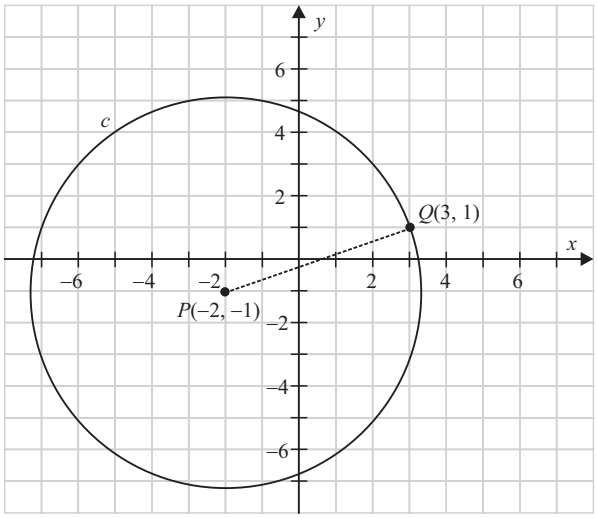
Sample Paper 2014 (Set F): Paper 2

Question 4 (25 marks)

Question 4 (a)



Plot points $P(-2, -1)$ and $Q(3, 1)$.
Draw the circle c with centre P passing through Q.

Question 4 (b)

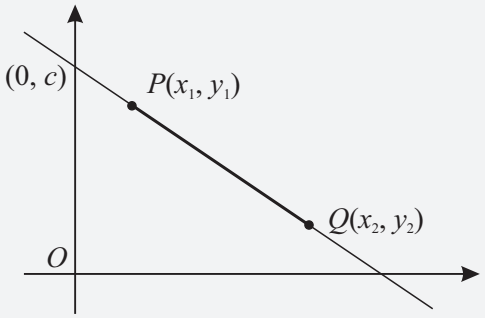
The radius r of c is the length of $|PQ|$.
$P(-2, -1) = (x_1, y_1)$, $Q(3, 1) = (x_2, y_2)$

$$r = |PQ| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(3-(-2))^2 + (1-(-1))^2}$$
$$= \sqrt{5^2 + 2^2}$$
$$= \sqrt{25+4}$$
$$= \sqrt{29}$$

Circle c: Centre $(-2, -1) = (h, k)$, radius $r = \sqrt{29}$

$$(x-h)^2 + (y-k)^2 = r^2$$
$$(x-(-2))^2 + (y-(-1))^2 = (\sqrt{29})^2$$
$$(x+2)^2 + (y+1)^2 = 29$$

Formulae and Tables Book
Co-ordinate geometry: Line



Slope of PQ [page 18]

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

Length of PQ [page 18]

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

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 4 (c)

Slope m_1 of PQ:
$P(-2, -1) = (x_1, y_1)$, $Q(3, 1) = (x_2, y_2)$

$$m_1 = \frac{1-(-1)}{3-(-2)} = \frac{1+1}{3+2} = \frac{2}{5}$$

Slope m_2 of QR:
$R(1, 6) = (x_1, y_1)$, $Q(3, 1) = (x_2, y_2)$

$$m_2 = \frac{6-1}{1-3} = \frac{5}{-2} = -\frac{5}{2}$$

$$m_1 \times m_2 = (\tfrac{2}{5})(-\tfrac{5}{2}) = -1$$

PQ is perpendicular to QR as the product of their slopes is equal to -1. Therefore, RQ is a tangent to c.