Outcome 1 – Gradient of tangent to curve

Bronze example

Example... $m_{tan} = \frac{dy}{dx}$

Find the gradient of the tangent to the curve $y = 2x^3 - 6x^2 - 8x + 9$ at the point where $x = -1$.

1. f'(x) 2. f'(number)

$y = 2x^3 - 6x^2 - 8x + 9$

$f'(x) = 6x^2 - 12x - 8$

$f'(-1) = 6 + 12 - 8 = 10$

The gradient of the tangent is 10.

Bronze questions

Find the gradient of the tangents to the curves...

1. $y = x^3$ where $x = 1$
2. $y = 5x^2$ where $x = 4$
3. $y = 2x^4$ where $x = -2$
4. $y = 3x^3 + 9$ where $x = -3$
5. $y = x^2 - 7x$ where $x = 2$
6. $y = x^3 + 6x^2$ where $x = -1$
7. $y = x^3 + 2x^2 - 10x$ where $x = -5$
8. $y = 4x^3 - 8x^2 - 7$ where $x = 3$

Outcome 2 – Equation of tangent to curve

Silver example

Example... $m_{tan} = \frac{dy}{dx}$

Find the equation of the tangent to the curve $y = x^3 + x^2 - 9x + 8$ at the point where $x = -3$.

$y = -27 + 9 + 27 + 8 = 17$ 1. Sub in to get y

$f'(x) = 3x^2 + 2x - 9$ 2. f'(x)

$f'(-3) = 27 - 6 - 9 = 12$ 3. f'(number)

$(-3, 17)$ $m_{tan} = 12$ 4. y - b...

$y - 17 = 12(x + 3)$

$y - 17 = 12x + 36$ $y = 12x + 53$

Silver questions

Find the equation of the tangents to the curves...

1. $y = x^2$ where $x = 4$
2. $y = 2x^3$ where $x = 1$
3. $y = 3x^5$ where $x = -1$
4. $y = 6x^2 + 7$ where $x = -2$
5. $y = x^2 + 5x$ where $x = -3$
6. $y = x^3 + 10x^2$ where $x = -5$
7. $y = x^3 - 2x^2 + 7x$ where $x = 2$
8. $y = 2x^4 - 3x^3$ where $x = 0$

Outcome 3 – Finding a point when given the gradient

Gold example

Example... $m_{tan} = \frac{dy}{dx}$

A point (x, y) lies on the curve with equation $y = x^2 - 6x$.

Calculate the coordinates for which the gradient of the tangent is 4.

$f'(x) = 2x - 6$ 1. f'(x)

$2x - 6 = 4$ 2. Set EQUAL to gradient

$2x = 10$ 3. Find x

$x = 5$ 4. Sub in to get y

$y = 25 - 30$

$= -5$ $(5, -5)$

Gold questions

Find the coordinate(s) (x, y) on the curves...

1. $y = 2x^2$ where $m_{tan} = 8$
2. $y = 4x^3$ where $m_{tan} = 12$
3. $y = x^2 - 8x$ where $m_{tan} = 4$
4. $y = 2x^3 + 6x^2 - 47x$ where $m_{tan} = 1$

Bronze Answers

1. $m_{tan} = 1$
2. $m_{tan} = 40$
3. $m_{tan} = -64$
4. $m_{tan} = 81$
5. $m_{tan} = -3$
6. $m_{tan} = -9$
7. $m_{tan} = 45$
8. $m_{tan} = 60$

Silver Answers

1. (4, 16), m = 8, y = 8x - 16
2. (1, 2), m = 6, y = 6x - 4
3. (-1, -3), m = 15, y = 15x + 12
4. (-2, 31), m = -24, y = -24x - 17
5. (-3, -6), m = -1, y = -x - 9
6. (-5, 125), m = -25, y = -25x
7. (2, 14), m = 11, y = 11x - 8
8. (0, 0), m = 0, y = 0

Gold Answers

1. (2, 8)
2. (1, 4) and (-1, -4)
3. (6, -12)
4. (-4, 156) and (2, -54)