projectmaths

12

The Tangent to a Curve and the Derivative of a Function

16	11	Differentiate	<i>x</i> + 2
	b		$\overline{3x-4}$.

2 Solution

15 12 c Find f'(x), where $f(x) = \frac{x^2 + 3}{x - 1}$.

2 Solution

14 11 c Differentiate $\frac{x^3}{x+1}$

Solution

13 11 b Evaluate $\lim_{x \to 2} \frac{x^3 - 8}{x^2 - 4}$.

Solution

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11 Find the equation of the tangent to the curve $y = x^2$ at the point where x = 3.

2 Solution

11 2c Find the equation of the tangent to the curve $y = (2x + 1)^4$ at the point where x = -1.

3 Solution

8d Let $f(x) = x^3 - 3x^2 + kx + 8$, where k is a constant. Find the values of k for which f(x) is an increasing function.

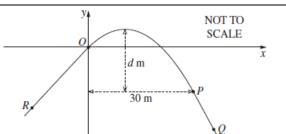
Solution

09 1d Find the gradient of the tangent to the curve $y = x^4 - 3x$ at the point (1, -2).

<u>Solution</u>

Solution

O9 6c The diagram illustrates the design for part of a roller-coaster track. The section *RO* is a straight line with slope 1.2 and the section *PQ* is a straight line with slope -1.8. The section OP is a parabola



 $y = ax^2 + bx$. The horizontal distance from the y-axis to P is 30 m. In order that the ride is smooth, the straight sections must

be tangent to the parabola at O and at P.

(i) Find the values of a and b so that the ride is smooth.

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(ii) Find the distance d, from the vertex of the parabola to the horizontal line through P, as shown on the diagram.

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09 8a The diagram shows the graph of a function y = f(x).

Solution

(i) For which values of x is the derivative, f'(x), negative?

1

(ii) What happens to f'(x) for large values of x?

1

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(iii) Sketch the graph of y = f'(x).

- **08 2a** Differentiate with respect to *x*:
- (i) $(x^2 + 3)^9$

Solution

05 2b

Solution

- Differentiate with respect to *x*:
- (ii) $\frac{x^2}{x-1}$

2