

Identities and Proofs

Printable teaching and practice sheet

Module 4 | Student Book pages 21-30 | Suggested time: 50 minutes | 20 marks



Name: _____ Class: _____ Date: _____

Learning goals

- Explain and apply identity with valid conditions and clear reasoning.
- Explain and apply coefficient comparison with valid conditions and clear reasoning.
- Explain and apply one-sided proof with valid conditions and clear reasoning.

Quick reference

Identity	An identity is true for every value in its domain.
Coefficient comparison	Equal polynomials have equal coefficients for corresponding powers.
One-sided proof	A clean identity proof transforms one side independently into the other side.

Worked example

Use an identity to evaluate $(9+6)^2 - (9-6)^2$ without expanding both squares separately. Worked solution: Use $(u+v)^2 - (u-v)^2 = 4uv$. Thus $4 \cdot 9 \cdot 6 = 216$.

Graduated practice

Answer without viewing the key. Show complete working for short-response questions.

1. Use an identity to evaluate $(9+6)^2 - (9-6)^2$ without expanding both squares separately. [1 marks]

- | | |
|--------|--------|
| A) 108 | B) 60 |
| C) 216 | D) 220 |

2. Use an identity to evaluate $(9+3)^2 - (9-3)^2$ without expanding both squares separately. [1 marks]

- | | |
|--------|--------|
| A) 108 | B) 54 |
| C) 48 | D) 112 |

3. Use an identity to evaluate $(3+2)^2 - (3-2)^2$ without expanding both squares separately. [1 marks]

- | | |
|-------|-------|
| A) 12 | B) 20 |
| C) 24 | D) 28 |

4. Use an identity to evaluate $(6+4)^2 - (6-4)^2$ without expanding both squares separately. [1 marks]

- | | |
|-------|--------|
| A) 96 | B) 48 |
| C) 40 | D) 100 |

5. Use an identity to evaluate $(7+3)^2 - (7-3)^2$ without expanding both squares separately. [1 marks]

- | | |
|-------|-------|
| A) 42 | B) 40 |
| C) 84 | D) 88 |

6. Use an identity to evaluate $(4+6)^2 - (4-6)^2$ without expanding both squares separately. Use the “Proof logic” method. [1 marks]

- | | |
|-------|--------|
| A) 96 | B) 48 |
| C) 40 | D) 100 |

7. True or false: An identity is true for every value in its domain. [1 marks]

☐ True ☐ False

8. True or false: Only constant terms need to match. [1 marks]

☐ True ☐ False

9. Use an identity to evaluate $(4+4)^2 - (4-4)^2$ without expanding both squares separately. Show a complete method. [3 marks]

10. Use an identity to evaluate $(3+5)^2 - (3-5)^2$ without expanding both squares separately. Show a complete method. [3 marks]

11. Use an identity to evaluate $(5+6)^2 - (5-6)^2$ without expanding both squares separately. Show a complete method. [3 marks]

12. Use an identity to evaluate $(4+4)^2 - (4-4)^2$ without expanding both squares separately. Show a complete method using the “Proof logic” method. [3 marks]

Challenge and review

1. Prove $(a+b)^2-(a-b)^2=4ab$ by transforming one side only.
2. If $(px+q)(x+2)=3x^2+7x+2$ is an identity, find p and q by comparing coefficients.
3. Error analysis: a student tested an identity only at $x=1$ and declared it proved. Explain the error.

Follow-up plan

Below 14/20: revisit the difference between an identity and an equation, plus coefficient comparison, then retry Questions 1-4 and 9. At 14 or above: continue to the online module challenge.