Coordinate Geometry: The Circle

chapter 4

Section 4.7 Circles touching the x-axis or y-axis

PROJECT MATHS – STRAND 2
Text & Tests 4
LEAVING CERTIFICATE HIGHER LEVEL

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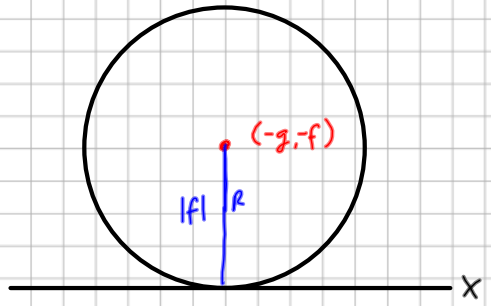
$$r = \sqrt{g^2 + f^2 - c}$$

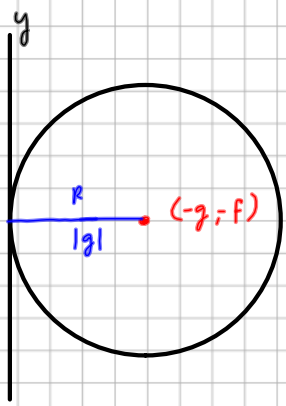
$$|f| = \sqrt{g^2 + f^2 - c}$$

$$0 \quad \cancel{f^2} = g^2 + \cancel{f^2} - c$$

$$\boxed{g^2 = c}$$

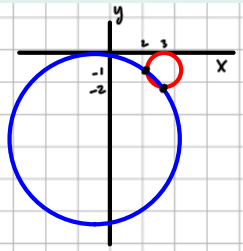
$$\boxed{f^2 = c}$$





Example 1

Find the equations of the two circles which contain the points (3, −2) and (2, −1) and which touch the x-axis.



Step 1: Sub in pts into $x^2+y^2+2gx+2fy+c=0$

Step 2: use: $g^2=c$ true when Circle touches the x-axis.

Step 3 Solve 3 equations

$(3)^2+(-2)^2+2g(3)+2f(-2)+c=0$

$9+4+6g-4f+c=0$

$6g-4f+c=-13$ ①

$(2)^2+(-1)^2+2g(2)+2f(-1)+c=0$

$4+1+4g-2f+c=0$

$4g-2f+c=-5$ ②

$g^2=c$ ③

use ① and ② to eliminate 'f'

$$\begin{array}{rl} ① & 6g-\cancel{4f}+c=-13 \\ -2② & -8g+\cancel{4f}-2c=10 \\ \hline & +2g+c=+3 \quad ④ \end{array}$$

Sub ③ into ④ ⇒

$2g+g^2=3$

Solve

$g^2+2g-3=0$

$(g-1)(g+3)=0$

$g=1$, $g=-3$

$g=1$
$g=-3$

③ $g^2=c$

$c=(1)^2 \Rightarrow c=1$

$c=(-3)^2 \Rightarrow c=9$

② $4g-2f+c=-5$

$g=1$, $c=1$

$4(1)-2f+1=-5$

$5-2f=-5$

$-2f=-10 \Rightarrow f=5$

$g=-3$, $c=9$

$4(-3)-2f+9=-5$

$-12-2f+9=-5$

$-3+2f=-5$

$2f=-2 \Rightarrow f=-1$

equation: $x^2+y^2+2gx+2fy+c=0$

$g=1$, $f=5$, $c=1$

$g=-3$, $f=-1$, $c=9$