

SAMPLE PAPER 1: PAPER 2

QUESTION 2 (25 MARKS)

Question 2 (a)

$$s_1 : x^2 + y^2 - 9 = 0$$

$$x^2 + y^2 = 9$$

Centre $(0, 0)$, $r = 3$

$$s_2 : x^2 + y^2 - 6y + 8 = 0$$

Centre $(-g, -f) = (0, 3)$

$$r = \sqrt{g^2 + f^2 - c} = \sqrt{0 + 9 - 8} = \sqrt{1} = 1$$

$$\sqrt{(h-0)^2 + (k-3)^2} = (r+1) \Rightarrow h^2 + (k-3)^2 = (r+1)^2$$

$$\sqrt{(h-0)^2 + (k-0)^2} = (r+3) \Rightarrow h^2 + k^2 = (r+3)^2$$

$$(k-3)^2 - k^2 = (r+1)^2 - (r+3)^2$$

$$(k-3+k)(k-3-k) = (r+1+r+3)(r+1-r-3)$$

$$a^2 - b^2 = (a-b)(a+b)$$

$$(2k-3)(-3) = (2r+4)(-2)$$

$$-6k+9 = -4r-8$$

$$4r+17 = 6k$$

Question 2 (b)

$$h^2 + k^2 = (r+3)^2$$

$$4r+17 = 6k \Rightarrow r = \frac{6k-17}{4}$$

$$h^2 + k^2 = \left(\frac{6k-17}{4} + 3 \right)^2$$

$$h^2 + k^2 = \left(\frac{6k-17+12}{4} \right)^2 = \left(\frac{6k-5}{4} \right)^2$$

$$h^2 = \frac{(6k-5)^2}{16} - k^2$$

$$16h^2 = (6k-5)^2 - 16k^2$$

$$a^2 - b^2 = (a-b)(a+b)$$

$$16h^2 = (6k-5+4k)(6k-5-4k)$$

$$16h^2 = (10k-5)(2k-5)$$

$$\therefore 16h^2 = 5(2k-1)(2k-5)$$

