

Algebra 1 - Exponent Rules and Radicals - Answer Key

Common Core N-RN.A.1, N-RN.A.2, N-RN.B.3 · maths-pdf.fr/en/

This answer key explains every problem on the exponent rules worksheet. Final answers are in bold, and the lines above them show how each result was found. Use it to correct mistakes and to look for patterns in the errors you make most often.

Algebra 1 · Common Core State Standards: **N-RN.A.1, N-RN.A.2, N-RN.B.3**

Exercise 1 - Evaluate a power

$$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81.$$

81

Exercise 2 - Product rule

Add the exponents: $x^{5+3} = x^8$. And $2^3 \cdot 2^4 = 2^7 = 128$.

x^8 ; **128**

Exercise 3 - Quotient rule

Subtract the exponents: $x^{9-4} = x^5$.

x^5

Exercise 4 - Power of a power

Multiply the exponents: $x^{3 \cdot 4} = x^{12}$.

x^{12}

Exercise 5 - Zero exponent

Any nonzero base raised to the power 0 equals 1.

1, 1, and 1

Exercise 6 - Negative exponent

$$3^{-2} = \frac{1}{3^2} = \frac{1}{9}.$$

$$\frac{1}{9}$$

Exercise 7 - Power of a product

Apply the power to each factor: $2^3 \cdot (x^4)^3 = 8x^{12}$.

$$8x^{12}$$

Exercise 8 - Negative exponent in a term

Only x has the negative exponent: $4x^{-2} = \frac{4}{x^2}$.

$$\frac{4}{x^2}$$

Exercise 9 - Quotient of monomials

Divide coefficients: $6 \div 2 = 3$. Subtract exponents: $x^5 - 2 = x^3$, $y^2 - 1 = y$.

$$3x^3y$$

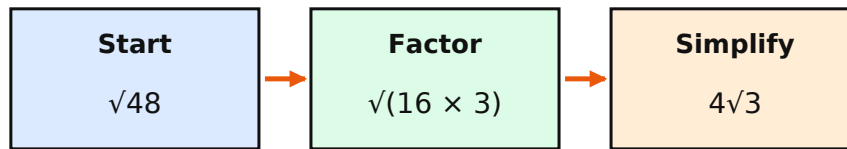
Exercise 10 - Several rules

Square each factor: $2^2 x^6 y^{-4} = 4x^6 y^{-4}$.

Move y^{-4} to the denominator.

$$\frac{4x^6}{y^4}$$

Exercise 11 - Simplify a radical



Pull out the perfect square.

The greatest perfect square factor is 16: $\sqrt{48} = \sqrt{16 \cdot 3}$.

$$= 4\sqrt{3}.$$

$$4\sqrt{3}$$

Exercise 12 - Simplify another radical

The greatest perfect square factor is 100: $\sqrt{200} = \sqrt{100 \cdot 2} = 10\sqrt{2}$.

$$10\sqrt{2}$$

Exercise 13 - Rational exponents

$$25^{1/2} = \sqrt{25} = 5.$$

$$27^{2/3} = (\sqrt[3]{27})^2 = 3^2 = 9.$$

$$16^{3/4} = (\sqrt[4]{16})^3 = 2^3 = 8.$$

5, 9, and 8

Exercise 14 - Radical and exponent forms

The exponent $\frac{1}{2}$ means a square root: $5^{1/2} = \sqrt{5}$.

The cube root of x^2 is $x^{2/3}$.

$$\sqrt{5}; x^{2/3}$$

Exercise 15 - Rational or irrational

$\sqrt{9} = 3$ is rational. $\sqrt{10}$ is not a perfect square, so it is irrational. $0.\bar{3} = \frac{1}{3}$ is rational. π is irrational.

rational, irrational, rational, irrational

Exercise 16 - Bacteria

$$P = 100 \cdot 2^6 = 100 \cdot 64 = 6400.$$

6,400 bacteria

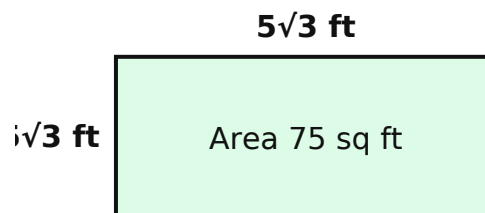
Exercise 17 - Computer memory

$$2^{10} \cdot 2^{10} = 2^{20}.$$

$$2^{20} = 1,048,576.$$

$$2^{20} = \mathbf{1,048,576 \text{ bytes}}$$

Exercise 18 - Square garden



A square of area 75 square feet.

$$\text{Side} = \sqrt{75} = \sqrt{25 \cdot 3} = 5\sqrt{3}.$$

Since $\sqrt{3} \approx 1.732$, the side is about $5(1.732) \approx 8.66$.

$$5\sqrt{3} \text{ ft} \approx \mathbf{8.66 \text{ ft}}$$

Exercise 19 - Falling object

$$t = \frac{\sqrt{64}}{4} = \frac{8}{4} = 2 \text{ seconds.}$$

$$t = \frac{\sqrt{50}}{4} = \frac{5\sqrt{2}}{4} \text{ seconds, about 1.77 seconds.}$$

$$\mathbf{2 \text{ s}; } \frac{5\sqrt{2}}{4} \text{ s}$$

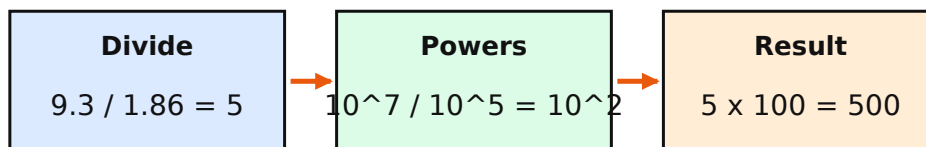
Exercise 20 - Explain irrational sums

Suppose the sum were a rational number r . Then $\sqrt{2} = r - \frac{1}{2}$.

A difference of two rational numbers is rational, so $\sqrt{2}$ would be rational. But $\sqrt{2}$ is irrational. This contradiction shows the sum is irrational.

The sum is irrational

Exercise 21 - Sunlight travel time



Divide the numbers and the powers of ten separately.

$$\frac{9.3 \times 10^7}{1.86 \times 10^5} = \frac{9.3}{1.86} \times 10^{7-5}.$$

$$= 5 \times 10^2 = 500.$$

500 seconds