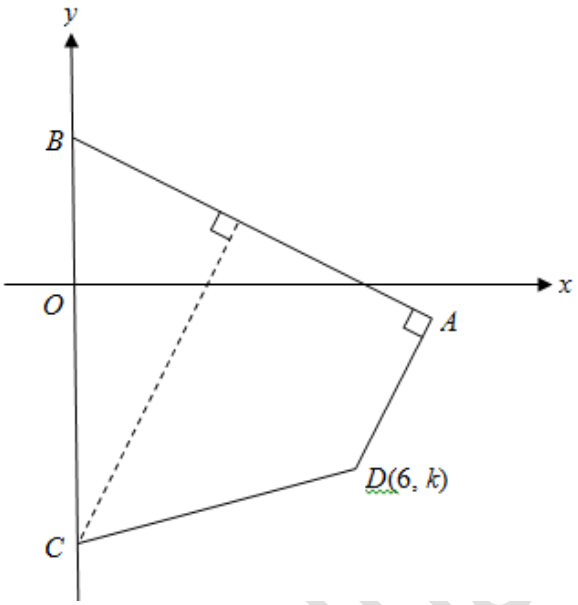
EQUITY
LEARNING PLACE

Additional Math Topical (Coordinate Geometry I)

Question 1:



The diagram shows a quadrilateral *ABCD*. The equation of line *AB* is $2y + x = 6$, and the *y*-coordinate of *A* is -1. The point *B* lies on the *y*-axis. The perpendicular bisector of *AB* meets the *y*-axis at the point *C*. The coordinates of *D* is (6, *k*) and *AD* is perpendicular to *AB*.

i) Find the coordinates of the point *A*.

ii) Find the value of *k*.

iii) Find the coordinates of the points *B* and *C*.

iv) Find the area of quadrilateral *ABCD*.

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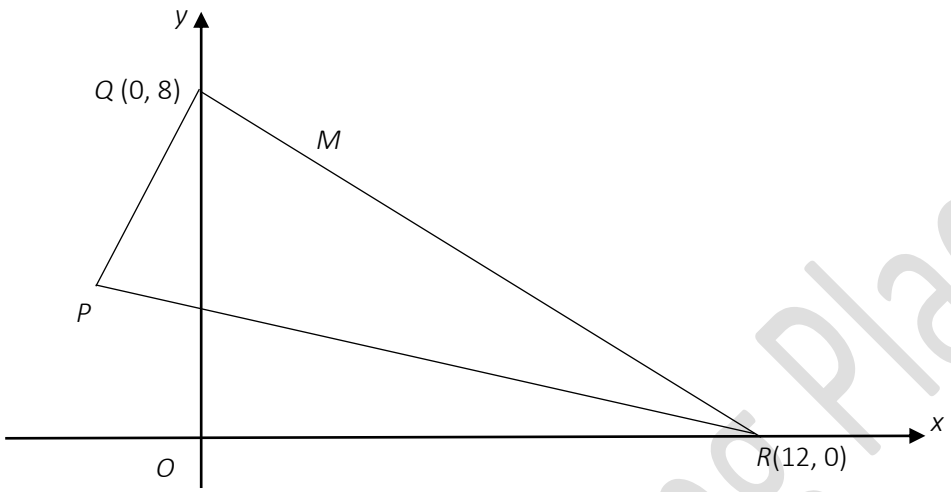
Question 2:



The diagram above shows a right-angled triangle *PQR* where angle $PQR = 90°$ and the coordinates of *Q* and *R* are (0, 8) and (12, 0) respectively. The equation of the lines *PQ* and *PR* are $2y - 3x = 16$ and $8y + x = 12$ respectively. It is also given that *MN* is the perpendicular to *QR* and *MR* = 3*MQ*.

Find

(i) the coordinates of *P*,

(ii) the coordinates of *M*,

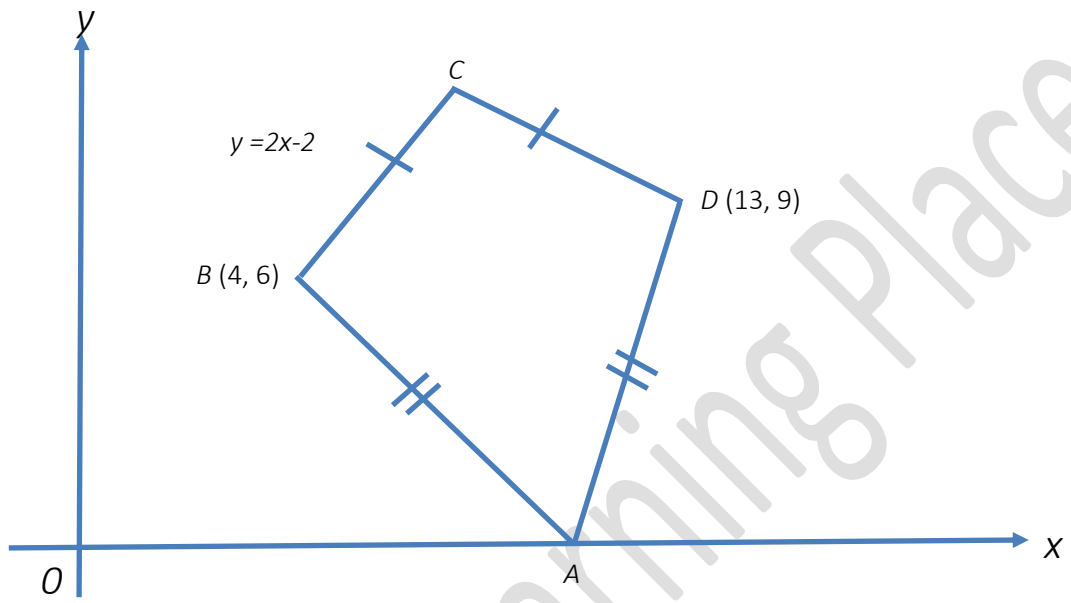
(iii) the equation of *MN*,

Additional Math Topical (Coordinate Geometry I)

Question 3:

Solutions to this question by accurate drawing will not be accepted.

The diagram is not drawn to scale.



The diagram shows a kite *ABCD*. The point *A* lies on the *x*-axis, the point *B* is (4, 6), the point *D* is (13, 9) and the equation of *BC* is $y = 2x - 2$. Find

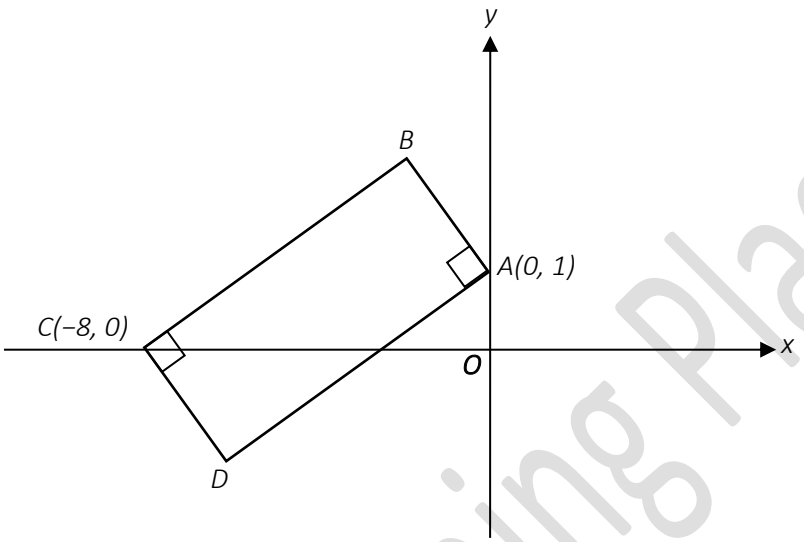
i) the coordinates of *A* and of *C*,

ii) the area of the kite *ABCD*.

Additional Math Topical (Coordinate Geometry I)

Question 4:

The diagram shows a rectangle *ABCD* where the coordinates of *A* and *C* are (0 , 1) and (−8, 0) respectively. The equation of line *AB* is $y + 2x - 1 = 0.$



Find

i) the coordinates of the points of intersection of the diagonals of the rectangle,

ii) the equations of the lines *AD* and *CD*,

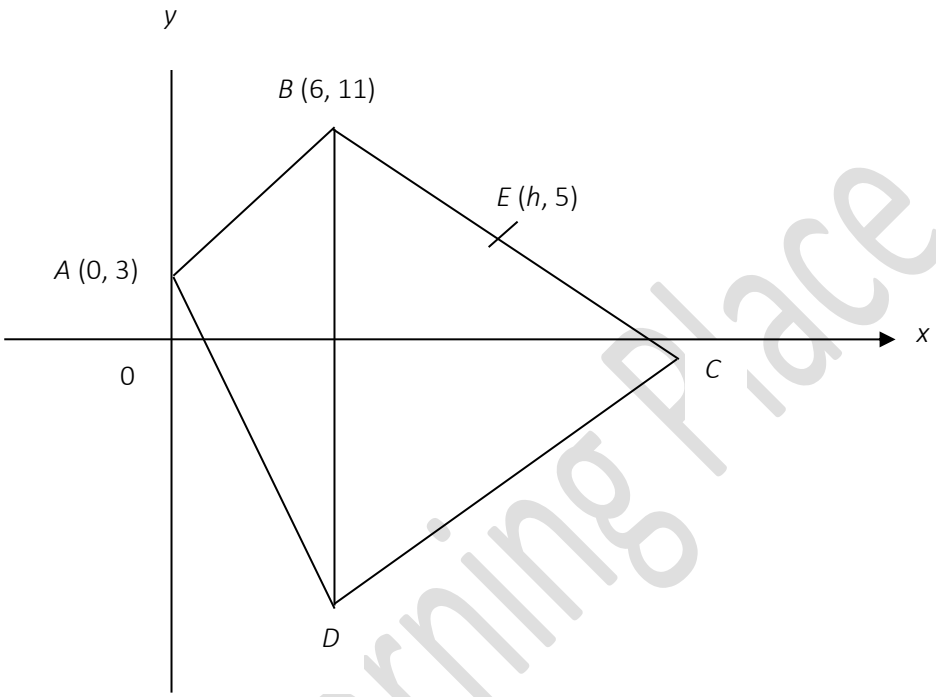
iii) the coordinates of *B* and of *D*,

iv) the area of rectangle *ABCD*.

Additional Math Topical (Coordinate Geometry I)

Question 5:

Solutions to this question by accurate drawing will not be accepted.



The diagram, which is not drawn to scale, shows a quadrilateral *ABCD*. *BD* is parallel to the *y*-axis and *D* is 26 units below *B.* The coordinates of the points *A* and *B* are (0, 3) and (6, 11) respectively. *E* is the midpoint of *BC* and $AB = BE$.

i) Show that the value of *h* is 14

ii) Find the coordinates of *C*.

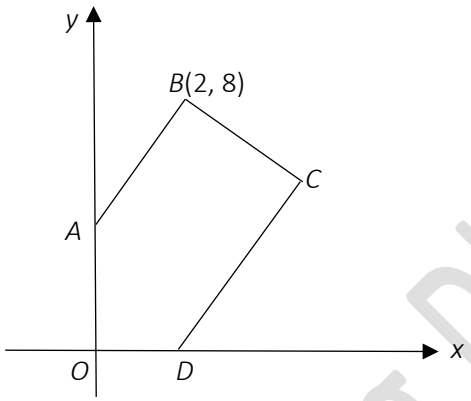
iii) Find the equation of the perpendicular bisector of *BC*.

iv) State the coordinates of *D*.

v) Find the area of quadrilateral *ABCD*.

Question 6:

Solution to this question by accurate drawing will not be accepted.



In the diagram, *AB* is parallel to *DC* and *AB* is perpendicular to *BC*. *A* is a point on the *y*-axis and *D* is a point on the *x*-axis. The coordinates of *A* and *B* are (0, 4) and (2, 8) respectively. The equation of *CD* is $y = 2x - 6$. Find

a) coordinates of *C,*

b) the area of *OABD*,

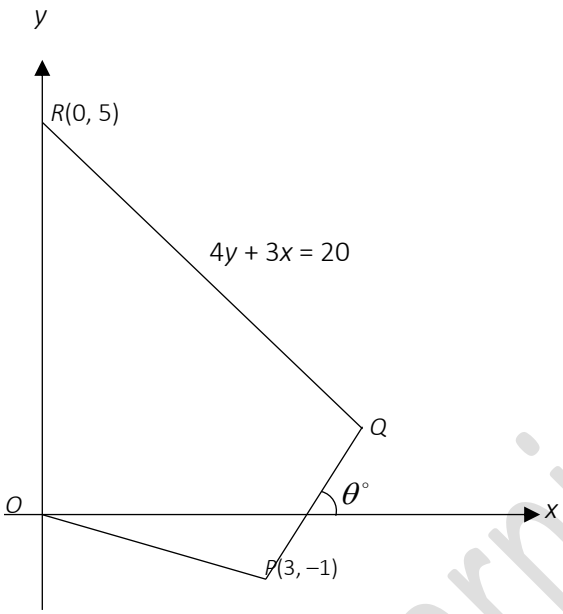
c) the equation of the perpendicular bisector of *AD*.

Additional Math Topical (Coordinate Geometry I)

Question 7:

Solutions to this question by accurate drawing will not be accepted.

The equation of *QR* is $4y + 3x = 20$ and the line *QP* makes an angle of θ° with the *x*-axis as shown. The coordinates of *P* and *R* are (3, –1) and (0, 5) respectively.



a) Given that the gradient of *PQ* is 3, explain why the value of $\theta = 71.6$.

b) Show that the coordinates of *Q* are (4, 2).

c) Show that *OQ* is perpendicular to *PR*.

d) Find the coordinates of *S*, the midpoint of *OQ*.

e) Given that *T* is a point on *RS* such that *OPQT* is a rhombus, find the coordinates of *T*.

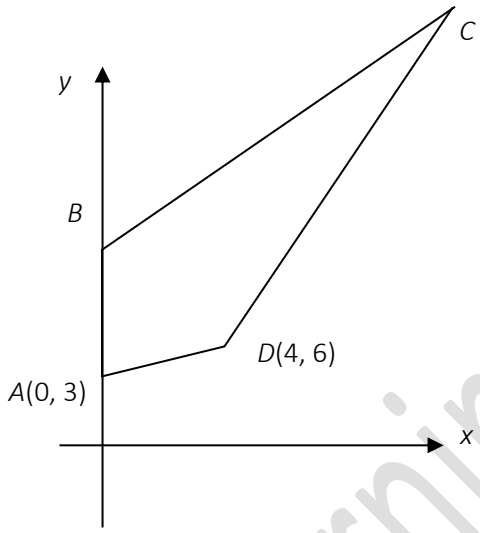
f) Find the area of rhombus *OPQT*.

g) *U* is the point on *OP* extended such that *OP* : *PU* = 1: 3. Find the coordinate of *U*.

Additional Math Topical (Coordinate Geometry I)

Question 8:

The diagram below, not drawn to scale, shows a kite, *ABCD*, where *A* and *B* lie on the *y*-axis. The equation of *BD* is $2y + x = 16$ and the equation of *CD* is $2y = 5x - 8$. The coordinates of *A* is (0, 3), and of *D* is (4, 6).



(i) Find the coordinates of *B*.

(ii) Show that the equation of *AC* is $y = 2x + 3$.

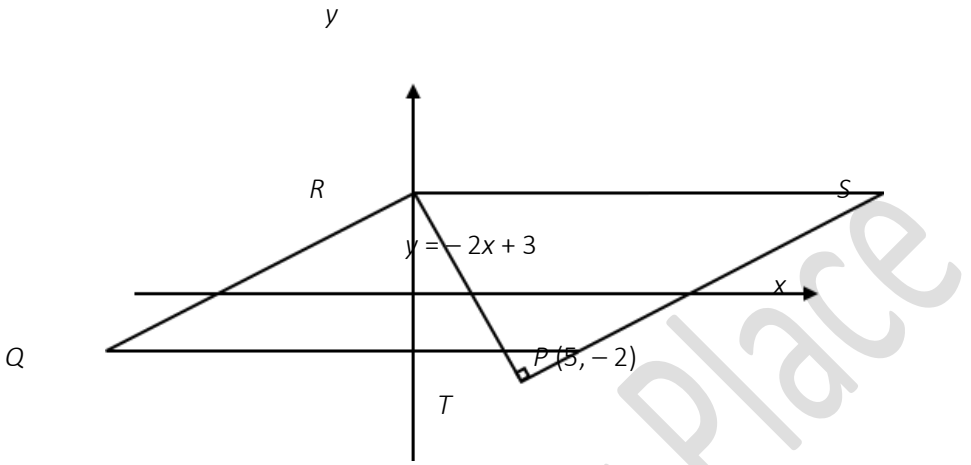
(iii) Find the coordinates of *C*.

(iv) Find the area of the kite *ABCD*.

Additional Math Topical (Coordinate Geometry I)

Question 9:

Solutions to this question by accurate drawing will not be accepted.



The diagram shows a parallelogram *PQRS* where *PQ* is parallel to the *x*-axis. The coordinates of *P* is (5, – 2) and *R* lies on the *y*-axis. The line *RT* $y = -2x + 3$ is perpendicular to *SP* extended.

Find

i) the coordinates of *R*,

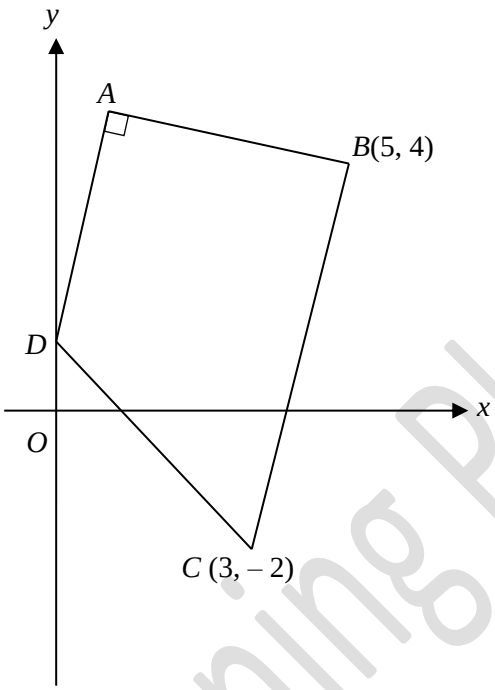
ii) the coordinates of *S*,

iii) the equation of the perpendicular bisector of *PR*.

iv) *X* is a point on *PS* extended such that the ratio of *PS* to *SX* is 5:1. Find the coordinates of *X*.

Hence, find the area of *PRX*.

Question 10:



The diagram shows a trapezium *ABCD* in which *AD* is parallel to *BC* and angle *DAB* = 90°. The point *B* is (5, 4) and the point *C* is (3, – 2). The equation of *CD* is $y = -x + 1$ and the equation of *AB* is $3y = -x + 17.$

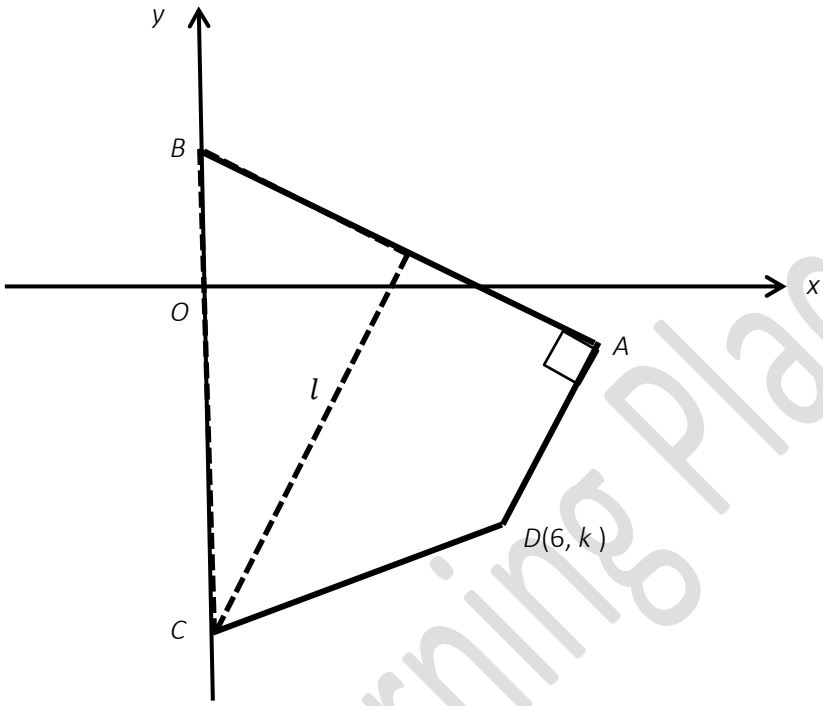
a) Find the coordinates of *D*.

b) Show that the coordinates of *A* is (1.4, 5.2).

c) Find the area of trapezium $ABCD.$

Additional Math Topical (Coordinate Geometry I)

Question 11:



The diagram above shows a quadrilateral *ABCD*. The equation of line *AB* is $2y + x - 6 = 0$ and the *y*-coordinate of *A* is -1. The point *B* lies on the *y*-axis. The perpendicular bisector of *AB*, l , meets the *y*-axis at the point *C*. The coordinates of *D* is (6, *k*) and *AD* is perpendicular to *AB*.

a) Find the coordinates of the point *B.*

b) Explain why the x-coordinate of *A* is 8.

c) State the gradient of the line *AB* and hence find the value of *k*.

d) Show that the coordinates of the point *C* is $(0, -7)$.

e) Find the area of the quadrilateral $ABCD$.

Additional Math Topical (Coordinate Geometry I)

Question 12:

Two points P and Q have coordinates $(-4, 3)$ and $(9, -2)$ respectively. The point $R(x, y)$ lies on the perpendicular bisector of PQ such that $\measuredangle PRQ = 90°$ and $y > 0$.

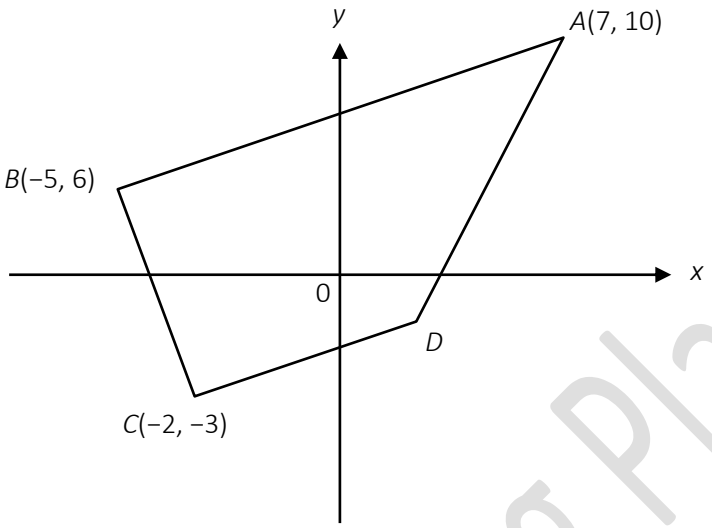
i) Find the equation of the perpendicular bisector of PQ.

ii) Find the coordinates of R.

iii) Find the area of ΔPQR.

Additional Math Topical (Coordinate Geometry I)

Question 13:



The diagram shows a trapezium *ABCD* in which *AB* is parallel to *DC*. The coordinates of *A*, *B* and *C* are (7, 10), (−5, 6) and (−2, −3) respectively.

i) Show that angle *ABC* = 90°.

ii) Find the equation of *DC*.

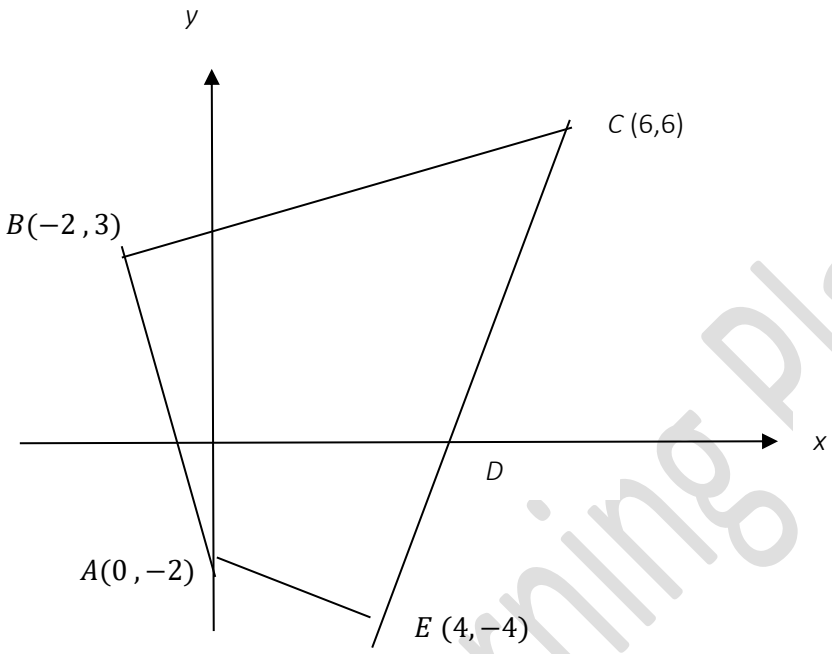
Given that the length of *AB* is twice the length of *CD*,

iii) show that the coordinates of *D* are $(4,-1)$,

iv) find the area of the trapezium *ABCD*.

Question 14:

Solutions to this question by accurate drawing will not be accepted.



The diagram above shows a quadrilateral *ABCE* with points $A(0,-2)$, $B(-2,3)$, $C(6,6)$, $E(4,-4)$. Point *D* lies on the *x*-axis. The points *C*, *D* and *E* are on the same

straight line.

(i) Find the coordinates of *D*.

(ii) Find the equation of the perpendicular bisector of *CE*.

(iii) Find the area of the quadrilateral *ABCE*.

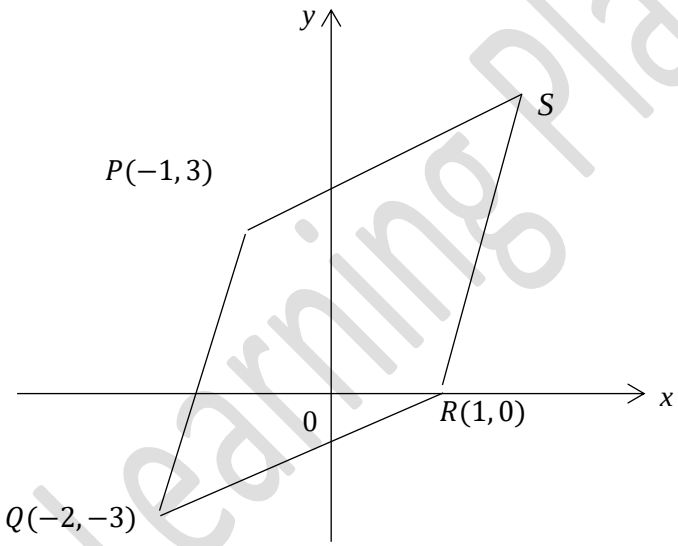
Additional Math Topical (Coordinate Geometry I)

Question 15:

The straight line $2y - x = 4$ intersects the curve $2x^2 + 4y^2 = 38 + xy$ at two distinct points *A* and *B*. Find the equation of the perpendicular bisector of *AB*.

Question 16:

The figure below shows a parallelogram *PQRS* with *P* $(-1, 3)$, *Q* $(-2, -3)$ and *R* (1, 0).



a) Find the mid-point of *PR*.

b) Write down coordinates of *S*.

c) Find the equation of *QR*.

d) Determine the area of *PQRS*.

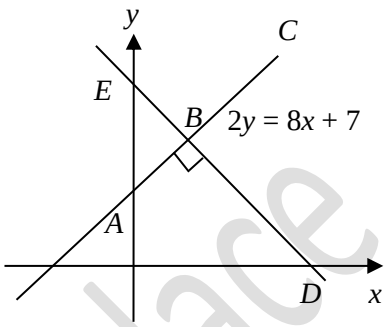
e) Prove whether *PQRS* is a rhombus.

Additional Math Topical (Coordinate Geometry I)

Question 17:

Solution of this question by accurate drawing will not be acceptable.

The line $2y = 8x + 7$ intersects the *y*-axis at the point *A*. The points *B* and *C* on this line are such that *AB* = *BC* and the *x*-coordinate of *B* is 1.



The line through *B* perpendicular to *AC* meets the *x*-axis at *D* and the *y*–axis at *E*.

Find

i) the equation of the line *BD*,

ii) the coordinates of the point *C*.

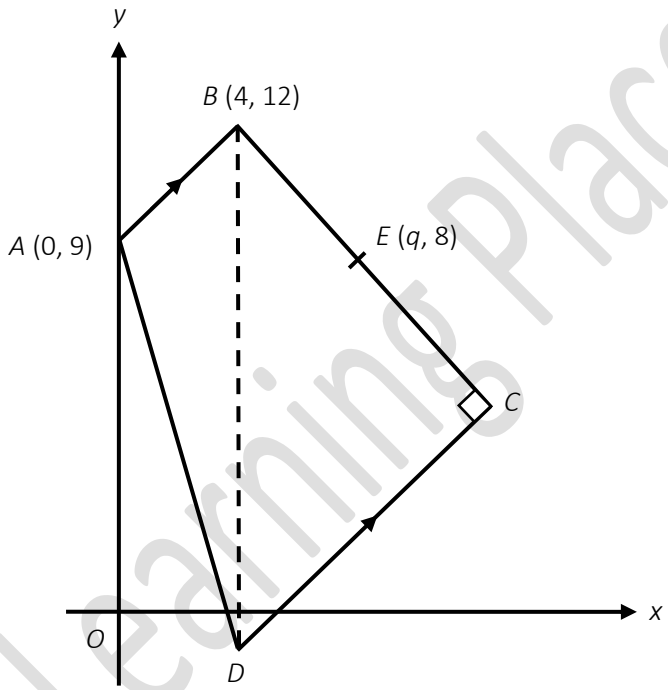
iii)the ratio *EB* : *BD*

Additional Math Topical (Coordinate Geometry I)

Question 18:

The diagram, which is not drawn to scale, shows a trapezium *ABCD* in which *AB* is parallel to *DC*. The coordinates of *A* and *B* are (0, 9) and (4, 12) respectively.

D is a point such that *BD* is parallel to the *y*-axis. *E* (*q*, 8) is the midpoint of *BC*.



i) Show that the value of *q* is 7.

ii) the coordinates of *C*,

iii) the equation of *DC*,

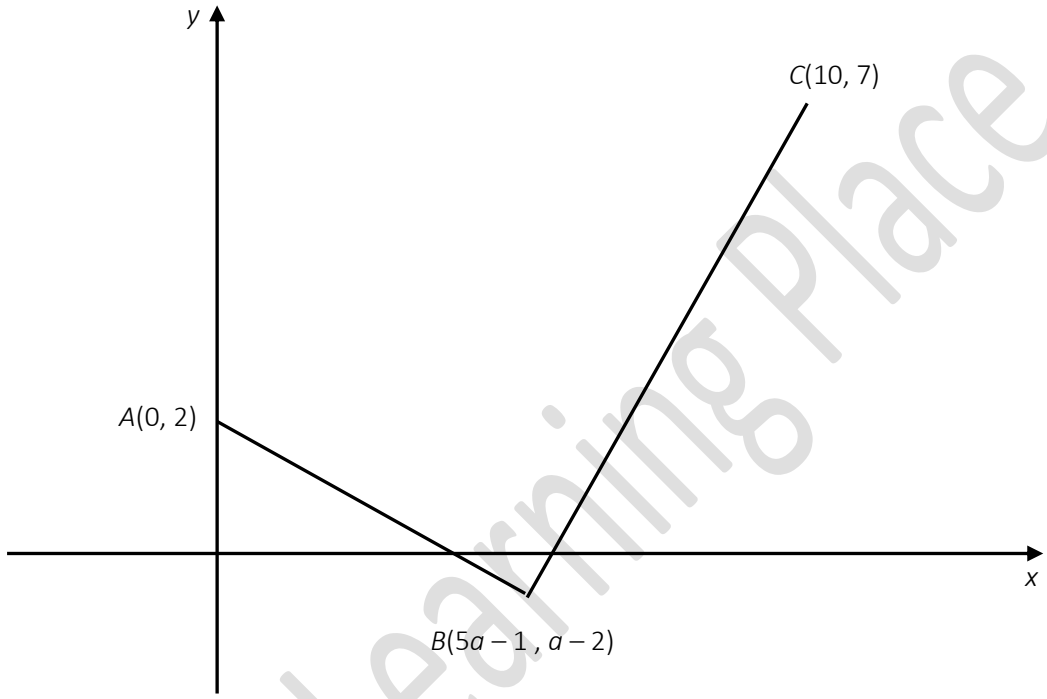
iv) the coordinates of *D*,

v) the area of trapezium *ABCD*.

Additional Math Topical (Coordinate Geometry I)

Question 19:

The diagram shows the coordinates of 3 of the vertices of a rectangle $ABCD$, $A(0, 2), B(5a-1, a-2)$, where a is an integer, and $C(10, 7)$.



i) Prove that $a = 1$.

ii) Find the equation of CD.

iii) Find the coordinates of D.

iv) Find the equation of the perpendicular bisector of BD.

v) Find the area of the rectangle $ABCD$.

Additional Math Topical (Coordinate Geometry I)

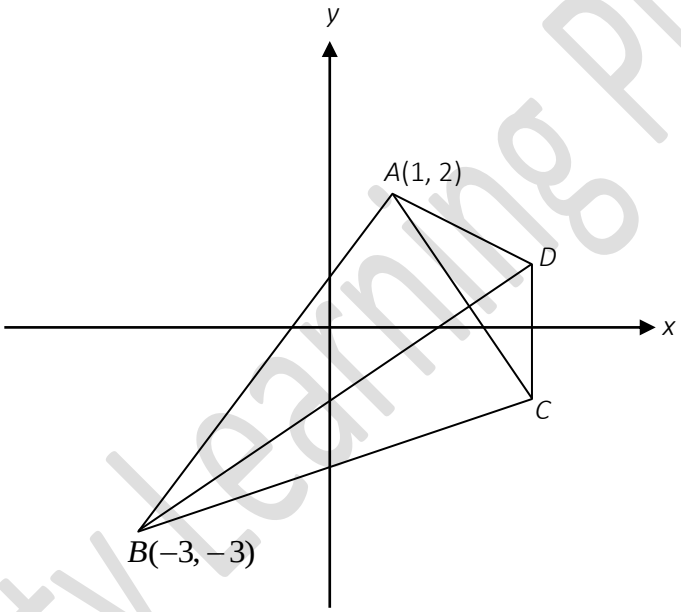
Question 20:

The line $4y = 3x + 7$ intersects the curve $2xy = 5$ at A and B.

a) Find the coordinates of A and of B

b) Find the length of AB.

Question 21:



The diagram, not drawn to scale, shows a triangle ABD, where $A = (1, 2)$ and $B = (-3, -3)$. The line BD cuts the x-axis at $x = 1.5$. The equation of the line AD is $x + 2y = 5$. The line CD is parallel to the y-axis.

Find the

a) coordinates of D,

b) equation of the line AC, given that AC is perpendicular to BD,

c) area of $ABCD$,

d) coordinates of E if $ABCE$ is a parallelogram.

Additional Math Topical (Coordinate Geometry I)

Question 22:

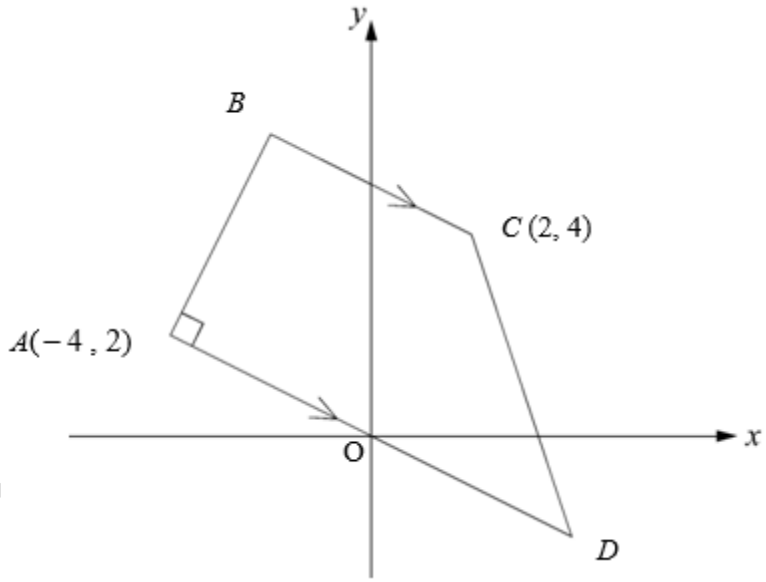
The points *A* and *B* have coordinates $(-2,0)$ and $(8,2)$ respectively.

a) Find the equation of the perpendicular bisector of *AB*.

b) The point $C(a,b)$, where $a>0$ and $b<0$, lies on the perpendicular bisector of *AB* such that $\angle ACB = 60°$. Find the values of *a* and of *b*.

Question 23:

The diagram below shows a trapezium, *ABCD* where *AD* passes through the origin *O*. *AD* is parallel to *BC* and *AD* is perpendicular to *AB*. The coordinates of *A* and *C* are $(-4, 2)$ and (2, 4) respectively.



i) Find the gradient of *BC*.

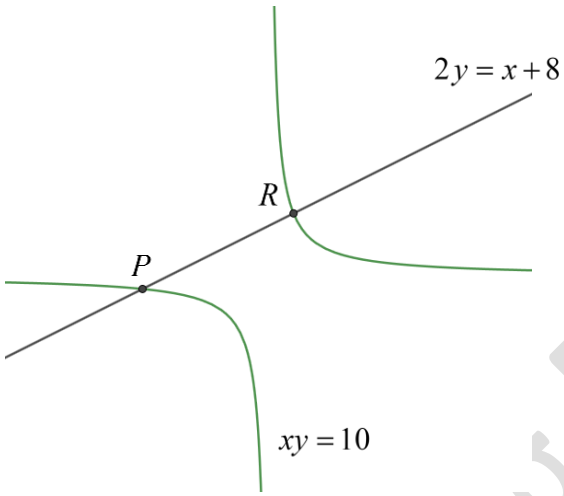
ii) Find the coordinates of *B*.

iii) Given that *O* is the midpoint of *AD*, find the area of the trapezium *ABCD*.

iv) Find the value of $\sin \angle BCD$.

Question 24:

The line $2y = x + 8$ intersects the cure $xy = 10$ at the points P and R.

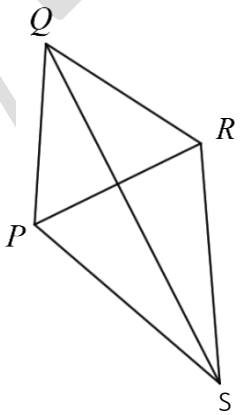


Find

a) the coordinates of P and R,

b) the equation of the perpendicular bisector of PR.

It is also known that PR is a diagonal of a kite $PQRS$ as shown in the diagram below.

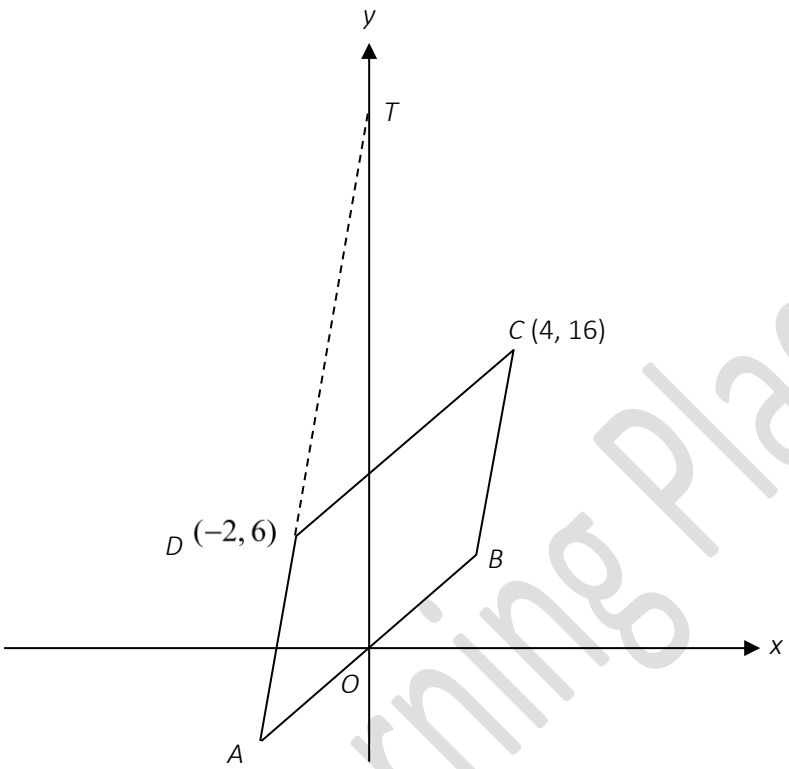


c) If the coordinates of Q and S are $(q, 6)$ and $(4, s)$ respectively, find the values of q and s.

d) Find the area of the kite $PQRS$.

Additional Math Topical (Coordinate Geometry I)

Question 25:



The diagram shows a parallelogram *ABCD* in which *C* is (4, 16) and *D* is $(-2, 6)$.

The line *AD*, when produced, meets the *y*-axis at point *T*. *AD* is parallel to $y - 11x = 4$ and *AC* is perpendicular to $x + 3y = 0$.

i) Show that the coordinates of *T* is (0, 28).

ii) Find the equation of *AC*

iii) Show that the coordinates of *A* is $(-3, -5)$.

iv) Evaluate the ratio *AD* : *DT*.

v) Find the coordinates of *B*.

vi) Find the area of parallelogram *ABCD*.

Additional Math Topical (Coordinate Geometry I)

Question 26:

The line $2x+y=9$ cuts the curve $3x^2-y^2+5x+6y=1$ at points *P* and *Q*. Find the midpoint of *PQ*.

Question 27:

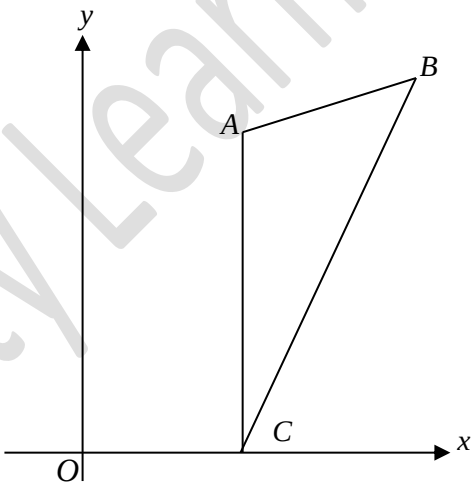
The line $3y+2x=12$ intersects the curve $y^2+8=4x$ at points *P* and *Q*. Calculate

a) the coordinates of *P* and of *Q*,

b) the distance between point *P* and point *Q*.

Question 28:

The diagram shows a triangle *ABC* in which $A(4,6)$ and $B(8,7)$. The point *C* lies on the *x*-axis and *AC* is parallel to the *y*-axis.



i) Write down the coordinates of point *C* and find the gradient of *AB*.

ii) Find the equation of the perpendicular bisector of the line segment joining point *A* and point *B*.

iii) The perpendicular bisector found in part **(ii)** intersects *AB* at point *P* and the *x*-axis at point *Q*. Find the area of triangle *PBQ*.

Additional Math Topical (Coordinate Geometry I)

Question 29:

The coordinates of three points are $A(-2, 6)$, $B(6, 10)$ and $C(p, 0)$.

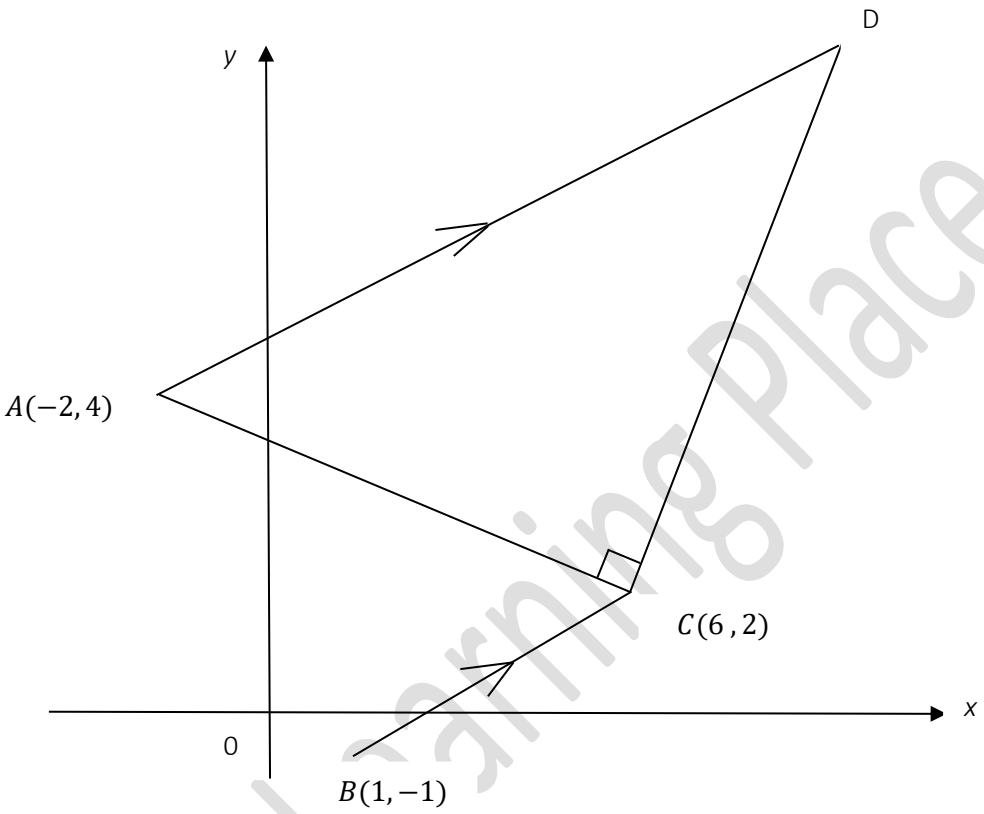
a) Find the coordinates of M, the mid-point of AB.

b) Given that CM is perpendicular to AB, find the value of the constant p.

c) Find angle MCB.

Question 30:

Solutions to this question by accurate drawing will not be accepted.



In the diagram the points *A*, *B* and *C* have coordinates (− 2 , 4), (1, − 1) and (6, 2) respectively.

The line *AD* is parallel to *BC* and angle *ACD* = 90°.

i) Find the equations of *AD* and *CD*.

ii) Find the coordinates of *D*.

iii) Show that triangle *ACD* is isosceles.