



Geometry 1 Workshop – Questions

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.

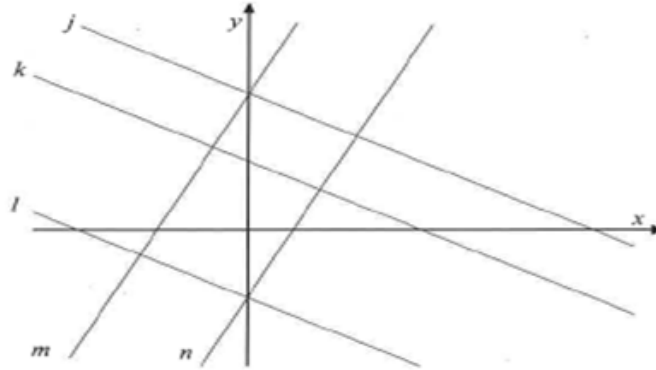
Description	Line(s)
A line with a slope of 2.	
A line which intersects the y -axis at $(0, -2\frac{1}{2})$.	
A line which makes equal intercepts on the axes.	
A line which makes an angle of 150° with the positive sense of the x -axis.	
Two lines which are perpendicular to each other.	

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



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.



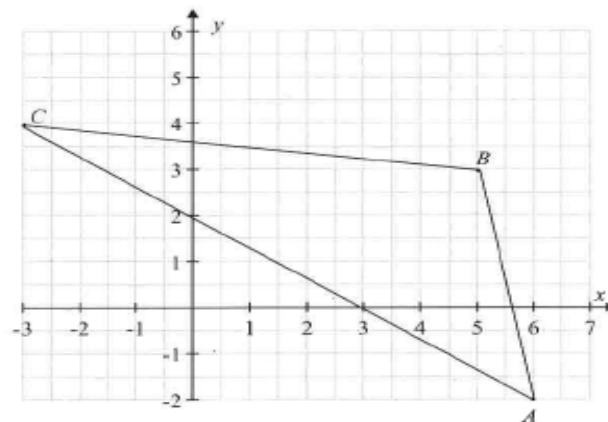
Equation	Line
$x + 2y = -4$	
$2x - y = -4$	
$x + 2y = 8$	
$2x - y = 2$	

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

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 .



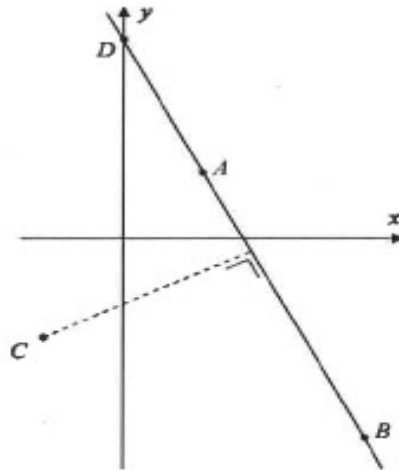
- (b) Use your answer to part (a) above to find the co-ordinates of the orthocentre of the triangle ABC .



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.)

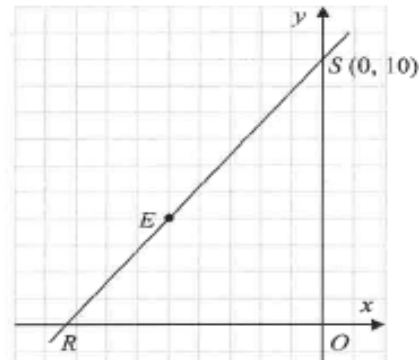
- (a) Find the equation of AB .
- (b) The line AB intersects the y -axis at D . Find the coordinates of D .
- (c) Find the perpendicular distance from C to AB .
- (d) Hence, find the area of the triangle ADC .



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 $\frac{125}{2}$ with the axes. Find the value of m and the value of c .

Question 6

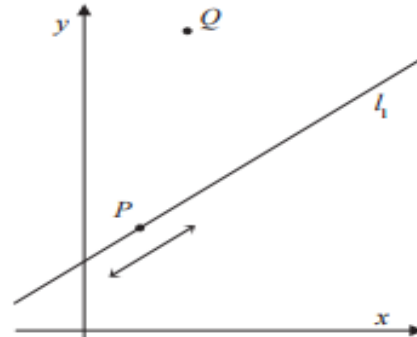
- (a) The co-ordinates of two points are $A(4, -1)$ and $B(7, t)$.
The line $l_1 : 3x - 4y - 12 = 0$ is perpendicular to AB . Find the value of t .
- (b) Find, in terms of k , the distance between the point $P(10, k)$ and l_1 .
- (c) $P(10, k)$ is on a bisector of the angles between the lines l_1 and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

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 $\angle PQR$.

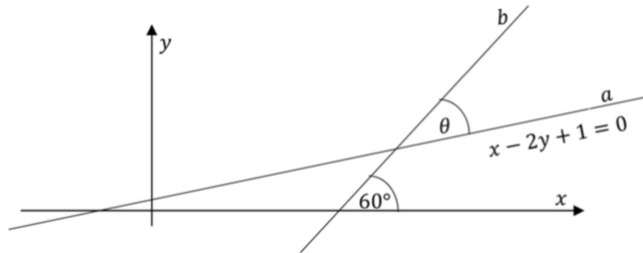
(c) the point R is moved to a new position on the x -axis and labelled R_1 . If $\angle PQR = 45^\circ$; find the co-ordinates of R_1

Question 9

- (a) The coordinates of three points are $A(2, -6)$, $B(6, -12)$, and $C(-4, 3)$.
Find the perpendicular distance from A to BC .

Based on your answer, what can you conclude about the relationship between the points A , B , and C ?

- (b) The diagram below shows two lines a and b . The equation of a is $x - 2y + 1 = 0$.
The acute angle between a and b is θ . Line b makes an angle of 60° with the positive sense of the x -axis, as shown in the diagram.
Find the value of θ , in degrees, correct to 3 decimal places.



Questions 10

- (a) Find the area of the triangle with vertices $(4, 6)$, $(-3, -1)$, and $(0, 11)$.

- (b) $A(-1, k)$ and $B(5, l)$ are two points, where $k, l \in \mathbb{Q}$.

(i) Show that the midpoint of $[AB]$ is $\left(2, \frac{k+l}{2}\right)$.

- (ii) The perpendicular bisector of $[AB]$ is:

$$3x + 2y - 14 = 0$$

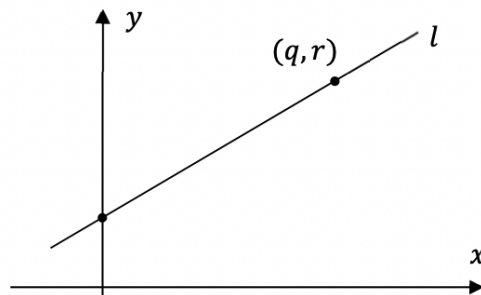
Find the value of l and the value of k .

Question 11

- (a) The points $A(8, -4)$ and $B(-1, 3)$ are the endpoints of the line segment $[AB]$.

Find the coordinates of the point C , which divides $[AB]$ internally in the ratio $4 : 1$.

- (b) The line l has a slope of m and contains the point (q, r) , where $m, q, r \in \mathbb{R}$ are all positive.
Find the co-ordinates of the point where l cuts the y -axis, in terms of m, q , and r .



- (c) The line k has a slope of -2 .
The line j makes an angle of 30° with k .

Find **one** possible value of the slope of the line j .

Give your answer in the form $d + e\sqrt{f}$, where $d, e, f \in \mathbb{Z}$.