CAMBRIDGE IGCSE MATHS (0580) · TOPIC 1: NUMBER

Indices questions and answers

10 questions · 7 Core, 3 Extended · 10 non-calculator · worked answers

Name _____ Date _____ Score _____

- Original questions in the style of the Cambridge 0580 papers, each labelled Core or Extended and calculator or non-calculator. Try every question before you look at the answers.
- Worked answers start after the questions. Questions with marks come from our 0580 practice bank (M method, A accuracy, B independent marks).
- Online, with more practice: igcsemathrevision.com/igcse-frontend/0580/indices-questions

Core: for everyone (Papers 1 and 3, and Extended Papers 2 and 4)

1. **Core · non-calculator · easy**

Find the value of

(a) 7^0

(b) 4^{-2}

2. **Core · non-calculator · easy**

Write each as a single power.

(a) $a^7 \times a^2$

(b) $b^{10} \div b^3$

(c) $(c^4)^2$

3. **Core · non-calculator · easy · 2 marks**

Write each answer as a single power.

(a) $3^4 \times 3^5$ (b) $7^8 \div 7^3$

4. **Core · non-calculator · easy · 2 marks**

Simplify

(a) $(m^3)^4$ (b) a^0

5. **Core · non-calculator · medium**

Find the value of $3^{-2} \times 3^5$.

6. **Core · non-calculator · medium**

Simplify

(a) $(2x^3)^4$

(b) $\frac{12a^5b^2}{3a^2b}$

7. **Core · non-calculator · medium · 2 marks**

Find the value of n when $5^n = \frac{1}{25}$.

Extended: for Papers 2 and 4

8. **Extended · non-calculator · medium**

Find the value of

(a) $64^{\frac{2}{3}}$

(b) $27^{-\frac{1}{3}}$

9. **Extended · non-calculator · hard**

Solve

(a) $2^{x+1} = 32$

(b) $9^x = 3^5$

10. **Extended · non-calculator · hard**

Find the value of $\left(\frac{8}{27}\right)^{-\frac{2}{3}}$. Give your answer as a fraction.

Answers and worked solutions

Question 1

Answer: (a) 1 (b) $\frac{1}{16}$

1. (a) Any non-zero number to the power 0 is 1.
2. (b) $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$.

Question 2

Answer: (a) a^9 (b) b^7 (c) c^8

1. (a) Add the indices: $a^{7+2} = a^9$
2. (b) Subtract the indices: $b^{10-3} = b^7$
3. (c) Multiply the indices: $c^{4\times 2} = c^8$

Question 3 — 2 marks

Answer: (a) 3^9 (b) 7^5

B1 (a) 3^9

B1 (b) 7^5

Question 4 — 2 marks

Answer: (a) m^{12} (b) 1

B1 (a) m^{12}

B1 (b) 1

Question 5

Answer: 27

1. $3^{-2} \times 3^5 = 3^{-2+5} = 3^3$
2. $3^3 = 27$

Question 6

Answer: (a) $16x^{12}$ (b) $4a^3b$

1. (a) $2^4 = 16$ and $(x^3)^4 = x^{12}$, so $16x^{12}$.
2. (b) $12 \div 3 = 4$, $a^{5-2} = a^3$, $b^{2-1} = b$, so $4a^3b$.

Question 7 — 2 marks

Answer: $n = -2$

M1 $25 = 5^2$ or $\frac{1}{25} = 5^{-2}$

A1 -2

Question 8

Answer: (a) 16 (b) $\frac{1}{3}$

1. (a) $\sqrt[3]{64} = 4$, then $4^2 = 16$.
2. (b) $27^{\frac{1}{3}} = 3$, and the negative index gives the reciprocal: $\frac{1}{3}$.

Question 9

Answer: (a) $x = 4$ (b) $x = 2.5$

1. (a) $32 = 2^5$, so $x + 1 = 5$ and $x = 4$.
2. (b) $9^x = (3^2)^x = 3^{2x}$, so $2x = 5$ and $x = 2.5$.

Question 10

Answer: $\frac{9}{4}$

1. The negative index turns the fraction upside down: $\left(\frac{27}{8}\right)^{\frac{2}{3}}$.
2. Cube root: $\frac{3}{2}$. Square: $\frac{9}{4}$.

More indices practice with instant marking, notes and common mistakes: igcsemathrevision.com/igcse-frontend/0580/indices-questions

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