

LC 2013 (SET D): PAPER 2

QUESTION 3 (25 MARKS)

Question 3 (a)

METHOD 1: You can write the slope of a line from its equation written in the form $ax + by + c = 0$.

Finding the slope m from the equation of a line l :

$$l: ax + by + c = 0 \Rightarrow m = -\frac{a}{b}$$

$$l: 3x + 2y + 18 = 0 \Rightarrow m = -\frac{3}{2}$$

METHOD 2: You can write the equation of the line in the form $y = mx + c$ and read off m .

$$3x + 2y + 18 = 0$$

$$2y = -3x - 18$$

$$y = -\frac{3}{2}x - 9$$

$$\therefore \text{Slope } m = -\frac{3}{2}$$

Question 3 (b)

To find the slope of a perpendicular line, invert the fraction and change the sign of the original slope.

$$\text{Slope of } l: m_1 = -\frac{3}{2}$$

$$\text{Slope of } k: m_2 = \frac{2}{3}$$

$$l \perp k \Rightarrow m_1 \times m_2 = -1$$

← The product of perpendicular slope is -1 .

$$\text{Equation of } k: (x_1, y_1) = (7, 0), m = \frac{2}{3}$$

$$y - 0 = \frac{2}{3}(x - 7)$$

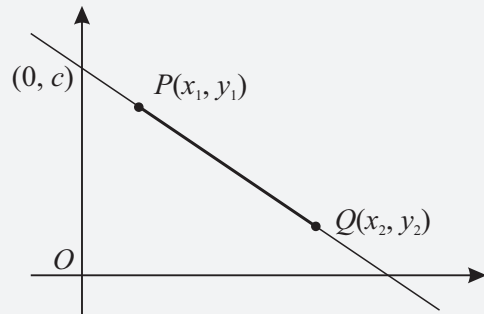
$$y = \frac{2}{3}(x - 7) \leftarrow \text{Multiply both sides of the equation by 3.}$$

$$3y = 2(x - 7) \leftarrow \text{Multiply out brackets.}$$

$$3y = 2x - 14 \leftarrow \text{Bring all terms to the same side of the equation.}$$

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

FORMULAE AND TABLES BOOK Co-ordinate geometry: Line



Slope of PQ [page 18]

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Equation of PQ [page 18]

$$y - y_1 = m(x - x_1)$$

$$y = mx + c$$

MARKING SCHEME NOTES

Question 3 (a) [Scale 10C (0, 4, 7, 10)]

- 4:**
- Writes $y = mx + c$ and stops.
 - Writes a relevant slope formula and stops
 - Some correct work at transposing terms
 - Finds one or two points on l
- 7:**
- Equation of the line written in the form $y = mx + c$ but slope not identified
 - Finds the slope of l using two points, one of which is incorrect
- NOTE:** A correct answer without work shown, award full credit

Question 3 (b) [Scale 10C (0, 4, 7, 10)]

- 4:**
- Identifies correct relevant formula, e.g. $y - y_1 = m(x - x_1)$ and stops
 - Writes correct or consistent slope for k
 - Some correct work with $(7, 0)$
- 7:**
- Substitution into the line equation with one error
- NOTE:** A correct answer without work shown, award full credit

Question 3 (c)

Solve the equations of l and k simultaneously to find the point of intersection (x, y) .

$$3x + 2y + 18 = 0 \dots (1) (\times 3)$$

$$2x - 3y - 14 = 0 \dots (2) (\times 2)$$

$$9x + 6y + 54 = 0$$

$$4x - 6y - 28 = 0$$

$$\hline 13x + 26 = 0 \Rightarrow 13x = -26 \Rightarrow x = -2$$

ANSWER: $(x, y) = (-2, -6)$

$$x = -2 : 3x + 2y + 18 = 0 \dots (1)$$

$$3(-2) + 2y + 18 = 0$$

$$-6 + 2y + 18 = 0$$

$$2y + 12 = 0$$

$$2y = -12$$

$$y = -\frac{12}{2} = -6$$

MARKING SCHEME NOTES

Question 3 (c) [Scale 5C (0, 3, 4, 5)]

- 3:**
- Relevant work towards equating coefficients in both equations
 - Relevant work towards substituting for one variable using the other equation
 - One line correctly graphed
- 4:**
- One correct or consistent co-ordinate found
 - One or two algebraic errors leading to an incorrect point of intersection
 - A correct structure to the solution with up to two errors
 - A correct answer, obtained graphically