

GCSE Maths: Powers and the laws of indices (Foundation): answers

GCSE Maths - Factors, Multiples and Primes - Foundation - Lesson 2.7

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch02-factors-multiples-primes-powers/foundation/powers-and-the-laws-of-indices/

Exercise 2G Laws of indices Non-calculator

1 Write each of these as a single power.

(a) $3^4 \times 3^2$

Answer: 3^6

(b) $5^3 \times 5^6$

Answer: 5^9

(c) $2^7 \times 2^5$

Answer: 2^{12}

(d) $7^2 \times 7^9$

Answer: 7^{11}

(e) $10^4 \times 10^3$

Answer: 10^7

(f) $4^2 \times 4^5$

Answer: 4^7

2 Write each of these as a single power.

(a) $2^9 \div 2^4$

Answer: 2^5

(b) $5^8 \div 5^5$

Answer: 5^3

(c) $3^7 \div 3^2$

Answer: 3^5

(d) $7^6 \div 7^3$

Answer: 7^3

(e) $10^8 \div 10^5$

Answer: 10^3

(f) $6^5 \div 6^2$

Answer: 6^3

3 Write each of these as a single power.

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

Answer: 3^8

(b) $(5^3)^2$

Answer: 5^6

(c) $(2^4)^3$

Answer: 2^{12}

(d) $(10^2)^5$

Answer: 10^{10}

(e) $(7^3)^2$

Answer: 7^6

(f) $(4^2)^3$

Answer: 4^6

4 Write each as a single power, then work out its value.

(a) $2^3 \times 2^2$

Answer: $2^5 = 32$

(b) $3^5 \div 3^3$

Answer: $3^2 = 9$

(c) $(2^2)^3$

Answer: $2^6 = 64$

(d) $10^2 \times 10^3$

Answer: $10^5 = 100,000$

(e) $5^4 \div 5^2$

Answer: $5^2 = 25$

(f) $(3^2)^2$

Answer: $3^4 = 81$

5 Find the value of n in each equation.

(a) $2^n \times 2^3 = 2^8$

Answer: 5

(b) $7^n \times 7^5 = 7^9$

Answer: 4

(c) $3^n \div 3^2 = 3^5$

Answer: 7

(d) $5^n \div 5^4 = 5^3$

Answer: 7

(e) $(2^n)^3 = 2^{12}$

Answer: 4

(f) $(10^n)^2 = 10^6$

Answer: 3

6 Write each as a single power, then work out its value.

(a) $(2^5 \times 2^4) \div 2^3$

Answer: $2^6 = 64$

(b) $(3^2)^3 \times 3^1$

Answer: $3^7 = 2187$

(c) $2^9 \div (2^2 \times 2^3)$

Answer: $2^4 = 16$

(d) $(5^6 \times 5^3) \div 5^4$

Answer: $5^5 = 3125$

(e) $(2^3)^2 \times 2^4$

Answer: $2^{10} = 1024$

(f) $3^{10} \div (3^3 \times 3^2)$

Answer: $3^5 = 243$

7 Find the value of x in each equation.

(a) $2^x = 64$

Answer: 6

(b) $3^x = 81$

Answer: 4

(c) $5^x = 125$

Answer: 3

(d) $2^x = 1024$

Answer: 10

(e) $4^x = 256$

Answer: 4

(f) $3^x = 729$

Answer: 6

- 8 A tile is placed in a pattern. Each row has twice as many tiles as the row before. Row 1 has 2 tiles, so row n has 2^n tiles. How many tiles are in row 10?

Answer: 1024

- 9 A sheet of paper is 0.1 mm thick. Each time it is folded in half the thickness doubles. (a) Write the thickness after 10 folds as a number multiplied by a power of 2. (b) Work out the thickness after 10 folds in mm.

(a) (a)

Answer: 0.1×2^{10} mm

(b) (b)

Answer: 102.4 mm

- 10 Check each statement and decide whether the pupil is correct. Explain any mistake.

(a) Ali says: $2^3 \times 2^4 = 4^7$

Answer: Wrong: it is $2^7 = 128$. The base stays 2.

(b) Ben says: $(2^3)^2 = 2^5$

Answer: Wrong: it is $2^6 = 64$. Multiply the indices.

(c) Cara says: $3^2 + 3^3 = 3^5$

Answer: Wrong: $9 + 27 = 36$, but $3^5 = 243$.

- 11 $2^a \times 2^b = 2^{10}$ and $2^a \div 2^b = 2^2$. Find the values of a and b .

Answer: $a = 6$ and $b = 4$