

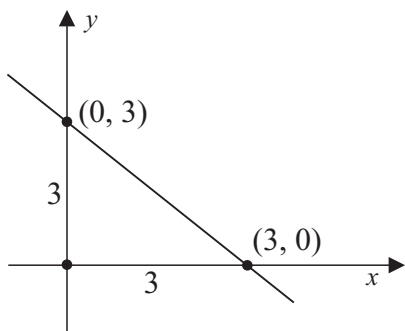
LC 2013 (SET D): PAPER 2

QUESTION 3 (25 MARKS)

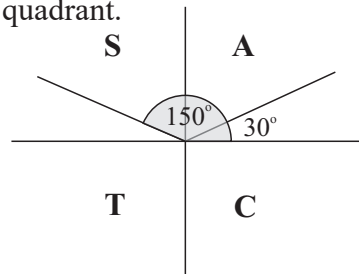
Question 3 (a)

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

The line *h* makes equal intercepts with the *x*-axis cutting it at 3 units from the origin.



The slope is the tan of the angle with the positive *x*-axis. Tan is negative in the second quadrant.



$$\tan \theta = \frac{1}{\sqrt{3}} \Rightarrow \tan^{-1} \frac{1}{\sqrt{3}} = 30^\circ$$

$$\therefore \theta = 180^\circ - 30^\circ = 150^\circ$$

Lines *k* and *l* are perpendicular as the product of their slopes is -1.

$$\text{Slope of } i: m_1 = \frac{1}{2}$$

$$\text{Slope of } k: m_2 = -\frac{1}{2}$$

$$m_1 \times m_2 = \frac{1}{2} \times -\frac{1}{2} = -1$$

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

MARKING SCHEME NOTES

Question 3 (a) [Scale 10D (0, 3, 7, 9, 10)]

- 3: • Any one correct
 • Any line sketched correctly
- 7: • Any two correct
- 9: • Any four correct

Question 3 (b)

Slope of m : $m_1 = -\frac{1}{\sqrt{3}}$

Slope of n : $m_2 = -\sqrt{3}$

$$\tan \theta = \frac{-\frac{1}{\sqrt{3}} + \sqrt{3}}{1 - \frac{1}{\sqrt{3}}(-\sqrt{3})} = \frac{-\frac{1}{\sqrt{3}} + \sqrt{3}}{1+1}$$

$$= \frac{\left(-\frac{1}{\sqrt{3}} + \sqrt{3}\right)}{1+1} \times \frac{\sqrt{3}}{\sqrt{3}} \leftarrow \text{Multiply above and below by root 3.}$$

$$= \frac{-1+3}{2\sqrt{3}} = \frac{2}{2\sqrt{3}}$$

$$= \frac{1}{\sqrt{3}}$$

$$\therefore \theta = \tan^{-1} \frac{1}{\sqrt{3}} = 30^\circ$$

FORMULAE AND TABLES BOOK

Co-ordinate geometry: Line

Angles between two lines of slopes m_1 and m_2 [page 19]

$$\tan \theta = \pm \frac{m_1 - m_2}{1 + m_1 m_2}$$

MARKING SCHEME NOTES

Question 3 (b) [Scale 15D (0, 4, 7, 11, 15)]

- 4: • Any reasonable step e.g. correct relevant formula
 • Slope m or n

- 7: • Both slopes

- 11: • $\tan \theta = \frac{1}{\sqrt{3}}$ and stops