

Powers, Powers of Ten and Order of Operations

Grade 6 math · Worksheet Answer Key · Standards: 6.EE.A.1, 6.EE.A.2c

Each solution rewrites the expression after every step so you can see where the order of operations applies. Compare each step with your own work, and check powers by writing them as repeated multiplication.

Standards: 6.EE.A.1, 6.EE.A.2c · **Level:** Grade 6

Problem 1 Repeated multiplication

Three factors of 6: $6^3 = 6 \times 6 \times 6 = 36 \times 6 = 216$.

Problem 2 Evaluating powers

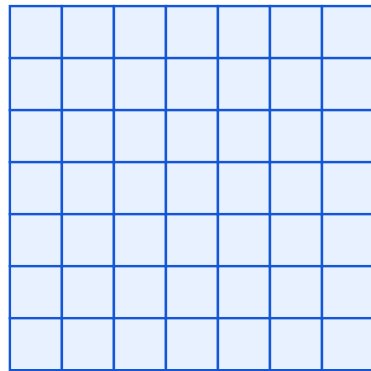
$3^4 = 3 \times 3 \times 3 \times 3 = 81$. $7^2 = 49$. $2^6 = 64$. $10^3 = 1,000$. **81, 49, 64, 1,000.**

Problem 3 Writing with exponents

Count the factors. **(a) 9^3 (b) 5^5 (c) 1.5^2 .**

Problem 4 Square floor

There are 7 rows of 7 tiles.



7 tiles per side

$$7 \times 7 = 7^2 = 49 \text{ tiles.}$$

$7^2 = 49$ tiles.

Problem 5 Powers of 10

The exponent counts the zeros. **$10^2 = 100$, $10^4 = 10,000$, $10^6 = 1,000,000$.**

Problem 6 Powers of 10 from numbers

100,000 has 5 zeros and 10,000,000 has 7 zeros. **10^5 and 10^7 .**

Problem 7 Left to right

Subtraction and addition share a level, so go left to right: $18 - 6 = 12$, then $12 + 4 = \mathbf{16}$.

Problem 8 Multiplication first

$5 + 3 \times 7 = 5 + 21 = 26$. $(5 + 3) \times 7 = 8 \times 7 = 56$. **26 and 56; the parentheses force the addition to happen first.**

Problem 9 Division and exponent

(a) Left to right: $40 \div 5 = 8$, then $8 \times 2 = 16$. (b) Exponent first: $2^3 = 8$, then $9 + 8 = 17$. **(a) 16 (b) 17.**

Problem 10 Power and subtraction

Powers: $5^2 = 25$ and $2^3 = 8$. Multiply: $6 \times 3 = 18$. Then $25 + 18 - 8 = \mathbf{35}$.

Problem 11 Grouping and exponent

Grouping: $10 - 4 = 6$. Exponent: $6^2 = 36$. Left to right: $6 \times 36 = 216$, and $216 \div 9 = \mathbf{24}$.

Problem 12 Find the error

The student added first: $8 + 2 = 10$, then $10 \times 5 = 50$. Multiplication must come first: $2 \times 5 = 10$, then $8 + 10 = \mathbf{18}$.

Problem 13 Parentheses with a power

Grouping: $2 + 3 = 5$. Exponent: $5^2 = 25$. Multiply: $3 \times 25 = 75$. Subtract: $100 - 75 = \mathbf{25}$.

Problem 14 Crate of blocks

Each layer has $3 \times 3 = 9$ blocks and there are 3 layers: $9 \times 3 = 27$. **$3^3 = 27$ blocks.**

Problem 15 Spreading news

Day 1: 3^1 , day 2: $3^2 = 9$, and each day multiplies by 3. Day 5 is $3^5 = 3 \times 3 \times 3 \times 3 \times 3 = \mathbf{243}$ people.

Problem 16 Growing culture

Doubling 6 times multiplies by $2^6 = 64$. Expression: $5 \times 2^6 = 5 \times 64 = \mathbf{320}$ cells.

Problem 17 Stadium seats

Ten times as many adds one factor of 10: 10^6 . $10^5 = 100,000$ and $10^6 = 1,000,000$. **Stadium $10^5 = 100,000$; arena $10^6 = 1,000,000$.**

Problem 18 Food truck bill

Total before coupon: $8 \times 3 + 5 \times 2 = 24 + 10 = 34$. Expression: $(8 \times 3 + 5 \times 2 - 4) \div 2 = (24$

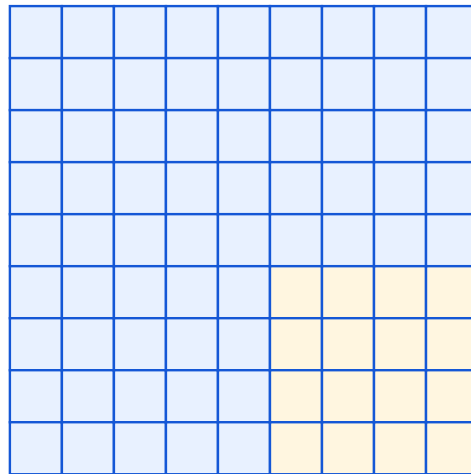
$$+ 10 - 4) \div 2 = 30 \div 2. \text{ Each friend pays \$15.}$$

Problem 19 Two-part expressions

(a) $3^2 - 1 = 8$; $8^2 = 64$; $64 \div 8 = 8$; $4 + 8 = 12$. (b) $(3 + 4) \times 5 - 2 = 7 \times 5 - 2 = 35 - 2 = 33$.
(a) 12 (b) $(3 + 4) \times 5 - 2$.

Problem 20 Tiles with a rug

The room has $9^2 = 81$ tiles and the rug covers $4^2 = 16$.



9 tiles per side

$$81 - 16 = 65 \text{ tiles remain.}$$

$81 - 16 = \mathbf{65 \text{ tiles}}$, from the expression $9^2 - 4^2$.