

**Properties of Exponents**

Write the expression using a single exponent.

1.  $3^2 \cdot 3^5$

2.  $(-6)^6 \cdot (-6)^7$

3.  $b^6 \cdot b^1$

4.  $ab^3 \cdot a^3b^2$

5.  $4^c \cdot 4^w$

6.  $\frac{3^9}{3^8}$

7.  $\frac{x^{56}}{x^{24}}$

8.  $\frac{184^9}{184^8}$

9.  $\frac{p^{12}}{p^{10}}$

Write  $<$ ,  $>$ , or  $=$  to complete the statement.

10.  $4^8 \cdot 4^3$   $\blacksquare$   $8^{24}$

11.  $8^2 \cdot 8^1$   $\blacksquare$   $16^2$

Simplify the expression.

12.  $8x^5 \cdot (-6x^5)$

13.  $7t^4 \cdot 7t^4$

14.  $(-6x^2) \cdot 5x$

**Simplify the expression.**

15.  $2^0$

16.  $(7x)^0$

17.  $7^{-3}$

**What is the simplified form of each expression?**

18.  $3p^4t^{-4}$

19.  $\frac{1}{g^{-2}}$

20.  $\frac{5}{x^{-2}y^6}$

**What is the simplified form of each expression?**

21.  $d^7 \cdot 2d^8$

22.  $7x^{-8} \cdot 6x^3$

**What is the simplified form of the expression?**

23.  $(y^2)^8$

24.  $(y^2)^{-8}$

**What is the simplified form of each expression?**

25.  $(6g^6)^3$

**What is the simplified form of each expression?**

26.  $\frac{m^{12}}{m^7}$

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$$27. \frac{g^8 h^8}{g^2 h^{20}}$$

## Properties of Exponents

### Answer Section

1. ANS:

$$3^7$$

PTS: 1                    DIF: L2                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

2. ANS:

$$(-6)^{13}$$

PTS: 1                    DIF: L2                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

3. ANS:

$$b^7$$

PTS: 1                    DIF: L2                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

4. ANS:

$$a^4 b^5$$

PTS: 1                    DIF: L3                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

5. ANS:

$$4^{c+w}$$

PTS: 1                    DIF: L3                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

6. ANS:

$$3^1$$

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.1 Dividing Powers With the Same Base                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 1                    KEY: dividing powers | base | exponent  
 DOK: DOK 1

7. ANS:

$x^{32}$

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.1 Dividing Powers With the Same Base                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 2                    KEY: dividing powers | exponent  
 DOK: DOK 1

8. ANS:

$184^1$

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.1 Dividing Powers With the Same Base                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 2                    KEY: dividing powers | base | exponent  
 DOK: DOK 1

9. ANS:

$p^2$

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.1 Dividing Powers With the Same Base                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 2                    KEY: dividing powers | base | exponent  
 DOK: DOK 1

10. ANS:

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PTS: 1                    DIF: L3                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

11. ANS:

&gt;

PTS: 1                    DIF: L3                    REF: 12-3 Exponents and Multiplication  
 OBJ: 12-3.1 Multiplying Powers With the Same Base                    NAT: NAEP A3b  
 TOP: 12-3 Example 1                    KEY: exponent | base | multiplying powers  
 DOK: DOK 1

12. ANS:

$-48x^{10}$

PTS: 1                    DIF: L2                    REF: 12-4 Multiplying Polynomials  
 OBJ: 12-4.1 Multiplying by a Monomial                    TOP: 12-4 Example 1  
 KEY: multiplying monomials | monomial                    DOK: DOK 1

13. ANS:

$49t^8$

PTS: 1                    DIF: L2                    REF: 12-4 Multiplying Polynomials  
 OBJ: 12-4.1 Multiplying by a Monomial                    TOP: 12-4 Example 1  
 KEY: multiplying monomials | monomial                    DOK: DOK 1

14. ANS:

$$-30x^3$$

PTS: 1                    DIF: L2                    REF: 12-4 Multiplying Polynomials  
 OBJ: 12-4.1 Multiplying by a Monomial                    TOP: 12-4 Example 1  
 KEY: multiplying monomials | monomial                    DOK: DOK 1

15. ANS:

1

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.2 Using Zero or Negative Exponents                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 3                    KEY: zero exponent  
 DOK: DOK 1

16. ANS:

1

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.2 Using Zero or Negative Exponents                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 3                    KEY: zero exponent  
 DOK: DOK 1

17. ANS:

$$\frac{1}{7^3}$$

PTS: 1                    DIF: L2                    REF: 12-5 Exponents and Division  
 OBJ: 12-5.2 Using Zero or Negative Exponents                    STA: 8MI N.ME.08.02  
 TOP: 12-5 Example 4                    KEY: negative exponent  
 DOK: DOK 1

18. ANS:

$$\frac{3p^4}{t^4}$$

PTS: 1                    DIF: L2                    REF: 7-1 Zero and Negative Exponents  
 OBJ: 7-1.1 To simplify expressions involving zero and negative exponents  
 NAT: N.1.d| N.3.a| A.3.c| A.3.h                    STA: L1.1.4| L2.1.2| A1.1.2  
 TOP: 7-1 Problem 2 Simplifying Exponential Expressions                    DOK: DOK 1

19. ANS:

$$g^2$$

PTS: 1                    DIF: L3                    REF: 7-1 Zero and Negative Exponents  
 OBJ: 7-1.1 To simplify expressions involving zero and negative exponents  
 NAT: N.1.d| N.3.a| A.3.c| A.3.h                    STA: L1.1.4| L2.1.2| A1.1.2  
 TOP: 7-1 Problem 2 Simplifying Exponential Expressions                    DOK: DOK 1

20. ANS:

$$\frac{5x^2}{y^6}$$

PTS: 1 DIF: L3 REF: 7-1 Zero and Negative Exponents

OBJ: 7-1.1 To simplify expressions involving zero and negative exponents

NAT: N.1.d| N.3.a| A.3.c| A.3.h STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-1 Problem 2 Simplifying Exponential Expressions DOK: DOK 1

21. ANS:

$$2d^{15}$$

PTS: 1 DIF: L2 REF: 7-3 Multiplying Powers With the Same Base

OBJ: 7-3.1 To multiply powers with the same base NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-3 Problem 2 Multiplying Powers in Algebraic Expressions

DOK: DOK 1

22. ANS:

$$\frac{42}{x^5}$$

PTS: 1 DIF: L3 REF: 7-3 Multiplying Powers With the Same Base

OBJ: 7-3.1 To multiply powers with the same base NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-3 Problem 2 Multiplying Powers in Algebraic Expressions

DOK: DOK 1

23. ANS:

$$y^{16}$$

PTS: 1 DIF: L2 REF: 7-4 More Multiplication Properties of Exponents

OBJ: 7-4.1 To raise a power to a power NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-4 Problem 1 Simplifying a Power Raised to a Power

DOK: DOK 1

24. ANS:

$$\frac{1}{y^{16}}$$

PTS: 1 DIF: L3 REF: 7-4 More Multiplication Properties of Exponents

OBJ: 7-4.1 To raise a power to a power NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-4 Problem 1 Simplifying a Power Raised to a Power

DOK: DOK 1

25. ANS:

$$216g^{18}$$

PTS: 1 DIF: L3 REF: 7-4 More Multiplication Properties of Exponents

OBJ: 7-4.2 To raise a product to a power NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-4 Problem 3 Simplifying a Product Raised to a Power

DOK: DOK 1

26. ANS:

$$m^5$$

PTS: 1

DIF: L2

REF: 7-5 Division Properties of Exponents

OBJ: 7-5.1 To divide powers with the same base

NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-5 Problem 1 Dividing Algebraic Expressions

DOK: DOK 1

27. ANS:

$$\frac{g^6}{h^{12}}$$

PTS: 1

DIF: L3

REF: 7-5 Division Properties of Exponents

OBJ: 7-5.1 To divide powers with the same base

NAT: N.1.d| N.1.f| N.3.a| A.3.c| A.3.h

STA: L1.1.4| L2.1.2| A1.1.2

TOP: 7-5 Problem 1 Dividing Algebraic Expressions

DOK: DOK 1