



Geometry 1 – Question Handout

Question 1.

The equations of six lines are given:

Line	Equation
<i>h</i>	$x = 3 - y$
<i>i</i>	$2x - 4y = 3$
<i>k</i>	$y = -\frac{1}{4}(2x - 7)$
<i>l</i>	$4x - 2y - 5 = 0$
<i>m</i>	$x + \sqrt{3}y - 10 = 0$
<i>n</i>	$\sqrt{3}x + y - 10 = 0$

- (a) Complete the table below by matching each description given to one or more of the lines.

Description	Line(s)
A line with a slope of 2.	
A line which intersects the $y$ -axis at $(0, -2\frac{1}{2})$ .	
A line which makes equal intercepts on the axes.	
A line which makes an angle of $150^\circ$ with the positive sense of the $x$ -axis.	
Two lines which are perpendicular to each other.	

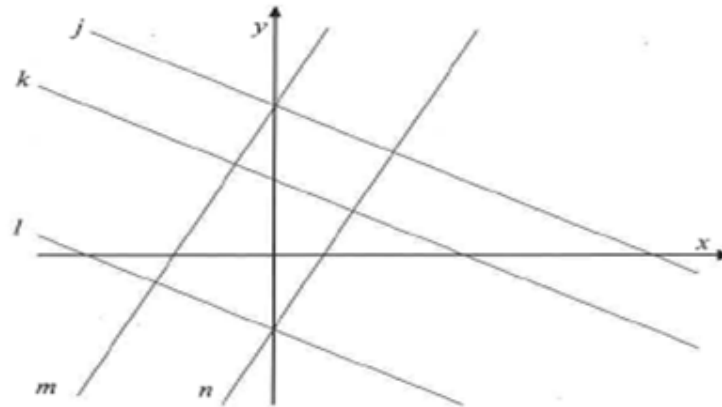
- (b) Find the acute angle between the lines  $m$  and  $n$ .



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Question 2.

In the co-ordinate diagram shown, the lines  $j$ ,  $k$ , and  $l$  are parallel, and so are the lines  $m$  and  $n$ . The equations of four of the five lines are given in the table below.



Equation	Line
$x + 2y = -4$	
$2x - y = -4$	
$x + 2y = 8$	
$2x - y = 2$	

- Complete the table, by matching four of the lines to their equations.
- Hence, insert scales on the  $x$ -axis and  $y$ -axis.
- Hence, find the equation of the remaining line, given that its  $x$ -intercept and  $y$ -intercept are both integers.

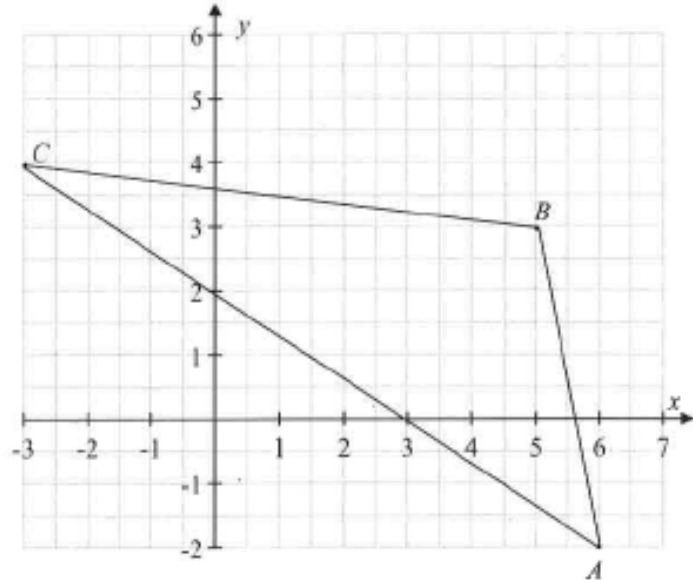


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Question 3.

The points  $A(6, -2)$ ,  $B(5, 3)$  and  $C(-3, 4)$  are shown on the diagram.

- (a) Find the equation of the line through  $B$  which is perpendicular to  $AC$ .



- (b) Use your answer to part (a) above to find the co-ordinates of the orthocentre of the triangle  $ABC$ .

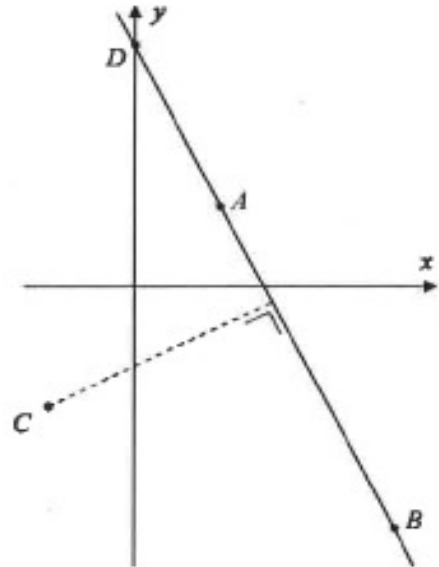


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Question 4.

The co-ordinates of three points  $A$ ,  $B$ , and  $C$  are:  $A(2, 2)$ ,  $B(6, -6)$ ,  $C(-2, -3)$ .  
(See diagram on facing page.)

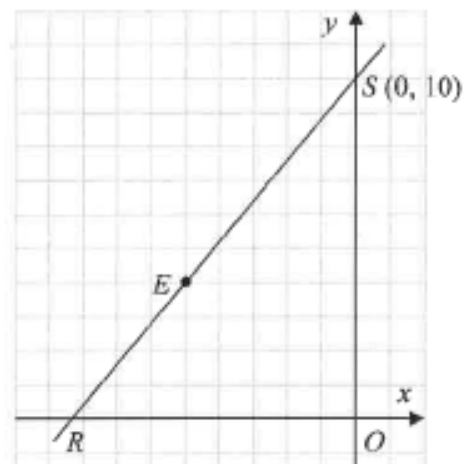
- (a) Find the equation of  $AB$ .
- (b) The line  $AB$  intersects the  $y$ -axis at  $D$ .  
Find the coordinates of  $D$ .
- (c) Find the perpendicular distance from  $C$  to  $AB$ .
- (d) Hence, find the area of the triangle  $ADC$ .



Question 5.

The line  $RS$  cuts the  $x$ -axis at the point  $R$  and the  $y$ -axis at the point  $S(0, 10)$ , as shown. The area of the triangle  $ROS$ , where  $O$  is the origin, is  $\frac{125}{3}$ .

- (a) Find the co-ordinates of  $R$ .
- (b) Show that the point  $E(-5, 4)$  is on the line  $RS$ .



- (c) A second line  $y = mx + c$ , where  $m$  and  $c$  are positive constants, passes through the point  $E$  and again makes a triangle of area  $\frac{125}{3}$  with the axes. Find the value of  $m$  and the value of  $c$ .



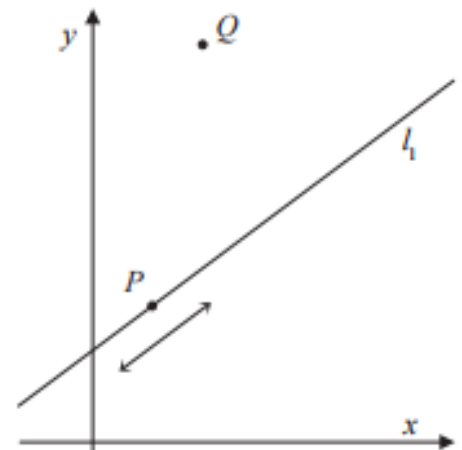
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Question 6.

- (a) The co-ordinates of two points are  $A(4, -1)$  and  $B(7, t)$ .  
The line  $l_1 : 3x - 4y - 12 = 0$  is perpendicular to  $AB$ . Find the value of  $t$ .
- (b) Find, in terms of  $k$ , the distance between the point  $P(10, k)$  and  $l_1$ .
- (c)  $P(10, k)$  is on a bisector of the angles between the lines  $l_1$  and  $l_2 : 5x + 12y - 20 = 0$ .
- (i) Find the possible values of  $k$ .
- (ii) If  $k > 0$ , find the distance from  $P$  to  $l_1$ .

Question 7.

- (a) Show that, for all  $k \in \mathbb{R}$ , the point  $P(4k - 2, 3k + 1)$  lies on the line  $l_1 : 3x - 4y + 10 = 0$ .
- (b) The line  $l_2$  passes through  $P$  and is perpendicular to  $l_1$ . Find the equation of  $l_2$ , in terms of  $k$ .



- (c) Find the value of  $k$  for which  $l_2$  passes through the point  $Q(3, 11)$ .
- (d) Hence, or otherwise, find the co-ordinates of the foot of the perpendicular from  $Q$  to  $l_1$ .



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### Question 8.

- (a) Find the measures of the angle between the line  $j: 3x - 2y - 6 = 0$  and the line  $k: 3x + y - 24 = 0$
- (b) A triangle PQR is enclosed between lines  $j$  and  $k$  and the  $x$ -axis. [PR] is on the  $x$ -axis. Find the acute angle  $\angle PQR$ .
- (c) the point R is moved to a new position on the  $x$ -axis and labelled  $R_1$ . If  $\angle PQR = 45^\circ$ , find the co-ordinates of  $R_1$

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