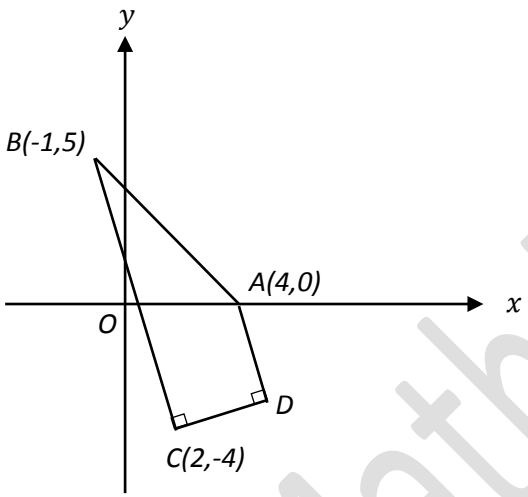
(7) Coordinate Geometry

1. The diagram shows a trapezium ABCD such that BC is parallel to AD and perpendicular to CD.

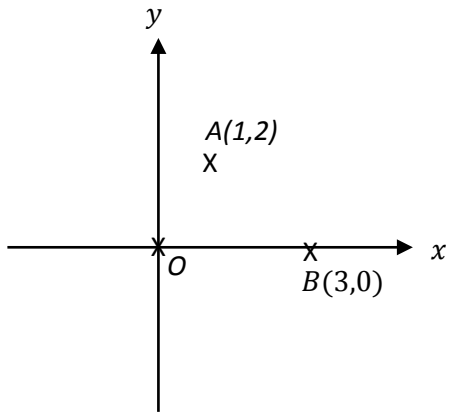
   i) Find the coordinates of vertex D
   ii) Point E lies on BC such that the area of triangle ACE is $\frac{1}{2}$ of the area of triangle ABE. Find the coordinates of E.
   iii) Point F lies on AD produce such that it forms a parallelogram with vertices A, B and C. Find the possible coordinates of F.
   iv) Determine the ratio of the area of triangle ACB to the parallelogram AFBC.



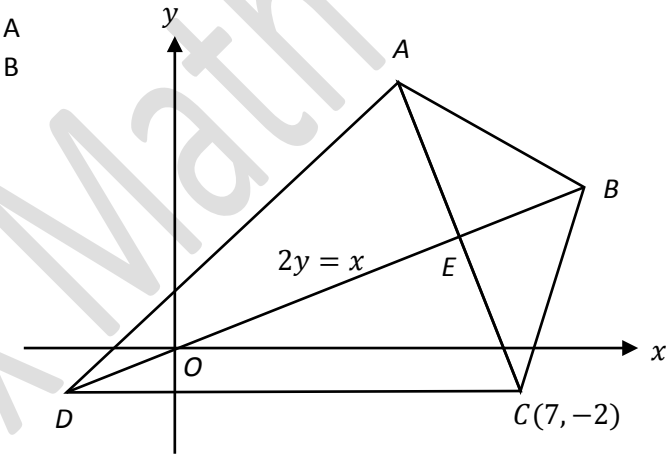
2. Point A has coordinates $(2,3)$ and line l_1 has equation $2y = 4x + 5$.
   a) Find the coordinates of the foot of the perpendicular from Point A to line l_1.
   b) Find the shortest distance from Point A to line l_1
   c) Point B is the reflection of Point A on the line l_1, find the coordinates of B.

3. The equation of the perpendicular bisector of the line segment which joins $A(2,3)$ and $B(h,k)$ is $y = x - 1$. Find the value of h and of k.

4. The diagram shows 3 vertices of a parallelogram. Given A(1,2), B(3,0) and O, find the possible positions of the fourth vertex.



5. The diagram above (not drawn to scale) shows kite $ABCD$ with DC parallel to the x-axis. The area of triangle ADC is 3 times that of triangle ABC. Given that $C(7,-2)$ and the equation of the diagonal BD is $2y = x$, find
   i) Coordinates of D
   ii) Coordinates of E
   iii) Coordinates of A
   iv) Coordinates of B

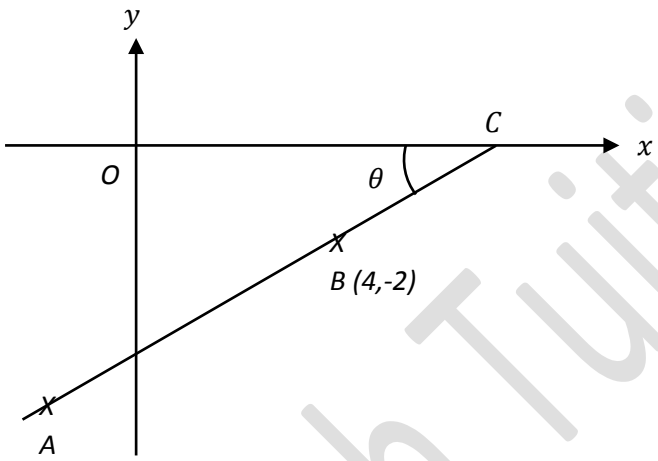


6. Three points A, B and C lies on a straight line such that $AB = 2BC$. The coordinates of point B is $(4, -2)$ and $\tan\theta = \frac{2}{3}$. Find the

   i) equation of line AC

   ii) coordinates of A and C

   iii) coordinates of the point on line AC that is closest to O.
   (Leave you answer to the nearest 3 s.f.)



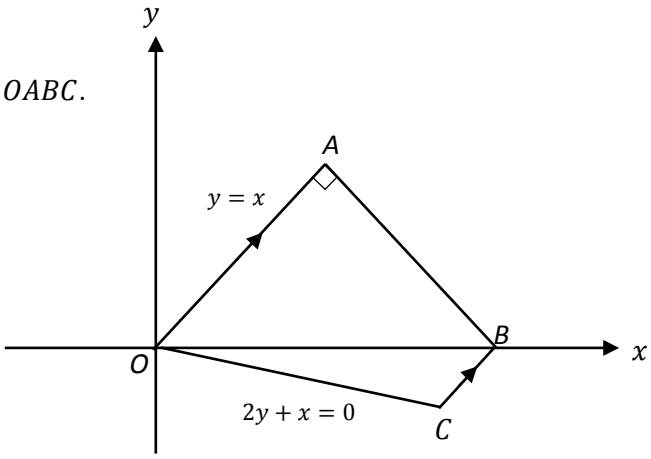
7. The diagram shows a trapezium OABC. The equation of OA is $y = x$ and the equation of OC is $2y + x = 0$. Line OA is parallel to CB and perpendicular to AB. Point B is on the x-axis. The length of OA is $4\sqrt{2}$ units.

   i) Find the coordinates of A

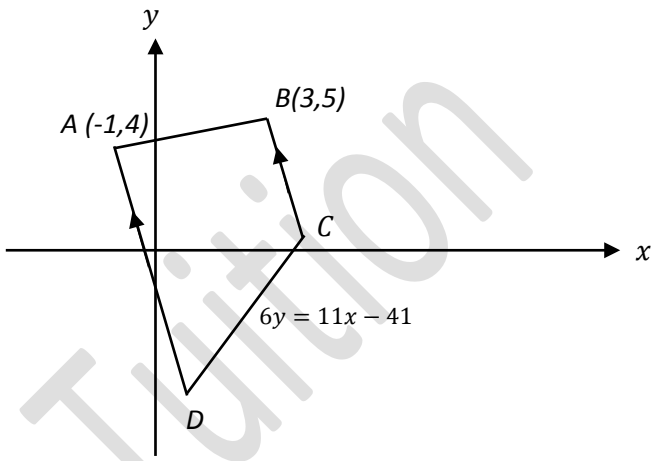
   ii) Find the coordinates of B

   iii) Find the coordinates of C.

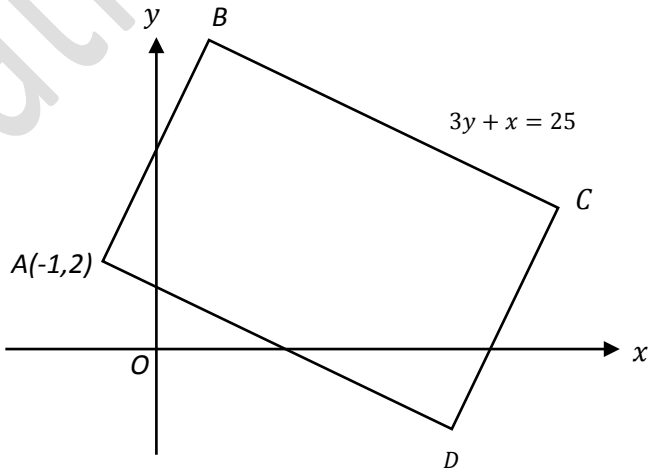
   iv) Hence, calculate the area of trapezium $OABC$.



8. ABCD is a trapezium with AB parallel to BC. The equation of DC is $6y = 11x - 41$. Given that midpoint of AD lies on the y-axis and the midpoint of BD lies on the x-axis, find
   i) the coordinates of D
   ii) the coordinates of C
   iii) area of ABCD
   iv) the perpendicular distance between AD and BC (leaving your answer to 3 s.f.)



9. In the diagram, ABCD is a rectangle. The coordinates of A are (-1,2) and the equation of BC is $3y + x = 25$. Given that the area of ABCD is $80\ units^2$, find the coordinates of B, C and D.



10. The diagram shows a rhombus ABCD. Two of the points are A(1,-1) and C(7,5). Point D lies on the y-axis.

    i) Find the coordinates of D

    ii) Find the coordinates of B

    iii) Find the area of rhombus ABCD

    iv) Calculate the perpendicular distance from C to AB.