

Ex Find perpendicular bisector between

$A(3, 5)$ and $B(7, 13)$

Gradient of AB

$$= \frac{y_2 - y_1}{x_2 - x_1} = \frac{13 - 5}{7 - 3} = \frac{8}{4} = 2$$

Gradient of perpendicular bisector = $-\frac{1}{2}$

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

$$= \left(\frac{3+7}{2}, \frac{5+13}{2} \right)$$

$$= (5, 9)$$

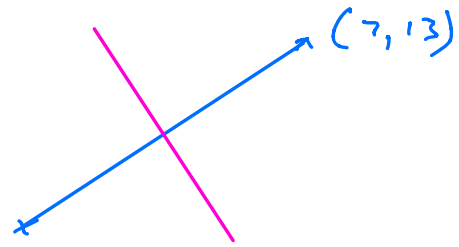
$$y - y_1 = m(x - x_1)$$

$$y - 9 = -\frac{1}{2}(x - 5)$$

$$y - 9 = -\frac{1}{2}x + \frac{5}{2}$$

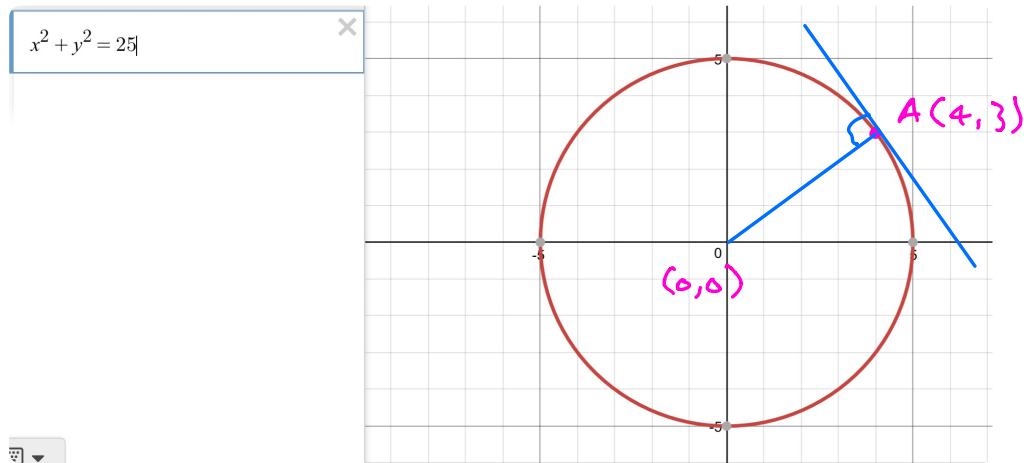
$$y = -\frac{1}{2}x + \frac{5}{2} + 9$$

$$y = -\frac{1}{2}x + \frac{23}{2}$$



Equation of a circle, centre the origin, radius r

$$x^2 + y^2 = r^2$$



Example $x^2 + y^2 = 25$
is circle centre $(0,0)$ radius 5

Find the eqn of the tangent to
 $x^2 + y^2 = 25$ at the point $A(4,3)$

$$\text{Gradient of radius } OA = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 0}{4 - 0} = \frac{3}{4}$$

Gradient of tangent at A will be $-\frac{4}{3}$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -\frac{4}{3}(x - 4)$$

$$y - 3 = -\frac{4}{3}x + \frac{16}{3}$$

$$y = -\frac{4}{3}x + \frac{16}{3} + 3$$

$$y = -\frac{4}{3}x + \frac{25}{3}$$