

Chapter 3 Practice Test

For #1–#3, select the best answer.

1. What is the coefficient of the expression $-3(4)^5$?

A -1 **B** -3
C 4 **D** 5

2. How can you write the expression $\frac{2^4 \times 2^6}{2^2}$ as a single power?

A 2^{12} **B** 2^{22}
C 2^5 **D** 2^8

3. René simplifies the following expression. Determine the step that contains the first error.

$$\begin{aligned} &5 \times 4 - 2(3)^2 \\ &= 5 \times 4 - 2 \times 9 && \text{Step 1} \\ &= 20 - 2 \times 9 && \text{Step 2} \\ &= 18 \times 9 && \text{Step 3} \\ &= 162 && \text{Step 4} \end{aligned}$$

A Step 1 **B** Step 2
C Step 3 **D** Step 4

4. Write the expression in repeated multiplication form. Then evaluate.

$$\frac{(-2)^3(-2)^4}{(-2)^6}$$

5. Write the expression as a single power: $7^8 \times (7^3)^4$.



6. Write the number *1 billion* as power with base 10.

7. A population of rabbits triples in number every 4 months. If there are initially 20 rabbits, how many will there be in

a) 1 year

b) 20 months

c) n months

8. Re-write each of the following as a division of two powers.

a) $\left(\frac{2}{3}\right)^4$

b) $\left(-\frac{5}{2}\right)^3$

c) $\left(\frac{x}{y^2}\right)^4$

9. A cube has a surface area of 54 cm^2 .

a) Determine its edge length.

b) Write the volume of the cube as a power with an exponent of 3.

10. Rewrite each expression as a single power where the exponent does not equal 1.

a) $\left(\frac{8^5}{8}\right)^4$

b) $\frac{((-4)^3(-4)^2)^4}{(-4)(-4)^7}$

c) $\left(\frac{4^5}{4^2}\right)^4 \times 2^2$

11. Arrange the following three powers in order from smallest to largest by rewriting each power as a power in base 2: 8^4 , 4^5 , and 2^{11} .

12. Evaluate the following expressions. Show your steps!

a) $(-2)^4 - 2^4$

b) $3 + 4 \times 5 + 2(-3)^2$

c) $-5 + (2^2)^3 + (3 \times 4)^2$

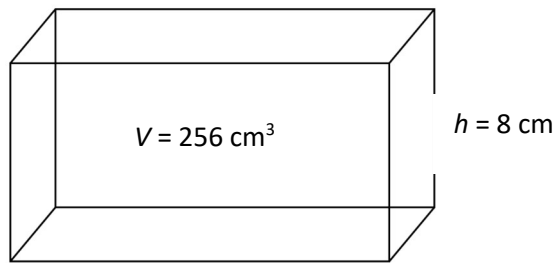
d) $\left(\frac{-2}{3}\right)^2 - \frac{4}{3^3}$

13. Explain the mistake in Chad's solution, then provide the correct answer.

$$\begin{aligned} & 7 \times 2 + 8^2(4 \times 2)^3 \\ &= 7 \times 2 + 8^2(8)^3 \\ &= 7 \times 2 + 8^6 \\ &= 7 \times 2 + 262\,144 \\ &= 14 + 262\,144 \\ &= 262\,158 \end{aligned}$$

EXTRA CHALLENGE

- 14.** A rectangular-based prism has a volume of 256 cm^3 and height of 8 cm.



- a)** Find the area of the base by converting each value to base 2 and then using exponent rules.
- b)** If each dimension of the base is a power of 2 with an exponent of at least 1, find all possible dimensions of the base.
- 15.** Each of the numbers 2, 3, 4, and 5 is substituted in some order for the letters a , b , c and d . What is the largest value possible for the expression, $a^b + c^d$?

1. B 2. D 3. C

4. $\frac{(-2)(-2)(-2)(-2)(-2)(-2)(-2)}{(-2)(-2)(-2)(-2)(-2)(-2)} = -2$

5. 7^{20}

6. 10^9

7. a) 540 b) 4860 c) $20\left(3^{\frac{n}{4}}\right)$

8. a) $\frac{2^4}{3^4}$ b) $\frac{(-5)^3}{2^3}$ or $\frac{5^3}{(-2)^3}$ c) $\left[\frac{x^4}{(y^2)^4}\right]$ or $\frac{x^4}{y^8}$

9. a) 3 cm b) $V = 3^3$

10. a) 8^{16} b) $(-4)^{12}$ c) 4^{13} or 2^{26}

11. rewrite each with a base of 2: $8^4 = (2^3)^4 = 2^{12}$, $4^5 = (2^2)^5 = 2^{10}$
smallest to largest: 2^{10} , 2^{11} , $2^{12} \rightarrow 4^5$, 2^{11} , 8^4

12. a) 0 b) 41 c) 203 d) $\frac{8}{27}$

13. Chad should have added the exponents, not multiplied them:

$$\begin{aligned} & 7 \times 2 + 8^2(4 \times 2)^3 \\ &= 7 \times 2 + 8^2(8)^3 \\ &= 7 \times 2 + 8^5 \\ &= 7 \times 2 + 37\,768 \\ &= 14 + 37\,768 \\ &= 32\,782 \end{aligned}$$

14. a) $V = l \times w \times h$

$$V = A \times h$$

$$256 = A \times 8$$

$$2^8 = A \times 2^3$$

$$2^8 \div 2^3 = A$$

$$2^{8-3} = A$$

$$2^5 = A$$

$$32 = A$$

b) $h = 8 \text{ cm} = 2^3 \text{ cm}$

$$A = 32 \text{ cm} = 2^5 \text{ cm}$$

$$l = 2^1 = 2 \text{ cm}, w = 2^4 = 16 \text{ cm}$$

$$l = 2^2 = 4 \text{ cm}, w = 2^3 = 8 \text{ cm}$$

$$l = 2^3 = 8 \text{ cm}, w = 2^2 = 4 \text{ cm}$$

$$l = 2^4 = 16 \text{ cm}, w = 2^1 = 2 \text{ cm}$$

15. $2^3 + 4^5 = 1032$