

Grade 8 - Properties of Integer Exponents - Answer Key

Common Core 8.EE.A.1 · maths-pdf.fr/en/

This answer key gives a full worked solution for each of the 21 problems on the integer exponents worksheet (Common Core 8.EE.A.1). Compare each step with your own work, not only the final answer, and note any step where your method differed.

Grade 8 · Common Core State Standards: **8.EE.A.1**

Exercise 1 - Product rule

Same base, add exponents: $5^3 + 4 = 5^7$.

$$5^7 = 78,125.$$

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Exercise 2 - Quotient rule

Subtract exponents: $5^7 - 4 = 5^3$.

$$5^3 = 125$$

Exercise 3 - Power of a power

Multiply exponents: $2^{3 \cdot 2} = 2^6$.

$$2^6 = 64$$

Exercise 4 - Zero exponent

Any nonzero number to the zero power is 1.

1 and 1

Exercise 5 - Count the factors



2^3 : 3 factors 2^2 : 2 factors

Together: 5 factors, so 2^5

$$2^3 \times 2^2 = 2^5$$

The picture shows $3 + 2 = 5$ factors of 2.

$$2^3 \cdot 2^2 = 2^5.$$

$$2^5 = 32$$

Exercise 6 - Negative exponent

Each step right divides by 3: $3^0 = 1$, then $1 \div 3 = \frac{1}{3}$, then $\frac{1}{3} \div 3 = \frac{1}{9}$.

3^3 27	3^2 9	3^1 3	3^0 1	3^{-1} $\frac{1}{3}$	3^{-2} $\frac{1}{9}$
	$\div 3$	$\div 3$	$\div 3$	$\div 3$	$\div 3$

Each step to the right divides by 3, so the exponent drops by 1.

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

Exercise 7 - Powers of ten

10^2 100	10^1 10	10^0 1	10^{-1} $\frac{1}{10}$	10^{-2} $\frac{1}{100}$	10^{-3} $\frac{1}{1000}$
	$\div 10$	$\div 10$	$\div 10$	$\div 10$	$\div 10$

Each step to the right divides by 10, so the exponent drops by 1.

$$10^{-2} = \frac{1}{10^2} = \frac{1}{100}.$$

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

Exercise 8 - Mixed exponents

Add exponents: $5 + (-3) = 2$.

$$2^2 = 4$$

Exercise 9 - Negative power of a power

Multiply exponents: $3^{-2} = \frac{1}{3^2}$.

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

Exercise 10 - Quotient with a negative result

Subtract exponents: $4^{2-5} = 4^{-3}$.

$$4^{-3} = \frac{1}{4^3} = \frac{1}{64}.$$

$$\frac{1}{64}$$

Exercise 11 - Power of a product

Way 1: $10^3 = 1,000$.

Way 2: $2^3 \cdot 5^3 = 8 \cdot 125 = 1,000$.

Both ways give 1,000.

Exercise 12 - Fraction to a negative power

Flip the fraction: $\left(\frac{3}{2}\right)^3 = \frac{27}{8}$.

$$\frac{27}{8}$$

Exercise 13 - Several rules

Numerator: $5^{-3+6} = 5^3$.

Then $\frac{5^3}{5^2} = 5^1$.

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Exercise 14 - Write as a power

$81 = 3^4$, so $\frac{1}{81} = \frac{1}{3^4} = 3^{-4}$.

3^{-4}

Exercise 15 - Power of a power with negatives

$(2^{-3})^2 = 2^{-6}$. Then $2^{-6} \cdot 2^9 = 2^3$.

$2^3 = 8$

Exercise 16 - Nested rules

Numerator: $4^{2+(-5)} = 4^{-3}$.

Divide: $4^{-3-(-1)} = 4^{-2} = \frac{1}{16}$.

$\frac{1}{16}$

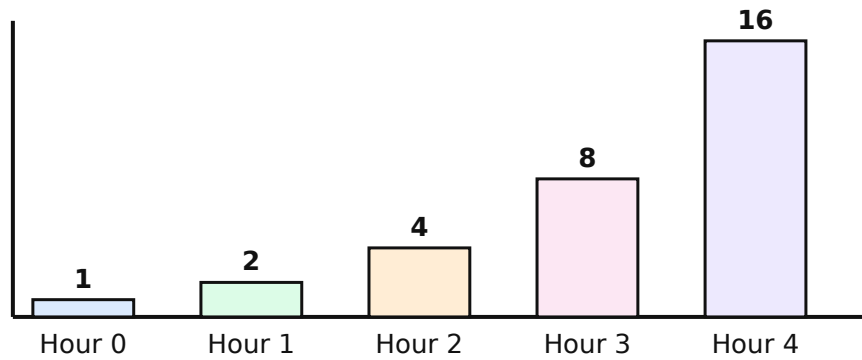
Exercise 17 - Find the exponent

Add exponents: $n+5=2$, so $n=-3$.

Check: $3^{-3} \cdot 3^5 = 3^2 = 9$.

$n=-3$

Exercise 18 - Bacteria growth



Each bar is twice the one before.

After 10 hours: $2^{10} = 1,024$ cells.

Compare: $\frac{2^{12}}{2^{10}} = 2^2 = 4$.

1,024 cells; 4 times as many

Exercise 19 - Computer storage

$$\frac{2^{30}}{2^{10}} = 2^{20}.$$

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

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

Exercise 20 - Square tile

$$\text{Area} = (3^2)^2 = 3^4 = 81.$$

$$3^4 = 81 \text{ square inches}$$

Exercise 21 - Find the error

She added the exponents. For a power of a power, multiply them: $5^{2 \cdot 3} = 5^6$.

$$5^6 = 15,625.$$

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