

2.5 The Power Rule

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **applying the power rule**.

You must be able to:

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

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ 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 .

■ Example

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

2 Practice

2.1 State the power rule. [1]

2.2 Differentiate x^5 . [1]

2.3 Differentiate x^2 and x . [2]

3 Exam-style questions

3.1 $\frac{d}{dx}[x^n]$ equals [1]

- **A** x^{n-1}
 - **B** $n x^{n-1}$
 - **C** $n x^n$
 - **D** $\frac{x^{n+1}}{n+1}$
-

3.2 $\frac{d}{dx}[x^4]$ equals [1]

- **A** $4x^3$
 - **B** x^3
 - **C** $4x^5$
 - **D** $3x^4$
-

3.3 Differentiate each.

(a) x^6 . [1]

(b) x . [1]

(c) 7 (a constant). [1]

4 Go further

- work through the **2.5 Applying the Power Rule** lesson on the **Learn** page;
- read the **Differentiation: Definition and Fundamental Properties** section of the AP Calculus AB handout on the **Know** page.

Solutions

2.1 $\frac{d}{dx}[x^n] = n x^{n-1}.$

2.2 $5x^4.$

2.3 $\frac{d}{dx}[x^2] = 2x; \frac{d}{dx}[x] = 1.$

3.1 B.

3.2 A.

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