

$$1) x^2 + y^2 + 2x + 6y + 6 = 0$$

$$x^2 + y^2 + 2x + 6y = -6$$

$$x^2 + 2x + y^2 + 6y = -6$$

Completing the square of both $2x$ & $6y$

$$x^2 + 2x + \left(\frac{2}{2}\right)^2 + y^2 + 6y + \left(\frac{6}{2}\right)^2 = -6 + \left(\frac{2}{2}\right)^2 + \left(\frac{6}{2}\right)^2$$

$$x^2 + 2x + 1 + y^2 + 6y + 9 = -6 + 1 + 9$$

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

$$\therefore \text{Using } (x-h)^2 + (y-k)^2 = r^2$$

where centre (h, k) radius $= r$

$$\therefore \text{centre } = (-1, -3) \text{ and } r = 2$$

$$2) \quad x^2 + y^2 - 4x + 10y - 8 = 0$$

$$x^2 + y^2 - 4x + 10y = 8$$

$$x^2 - 4x + y^2 + 10y = 8$$

Using the completing the square method

$$x^2 - 4x + \left(\frac{-4}{2}\right)^2 + y^2 + 10y + \left(\frac{10}{2}\right)^2 = 8 + \left(\frac{-4}{2}\right)^2 + \left(\frac{10}{2}\right)^2$$

$$x^2 - 4x + (-2)^2 + y^2 + 10y + 5^2 = 8 + (-2)^2 + 5^2$$

$$(x-2)^2 + (y+5)^2 = 37$$

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

where centre (h, k) radius $= r$

\therefore Centre $= (2, -5)$ $r = 37$