

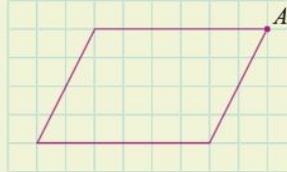
# Rotation

**WALT** understand how an object can rotate around a fixed point.

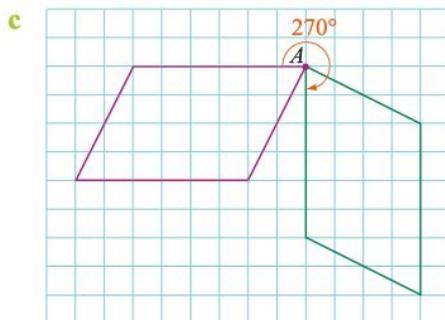
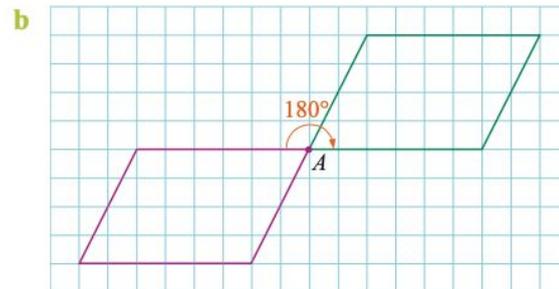
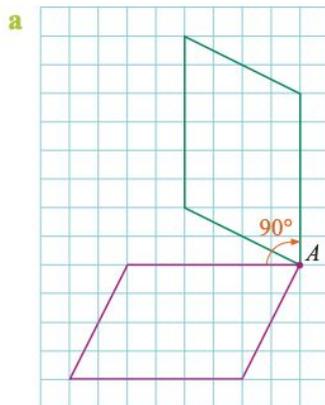
**Success criteria** I know a rotation is a turn around a fixed point and called the centre of rotation. The direction of rotation can be clockwise or anticlockwise.

Draw this parallelogram on grid paper, make a copy and cut it out. Place the copy on top of the parallelogram and rotate it clockwise about  $A$  through the following turns. In each case, draw the image on your grid paper.

- a  $\frac{1}{4}$  turn (1 right angle or  $90^\circ$ )
- b  $\frac{1}{2}$  turn (2 right angles or  $180^\circ$ )
- c  $\frac{3}{4}$  turn (3 right angles or  $270^\circ$ )

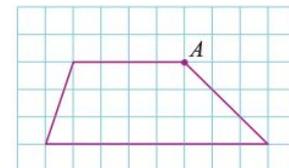


The point  $A$  is the centre of rotation. ! .....

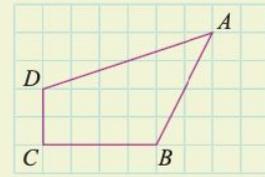


**1** Draw this trapezium on grid paper, make a copy and cut it out. Place the copy on top of the trapezium and rotate it clockwise about  $A$  through the following turns. In each case, draw the image on your grid paper.

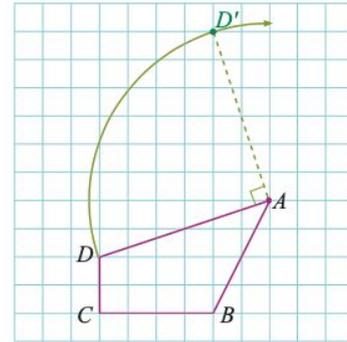
- a  $\frac{1}{4}$  turn (1 right angle or  $90^\circ$ )
- b  $\frac{1}{2}$  turn (2 right angles or  $180^\circ$ )
- c  $\frac{3}{4}$  turn (3 right angles or  $270^\circ$ )



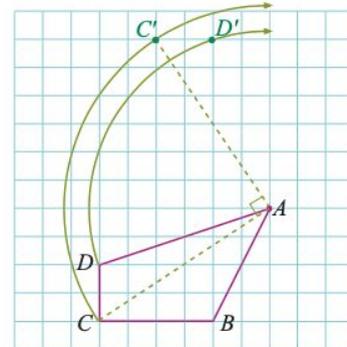
Rotate this shape clockwise about  $A$  through  $90^\circ$  (1 right angle).



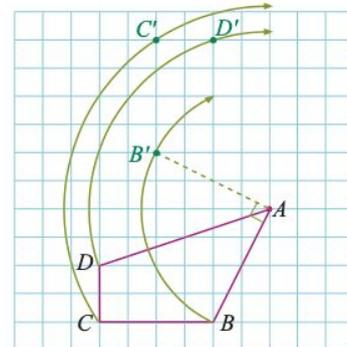
*Step 1:* Place the point of your compasses at  $A$ , open to width  $AD$  and draw an arc in a clockwise direction. Using your protractor, measure an angle of  $90^\circ$  from  $AD$ , as shown. Label the point  $D'$  where the arm of the right angle cuts this arc.



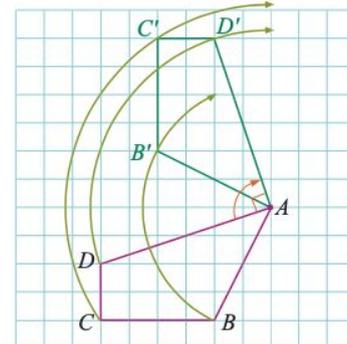
*Step 2:* Place the point of your compasses at  $A$ , open to width  $AC$  and draw an arc in a clockwise direction. Using your protractor, measure an angle of  $90^\circ$  from  $AC$ , as shown. Label the point  $C'$  where the arm of the right angle cuts this arc.



*Step 3:* Place the point of your compasses at  $A$ , open to width  $AB$  and draw an arc in a clockwise direction. Using your protractor, measure an angle of  $90^\circ$  from  $AB$ , as shown. Label the point  $B'$  where the arm of the right angle cuts this arc.

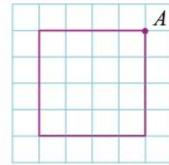


*Step 4:* Join the new points  $AB'C'D'$ .



**2 a** Copy this square onto grid paper and rotate it clockwise about  $A$  through:

- i**  $90^\circ$  (1 right angle)
- ii**  $180^\circ$  (2 right angles)
- iii**  $270^\circ$  (3 right angles)
- iv**  $360^\circ$  (4 right angles)



- b** Compare each image with its original.
- i** Are the matching sides the same length?
  - ii** Are the matching angles the same size?
  - iii** Are the areas the same?

**3 a** Consider the square and its image drawn in question 2 part **ii**. Mark a point  $P$  on the square and rotate it through  $180^\circ$ . Is the new position of  $P$  on the image? Is this true for any point  $P$  on the square? Are  $P$  and its new position the same distance from the centre of rotation?

**b** Consider the square and its image in question 2 part **iii**. Mark a point  $P$  on the square and rotate it through  $270^\circ$ . Is the new position of  $P$  on the image? Is this true for any point  $P$  on the square? Are  $P$  and its new position the same distance from the centre of rotation?

**c** Complete these statements:

- i** 'When a shape is rotated, every point on it moves through the \_\_\_\_\_ angle in the \_\_\_\_\_ direction.'
- ii** 'The distance of any point and its image from the centre of rotation \_\_\_\_\_.'

**4** Copy this rectangle onto grid paper and rotate it:

**a** clockwise about  $A$  through

- i** 1 right angle
- ii** 2 right angles
- iii** 3 right angles
- iv** 4 right angles

**b** clockwise about  $C$  through

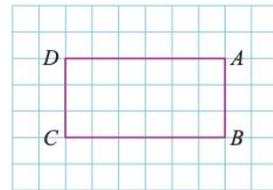
- i** 1 right angle
- ii** 2 right angles
- iii** 3 right angles
- iv** 4 right angles

**c** anticlockwise about  $B$  through

- i** 1 right angle
- ii** 2 right angles
- iii** 3 right angles

**d** anticlockwise about  $D$  through

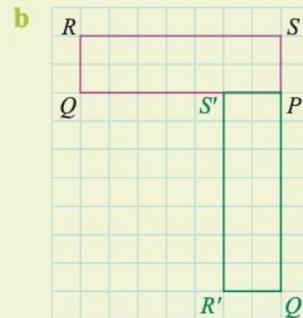
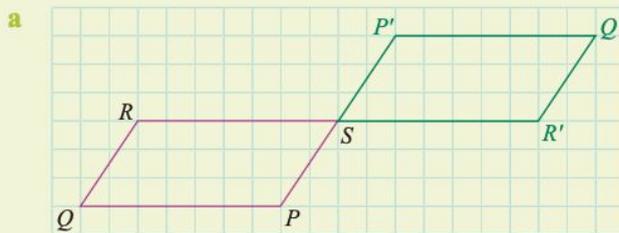
- i** 1 right angle
- ii** 2 right angles
- iii** 3 right angles



Anticlockwise is in the opposite direction to clockwise.

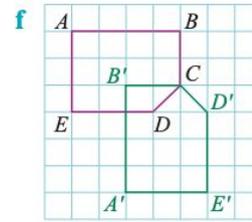
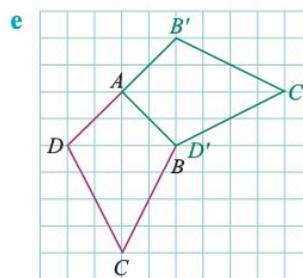
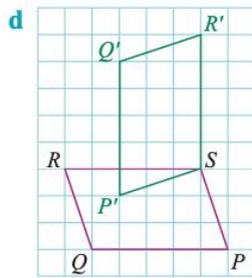
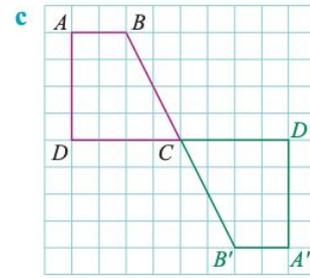
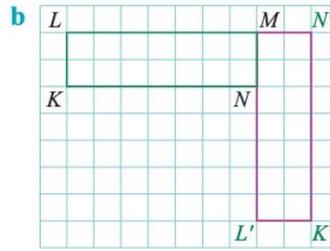
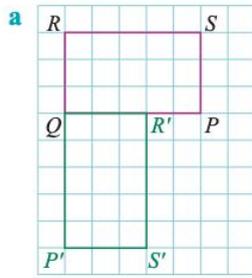
For each transformation shown:

- i** Describe the smallest rotation needed for the transformation.
- ii** State what transformation is needed to move the image back to its original position.

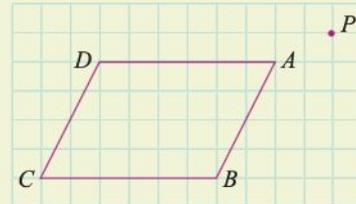


- a i** Clockwise (or anticlockwise) rotation about  $S$  through  $180^\circ$ .
- ii** Anticlockwise (or clockwise) rotation about  $S$  through  $180^\circ$ .
- b i** Anticlockwise rotation about  $P$  through  $90^\circ$ .
- ii** Clockwise rotation about  $P$  through  $90^\circ$ .

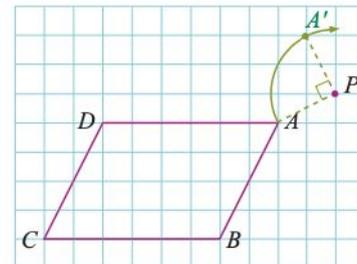
- 5 For each transformation shown:
- Describe the smallest rotation needed for the transformation.
  - State what transformation is needed to move the image back to its original position.



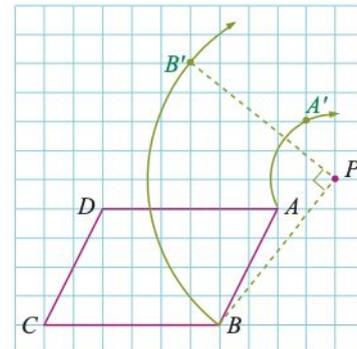
Rotate this parallelogram clockwise through  $90^\circ$  (1 right angle) about the point  $P$ .



*Step 1:* Place the point of your compasses at  $P$ . Draw an arc in a clockwise direction from  $A$ . Use your protractor to measure an angle of  $90^\circ$  from  $PA$ , as shown. Mark the new point  $A'$ .

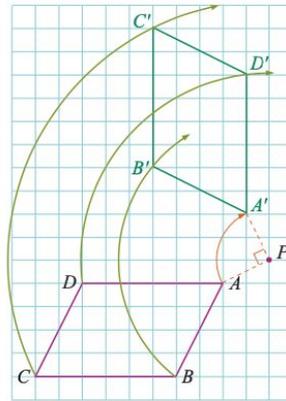
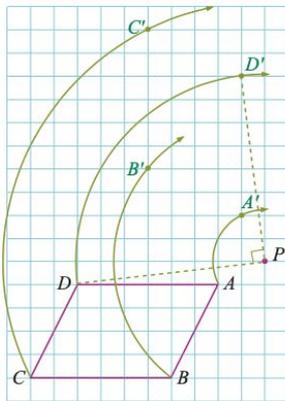
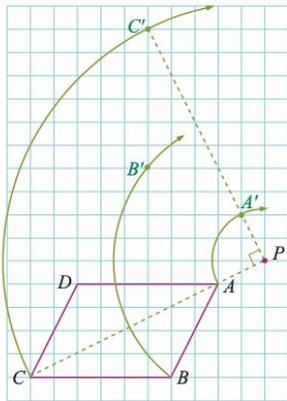


*Step 2:* Do similar for point  $B$ . Mark the new point  $B'$ .



Step 3: Repeat for points  $C$  and  $D$ . Mark the new points  $C'$  and  $D'$  respectively.

Step 4: Join the new points  $A'B'C'D'$ .



- 6 Repeat questions 2a and 2b, except rotate this square about  $P$ , a point outside the square.

