



GRADE 12 TANGENTS TO A CURVE

Equations of tangents to graphs of functions
ANSWERS TO QUESTIONS

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 $y = \dots$

Answers

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

ANSWER

STEP 1 – FIND DERIVATIVE

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

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

STEP 2 – FIND VALUE OF DERIVATIVE (GRADIENT) AT THE POINT $x = 1$.

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

$$f'(1) = 5$$

STEP 3 – CALCULATE THE y -VALUE WHEN $x=1$ BY SUBSTITUTING $x=1$ INTO THE ORIGINAL EQUATION.

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

$$f(1) = (1)^3 + 2(1) + 4$$

$$f(1) = 7$$

THEREFORE $x_1 = 1$ AND $y_1 = 7$

STEP 4 – WORK OUT THE EQUATION OF TANGENT BY USING $y - y_1 = m(x - x_1)$. THE POINT IS $x_1 = 1$ AND $y_1 = 7$

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

$$y - 7 = 5(x - 1)$$

$$y = 5x - 5 + 7$$

$y = 5x + 2$

Answers

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 $y = \dots$

ANSWER

STEP 1 – FIND DERIVATIVE

$$g(x) = -2x^3 - 3x^2 + 12x + 20$$

$$g'(x) = -6x^2 - 6x + 12$$

STEP 2 – FIND VALUE OF DERIVATIVE (GRADIENT) AT THE POINT $x = -3$ FROM THE POINT GIVEN $P(-3; 11)$.

$$g'(x) = -6x^2 - 6x + 12$$

$$g'(-3) = -6(-3)^2 - 6(-3) + 12$$

$$g'(-3) = -54 + 18 + 12$$

$$g'(-3) = -24$$

STEP 3 – CALCULATE THE y -VALUE WHEN $x = -3$ BY SUBSTITUTING $x = -3$ INTO THE ORIGINAL EQUATION.

THE POINT IS GIVEN IN QUESTION AT POINT $P(-3; 11)$. FROM THIS POINT $y_1 = 11$ WHEN $x_1 = -3$

THEREFORE $x_1 = -3$ AND $y_1 = 11$

STEP 4 – WORK OUT THE EQUATION OF TANGENT BY USING $y - y_1 = m(x - x_1)$. THE POINT IS $x_1 = -3$ AND $y_1 = 11$

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

$$y - 11 = -24(x - (-3))$$

$$y - 11 = -24(x + 3)$$

$$y = -24x - 61$$