

CIRCLE

1. Breakdown of the equation for a circle into constituent parts (the centre and the radius):

a) $x^2 + 2x + y^2 + 4y = 16$

b) $4x^2 - 8x + 4y^2 + 24y = 144$

c) $8x^2 + 6x + 8y^2 - 12y = 100$

d) $\frac{5}{6}x^2 - 12x + \frac{5}{6}y^2 - 20y = 24$

2. Build-up of the equation of the circle given particular pieces of information:

a) Centre and radius: key formula $(x - h)^2 + (y - k)^2 = r^2$

1. C(-2, 4); radius = 16

2. C(-4, -7); radius = 12

3. C(2/3, 5/6); radius = 4

b) Points forming the diameter of the circle.

key formulas: Midpoint : $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$, distance: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$\text{radius} = d/2$$

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

1. (4, 8) and (-2, -10)

2. (-5, 6) and (7, -4)

3. (-3, 5) and (2, -3)

c) Tangent arguments (Remember a tangent is perpendicular the radius at the point of tangency).

1. Centre is in the second quadrant; radius is 6; the point of tangency to the y-axis at (0, 3)

2. Centre is in the third quadrant; the radius is 12; the point of tangency to the x-axis at (-4, 0)

3. Centre is on the line $x = 6$; tangent to y-axis at (0, -5)

4. Centre is on the line $y = -12$; tangent to x-axis at (-8, 0)

5. Centre is on the line $x + y = 6$; tangent to both axes.

d) Other Arguments

1. three points on the circumference of the circle: (1, -1), (2, -2) (0, 2)

2. Sketch the set of points that satisfy the inequality $x^2 + y^2 - 4x + 2y + 1 \leq 0$