Equation of the Circle

SAT Notes

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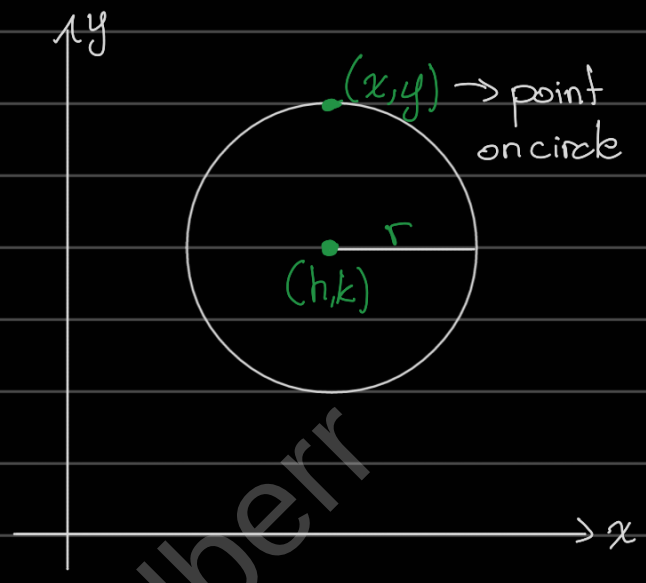
Equation of the Circle



* Standard Form:
$\Rightarrow (x-h)^2+(y-k)^2=r^2$ * r=Radius

* To find the centre take opposite sigin.

Ex: $(x+3)^2+(y-4)^2=25$

$\Rightarrow$ The center = $(-3,4)$ Radius $\Rightarrow \sqrt{25}=5$

* General Form: $x^2+y^2+ax+bx+c=0$

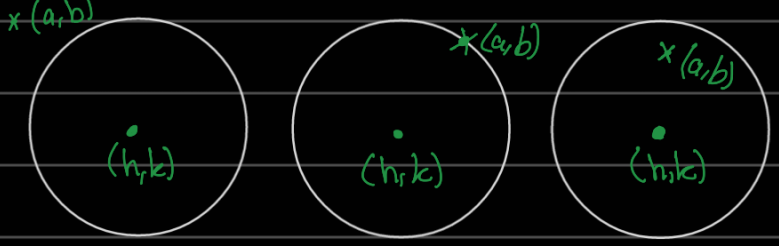
$\Rightarrow$ To find the centre $\Rightarrow \left(\frac{a}{-2},\frac{b}{-2}\right)$ * Take a and b with their same sigin.

$\Rightarrow$ To find the Radius $\Rightarrow \sqrt{\left(\frac{a}{-2}\right)^2+\left(\frac{b}{-2}\right)^2-c}$

* When "c" is in the left side of the equation, then take it with its opposite sigin. When it's in the right side take it with its same sigin.

* Calculate the distance "d" between "any point" and the "centre":

d>r d=r d<r * Distance Formula:



Point (1) (x_1,y_1) point on the circle.
Point (2) (x_2,y_2) point of the centre.

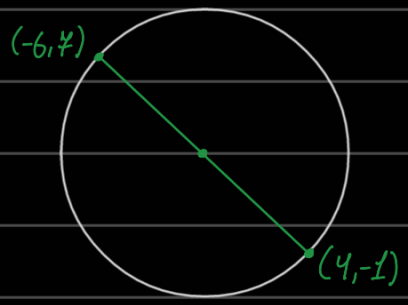
$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

* Midpoint: It is a point that is exactly half the distance between two points. point ① (x_1, y_1), point ② (x_2, y_2)

$$\text{Midpoint } (x_m, y_m) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

* Remember that: Unit circle is a circle with radius = 1.

* Ex: Write the equation of a circle whose diameter has endpoints (4, -1) and (-6, 7)



* To write the equation of a circle we need
① Radius ② Centre (h, k)

- Find the centre by using midpoint formula:

$$\left(\frac{x_1+x_2}{2}, \frac{x_2+x_2}{2}\right) = \left(\frac{-6+4}{2}, \frac{7+(-1)}{2}\right) = (-1, 3)$$

- Radius $= \sqrt{(-6-(-1))^2 + (7-3)^2}$
$= \sqrt{41}$

* Find the radius using distance formula.

The equation $\Rightarrow (x+1)^2 + (y-3)^2 = 41$