AP CALCULUS BC • EXERCISE SHEET

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

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

3.2 $\dfrac{d}{dx}[x^4]$ 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 BC handout on the **Know** page.

Solutions

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

2.2 $5x^4$.

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

3.1 **B**.

3.2 **A**.

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