

# Differentiation Rules

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name \_\_\_\_\_  
 Date \_\_\_\_\_  
 Class \_\_\_\_\_

## 1. Key Ideas

Differentiating from first principles is powerful, but tedious. What if there were shortcuts? In this lesson, you will learn the three fundamental rules — power, constant multiple, and sum/difference — that let you differentiate polynomials in seconds instead of minutes.

- The power rule:  $\frac{d}{dx}(x^n) = nx^{n-1}$
- Why the power rule is consistent with first principles

## 2. Success Criteria

By the end, you should be able to:

- The power rule:  $\frac{d}{dx}(x^n) = nx^{n-1}$
- The constant multiple, sum, and difference rules
- How to rewrite roots and reciprocals as powers

## 3. Key Terms

### Derivative

The rate of change of a function at a point; the gradient of the tangent.

### Differentiation

The process of finding the derivative of a function.

### Stationary Point

A point where the derivative equals zero.

### Chain Rule

A rule for differentiating composite functions:  
 $dy/dx = dy/du \times du/dx$ .

### Product Rule

A rule for differentiating products:  $d(uv)/dx = u(dv/dx) + v(du/dx)$ .

### Power Rule

If  $f(x) = x^n$ , then  $f'(x) = n \cdot x^{n-1}$  for all real  $n$ .

## 4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

## 5. Short Answer Questions

1. Explain this lesson goal in your own words: "The power rule:  $\frac{d}{dx}(x^n) = nx^{n-1}$ ". Use one specific example from the lesson.

**BAND 3** **2 MARKS**

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2. Apply this idea to a new example: "The constant multiple, sum, and difference rules". Show your reasoning clearly.

**BAND 4** **3 MARKS**

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3. Analyse why this idea matters for understanding Differentiation Rules: "How to rewrite roots and reciprocals as powers".

**BAND 5** **4 MARKS**

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## 6. Extend: Apply the Idea

BAND 5/6

5 MARKS

**A student gives a memorised answer about Differentiation Rules but does not use evidence or reasoning.**

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

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## 7. Multiple Choice

1. What is the best first step when answering a question about Differentiation Rules?

- A. Identify the key concept being tested
- B. Write every fact from memory
- C. Ignore the command word
- D. Skip examples and evidence

2. Which answer would show stronger understanding of Differentiation Rules?

- A. An answer with accurate terms and reasoning
- B. A copied definition only
- C. A single-word response
- D. An answer with no example

3. What should you do if a question asks you to explain?

- A. Link the idea to a reason or cause
- B. List unrelated facts
- C. Only draw a diagram
- D. Write the shortest possible answer

## 8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

### SUCCESS CRITERION 1

Prove that you can: The power rule:  $\frac{d}{dx}(x^n) = nx^{n-1}$

**BAND 3** **2 MARKS**

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### SUCCESS CRITERION 2

Prove that you can: The constant multiple, sum, and difference rules

**BAND 4** **3 MARKS**

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### SUCCESS CRITERION 3

Prove that you can: How to rewrite roots and reciprocals as powers

**BAND 5** **4 MARKS**

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One thing I still need help with:

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