Lower 6 Chapter 12

Differentiation

Chapter Overview

1. First Principles and finding the derivative of polynomials.
2. Find equations of tangents and normal to curves.
3. Identify increasing and decreasing functions.
4. Find and understand the second derivative $\frac{d^{2}y}{dx^{2}}$ or $f^{''}\left(x\right)$
5. Find stationary points and determine their nature.
6. Sketch a gradient function.
7. Model real-life problems.

  

The Gradient Function

Example

The point $A$ with coordinates $\left(4,16\right)$ lies on the curve with equation $y=x^{2}$.

At point $A$ the curve has gradient $g$.

1. Show that $g=\lim\_{h\to 0}\left(8+h\right)$
2. Deduce the value of $g$.

Example

Prove from first principles that the derivative of $x^{3}-2x=3x^{2}-2$

Test you understanding

Prove **from first principles** that the derivative of $x^{4}$ is $4x^{3}$.

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