Indices and scientific notation - practice test 2

16 questions | 40 marks | 55 minutes

A second balanced paper with explanation, error analysis and practical calculations.

Equivalent correct methods earn the corresponding marks.

1. Write $9^6 \div 9^4$ as one power. [1 mark]

$6 - 4 = 2$.

Answer: 9^2

2. Evaluate $10^0 + 10^{-1}$. [2 marks]

$10^0 = 1$ and $10^{-1} = 0.1$.

Answer: 1.1

3. Simplify $(2^3)^2 \times 2^{-4}$. [2 marks]

$(2^3)^2 = 2^6$.

$2^{6-4} = 2^2 = 4$.

Answer: 4

4. Evaluate $(-4)^{-1}$. [2 marks]

$(-4)^{-1} = \frac{1}{-4} = -\frac{1}{4}$.

Answer: $-\frac{1}{4}$

5. Simplify $(2m^3n)^2$. [2 marks]

Square the coefficient and every variable factor.

Answer: $4m^6n^2$

6. Simplify $\frac{21p^5q^2}{7p^2q^4}$, using positive exponents, for $p, q \neq 0$. [3 marks]

$21 \div 7 = 3$, $p^{5-2} = p^3$, $q^{2-4} = q^{-2}$.

Write q^{-2} in the denominator.

Answer: $\frac{3p^3}{q^2}$

7. Write 0.00000084 in scientific notation. [2 marks]

$8.4 \div 10000000 = 0.00000084$.

Answer: 8.4×10^{-7}

8. Write 3.05×10^6 as an ordinary number. [2 marks]

$3.05 \times 1000000 = 3050000$.

Answer: 3050000

9. Rewrite 0.62×10^8 in standard scientific notation. [2 marks]

Multiply the coefficient by 10 and reduce the exponent by 1.

Answer: 6.2×10^7

10. Arrange in ascending order: 4.1×10^{-3}, 7×10^{-4}, 3.9×10^{-3}. [3 marks]

$7 \times 10^{-4} = 0.7 \times 10^{-3}$.

Compare 0.7, 3.9 and 4.1.

Answer: $7 \times 10^{-4},\ 3.9 \times 10^{-3},\ 4.1 \times 10^{-3}$

11. Calculate $(7 \times 10^{-4})(3 \times 10^6)$. [3 marks]

$7 \times 3 = 21$ and $-4 + 6 = 2$.

$21 \times 10^2 = 2.1 \times 10^3$.

Answer: 2.1×10^3

12. Calculate $\frac{8 \times 10^{-3}}{2 \times 10^{4}}$. [3 marks]

$8 \div 2 = 4$ and $-3 - 4 = -7$.

Answer: 4×10^{-7}

13. Calculate $5 \times 10^{7} - 1.8 \times 10^{7}$. [2 marks]

The powers match, so subtract $5 - 1.8 = 3.2$.

Answer: 3.2×10^{7}

14. A wire is 2.4×10^{-4} m thick. Find the combined thickness of 500 equal wires laid tightly together. Give metres. [4 marks]

$500 = 5 \times 10^{2}$.

$(2.4 \times 10^{-4})(5 \times 10^{2}) = 12 \times 10^{-2} = 0.12$ m.

Answer: 0.12 m

15. A motor turns 1.2×10^{3} times each minute. How many turns does it make in 2 hours at this rate? [4 marks]

2 hours $= 120 = 1.2 \times 10^{2}$ minutes.

$(1.2 \times 10^{3})(1.2 \times 10^{2}) = 1.44 \times 10^{5}$.

Answer: 1.44×10^{5} turns

16. Leo claims $(3x^{2})^{2} = 3x^{4}$. Identify the missing operation and correct the expression. [3 marks]

The coefficient 3 must be squared too.

$3^{2}(x^{2})^{2} = 9x^{4}$.

Answer: $9x^{4}$