

LC 2014 (SET C): PAPER 2

QUESTION 3 (25 MARKS)

Question 3 (a) (i)

$$c: (x + 2)^2 + (y - 3)^2 = 100$$

Centre $A(-2, 3)$

$$\text{Radius } r = \sqrt{100} = 10$$

FORMULAE AND TABLES BOOK
Co-ordinate geometry: Circle [page 19]

Given centre (h, k) and radius r

$$(x - h)^2 + (y - k)^2 = r^2$$

Question 3 (a) (ii)

Show P is on c by substituting P into c :

$$P(-8, 11) \in c: (x + 2)^2 + (y - 3)^2 = 100?$$

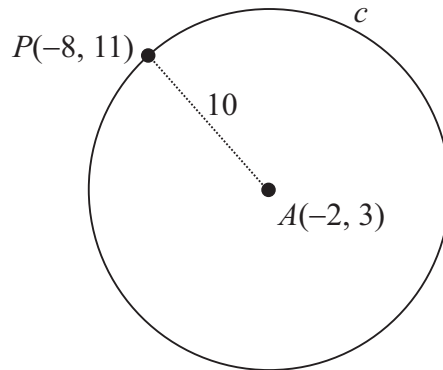
$$\begin{aligned} & (-8 + 2)^2 + (11 - 3)^2 \\ &= (-6)^2 + (8)^2 \\ &= 36 + 64 \\ &= 100 \end{aligned}$$

or

Show that $|AP| = r$.

$$A(-2, 3) = (x_1, y_1), P(-8, 11) = (x_2, y_2)$$

$$\begin{aligned} |AP| &= \sqrt{(-8 - (-2))^2 + (11 - 3)^2} \\ &= \sqrt{(-6)^2 + (8)^2} \\ &= \sqrt{36 + 64} \\ &= \sqrt{100} = 10 = r \end{aligned}$$



MARKING SCHEME NOTES

Question 3 (a) (i) (ii) [Scale 5C (0, 3, 4, 5)]

3: • Relevant work in one section
e.g. Finds one correct co-ordinate of the centre A or works to $r^2 = 100$ and/or $\sqrt{100}$ and stops

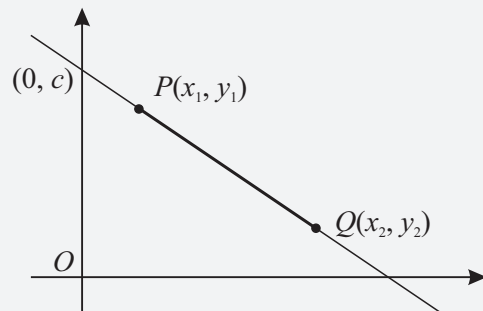
4: • One section correct

Question 3 (b) (i)

$$A(-2, 3) = (x_1, y_1), P(-8, 11) = (x_2, y_2)$$

$$m = \frac{11 - 3}{-8 - (-2)} = \frac{8}{-6} = -\frac{4}{3}$$

FORMULAE AND TABLES BOOK
Co-ordinate geometry: Line



Length of PQ [page 18]

$$|PQ| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Slope of PQ [page 18]

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

Equation of PQ [page 18]

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

MARKING SCHEME NOTES

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

4: • Identifies correct relevant formula, e.g. writes $\left(m = \frac{y_2 - y_1}{x_2 - x_1} \right)$

• Any correct or consistent substitution

- 7: • Formula substituted correctly
 • Calculates slope with one incorrect substitution
- 10: • Accept for full credit answer as $\frac{8}{-6}$ without work

Question 3 (b) (ii)

The tangent t is perpendicular to the radius $[AP]$.

$$m = -\frac{4}{3} \Rightarrow m_{\perp} = \frac{3}{4}$$

$$m = \frac{a}{b} \Rightarrow m_{\perp} = -\frac{b}{a}$$

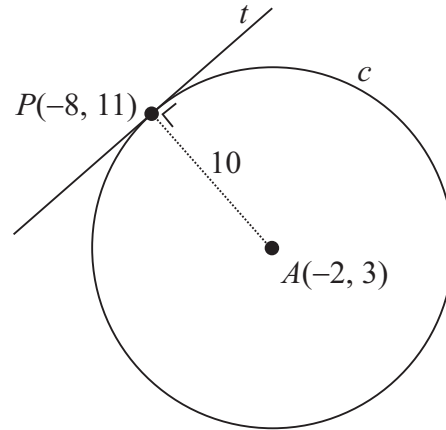
Equation of t : $P(-8, 11) = (x_1, y_2), m = \frac{3}{4}$

$$y - 11 = \frac{3}{4}(x - (-8))$$

$$4(y - 11) = 3(x + 8)$$

$$4y - 44 = 3x + 24$$

$$3x - 4y + 68 = 0$$



MARKING SCHEME NOTES

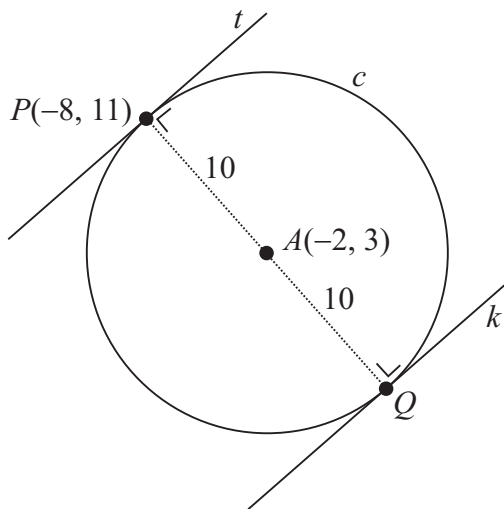
Question 3 (b) (ii) [Scale 5C (0, 3, 4, 5)]

- 3: • Identifies correct relevant formula, e.g. writes $y - y_1 = m(x - x_1)$.
 • Correct or consistent slope identified in this part and stops.
- 4: • A fully correct or consistent substitution. e.g. $[y - 11 = \frac{3}{4}(x + 8)]$.
 • Calculates equation of line with one incorrect substitution.

Question 3 (c)

Q is obtained by passing P through A (central symmetry) and the same distance beyond A .

$$P(-8, 11) \rightarrow A(-2, 3) \rightarrow Q(4, -5) \text{ [Add 6, Subtract 8]}$$



MARKING SCHEME NOTES

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

- 3: • Writes slope of k equal to slope of t .
 • Identifies correct relevant formula, e.g. writes $\left[x = \frac{x_1 + x_2}{2}, y = \frac{y_1 + y_2}{2} \right]$.
- Work with a translation which indicates an understanding of the concept
 • Any work of merit using algebraic method
- 4: • An incorrect translation correctly applied
 • A correct graphical solution.
 • Finds both points of intersection algebraically and stops