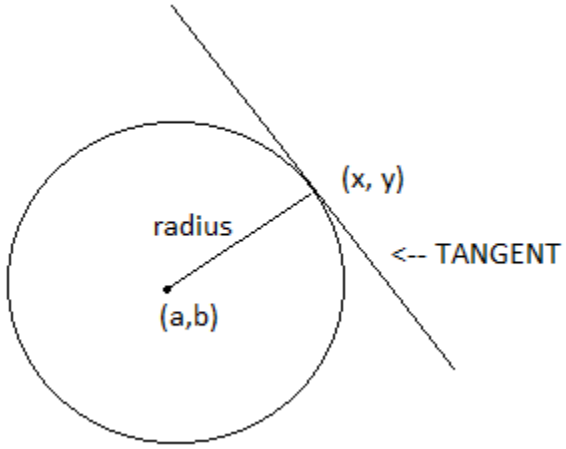
Subject: Additional Mathematics **Class: Form 4D, 4L, 4S**

LESSON 1

EQUATION OF TANGENT TO A CIRCLE

A tangent is perpendicular to a radius at the point of tangency. The radius is also called a NORMAL to the tangent.



If the gradient of the radius (NORMAL) is m then the gradient of the tangent = $-\frac{1}{m}$

Example:

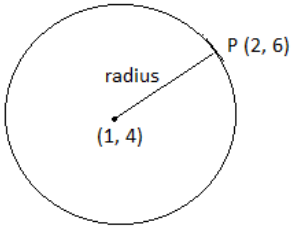
1. Find the equation of the tangent to the circle $(x-1)^2+(y-4)^2=5$ *at the point* $(2,6)$.

$$(x-1)^2+(y-4)^2=5$$

$$(x-a)^2+(y-b)^2=r^2$$

Comparing a = 1, b = 4

therefore, Centre of circle is (1, 4)



Gradient of radius

$$m=\frac{y_2-y_1}{x_2-x_1}=\frac{6-4}{2-1}=\frac{2}{1}=2$$

Therefore, Gradient of Tangent $=-\frac{1}{m}=-\frac{1}{2}$

Let equation of tangent be $y = mx + c\ then\ y = -\frac{1}{2}x + c$

at the point (2, 6)….x = 2, y = 6

therefore,

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

$$6 = -\frac{1}{2}(2) + c$$

$$6 = -1 + c$$

$$6 + 1 = c$$

$$7 = c$$

Hence, equation of tangent is

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

$$y = -\frac{1}{2}x + 7$$

2. Find the equation of the normal (RADIUS) that passes through the point (2, 6).

Gradient of radius (NORMAL) is

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{2 - 1} = \frac{2}{1} = 2$$

Let equation of NORMAL be

$$y = mx + c\ , therefore\ \ y = 2x + c$$

at the point (2, 6)…..x = 2, y = 6

Using

$$y = 2x + c$$

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

$$6 = 4 + c$$

$$6 - 4 = c$$

$$2 = c$$

Equation of the normal (RADIUS) is $y = 2x + 2$

ADDITIONAL MATHS TEXT BOOK

EX 7.7 PAGE 245

1B, 2A, 3A