Exercise walk-through

Applying the Power Rule ▪ 2.5

eXercise

You must be able to

- differentiate a power of x with the **power rule** 幂法则 $\frac{d}{dx}[x^n] = nx^{n-1}$

Method — The power rule

$$\frac{d}{dx}[x^n] = n\,x^{n-1}.$$

Special cases: $\frac{d}{dx}[x] = 1$ and $\frac{d}{dx}[c] = 0$ for a constant c.

Method — Example

$$\frac{d}{dx}[x^3] = 3x^2.$$

Practice 2.1 ▪ 1 mark

State the power rule.

Solution 2.1

Method: The power rule

Worked steps

$$\frac{d}{dx}[x^n] = n\,x^{n-1}$$ B1.

Practice 2.2 ▪ 1 mark

Differentiate x^5.

Solution 2.2

Worked steps

$5x^4$ B1.

Practice 2.3 ▪ 2 marks

Differentiate x^2 and x.

Solution 2.3

Worked steps

$\frac{d}{dx}[x^2] = 2x$; $\frac{d}{dx}[x] = 1$ B1 B1.

Exam-style 3.1 ▪ 1 mark

$\frac{d}{dx}[x^n]$ equals

A x^{n-1}

B $n\,x^{n-1}$

C $n\,x^n$

D $\frac{x^{n+1}}{n+1}$

Solution 3.1

A x^{n-1}

B $n\,x^{n-1}$ ✓

C $n\,x^{n}$

D $\dfrac{x^{n+1}}{n+1}$

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

$\frac{d}{dx}[x^4]$ equals

A $4x^3$

B x^3

C $4x^5$

D $3x^4$

Solution 3.2

A $4x^3$ ✓

B x^3

C $4x^5$

D $3x^4$

Worked steps

A.

Exam-style 3.3 ▪ 1 mark

Differentiate each.
(a) x^6.
(b) x.
(c) 7 (a constant).

Solution 3.3

Worked steps

(a) $6x^5$ B1. (b) 1 B1. (c) 0 B1.