

**Chapter 8: Simplifying Exponential Expressions****Multiple Choice**

Identify the choice that best completes the statement or answers the question.

**Simplify the expression.**

1.  $(-8.6)^0$   
Ⓐ  $-1$                       Ⓑ  $0$                       Ⓒ  $-8.6$                       Ⓓ  $1$
2.  $-(6)^{-1}$   
Ⓐ  $6$                       Ⓑ  $-\frac{1}{-1^6}$                       Ⓒ  $\frac{1}{6}$                       Ⓓ  $-\frac{1}{6}$
3.  $(4)^{-2}$   
Ⓐ  $-\frac{1}{16}$                       Ⓑ  $16$                       Ⓒ  $\frac{1}{16}$                       Ⓓ  $-8$
4.  $7a^{-5}b^3$   
Ⓐ  $7ab^{-15}$                       Ⓑ  $\frac{b^3}{7a^5}$                       Ⓒ  $\frac{7b^3}{a^5}$                       Ⓓ  $7a^5b^{-3}$
5.  $\frac{12}{c^{-8}d^2}$   
Ⓐ  $\frac{12}{cd^{-6}}$                       Ⓑ  $\frac{96c}{d^2}$                       Ⓒ  $\frac{12}{c^8d^2}$                       Ⓓ  $\frac{12c^8}{d^2}$
6.  $20 \cdot 5^{-2}$   
Ⓐ  $25$                       Ⓑ  $-500$                       Ⓒ  $\frac{4}{5}$                       Ⓓ  $-200$
7.  $2k^8 \cdot 3k^3$   
Ⓐ  $5k^{24}$                       Ⓑ  $5k^{11}$                       Ⓒ  $6k^{11}$                       Ⓓ  $6k^{24}$
8.  $(t^{-2})^6$   
Ⓐ  $t^{12}$                       Ⓑ  $\frac{x}{12}$                       Ⓒ  $\frac{1}{t^{12}}$                       Ⓓ  $\frac{1}{t^{64}}$
9.  $(x^9)^0(x^7)^2$   
Ⓐ  $x^{18}$                       Ⓑ  $1$                       Ⓒ  $x^{14}$                       Ⓓ  $x^{126}$
10.  $(5k^2)^3$   
Ⓐ  $125k^6$                       Ⓑ  $125k^5$                       Ⓒ  $5k^6$                       Ⓓ  $5k^8$
11.  $(3xy^3)^2(xy)^6$   
Ⓐ  $9x^8y^{12}$                       Ⓑ  $3x^8y^{12}$                       Ⓒ  $2x^3y^{12}$                       Ⓓ  $9x^8y^9$

12.  $\frac{3^7}{3^5}$

- (A)  $3^{35}$                       (B)  $3^{12}$                       (C)  $\frac{1}{3^9}$                       (D) 9

13.  $\frac{x^{14}}{x^7}$

- (A)  $x^7$                       (B)  $x^{98}$                       (C)  $\frac{1}{x^7}$                       (D)  $x^{21}$

14. Evaluate  $\frac{1}{2^{-2}x^{-3}y^5}$  for  $x = 2$  and  $y = -4$ .

- (A) 16                      (B) -4                      (C)  $-\frac{1}{32}$                       (D) -16

15. Write  $4 \cdot 10^{-3}$  as a decimal.

- (A) 0.4                      (B) 0.004                      (C) -120                      (D) 4,000

16. Chase scored 14 points on Monday, and he doubled his score each day thereafter. How many points did he score on Thursday?

- (A) 224 points                      (B) 112 points                      (C) 56 points                      (D) 42 points

17. Which number is NOT written in scientific notation?

- (A)  $3 \times 10^{-8}$                       (B)  $6.7 \times 10^3$                       (C)  $8.7 \times 10^{-5}$                       (D)  $25.67 \times 10^{-2}$

18. Which number is written in scientific notation?

- (A)  $7.8 \times 10^{-5}$                       (B)  $3.4 \times 100^2$                       (C)  $0.84 \times 10^6$                       (D)  $-5 \times 10^{-12}$

**Complete the equation, by supplying the missing exponent.**

19.  $3^{\blacksquare} \cdot 3^{-6} = 3^2$

- (A) -8                      (B) -3                      (C) 8                      (D) 4

Name: \_\_\_\_\_

ID: A

Short Answer: Show ALL work!!

Simplify the expression.

20.  $\frac{m^{-6}n^{-3}}{m^{-13}n^{-1}}$

Answer: \_\_\_\_\_

21.  $(-5g^5h^6)^2(g^4h^2)^4$

Answer: \_\_\_\_\_

22.  $-4x^3 \cdot 2y^{-2} \cdot 5y^5 \cdot x^{-8}$

Answer: \_\_\_\_\_

Name: \_\_\_\_\_

ID: A

23. Simplify. Show your work.

$$(3m^{-1}n^4)^{-2}(2m^3n^{-5})^4$$

Answer: \_\_\_\_\_

**Other**

24. Explain why  $(2g)^4$  is not in simplest form.

## Chapter 8: Simplifying Exponential Expressions

### Answer Section

#### MULTIPLE CHOICE

1. ANS: D           PTS: 1           DIF: L2           REF: 8-1 Zero and Negative Exponents  
OBJ: 8-1.1 Zero and Negative Exponents           NAT: ADP J.1.1 | ADP J.1.6  
STA: UT 2.2.7 | UT 2.2.5           TOP: 8-1 Example 1  
KEY: zero as an exponent | negative exponent | simplfying a power
2. ANS: D           PTS: 1           DIF: L2           REF: 8-1 Zero and Negative Exponents  
OBJ: 8-1.1 Zero and Negative Exponents           NAT: ADP J.1.1 | ADP J.1.6  
STA: UT 2.2.7 | UT 2.2.5           TOP: 8-1 Example 1  
KEY: zero as an exponent | negative exponent | simplfying a power
3. ANS: C           PTS: 1           DIF: L2           REF: 8-1 Zero and Negative Exponents  
OBJ: 8-1.1 Zero and Negative Exponents           NAT: ADP J.1.1 | ADP J.1.6  
STA: UT 2.2.7 | UT 2.2.5           TOP: 8-1 Example 1  
KEY: zero as an exponent | negative exponent | simplfying a power
4. ANS: C           PTS: 1           DIF: L2           REF: 8-1 Zero and Negative Exponents  
OBJ: 8-1.1 Zero and Negative Exponents           NAT: ADP J.1.1 | ADP J.1.6  
STA: UT 2.2.7 | UT 2.2.5           TOP: 8-1 Example 2  
KEY: zero as an exponent | negative exponent | simplifying an exponential expression
5. ANS: D           PTS: 1           DIF: L2           REF: 8-1 Zero and Negative Exponents  
OBJ: 8-1.1 Zero and Negative Exponents           NAT: ADP J.1.1 | ADP J.1.6  
STA: UT 2.2.7 | UT 2.2.5           TOP: 8-1 Example 2  
KEY: negative exponent | simplifying an exponential expression
6. ANS: C           PTS: 1           DIF: L3           REF: 8-1 Zero and Negative Exponents  
OBJ: 8-1.1 Zero and Negative Exponents           NAT: ADP J.1.1 | ADP J.1.6  
STA: UT 2.2.7 | UT 2.2.5           TOP: 8-1 Example 1  
KEY: negative exponent | simplifying an exponential expression
7. ANS: C           PTS: 1           DIF: L2  
REF: 8-3 Multiplication Properties of Exponents           OBJ: 8-3.1 Multiplying Powers  
NAT: ADP I.1.5 | ADP J.1.1           STA: UT 2.2.7 | UT 2.2.5 | UT 1  
TOP: 8-3 Example 2  
KEY: exponential expression | simplifying an exponential expression | multiplying powers with the same base
8. ANS: C           PTS: 1           DIF: L2  
REF: 8-4 More Multiplication Properties of Exponents           OBJ: 8-4.1 Raising a Power to a Power  
NAT: ADP I.1.5 | ADP J.1.1           STA: UT 2.2.7 | UT 1  
TOP: 8-4 Example 1  
KEY: raising a power to a power | exponential expression | simplifying an exponential expression
9. ANS: C           PTS: 1           DIF: L2  
REF: 8-4 More Multiplication Properties of Exponents           OBJ: 8-4.1 Raising a Power to a Power  
NAT: ADP I.1.5 | ADP J.1.1           STA: UT 2.2.7 | UT 1  
TOP: 8-4 Example 2  
KEY: exponential expression | simplifying an exponential expression | simplifying an expression with powers

- 10.** ANS: A            PTS: 1            DIF: L2  
 REF: 8-4 More Multiplication Properties of Exponents      OBJ: 8-4.2 Raising a Product to a Power  
 NAT: ADP I.1.5 | ADP J.1.1            STA: UT 2.2.7 | UT 1  
 TOP: 8-4 Example 3  
 KEY: raising a product to a power | exponential expression | simplifying an exponential expression
- 11.** ANS: A            PTS: 1            DIF: L2  
 REF: 8-4 More Multiplication Properties of Exponents      OBJ: 8-4.2 Raising a Product to a Power  
 NAT: ADP I.1.5 | ADP J.1.1            STA: UT 2.2.7 | UT 1  
 TOP: 8-4 Example 4  
 KEY: raising a product to a power | exponential expression | simplifying an exponential expression
- 12.** ANS: D            PTS: 1            DIF: L2            REF: 8-5 Division Properties of Exponents  
 OBJ: 8-5.1 Dividing Powers With the Same Base      NAT: ADP I.1.5 | ADP I.2.2 | ADP J.1.1  
 STA: UT 2.2.7 | UT 2.2.5 | UT 1      TOP: 8-5 Example 1  
 KEY: dividing powers with the same base | exponential expression
- 13.** ANS: A            PTS: 1            DIF: L2            REF: 8-5 Division Properties of Exponents  
 OBJ: 8-5.1 Dividing Powers With the Same Base      NAT: ADP I.1.5 | ADP I.2.2 | ADP J.1.1  
 STA: UT 2.2.7 | UT 2.2.5 | UT 1      TOP: 8-5 Example 1  
 KEY: dividing powers with the same base | exponential expression
- 14.** ANS: C            PTS: 1            DIF: L3            REF: 8-1 Zero and Negative Exponents  
 OBJ: 8-1.2 Evaluating Exponential Expressions      NAT: ADP J.1.1 | ADP J.1.6  
 STA: UT 2.2.7 | UT 2.2.5            TOP: 8-1 Example 3  
 KEY: negative exponent | simplifying an exponential expression | evaluating exponential expression
- 15.** ANS: B            PTS: 1            DIF: L3            REF: 8-1 Zero and Negative Exponents  
 OBJ: 8-1.1 Zero and Negative Exponents            NAT: ADP J.1.1 | ADP J.1.6  
 STA: UT 2.2.7 | UT 2.2.5            TOP: 8-1 Example 1  
 KEY: simplifying an exponential expression | negative exponent
- 16.** ANS: B            PTS: 1            DIF: L3            REF: 8-1 Zero and Negative Exponents  
 OBJ: 8-1.2 Evaluating Exponential Expressions      NAT: ADP J.1.1 | ADP J.1.6  
 STA: UT 2.2.7 | UT 2.2.5            TOP: 8-1 Example 4  
 KEY: evaluating exponential expression | simplifying a power | word problem | problem solving
- 17.** ANS: D            PTS: 1            DIF: L2            REF: 8-2 Scientific Notation  
 OBJ: 8-2.1 Writing Numbers in Scientific and Standard Notations  
 NAT: NAEP 2005 N1d | NAEP 2005 N1f | ADP I.1.5 | ADP I.2.2  
 TOP: 8-2 Example 1            KEY: scientific notation
- 18.** ANS: A            PTS: 1            DIF: L2            REF: 8-2 Scientific Notation  
 OBJ: 8-2.1 Writing Numbers in Scientific and Standard Notations  
 NAT: NAEP 2005 N1d | NAEP 2005 N1f | ADP I.1.5 | ADP I.2.2  
 TOP: 8-2 Example 1            KEY: scientific notation
- 19.** ANS: C            PTS: 1            DIF: L3  
 REF: 8-3 Multiplication Properties of Exponents      OBJ: 8-3.1 Multiplying Powers  
 NAT: ADP I.1.5 | ADP J.1.1            STA: UT 2.2.7 | UT 2.2.5 | UT 1  
 KEY: multiplying powers with the same base | simplifying an exponential expression | exponential expression

## SHORT ANSWER

20. ANS:

$$\frac{m^7}{n^2}$$

PTS: 1                    DIF: L2                    REF: 8-5 Division Properties of Exponents  
 OBJ: 8-5.1 Dividing Powers With the Same Base                    NAT: ADP I.1.5 | ADP I.2.2 | ADP J.1.1  
 STA: UT 2.2.7 | UT 2.2.5 | UT 1                    TOP: 8-5 Example 1  
 KEY: dividing powers with the same base | exponential expression

21. ANS:

$$25g^{26}h^{20}$$

PTS: 1                    DIF: L3                    REF: 8-4 More Multiplication Properties of Exponents  
 OBJ: 8-4.2 Raising a Product to a Power                    NAT: ADP I.1.5 | ADP J.1.1  
 STA: UT 2.2.7 | UT 1                    TOP: 8-4 Example 4  
 KEY: exponential expression | raising a product to a power | simplifying an exponential expression

22. ANS:

$$\frac{40y^3}{x^5}$$

PTS: 1                    DIF: L3                    REF: 8-3 Multiplication Properties of Exponents  
 OBJ: 8-3.1 Multiplying Powers                    NAT: ADP I.1.5 | ADP J.1.1  
 STA: UT 2.2.7 | UT 2.2.5 | UT 1                    TOP: 8-3 Example 2  
 KEY: multiplying powers with the same base | exponential expression | simplifying an exponential expression

## ESSAY

23. ANS:

$$\begin{aligned}
 [4] \quad & (3m^{-1}n^4)^{-2}(2m^3n^{-5})^4 \\
 & = 3^{-2}m^2n^{-8} \cdot 2^4m^{12}n^{-20} \\
 & = (3^{-2})(2^4)m^2m^{12} \cdot n^{-8}n^{-20} \\
 & = (3^{-2})(2^4)m^{14} \cdot n^{-28} \\
 & = \frac{1}{9}(16)m^{14} \cdot \frac{1}{n^{28}} \\
 & = \frac{16m^{14}}{9n^{28}}
 \end{aligned}$$

[3] one computational error

[2] incorrect application of a law of exponents OR two computational errors

[1] more than two computational errors

PTS: 1                    DIF: L3                    REF: 8-4 More Multiplication Properties of Exponents

OBJ: 8-4.2 Raising a Product to a Power

NAT: ADP I.1.5 | ADP J.1.1

STA: UT 2.2.7 | UT 1

KEY: raising a product to a power | exponents | multiplying powers with the same base | extended response | rubric-based question

## OTHER

24. ANS:

Each term should be raised to the fourth power and simplified.

PTS: 1                    DIF: L3                    REF: 8-4 More Multiplication Properties of Exponents

OBJ: 8-4.2 Raising a Product to a Power

NAT: ADP I.1.5 | ADP J.1.1

STA: UT 2.2.7 | UT 1

KEY: raising a product to a power | simplifying an exponential expression | exponential expression | writing in math | reasoning