Lesson 5

GCSE Mathematics

Transformation Geometry

5.1 T3 Rotation

A ***rotation*** is the third of the four ***transformations*** to be studied.

Three items of information describe a rotation fully:

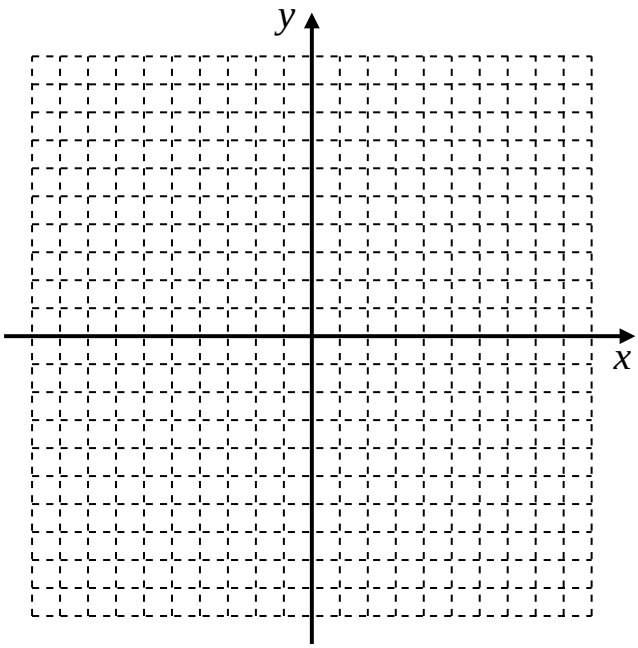
Ro1 The size of the **angle** of rotation.

Ro2 The **point** about which rotation takes place.

Ro3 The **direction** of the rotation: clockwise or anti-clockwise.

If the direction is omitted then it is assumed to be anti-clockwise.
In mathematics anti-clockwise rotation is considered to be positive.

5.2 Example



(i) Plot the L-shape, L, with vertices;

$A(0, -6)$, $B(0, -10)$, $C(6, -10)$,

$D(6, -8)$, $E(2, -8)$, $F(2, -6)$

Put the identifier $L1$ inside the L-shape.

(ii) Rotate $L1$ about the point $(1, -1)$ by $90°$

Put the identifier $L2$ inside the rotated shape.

(iii) Rotate $L2$ about the point $(1, -1)$ by $180°$

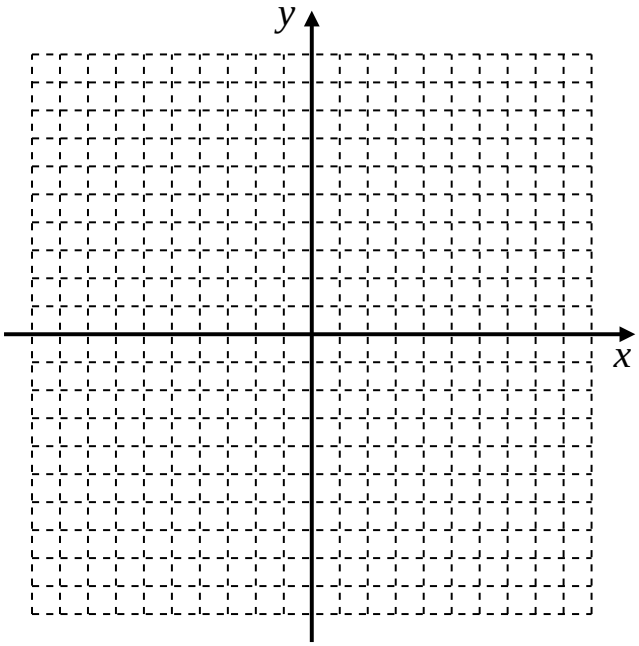
Put the identifier $L3$ inside the rotated shape.

(iv) Finally, rotate $L3$ about the point $(1, -1)$ by $270°$

Put the identifier $L4$ inside the rotated shape.

5.3 Exercise

Question 1



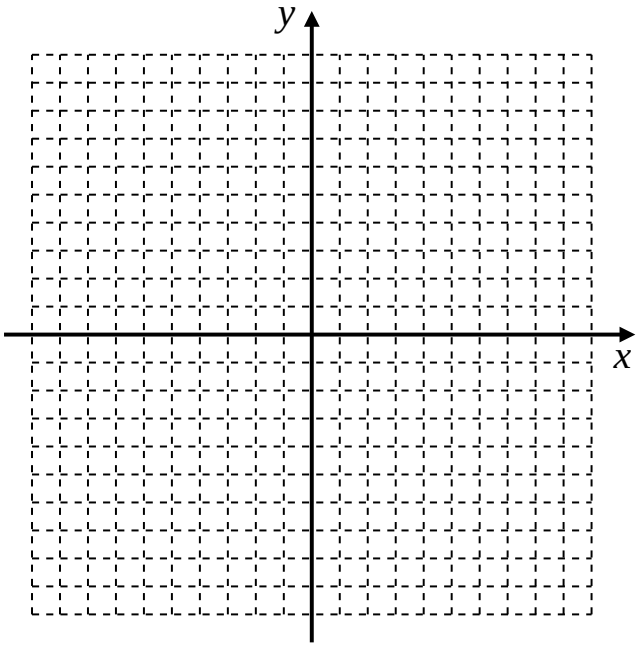
(i) Plot the triangle, *T*, with vertices; $A\,(7, 4)$, $B\,(3, 2)$, $C\,(5, 0)$.

(ii) Put the identifier *T1* inside the triangle.

(iii) Rotate *T1* about the point $(-1, 2)$ by 90°.

(iv) Put the identifier *T2* inside the rotated shape.

Question 2



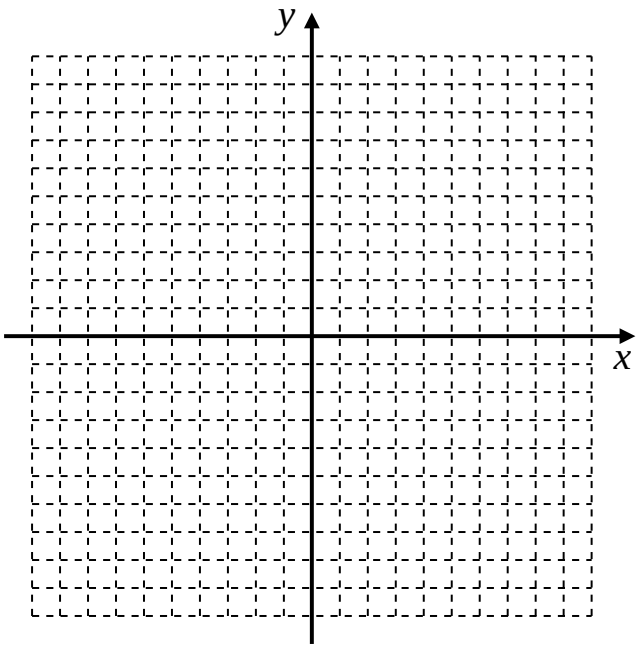
(i) Plot the isosceles triangle given by $J\,(-7, 2)$, $K\,(-1, 5)$, $L\,(-10, 8)$.

(ii) Put the identifier *I1* inside the part (i) isosceles triangle.

(iii) Rotate *I1* about the point $(-1, -1)$ by $-90°$

(iv) Put the identifier *I2* inside the rotated shape.

Question 3



(i) Plot the rhombus, *R*, with vertices;

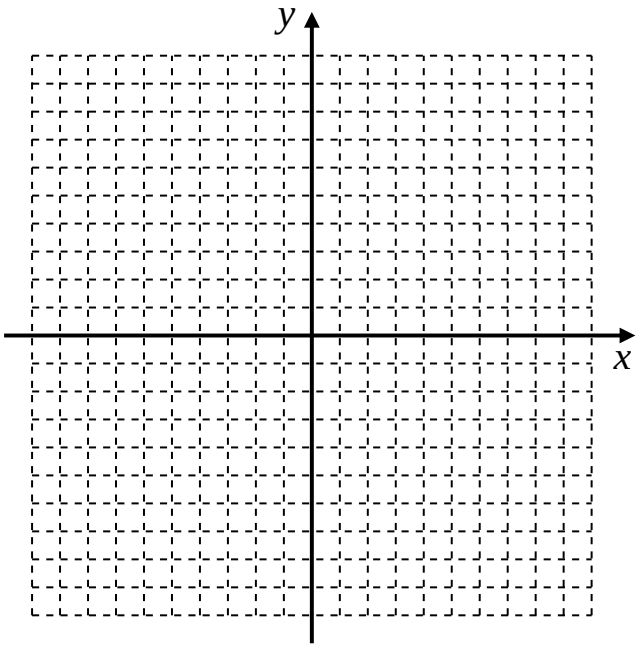
$D(5,\ 3)$, $E(-3,\ 1)$, $F(-5, -7)$, $G(3, -5)$

(ii) Put the identifier *R1* inside the rhombus.

(iii) Rotate *R1* about the point (2, 0) by 180°.

(iv) Put the identifier *R2* inside the rotated shape.

Question 4



(i) Plot the kite, *K1*, with vertices;

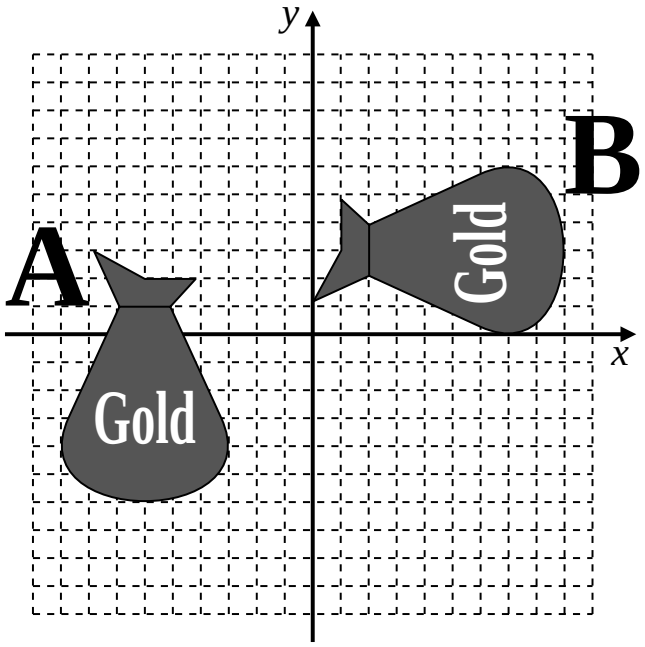
$P(-9, -1)$, $Q(3, -3)$, $R(5, -1)$ $S(3,\ 1)$

(ii) Put the identifier *K1* inside the kite.

(iii) Rotate *K1* about the point (1, 4) by 90°.

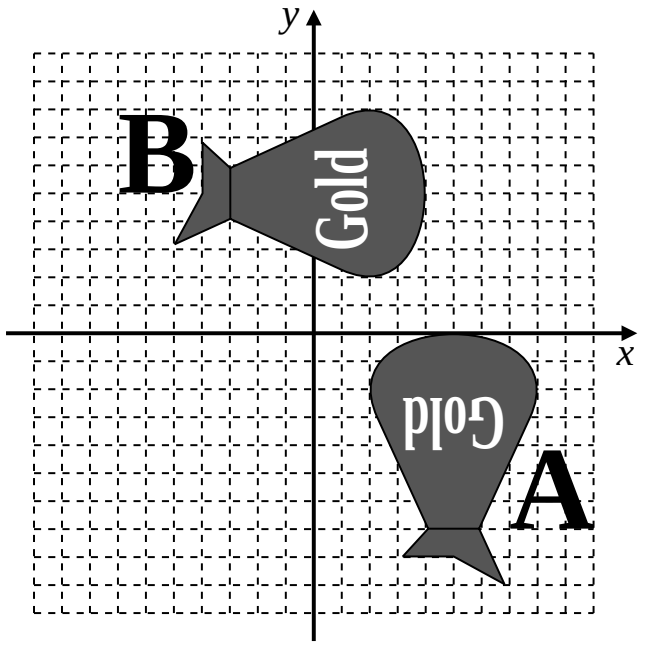
(iv) Put the identifier *K2* inside the rotated shape.

Question 5



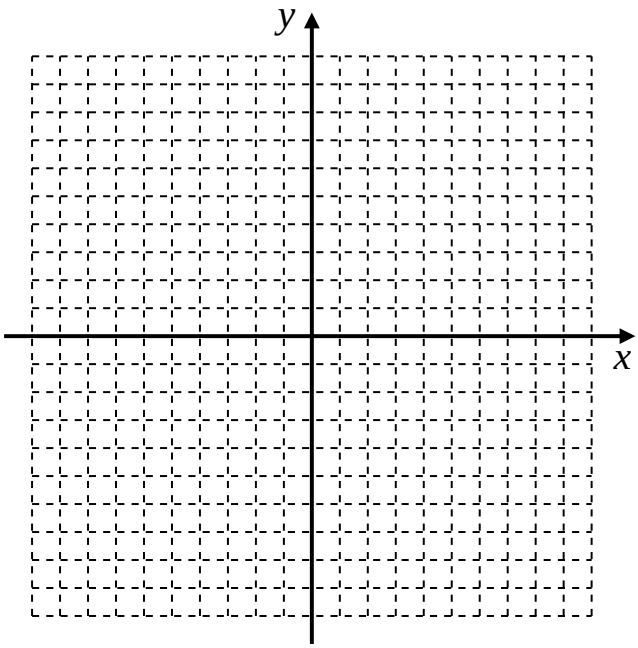
Specify fully the single transformation that maps bag of gold A onto bag of gold B.

Question 6



Specify fully the single transformation that maps bag of gold A onto bag of gold B.

Question 7



(i) Plot the Z-shape, *Z*, with vertices;

$A\ (3, 3)$, $B\ (3, 5)$, $C\ (2, 5)$, $D\ (2, 4)$,

$E(-4, 4)$, $F(-4, 0)$, $G(-2, 0)$, $H(-2, 3)$

(ii) Put the identifier *Z1* inside the Z-shape.

(iii) Rotate *Z1* about the point (3, 1) by 90°.

(iv) Put the identifier *Z2* inside the rotated shape.

(v) Rotate *Z2* about the point (3, 1) by 180°.

(vi) Put the identifier *Z3* inside the rotated shape.

(vii) Finally, rotate *Z3* about the point (3, 1) by 270°.

(viii) Put the identifier *Z4* inside the rotated shape.