GRADE 12 TANGENTS TO A CURVE

Equations of tangents to graphs of functions

The slope of a curve at a point is the derivative of the function at a point. Therefore the steps to find the equation of a tangent to the function at a point is as below

- **Example**

Find the tangent equation to the function $f(x) = x^3 + 2x^2 + 2x + 1$ at the point x=2

- **STEP 1**

Find the Derivative of f(x). Therefore find $f'(x)$

$f'(x) = 3x^2 + 4x + 2$

- **STEP 2**

Work out the Derivative at x=2. (Point given). That means substitute x=2 into $f'(x)$

$f'(2) = 3(2)^2 + 4(2) + 2$

$f'(2) = 22$ - THIS IS THE GRADIENT AT THE POINT x=2. Therefore m=22

The slope of a curve at a point is the derivative of the function at a point. Therefore the steps to find the equation of a tangent to the function at a point is as below CONTINUED….

- **STEP 3**

Calculate the y-value from the original function when x=2. In other words calculate f(2).

$f(x) = x^3 + 2x^2 + 2x + 1$

$f(2) = (2)^3 + 2(2)^2 + 2(2) + 1$

$f(2) = 21$ So therefore $x_1 = 2 \; and \; y_1 = 21$

- **STEP 4**

Work out the tangent equation using $y - y_1 = m(x - x_1)$ at the point $(x_1; y_1)$ THAT IS (2;21) IN THIS EXAMPLE.

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

$y - 21 = 22(x - 2)$

$y = 22x - 44 + 21$

$y = 22x - 23$

THIS IS THEREFORE THE EQUATION OF THE TANGENT OF F(X) AT THE POINT X =2

QUESTIONS TO TRY ON YOUR OWN.

1. Find the equation of the tangent to the function $f(x) = x^3 + 2x + 4$ at the point where $x = 1$.

2. If $g(x) = -2x^3 - 3x^2 + 12x + 20$, determine the equation of the tangent to g at P(–3; 11) in the form $y = \ldots$