Marking guide | Index laws

Index laws - topic test

15 questions | 27 marks | 45 minutes

Progress from reading powers to combining numerical laws and applying them to area.

Equivalent correct methods earn the corresponding marks.

1. Write $4 \times 4 \times 4$ as a power. [1 mark]

There are three equal factors of 4.

Answer: 4^3

2. Evaluate 3^3. [1 mark]

$3 \times 3 \times 3 = 27$.

Answer: 27

3. Evaluate $(-2)^3$. [1 mark]

$(-2)(-2)(-2) = -8$.

Answer: -8

4. Write $5^2 \times 5^4$ as one power. [1 mark]

$2 + 4 = 6$.

Answer: 5^6

5. Write $7^6 \div 7^2$ as one power. [1 mark]

$6 - 2 = 4$.

Answer: 7^4

6. Write $(3^2)^4$ as one power. [1 mark]

$2 \times 4 = 8$.

Answer: 3^8

7. Evaluate $(-9)^0$. [1 mark]

The bracketed base is nonzero.

Answer: 1

8. Evaluate -9^0. [1 mark]

The power gives 1 before the outside negative sign.

Answer: -1

9. Find n if $2^3 \times 2^n = 2^9$. [2 marks]

$3 + n = 9$, so $n = 6$.

Answer: 6

10. Simplify $\frac{10^7}{10^2 \times 10^3}$ and evaluate. [2 marks]

The denominator is 10^5.

$10^{7-5} = 10^2 = 100$.

Answer: 100

11. Simplify $\frac{(2^3)^3}{2^5}$ and evaluate. [2 marks]

$2^{3 \times 3 - 5} = 2^4 = 16$.

Answer: 16

12. Evaluate $2^3 + 2^4$ and explain why adding exponents would not work. [3 marks]

$8 + 16 = 24$.

The product law does not apply to addition.

Answer: 24

13. A student writes $6^5 \div 6^2 = 6^{5 \div 2}$. Correct the error. [3 marks]

Cancellation subtracts the exponents rather than dividing them.

$6^{5-2} = 6^3$.

Answer: 6^3

14. Simplify $\frac{(3^2)^2 \times 3^3}{3^5}$ and evaluate. [3 marks]

$3^{2 \times 2 + 3 - 5} = 3^2 = 9$.

Answer: 9

15. A poster has width 2^3 cm and length 2^5 cm. [4 marks]

(a) Write the poster area as one power of 2, then evaluate. [2 marks]

$2^3 \times 2^5 = 2^{3+5} = 2^8 = 256$.

Answer: $2^8 = 256$ cm^2.

(b) Each square tile has area 2^2 cm^2. How many whole tiles cover the poster without gaps or overlaps? [2 marks]

$2^8 \div 2^2 = 2^6 = 64$.

Each tile is 2 cm by 2 cm; the poster dimensions 8 cm and 32 cm are both multiples of 2 cm, so whole tiles fit.

Answer: 64 tiles.