CALCULUS: EQUATION OF A TANGENT TO A CURVE

Best Guess Mastery Worksheet (Target Grade 4/5)

I Do

A curve has equation $y = x^3 - 2x^2 - 4x + 7$

Find the equation of the tangent to the curve at the point where $x = 3$

Give your answer in the form $y = mx + c$

$y =$ .....

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We Do

A curve has equation $y = x^3 - 3x^2 + 2x + 5$

Find the equation of the tangent to the curve at the point where $x = 2$

Give your answer in the form $y = mx + c$

$y =$ .....

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You Do 1

A curve has equation $y = x^3 - x^2 - 5x + 4$

Find the equation of the tangent to the curve at the point where $x = 2$

Give your answer in the form $y = mx + c$

$y =$ .....

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You Do 2

A curve has equation $y = x^3 - 4x^2 + 3x + 2$

Find the equation of the tangent to the curve at the point where $x = 3$

Give your answer in the form $y = mx + c$

$y =$ .....

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Challenge 1

A curve has equation $y = 2x^3 - 5x^2 + x - 3$

Find the equation of the tangent to the curve at the point where $x = 2$

Give your answer in the form $y = mx + c$

$y =$ .....

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Challenge 2

A curve has equation $y = 3x^3 - 4x^2 - 5x + 1$

Find the equation of the tangent to the curve at the point where $x = 1$

Give your answer in the form $y = mx + c$

$y =$ .....

Answers & Worked Solutions

I Do:

1. Find y when $x = 3$: $y = (3)^3 - 2(3)^2 - 4(3) + 7 = 27 - 18 - 12 + 7 = 4$. Point is (3, 4).
2. Differentiate: $dy/dx = 3x^2 - 4x - 4$.
3. Find gradient m when $x = 3$: $m = 3(3)^2 - 4(3) - 4 = 27 - 12 - 4 = 11$.
4. Equation: $y - 4 = 11(x - 3) \rightarrow y - 4 = 11x - 33 \rightarrow$ **$y = 11x - 29$**

We Do:

1. Find y when $x = 2$: $y = (2)^3 - 3(2)^2 + 2(2) + 5 = 8 - 12 + 4 + 5 = 5$. Point is (2, 5).
2. Differentiate: $dy/dx = 3x^2 - 6x + 2$.
3. Gradient when $x = 2$: $m = 3(2)^2 - 6(2) + 2 = 12 - 12 + 2 = 2$.
4. Equation: $y - 5 = 2(x - 2) \rightarrow y - 5 = 2x - 4 \rightarrow$ **$y = 2x + 1$**

You Do 1:

1. Find y when $x = 2$: $y = (2)^3 - (2)^2 - 5(2) + 4 = 8 - 4 - 10 + 4 = -2$. Point is (2, −2).
2. Differentiate: $dy/dx = 3x^2 - 2x - 5$.
3. Gradient when $x = 2$: $m = 3(2)^2 - 2(2) - 5 = 12 - 4 - 5 = 3$.
4. Equation: $y - (-2) = 3(x - 2) \rightarrow y + 2 = 3x - 6 \rightarrow$ **$y = 3x - 8$**

You Do 2:

1. Find y when $x = 3$: $y = (3)^3 - 4(3)^2 + 3(3) + 2 = 27 - 36 + 9 + 2 = 2$. Point is (3, 2).
2. Differentiate: $dy/dx = 3x^2 - 8x + 3$.
3. Gradient when $x = 3$: $m = 3(3)^2 - 8(3) + 3 = 27 - 24 + 3 = 6$.
4. Equation: $y - 2 = 6(x - 3) \rightarrow y - 2 = 6x - 18 \rightarrow$ **$y = 6x - 16$**

Challenge 1:

1. Find y when $x = 2$: $y = 2(2)^3 - 5(2)^2 + (2) - 3 = 16 - 20 + 2 - 3 = -5$. Point is (2, −5).
2. Differentiate: $dy/dx = 6x^2 - 10x + 1$.
3. Gradient when $x = 2$: $m = 6(2)^2 - 10(2) + 1 = 24 - 20 + 1 = 5$.
4. Equation: $y - (-5) = 5(x - 2) \rightarrow y + 5 = 5x - 10 \rightarrow$ **$y = 5x - 15$**

Challenge 2:

1. Find y when $x = 1$: $y = 3(1)^3 - 4(1)^2 - 5(1) + 1 = 3 - 4 - 5 + 1 = -5$. Point is (1, −5).
2. Differentiate: $dy/dx = 9x^2 - 8x - 5$.
3. Gradient when $x = 1$: $m = 9(1)^2 - 8(1) - 5 = 9 - 8 - 5 = -4$.
4. Equation: $y - (-5) = -4(x - 1) \rightarrow y + 5 = -4x + 4 \rightarrow$ **$y = -4x - 1$**