

GCSE Maths: Zero and negative indices (Higher): answers

GCSE Maths - Factors, Multiples and Primes - Higher - Lesson 2.8

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/higher/zero-and-negative-indices/

Exercise 2H Zero and negative indices

Non-calculator

1 Write down the value of each of these.

(a) 5^0

Answer: 1

(b) 8^0

Answer: 1

(c) 10^0

Answer: 1

(d) 12^0

Answer: 1

(e) 100^0

Answer: 1

(f) 3^0

Answer: 1

2 Work out each of these. Give your answer as a fraction.

(a) 2^{-2}

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

(b) 3^{-2}

Answer: $\frac{1}{9}$

(c) 5^{-1}

Answer: $\frac{1}{5}$

(d) 10^{-3}

Answer: $\frac{1}{1000}$

(e) 4^{-2}

Answer: $\frac{1}{16}$

(f) 2^{-4}

Answer: $\frac{1}{16}$

3 Write each number as a fraction and as a decimal.

(a) 2^{-3}

Answer: $\frac{1}{8} = 0.125$

(b) 5^{-2}

Answer: $\frac{1}{25} = 0.04$

(c) 10^{-2}

Answer: $\frac{1}{100} = 0.01$

(d) 4^{-1}

Answer: $\frac{1}{4} = 0.25$

(e) 10^{-1}

Answer: $\frac{1}{10} = 0.1$

(f) 2^{-2}

Answer: $\frac{1}{4} = 0.25$

4 Write each fraction as a power of the base given, using a negative index.

(a) $\frac{1}{9}$ (base 3)

Answer: 3^{-2}

(b) $\frac{1}{8}$ (base 2)

Answer: 2^{-3}

(c) $\frac{1}{25}$ (base 5)

Answer: 5^{-2}

(d) $\frac{1}{100}$ (base 10)

Answer: 10^{-2}

(e) $\frac{1}{32}$ (base 2)

Answer: 2^{-5}

(f) $\frac{1}{81}$ (base 3)

Answer: 3^{-4}

5 Work out each of these.

(a) $2^5 \times 2^{-2}$

Answer: 8

(b) $3^{-1} \times 3^4$

Answer: 27

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

Answer: $\frac{1}{25}$

(d) $10^3 \times 10^{-5}$

Answer: $\frac{1}{100}$

(e) $2^{-3} \div 2^{-5}$

Answer: 4

(f) $4^{-2} \times 4^2$

Answer: 1

6 Put these numbers in order, smallest first: 2^{-3} , 2^0 , 2^3 , 2^{-1} , $\frac{1}{4}$.

Answer: 2^{-3} , $\frac{1}{4}$, 2^{-1} , 2^0 , 2^3

7 Explain why $2^0 = 1$. Use the index law for dividing.

Answer: $2^3 \div 2^3 = 2^{3-3} = 2^0$, and $8 \div 8 = 1$

8 Decide whether each statement is true or false. Give a reason.

(a) $3^{-2} = -9$

Answer: False: $3^{-2} = \frac{1}{9}$

(b) $2^{-1} = 0.5$

Answer: True

(c) $10^0 = 0$

Answer: False: $10^0 = 1$

(d) $4^{-2} = \frac{1}{16}$

Answer: True

9 Work out each of these. Give your answer as a fraction.

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

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

(b) $(\frac{2}{5})^{-2}$

Answer: $\frac{25}{4}$

(c) $(\frac{3}{4})^{-3}$

Answer: $\frac{64}{27}$

(d) $(\frac{2}{3})^{-3}$

Answer: $\frac{27}{8}$

10 Work out each of these. Give your answer as a fraction.

(a) $2^{-1} + 2^{-2}$

Answer: $\frac{3}{4}$

(b) $3^0 + 3^{-1}$

Answer: $\frac{4}{3}$

11 Find the value of n in each equation.

(a) $2^n = \frac{1}{32}$

Answer: -5

(b) $3^n = \frac{1}{81}$

Answer: -4

(c) $5^n = \frac{1}{125}$

Answer: -3

(d) $10^n = \frac{1}{1000}$

Answer: -3

12 Show that $5^{-2} \times 25 = 1$.

Answer: $5^{-2} \times 5^2 = 5^0 = 1$

13 Which is bigger, 2^{-3} or 3^{-2} ? Show how you know.

Answer: $2^{-3} = \frac{1}{8}$ is bigger than $3^{-2} = \frac{1}{9}$

