

Laws of Integer Exponents Made Simple

Grade 8 math · Test Answer Key · Standards: 8.EE.A.1

Use the scoring line under each solution to award points. Give credit for correct reasoning even when a final arithmetic slip occurs, and look closely for the common errors of multiplying bases or misplacing a negative sign.

Standards: 8.EE.A.1 · **Level:** Grade 8

Question 1 Evaluate powers (3 points)

- a. Zero exponent: 1.
- b. $3^{-4} = \frac{1}{81}$.
- c. Five negative factors: -32 .

(a) 1 (b) $\frac{1}{81}$ (c) -32

Scoring: 1 point per part.

Question 2 One power (3 points)

- a. $6 + (-2) = 4$: 7^4 .
- b. $4 - 9 = -5$: 11^{-5} .
- c. $(-2)(3) = -6$: 5^{-6} .

(a) 7^4 (b) 11^{-5} (c) 5^{-6}

Scoring: 1 point per part.

Question 3 Positive exponents (2 points)

Cube each factor: $2^3 = 8$ and $(a^{-2})^3 = a^{-6}$. So $8a^{-6} = \frac{8}{a^6}$.

$\frac{8}{a^6}$

Scoring: 1 point for $8a^{-6}$, 1 point for the positive exponent form.

Question 4 Table of powers of 4 (3 points)

Dividing by 4 at each step: $16 \div 4 = 4$, $4 \div 4 = 1$, $1 \div 4 = \frac{1}{4}$. Check the last box: $4^{-2} = \frac{1}{16}$.

4^3	4^2	4^1	4^0	4^{-1}	4^{-2}

Completed table.

4, 1 and $\frac{1}{4}$

Scoring: 1 point per value.

Question 5 Several rules at once (3 points)

Multiply: $-5 + 8 = 3$, so 2^3 . Divide: $3 - (-2) = 5$, so $2^5 = 32$.

32

Scoring: 1 point for 2^3 , 1 point for 2^5 , 1 point for 32.

Question 6 Dev's work (2 points)

Dev added the exponents, but a power of a power needs multiplication: $2 \cdot 4 = 8$. So $(3^2)^4 = 3^8 = 6,561$.

$3^8 = 6,561$

Scoring: 1 point for naming the error, 1 point for the correct power.

Question 7 Views multiply (2 points)

$10^7 \div 10^3 = 10^4 = 10,000$.

$10^4 = 10,000$ times as many

Scoring: 1 point for subtracting exponents, 1 point for 10,000.

Question 8 Reading a picture (2 points)

Three boxes of 2^2 is $(2^2)^3$. Multiply exponents: $2 \cdot 3 = 6$, giving $2^6 = 64$.

$(2^2)^3 = 2^6 = 64$

Scoring: 1 point for the power of a power, 1 point for 64.