

ANSWERS

1. Complete the table.

Power	Base	Exponent	Repeated Multiplication	Standard Form
3^5	3	5	$3 \times 3 \times 3 \times 3 \times 3$	243
$(-2)^4$	-2	4	$(-2)(-2)(-2)(-2)$	16
10^3	10	3	$10 \times 10 \times 10$	1000
-2^6	2	6	$-(2 \times 2 \times 2 \times 2 \times 2 \times 2)$	-64

2. Write as a power of 10.

- (a) ten 10^1 (b) $10 \times 10 \times 10 \times 10$ 10^4
 (c) -1 -10^0 (d) 10 000 000 10^7

3. Write in Standard form.

- (a) $2^5 = 32$ (b) $5^3 = 125$

4. Write as a single power.

- (a) $8^3 \times 8^6$ 8^9 (b) $4 \times 4^3 \times 4^8$ 4^{12}
 (c) $x^4 \times x^{41}$ x^{45} (d) $4^{21} \div 4^7$ 4^{14}
 (e) $9^{10} \div 9$ 9^9 (f) $\frac{3^4 \times 3^5}{3^6 \times 3^2} = \frac{3^9}{3^8} = 3^1$
 (g) $3^{17} \times 3^{12}$ 3^{29} (h) $\left(\frac{a^7}{a^5}\right)^4 = \frac{a^{28}}{a^{20}} = a^8$
 (i) $d^8 \div d^6$ d^2 (j) $3^8 \div 3^4$ 3^4
 (k) $\frac{6^9}{6^9}$ 6^0 (l) $a^4 \times a^8 \times a^2$ a^{14}
 (m) $m^{14} \div m^2$ m^{12} (n) $(ab^3c^2)^4$ $a^4b^{12}c^8$
 (o) $\frac{x^4 \cdot x^6}{x}$ $\frac{x^{10}}{x} = x^9$ (p) $(2a^2b)^3$ $2^3a^6b^3 = 8a^6b^3$

5. Evaluate:

- (a) $6^0 = 1$ (b) $1^{15} \times 1^4 \times 1^6 = 1$
 (c) $\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$

6. Evaluate:

- (a) $3^2 + 4^2 = 25$ (b) $(-5)^2 + (-12)^2 = 169$

(c) $-2^3 + 10^2 = 92$ (d) $\left(\frac{2}{5}\right)^2 \times \left(-\frac{5}{8}\right)^2 = \frac{1}{16}$

7. Write each power of a power as a single power, then evaluate it.

- (a) $(9^8)^0 = 9^0 = 1$
 (b) $[(-2)^4]^2 = (-2)^8 = 256$
 (c) $-(3^2)^3 = -3^6 = -729$

8. Write each power of a power as a single power, then evaluate it.

- (a) $3^3 \times 3^2 = 3^5 = 243$ (b) $(-2)^4 \times (-2)^0 = (-2)^4 = 16$
 (c) $5^{11} \div 5^{10} = 5^1 = 5$ (d) $10^8 \times 10^2 \div 10^6 = 10^{10-6} = 10^4 = 10000$
 i) 8^3 or 3^8 512 ii) 2^{10} or 10^2 1024
 i) 8^3 or 3^8 6561 ii) 2^{10} or 10^2 100

10. Evaluate;

- (a) $[(-3)^3]^3 \times [(-4)^0]^3 - [(-3)^5]^0$
 $(-3)^9 \times (-4)^0 - [-3]^0$
 $(-19683) \times 1 - 1$
 $-19683 - 1 = -19684$
 (b) $[(-4) \times (-5)]^4 + [(-4)^2]^2 - [(-2)^8 \div (-2)^7]^3$
 $(-4)^4 \times (-5)^4 + (-4)^4 - [(-2)^1]^3$
 $256 \times 625 + 256 - (-8)$
 $160000 + 256 + 8 = 160264$

WORD PROBLEMS

10. a) The tallest tree in the world, Hyperion in California, is about 10^2 m tall. The highest Mountain, Mount Everest, is about 10^4 m high. About how many times as high as the tree is the mountain?

$$\frac{10^4}{10^2} = \frac{100}{10000}$$

$$\text{or } = 10^{4-2} = 10^2$$

b) Earth's diameter is about 10^7 m. The largest known star has a diameter of about 10^{12} m. About how many times as great as the diameter of Earth is the diameter of the largest known star?

$$\frac{10^{12}}{10^7} = 10^5 \text{ or } 100000$$

c) Robbie, Marcia, and Nick got different answers when they evaluated this expression:

$$(-6)^2 - 2[(-8) \div 2]^2$$

Robbie's answer was 68,

Marcia's answer was 4, and

Nick's answer was -68.

a) Who had the correct answer? Show how you determined.

$$\begin{aligned} & (-6)(-6) - 2[-4]^2 \\ & 36 - 2(-4)(-4) \\ & 36 - 2(16) \\ & 36 - 32 = 4 \end{aligned}$$

b) Show and explain how the other two students might have got their answers. Where did they go wrong?

$$\text{Nick: thought } (-6)^2 \text{ was } -36$$

$$\text{So } -36 - 32 = -68$$

$$\text{Robbie: thought } (-8 \div 2)^2 \text{ was negative}$$

$$36 - (-32) = 68$$

d) A timber supplier manufactures and delivers

wood chips. The chips are packaged in boxes that are cubes with edge length 25 cm. The cost of the chips is \$14/m³, and delivery costs \$10 per 25 km. One customer orders 150 boxes of wood chips and she lives 130 km from the supplier. This expression represents the cost, in dollars:

$$\frac{10 \times 130}{25} + 25^3 \div 10^6 \times 14 \times 150$$

How much does the customer pay?

$$84.81$$

$$\frac{1300}{25}$$

$$+ 15625 \div 10^6 \times 14 \times 150$$

and

$$52 + (.015625 \times 14 \times 150)$$

$$52 + (.21875 \times 150)$$

$$52 + (32.8125)$$

$$\text{\$ } 84.81$$