NAME :

Centre of Excellence in Mathematics
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YEAR 12 – ADVANCED MATHS

REVIEW TOPIC (SP1)
COORDINATE GEOMETRY

Mixed exercises:

(1) $O(0,0), P(1,0), Q(2,1)$ are the vertices of a triangle. Find:

(a) The equation of the line PQ in general form.

$\boxed{x-y-1=0}$

(b) The equation of the line through O

(i) parallel to PQ.

$\boxed{x-y=0}$

(ii) perpendicular to PQ.

$\boxed{x+y=0}$

(2) Find the equation of the line through the point $(5,2)$ which is perpendicular to the line $5x+2y=20$.

$\boxed{2x-5y=0}$

(3) The line PQ is perpendicular to the line $x-y-1=0$, meets the line in the point P and intersects the y-axis in $Q(0,5)$. Find the coordinates of P. (Hint: draw a sketch).

$\boxed{x+y-5=0, P(3,2)}$

(4) Find the coordinates of the foot of the perpendicular from the point $(-5,4)$ to the line $3x+y-21=0$.

$\left(4\frac{3}{5},7\frac{1}{5}\right)$

(5) Show that the triangle whose sides satisfy $2x-y=0, x+2y=5, x-3y=20$ is a right triangle.

(6) Find the equation of the line through the intersection of the lines $x+y-3=0$ and $3x+4y-1=0$ and perpendicular to the line $3x-4y+15=0$.

$\boxed{k=-\frac{1}{7};\ 4x+3y-20=0}$

(7) Find the equations of the lines given by $(2x-y+4)+k(3x+2y-9)=0$ when k takes the values $-1, 0, 1$. Verify that these three lines are concurrent.

(8) Find the (i) midpoint and (ii) the distance between these pairs of points:

(a) $A(4,3)$ and $B(7,5)$

$\boxed{\text{(i) } \left(\frac{11}{2},4\right) \text{ (ii) } \sqrt{13}}$

(b) $P(-2,-3)$ and $Q(-5,-4)$

$\boxed{\text{(i) } \left(-\frac{7}{2},-\frac{7}{2}\right) \text{ (ii) } \sqrt{10}}$

(9) Find the perpendicular distance from the point $(6,-5)$ to the line $4x-3y-9=0$.

6

(10) Determine whether the given points $(3,2)$ and $(7,3)$ lie on the same or opposite sides of the given line $2x-5y+3=0$.

opposite sides

(11) Show that the line $4x+3y-8=0$ is a tangent to the circle with centre $(-2,-3)$ and radius 5 units.

(12) Find the distance between these parallel lines:

$5x-12y+21=0$ and $5x-12y-5=0$.

(13) $ABCD$ is a rhombus where $A(0,-1), B(3,-2)$ and $C(4,1)$ are three vertices. Find the coordinates of the fourth vertex.

$\boxed{(1,2)}$

PAST HSC QUESTIONS:

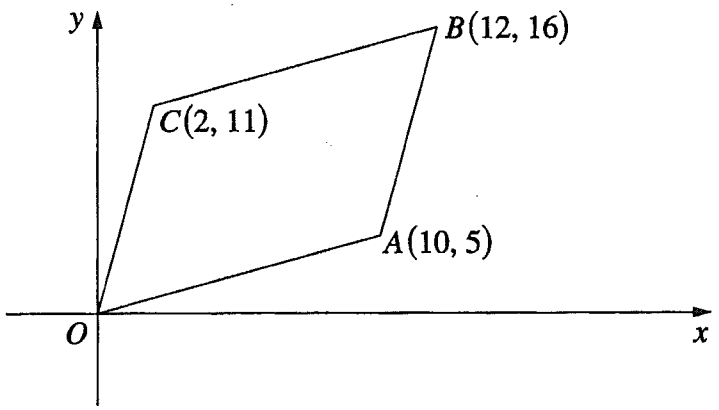
HSC 07

(1)

(f) Find the equation of the line that passes through the point $(-1, 3)$ and is perpendicular to $2x + y + 4 = 0$. **2**

$\boxed{x - 2y + 7 = 0}$

(a)



NOT TO SCALE

(3)

In the diagram, A, B and C are the points $(10, 5)$, $(12, 16)$ and $(2, 11)$ respectively.

Copy or trace this diagram into your writing booklet.

(i) Find the distance AC. **1**

10

(ii) Find the midpoint of AC. **1**

(6,8)

(iii) Show that $OB \perp AC$. **2**

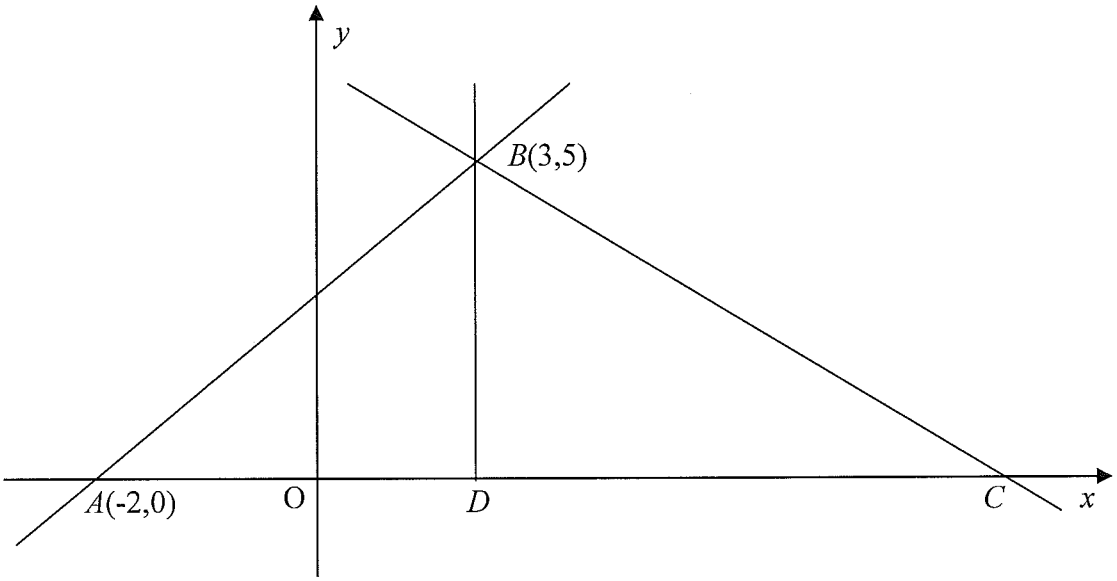
(iv) Find the midpoint of OB and hence explain why $OABC$ is a rhombus. **2**

(v) Hence, or otherwise, find the area of $OABC$. **1**

100 units^2

HSC '99

(2) (b)



The diagram show the points $A(-2,0)$, $B(3,5)$ and the point C which lies on the x axis. The point D also lies on the x axis such that BD is perpendicular to AC.

(i) Show that the gradient of AB is 1.

(ii)Find the equation of the line AB.

$\boxed{y = x + 2}$

(iii) What is the size of $\angle BAC$?

45^0

(iv) The length of BC is 13units. Find the length of DC.

12 units

(v) Calculate the area of ΔABC.

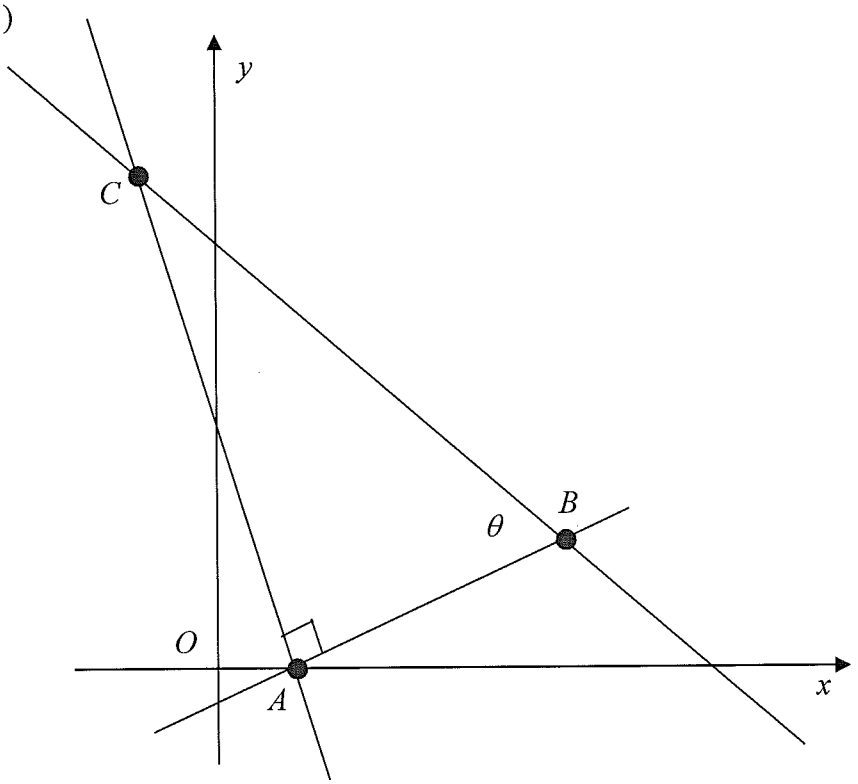
42.5 sq. units

(vi) Calculate the size of $\angle ABC$ to the nearest degree.

112^0

HSC '98

(3)



The diagram shows points $A(1,0)$, $B(4,1)$ and $C(-1,6)$ in the Cartesian plane.
Angle ABC is θ.

Copy or trace this diagram into your Writing Booklet.

(a) Show that A and C lie on the line $3x+y=3$. **2**

(b) Show that the gradient of AB is $\frac{1}{3}$. **1**

(c) Show that the length of AB is $\sqrt{10}$ units. **1**

(d) Show that AB and AC are perpendicular. **1**

(e) Find $\tan\theta$. **2**

(f) Find the equation of the circle with centre A that passes through B. **2**

$\boxed{x^2 + y^2 - 2x - 9 = 0}$

(g) The point D is not shown on the diagram. The point D lies on the line $3x + y = 3$ between A and C, and AD=AB. Find the coordinates of D. **2**

$\boxed{(0,3)}$

(h) On your diagram, shade the region satisfying the inequality $3x + y \leq 3$. **1**

HSC '97

(3) (b) Let A and B be the points (0, 1) and (2, 3) respectively. **6**

(i) Find the coordinates of the midpoint of AB.

$\boxed{(1,2)}$

(ii) Find the slope of the line AB.

$\boxed{1}$

(iii) Find the equation of the perpendicular bisector of AB.

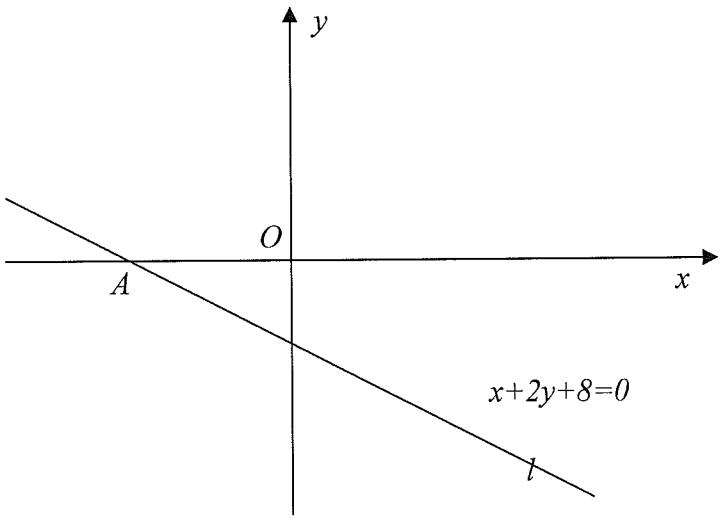
$\boxed{x+y-3=0}$

(iv) The point P lies on the line $y=2x-9$ and is equidistant from A and B. Find the coordinates of P.

$\boxed{P(4,-1)}$

HSC '96

(2)



The line l is shown in the diagram. It has equation $x+2y+8=0$ and cuts the x axis at A.

The line k has equation $y=-\frac{1}{2}x+6$, and is not shown on the diagram.

Copy and trace the diagram.

(a) Find the coordinates of A. **1**

$\boxed{(-8,0)}$

(b) Explain why k is parallel to l. **1**

(c) Draw the graph of k on your diagram, indicating where it cuts the axes. **2**

(d) Shade the region $x+2y+8 \leq 0$ on your diagram. **1**

(e) Write down a pair of inequalities which define the region between k and l. **2**

$$\frac{1}{2}x+y-6<0 \text{ and } x+2y+8>0$$

(f) Show that $P(8,2)$ lies on k. **1**

(g) Find the perpendicular distance from P to l. **2**

$\boxed{4\sqrt{5}}$

(h) $Q(4,-6)$ lies on l. Show that Q is the point on l which is closest to P. **2**

Show that the perp. distance is $4\sqrt{5}$