

GCSE Maths: Powers and the laws of indices (Higher): worksheet

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

Name: _____

Date: _____

Score: _____

15 questions. Write your answers in the spaces. Answers and step-by-step help are free at websink.site/gcse/maths/ch02-factors-multiples-primes-powers/higher/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: _____

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

Answer: _____

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

Answer: _____

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

Answer: _____

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

Answer: _____

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

Answer: _____

2 Write each of these as a single power.

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

Answer: _____

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

Answer: _____

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

Answer: _____

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

Answer: _____

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

Answer: _____

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

Answer: _____

3 Write each of these as a single power.

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

5 Find the value of n in each equation.

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

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

Answer:

7 Find the value of x in each equation.

(a) $2^x = 64$

Answer:

(b) $3^x = 81$

Answer:

(c) $5^x = 125$

Answer:

(d) $2^x = 1024$

Answer:

(e) $4^x = 256$

Answer:

(f) $3^x = 729$

Answer:

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:

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:

(b) (b)

Answer:

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:

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

Answer:

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

Answer:

11 Write each of these as a single power of 2. Then work out its value.

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

Answer:

(b) $8^2 \times 4^3$

Answer:

(c) $16^3 \div 8^2$

Answer:

(d) $32^2 \div 4^3$

Answer:

12 Write each of these as a single power of the given base.

(a) $9^2 \times 27$ (base 3)

Answer:

(b) $25^3 \div 125$ (base 5)

Answer:

(c) $81^2 \times 9^3$ (base 3)

Answer:

13 Show that $2^n + 2^n = 2^{n+1}$.

Answer:

14 Show that $8^4 \div 4^3 = 2^6$.

Answer:

15 $2^a \times 2^b = 2^{10}$ and $2^a \div 2^b = 2^2$. Find the values of a and b .

Answer: