the same.  
 (c) A reflection in the straight line  $x = 4$ .
- 32 (a) Rotation  
 (b) (i) Sizes of  $P$  and  $Q$  are the same.  
 (ii) Shapes of  $P$  and  $Q$  are the same.  
 (c) Object  $P$  and image  $Q$  under the isometry are congruent.
- 33 (a) Translation  $\vec{AA'}$   
 (b)  $60^\circ + x = 140^\circ$   
 $x = 80^\circ$   
 $\angle A'B'C' = \angle ABC$   
 $y = 180^\circ - 140^\circ$   
 $= 40^\circ$

34 Object B

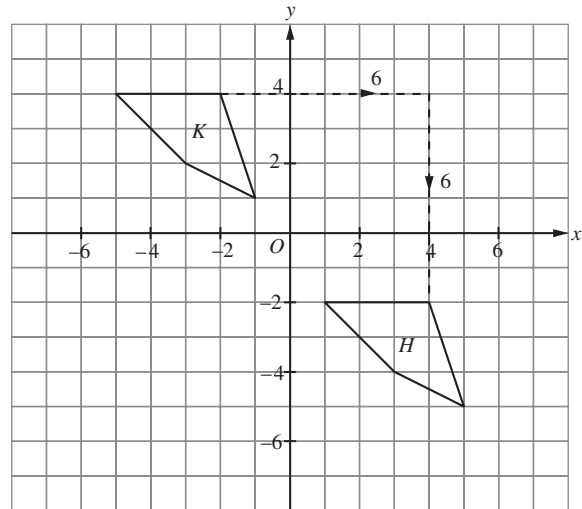


(b) Order of rotational symmetry = 4



### Summative Practice

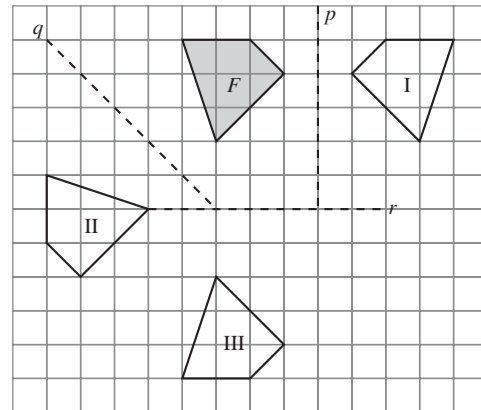
1



The translation  $T$  is  $\begin{pmatrix} 6 \\ -6 \end{pmatrix}$ .

Answer: C

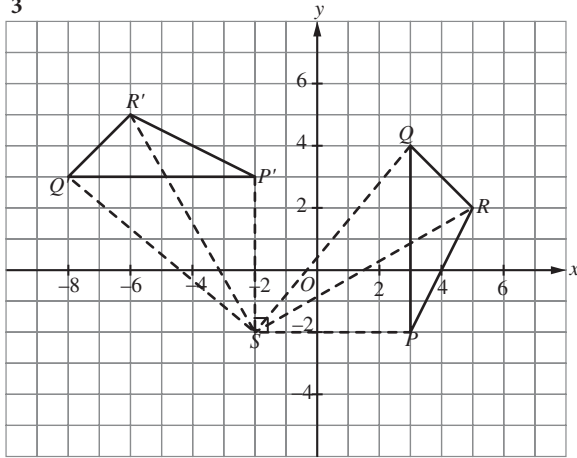
2



The figures I, II and III are the images of figure  $F$  under a reflection on the lines  $p$ ,  $q$  and  $r$  respectively.

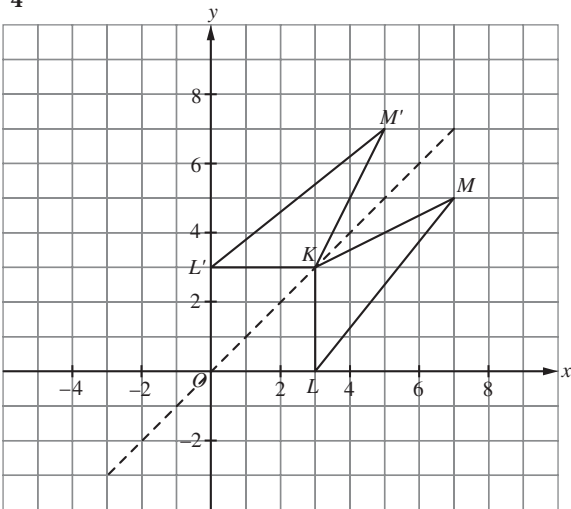
Answer: D

3



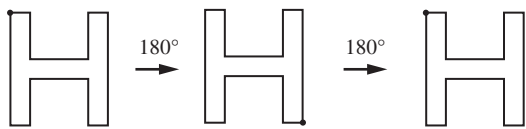
$\angle P'S'P' = \angle Q'S'Q' = \angle R'S'R' = 90^\circ$   
 The coordinates of point S are  $(-2, -2)$ .  
 Answer: **D**

4



The coordinates of the image of point M are  $(5, 7)$ .  
 Answer: **D**

5

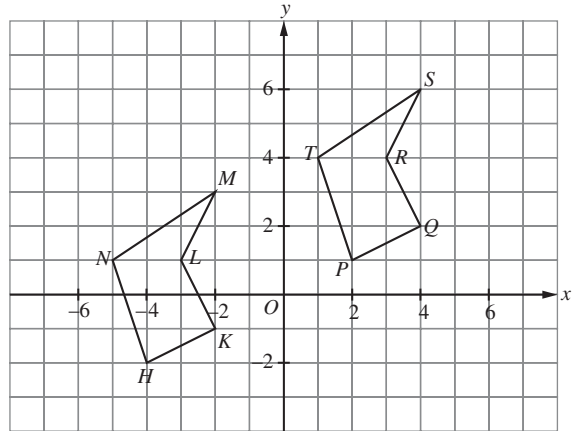


The order of rotational symmetry is 2.  
 Answer: **B**

6

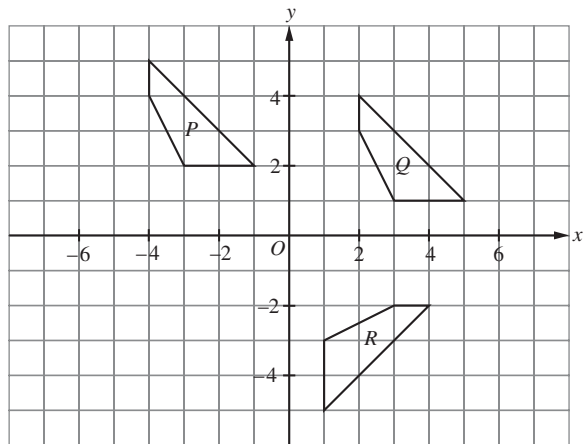
- (a) Shape and size of object are the same.  
 Position and orientation of object are different.
- (b) (i) The correspondence of the point of image of point D is point S.  
 (ii) The correspondence of the point of object of point U is point F.
- (c) Polygons ABCDEF and PQRSTU are congruent.

- 7 (a) Translation  $T = \begin{pmatrix} 6 \\ 3 \end{pmatrix}$   
 $a = 6, b = 3$   
 (b)



$H(-4, -2), K(-2, -1), L(-3, 1), M(-2, 3), N(-5, 1)$

- 8 (a) (i) The translation is  $\begin{pmatrix} 6 \\ -1 \end{pmatrix}$ .  
 (ii) The effect of the translation on the relation between the distances of two points on the object and the image is the same.
- (b)



- (c) The isometry is a rotation.