GRADE 12

Calculus –Equations of Tangents to Graphs of Functions _17 July 2020

WEBSITE NOTES

TOPIC:

- Equations of tangents to graphs of functions.

Remember that a Tangent is a straight line and therefore has the equation y=mx+c. To work out the gradient you will need to work out the derivative first.

Example 1

$$Given \quad f(x) = -x^3 + 3x^2 - 10x + 3$$

Determine the equation of the tangent at the point S (2; -13) in the form of y=……

Answer

STEP 1

Work out the Derivative (Gradient) of f(x)

$$f(x) = -x^3 + 3x^2 - 10x + 3$$
$$f'(x) = -3x^2 + 6x - 10$$

STEP 2

Determine the Derivative (Gradient) at the point S (2; -13). In other words, substitute x = 2 into the Derivative (Gradient) worked in step 1. Do not substitute the y=-13 in.

y=-13 is the y-coordinate of $f(x) = -x^3 + 3x^2 - 10x + 3$ when x=2.

$$f'(x) = -3x^2 + 6x - 10$$
$$f'(2) = -3.(2)^2 + 6.(2) - 10$$
$$f'(2) = -10$$

Therefore, the Derivative (Gradient) at x=2 is -10. This is the ***m*** value in ***y=mx+c***

STEP 3

Use the equation $y - y_1 = m(x - x_1)$ where $\boldsymbol{x_1 = 2}$ *and* $\boldsymbol{y_1 = -13}$ $(\boldsymbol{the\ point\ S\ given})$ *and* $\boldsymbol{m = -10}$

$$y - y_1 = m(x - x_1)$$
$$y - (\mathbf{-13}) = \mathbf{-10}.(x - (\mathbf{2}))$$
$$y + 13 = -10x + 20$$
$$y = -10x + 20 - 13$$
$$\underline{\boldsymbol{y = -10x + 7}}$$

Example 2

Try the following on your own

$$Given \quad f(x) = x^3 + 2x^2 + 2x - 4$$

Determine the equation of the tangent at the point S (1; -1) in the form of y=……

Example 3

Try the following on your own

$$Given \quad f(x) = 2x^3 - x^2 + 3x - 5$$

Determine the equation of the tangent at the point S (-1; -11) in the form of y=……

Example 4

Try the following on your own

$$Given \quad f(x) = x^2 + 2x - 2$$

Determine the equation of the tangent at the point S (2; 6) in the form of y=……