

Circle KeyPoints

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Graduate Bsc (Hons) MathsSci (Open) GIMA

The 2 standard forms for the circle equation are:-

$$x^2 + y^2 + 2 \cdot g \cdot x + 2 \cdot f \cdot y + c = 0 \quad \text{where centre is } (-g, -f)$$

$$\text{radius (r)} \quad r = \sqrt{(g^2 + f^2 - c)}$$

OR

$$(x - a)^2 + (y - b)^2 = r^2 \quad \text{where centre is } (a, b)$$

1. Given the centre and radius of a circle we can write down its equation in either of the formats above.
2. Given an equation in the standard form, for it to be an equation of a circle we must have the radius $(r) > 0$ (makes sense!)

$$r = \sqrt{(g^2 + f^2 - c)} > 0$$

3. Two circles touch if the following is true.

$$r_1 + r_2 = \text{distance between } C_1 C_2$$

$C = \text{centre of circle}$

"In words " the sum of their radii equals the distance between their centres.

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4. To find if a line "intersects ", " is a tangent to "or" does not touch "a given circle we solve the equation

Line equation = circle equation

After rearranging the resultant quadratic, the discriminant gives the answer

$b^2 - 4 \cdot a \cdot c > 0$ two real roots, then line cuts circle at 2 points.

$b^2 - 4 \cdot a \cdot c = 0$ one real root, then line is a tangent to the circle.

$b^2 - 4 \cdot a \cdot c < 0$ no real roots, then line does not cut or touch the circle.