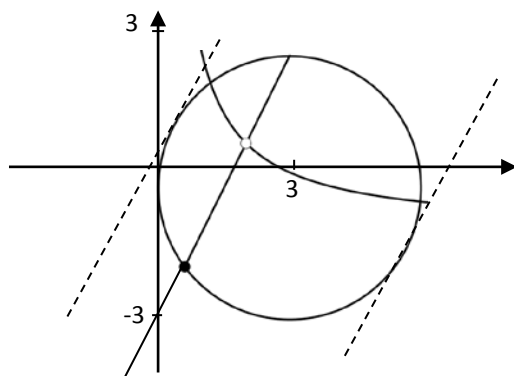


$$x^2 - 6x + y^2 = 0$$

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

$$(x-3)^2 + y^2 = 9$$

centre at (3, 0) & radius 3.



White Dot

The white dot is where $y = 2x - 3$ and

$x(y+1) = 4$ meet.

$$x(2x - 3 + 1) = 4$$

$$x(2x - 2) = 4$$

$$2x^2 - 2x = 4$$

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

$$x = 2 \text{ or } x = -1$$

(2, 1)

1

Black Dot

The black dot is where $(x-3)^2 + y^2 = 9$ and $y = 2x - 3$ meet.

$$(x-3)^2 + (2x-3)^2 = 9$$

$$x^2 - 6x + 9 + 4x^2 - 12x + 9 = 9$$

$$5x^2 - 18x + 9 = 0$$

$$x = 0.6 \text{ or } x = 3$$

$$x = 0.6$$

so $y = 2(0.6) - 3$

$$y = -1.8$$

black dot at (0.6, -1.8)

2

Grey Line

parallel to $y = 2x - 3$

Try $y = 2x - 6$

$$x(2x - 5) = 4$$

$$2x^2 - 5x = 4$$

$$x = -0.64 \text{ calculator solver}$$

$$y = -7.28$$

$$(-0.64, -7.28)$$

3

Tangent

$$y = 2x + c$$

so

$$x^2 - 6x + (2x + c)^2 = 0$$

$$x^2 - 6x + (2x + c)(2x + c) = 0$$

$$x^2 - 6x + 4x^2 + 4cx + c^2 = 0$$

$$5x^2 - 6x + 4cx + c^2 = 0$$

$$(-6 + 4c)^2 - 4 \times 5 \times c^2 = 0$$

$$(-6 + 4c)(-6 + 4c) - 20c^2 = 0$$

$$36 - 48c + 16c^2 - 20c^2 = 0$$

$$36 - 48c - 4c^2 = 0$$

$$9 - 12c - c^2 = 0$$

$$c^2 + 12c - 9 = 0$$

$$c^2 + 12c + 36 = 9 + 36$$

$$(c + 6)^2 = 45$$

$$c + 6 = \pm 6.71$$

$$c = -12.71 \text{ or } 0.71$$

tangent 1 $y = 2x + 0.71$

tangent 2 $y = 2x - 12.71$

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