

Exponents and Scientific Notation: math practice, Grade 8 – download the PDF

20 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Parts of a power

★ ★ ★

Consider 6^4 .

- Name the base and the exponent.
- Write 6^4 as a repeated multiplication.
- Calculate its value.

2 Evaluating powers

★ ★ ★

Evaluate each expression: 2^6 ; 10^3 ; $(-2)^3$; $(-4)^2$; -4^2 ; 3^4 .

3 Using the product rule

★ ★ ★

Write each product as a single power: $4^3 \times 4^5$; 9×9^6 ; $x^2 \times x^7$; $y^5 \times y$.

4 Using the quotient rule



Write each quotient as a single power: $\frac{6^9}{6^4}$; $\frac{10^8}{10^3}$; $\frac{z^{12}}{z^5}$; $\frac{2^7}{2^7}$.

5 Powers of powers



Simplify: $(3^2)^4$; $(5^3)^3$; $(y^6)^2$; $(10^2)^5$.

6 Zero and negative exponents



Evaluate: 7^0 ; 3^{-2} ; 10^{-3} ; 2^{-4} ; $(-5)^0$. Give 10^{-3} also as a decimal.

7 Standard form



Write each number in standard form (no power of 10): 3.2×10^4 ; 7×10^6 ; 5.1×10^{-3} ; 9.04×10^2 .

8 True or false?



Decide whether each statement is true or false, and justify.

a. $2^3 \times 2^4 = 2^{12}$

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

c. $5^{-1} = -5$

d. $4^0 = 0$

9 Which is bigger?



Compute both sides and say which is greater: (a) 2^5 or 5^2 ; (b) 3^4 or 4^3 ; (c) 2^{10} or 10^2 .

10 Simplifying with variables



Simplify each expression: (a) $(4x^3)(5x^4)$; (b) $\frac{18m^9}{6m^4}$; (c) $(2a^2)^3$.

11 To scientific notation



Write in scientific notation: 58,000,000 ; 0.00071 ; 640,000,000,000 ; 0.0000093.

12 Ordering numbers



Order each list from least to greatest.

a. 4.2×10^5 , 3.9×10^6 , 8.1×10^4 , 6×10^5

b. 7.2×10^{-3} , 9×10^{-4} , 1.1×10^{-3}

13 Multiplying in scientific notation



Compute and give each answer in scientific notation: (a) $(2.5 \times 10^3)(4 \times 10^5)$; (b) $(6 \times 10^{-2})(3 \times 10^7)$.

14 Phone storage



A phone has 256 GB of storage, where 1 GB = 10^9 bytes. A text file takes about 2×10^3 bytes.

- Write the storage in bytes using scientific notation.
- How many such text files could fit, assuming nothing else is stored?

15 Simplifying with negative exponents

★★★

Simplify, and write each answer with positive exponents only:

a. $\frac{x^3 \times x^{-7}}{x^{-2}}$

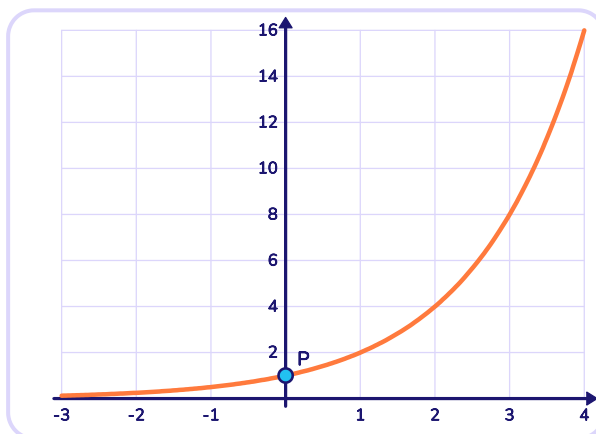
b. $\frac{2^{-3} \times 2^5}{2^{-1}}$

c. $(5^2)^{-2} \times 5^3$

16 Reading an exponential curve

★★★

The graph shows $y = 2^x$. Use it and the rules of exponents to answer.



a. What is the value of y when $x = 2$? when $x = -1$?

b. For which x does $2^x = 8$? $2^x = \frac{1}{2}$?

c. Why does the curve never touch the x -axis?

17 Doubling bacteria

★★★

A culture starts with 500 bacteria and the population doubles every hour, so after n hours there are 500×2^n bacteria.

a. How many bacteria are there after 6 hours?

b. After how many whole hours does the population first exceed one million?

18 Adding and subtracting



Compute and write the result in scientific notation: (a) $6.2 \times 10^5 + 8.5 \times 10^4$; (b) $4.1 \times 10^{-3} - 2.6 \times 10^{-4}$.

19 How long does light take?



Light travels at about 3×10^8 meters per second. Find the time it needs to travel from the Sun to Earth (1.5×10^{11} m) and from the Moon to Earth (3.84×10^8 m). Convert the first time into minutes and seconds.

20 How many times larger?



A city has about 2.4×10^6 residents and a country has about 3.3×10^8 residents. Which is larger, and about how many times larger? Give the ratio in scientific notation, rounded to two significant digits.



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