

Ex 4.2

Q1 (i) $(x-3)^2 + (y-1)^2 = 4$

(ii) $(x-1)^2 + (y+4)^2 = 8$

(iii) $(x-4)^2 + y^2 = 12$

(iv) $x^2 + (y+5)^2 = 18$

Q2 radius = $\sqrt{(5-2)^2 + (1-2)^2} = \sqrt{9+1} = \sqrt{10}$
eqn $\equiv (x-2)^2 + (y-2)^2 = 10$

Q3 (3, 5) (-1, 1) centre = mid pt $(\frac{3-1}{2}, \frac{5+1}{2})$
 $= (1, 3)$

radius: (3, 5) (1, 3) $\sqrt{(1-3)^2 + (3-5)^2} = \sqrt{4+4} = \sqrt{8}$

Eqn: centre (1, 3) radius = $\sqrt{8}$

$$(x-1)^2 + (y-3)^2 = 8$$

Q4 (i) centre (3, 2) $r = 4$

(ii) centre (-2, 6) $r = \sqrt{8} = 2\sqrt{2}$

(iii) centre (3, 0) $r = \sqrt{5}$

(iv) centre (0, -2) $r = \sqrt{10}$

Q5 $(x-3)^2 + (y+4)^2 = 18$ radius = $\sqrt{18}$

\Rightarrow diameter = $2\sqrt{18} = 2(3\sqrt{2}) = 6\sqrt{2}$

eqn, centre $(-2, 5)$ $r = 6\sqrt{2}$

$(x+2)^2 + (y-5)^2 = 72$.

Q6 centre $(3, 3)$ $r = 3$

Eqn: $(x-3)^2 + (y-3)^2 = 9$

Q7 (i) $x^2 + y^2 - 4x + 8y - 5 = 0$
centre = $(2, -4)$ $r = \sqrt{2^2 + (-4)^2 + 5} = \sqrt{25} = 5$

(ii) $x^2 + y^2 - 2x - 6y - 15 = 0$
centre = $(1, 3)$ $r = \sqrt{1^2 + 3^2 + 15} = \sqrt{25} = 5$

(iii) $x^2 + y^2 - 8x - 8 = 0$
centre $(4, 0)$ $r = \sqrt{4^2 + 0^2 + 8} = \sqrt{24} = 2\sqrt{6}$

(iv) $x^2 + y^2 + 5x - 6y - 5 = 0$
centre $(-5/2, 3)$ $r = \sqrt{(-5/2)^2 + 3^2 + 5} = \sqrt{81/4} = 9/2$

(v) $2x^2 + 2y^2 - 4x + 3y = 0$
 $x^2 + y^2 - 2x + 3/2y = 0$
centre $(1, -3/4)$ $r = \sqrt{1^2 + (-3/4)^2} = \sqrt{25/16} = 5/4$

(vi) $A x^2 + 4y^2 - 28y + 33 = 0$

$$x^2 + y^2 - 7y + 33/4 = 0$$

$$\text{centre } (0, 7/2) \quad r = \sqrt{0^2 + (7/2)^2 - 33/4} = \sqrt{\frac{49}{4} - \frac{33}{4}}$$
$$= \sqrt{16/4} = 4/2 = 2.$$

Q8

$(5, -5)$ is on $x^2 + y^2 - 4x + 2y - 20 = 0$

$$(5)^2 + (-5)^2 - 4(5) + 2(-5) - 20 = 0$$

$$25 + 25 - 20 - 10 - 20 = 0$$

$$50 - 50 = 0$$

$$0 = 0$$

\therefore On circle.

OR

centre $(2, -1)$ radius $= \sqrt{2^2 + (-1)^2 + 20} = \sqrt{25} = 5$

$$\text{Dis } (5, -5) (2, -1) = \sqrt{(5-2)^2 + (-5+1)^2} = \sqrt{9+16} = \sqrt{25} = 5$$

Dis = radius \Rightarrow on the circle

Q9 $(3, 6)$ is outside $x^2 + y^2 + 2x - 4y - 20 = 0$

$$(3)^2 + (6)^2 + 2(3) - 4(6) - 20 = 0$$

$$9 + 36 + 6 - 24 - 20 = 0$$

$$51 - 44$$

$$7 > 0$$

\Rightarrow outside

OR

centre $(-1, 2)$ $r = \sqrt{(-1)^2 + (2)^2 + 20} = \sqrt{25} = 5$

$$\text{Dis } (3, 6) (-1, 2) = \sqrt{(-1-3)^2 + (2-6)^2} = \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$$

$4\sqrt{2} > 5 \Rightarrow$ outside

Q10 (3,1) $x^2 + y^2 - 2x + 4y - 15 = 0$
 $(3)^2 + (1)^2 - 2(3) + 4(1) - 15$
 $9 + 1 - 6 + 4 - 15$
 $-7 < 0 \Rightarrow \text{Inside}$

OR

Centre (1, -2) $r = \sqrt{1^2 + (-2)^2 + 15} = \sqrt{20} = 2\sqrt{5}$

Dis (1, -2)(3, 1) = $\sqrt{(3-1)^2 + (-1+2)^2} = \sqrt{4+1} = \sqrt{5}$

$\sqrt{5} < 2\sqrt{5} \Rightarrow \text{Inside}$

Q11

(1,1) $x^2 + y^2 - 6x + 4y + 4 = 0$
 $(1)^2 + (1)^2 - 6(1) + 4(1) + 4$
 $1 + 1 - 6 + 4 + 4$
 $4 > 0 \Rightarrow \text{Outside}$

OR

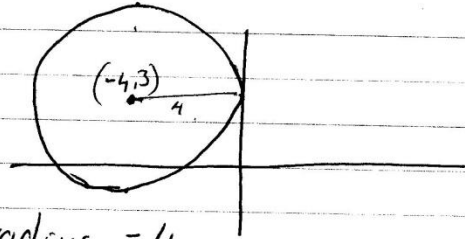
centre (3, -2) $r = \sqrt{3^2 + (-2)^2 - 4} = \sqrt{9} = 3$
 dis (3, -2)(1, 1) = $\sqrt{(1-3)^2 + (1+2)^2} = \sqrt{4+9} = \sqrt{13}$

$\sqrt{13} > 3 \Rightarrow \text{outside}$

Q12

$x^2 + y^2 - 8x + 10y + k = 0$
 $r = \sqrt{4^2 + (-5)^2 - k} = 7$
 $\sqrt{16 + 25 - k} = 7$
 $\sqrt{41 - k} = 7$
 $41 - k = 49$
 $41 - 49 = k$
 $-8 = k$

Q13 (i)



(ii) radius = 4

(iii) $(x+4)^2 + (y-3)^2 = 16$

Q14

(i) $x^2 + y^2 = 4$ radius = 2

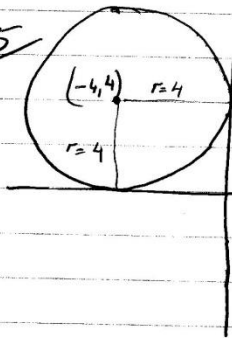
(ii) centre $K_3 = (4, -4)$

(iii) eqn K_3 : $(x-4)^2 + (y+4)^2 = 4$

(iv) $x^2 + (y+4)^2 = 4$

centre $(0, -4) \Rightarrow K_4$.

Q15



Eqn: $(x+4)^2 + (y-4)^2 = 16$

Q16

(i) $(x-2)^2 + (y-6)^2 = 100$

centre $(2, 6)$

radius = 10

(ii) \perp = opp slopes.

slope of $(2, 6)$ to $(10, 0)$ $\frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 6}{10 - 2} = \frac{-6}{8} = -\frac{3}{4}$

Slope of $4x - 3y - 40 = 0$ $\frac{-\text{coeff } x}{\text{coeff } y} = \frac{-4}{-3} = \frac{4}{3}$

$-\frac{3}{4} \times \frac{4}{3} = -1 \therefore$ Are Perpendicular.

Q17 centre = pt of intersection

$$\begin{array}{r} y = x + 4 \\ y = x \\ \hline 2y = 4 \\ y = 2 \end{array}$$

$$\Rightarrow x = 2 \quad \text{Centre } (2, 2)$$

$$\text{Diameter} = 2 \Rightarrow \text{radius} = 1$$

$$\text{Eqn: } (x-2)^2 + (y-2)^2 = 1$$

Q18 (i) $(x+2)^2 + (y+1)^2 = 25$
centre $(-2, -1)$ radius = 5

$$\Rightarrow \text{A: Centre } (-7, -1) \text{ radius} = 10 \quad \text{B: centre } (3, -1) \text{ radius} = 10$$

(ii) Eqn A: Centre $(-7, -1)$ $r = 10$

$$(x+7)^2 + (y+1)^2 = 100$$