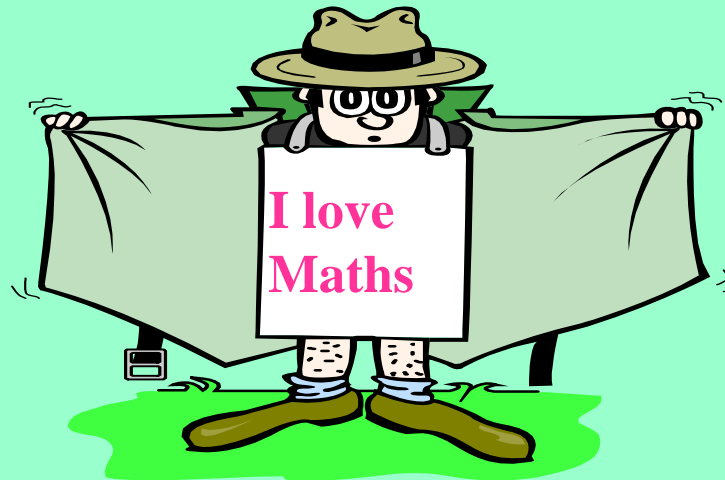


5.

Tangents to Circles



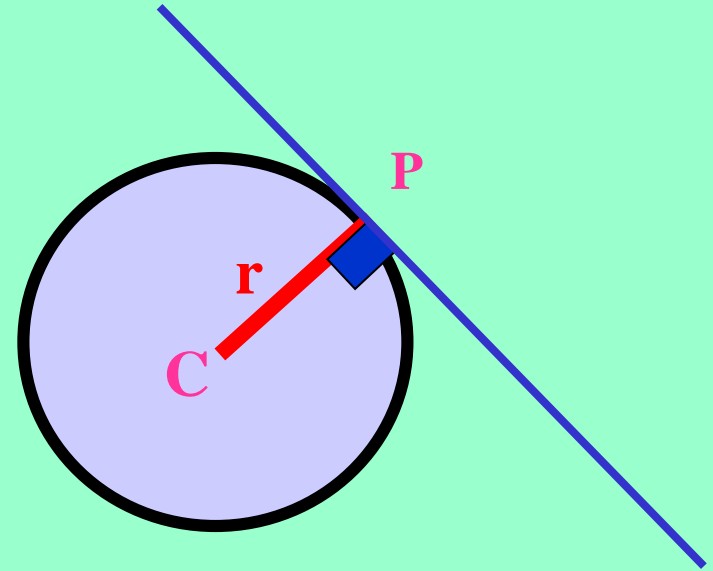
The equation of the tangent to the Circle

Copy the following:

To find the equation of the tangent:

1. Find the gradient between C and the point of contact using:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



2. Find gradient of tangent using $m_1 \times m_2 = -1$

3. Find equation of tangent using **point of contact** and $y - b = m(x - a)$

Example 1

Prove that the point $(-4,4)$ lies on the circle $x^2 + y^2 - 12y + 16 = 0$.

Find the equation of the tangent at this point.

Solution:

Sub $x = -4$ and $y = 4$ into equation for circle:

$$\begin{aligned}\text{LHS: } & x^2 + y^2 - 12y + 16 \\ & = (-4)^2 + (4)^2 - 12(4) + 16 \\ & = 16 + 16 - 48 + 16 \\ & = 0 \\ & = \text{RHS so point lies on circle}\end{aligned}$$

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Prove that the point $(-4,4)$ lies on the circle $x^2 + y^2 - 12y + 16 = 0$.

Find the equation of the tangent at this point.

Solution:

Centre of circle is $(0, 6)$

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Gradient between C and P

$$m_{cp} = \frac{6-4}{0-(-4)} = \frac{2}{4} = \frac{1}{2}$$

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Equation of tangent:

$$y - y_1 = m(x - x_1) \\ y - 4 = -2(x - (-4)) \\ y - 4 = -2(x + 4) \\ y - 4 = -2x - 8$$

$$2x + y = -4$$

Heinemann,
p.220, EX 12L, Q1 to 5