

**LESSON**

**7-1**

**Practice B**

**Integer Exponents**

**Simplify.**

1.  $5^{-3} = \frac{1}{\quad} = \frac{1}{\quad}$

2.  $2^{-6} = \frac{1}{\quad} = \frac{1}{\quad}$

3.  $(-5)^{-2}$  \_\_\_\_\_

4.  $-(4)^{-3}$  \_\_\_\_\_

5.  $-6^0$  \_\_\_\_\_

6.  $(7)^{-2}$  \_\_\_\_\_

**Evaluate each expression for the given value(s) of the variable(s).**

7.  $d^{-3}$  for  $d = -2$

8.  $a^5b^{-6}$  for  $a = 3$  and  $b = 2$

9.  $(b - 4)^{-2}$  for  $b = 1$

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10.  $5z^{-x}$  for  $z = -3$  and  $x = 2$

11.  $(5z)^{-x}$  for  $z = -3$  and  $x = 2$

12.  $c^{-3}(16^{-2})$  for  $c = 4$

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**Simplify.**

13.  $t^{-4}$

14.  $3r^{-5}$

15.  $\frac{s^{-3}}{t^{-5}}$

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16.  $\frac{h^0}{3}$

17.  $\frac{2x^{-3}y^{-2}}{z^4}$

18.  $\frac{4fg^{-5}}{5h^{-3}}$

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19.  $\frac{14a^{-4}}{20bc^{-1}}$

20.  $\frac{a^4c^2e^0}{b^{-1}d^{-3}}$

21.  $\frac{-3g^{-2}hk^{-2}}{-6h^0}$

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22. A cooking website claims to contain  $10^5$  recipes.  
Evaluate this expression.

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23. A ball bearing has diameter  $2^{-3}$  inches.  
Evaluate this expression.

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**LESSON 7-1 Practice A**  
**Integer Exponents**

Simplify.

1.  $3^{-2} = \frac{1}{3^2} = \frac{1}{3 \cdot 3} = \frac{1}{9}$       2.  $2^{-4} = \frac{1}{2^4} = \frac{1}{2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{16}$   
 3.  $(-3)^{-3} = \frac{1}{(-3)^3} = \frac{1}{-3 \cdot -3 \cdot -3} = \frac{1}{-27}$   
 4.  $(-1)^{-5} = \frac{1}{(-1)^5} = \frac{1}{-1 \cdot -1 \cdot -1 \cdot -1 \cdot -1} = \frac{1}{-1} = -1$   
 5.  $-(7.2)^0 = -1$       6.  $(4)^{-3} = \frac{1}{64}$

Evaluate each expression for the given value(s) of the variable(s).

7.  $x^{-2}$  for  $x = 3$       8.  $m^0 n^{-3}$  for  $m = 2$  and  $n = 3$       9.  $5r^{-4}$  for  $r = -2$   
 $(3)^{-2} = \frac{1}{(3)^2} = \frac{1}{9}$        $(2)^0 (3)^{-3} = (1) \cdot \frac{1}{(3)^3} = \frac{1}{27}$        $5(-2)^{-4} = 5 \cdot \frac{1}{(-2)^4} = 5 \cdot \frac{1}{16} = \frac{5}{16}$

Simplify.

10.  $4x^{-3} = \frac{4}{x^3}$       11.  $\frac{5}{b^{-2}} = 5b^2$       12.  $\frac{m^3 n^{-4}}{p^0} = \frac{m^3}{n^4}$   
 13.  $\frac{k^{-4}}{2} = \frac{1}{2k^4}$       14.  $\frac{t^4}{g^{-1}} = t^4 g$       15.  $\frac{r^6 t^0}{s^{-2}} = r^6 s^2$

16. The weight of a silver charm is  $2^{-2}$  grams. Evaluate this expression.  $\frac{1}{4}$  gram or 0.25 gram  
 17. There are about  $10^4$  different species of birds on Earth. Just over  $10^3$  of them are threatened. Evaluate both expressions. 10,000; 1000

**LESSON 7-1 Practice B**  
**Integer Exponents**

Simplify.

1.  $5^{-3} = \frac{1}{5^3} = \frac{1}{125}$       2.  $2^{-6} = \frac{1}{2^6} = \frac{1}{64}$   
 3.  $(-5)^{-2} = \frac{1}{25}$       4.  $-(4)^{-3} = -\frac{1}{64}$   
 5.  $-6^0 = -1$       6.  $(7)^{-2} = \frac{1}{49}$

Evaluate each expression for the given value(s) of the variable(s).

7.  $d^{-3}$  for  $d = -2$       8.  $a^5 b^{-6}$  for  $a = 3$  and  $b = 2$       9.  $(b - 4)^{-2}$  for  $b = 1$   
 $-\frac{1}{8}$        $\frac{243}{64}$        $\frac{1}{9}$   
 10.  $5z^{-x}$  for  $z = -3$  and  $x = 2$       11.  $(5z)^{-x}$  for  $z = -3$  and  $x = 2$       12.  $c^{-3} (16^{-2})$  for  $c = 4$   
 $\frac{5}{9}$        $\frac{1}{225}$        $\frac{1}{16,384}$

Simplify.

13.  $t^{-4} = \frac{1}{t^4}$       14.  $3r^{-5} = \frac{3}{r^5}$       15.  $\frac{s^{-3}}{t^{-5}} = \frac{t^5}{s^3}$   
 16.  $\frac{h^0}{3} = \frac{1}{3}$       17.  $\frac{2x^{-3}y^{-2}}{z^4} = \frac{2}{x^3 y^2 z^4}$       18.  $\frac{4fg^{-5}}{5h^{-3}} = \frac{4fh^3}{5g^5}$   
 19.  $\frac{14a^{-4}}{20bc^{-1}} = \frac{7c}{10a^4 b}$       20.  $\frac{a^4 c^2 e^0}{b^{-1} d^{-3}} = \frac{a^4 b c^2 d^3}{1}$       21.  $\frac{-3g^{-2}hk^{-2}}{-6h^0} = \frac{h}{2g^2 k^2}$

22. A cooking website claims to contain  $10^5$  recipes. Evaluate this expression. 100,000  
 23. A ball bearing has diameter  $2^{-3}$  inches. Evaluate this expression.  $\frac{1}{8}$  inch or 0.125 inch

**LESSON 7-1 Practice C**  
**Integer Exponents**

Simplify.

1.  $4^{-2} = \frac{1}{16}$       2.  $6^0 = 1$       3.  $-6^{-2} = -\frac{1}{36}$   
 4.  $(-1)^{-5} = -1$       5.  $(-3)^{-2} = \frac{1}{9}$       6.  $5^{-3} = \frac{1}{125}$   
 7.  $-7^{-3} = -\frac{1}{343}$       8.  $(-4)^{-5} = -\frac{1}{1024}$       9.  $(-9)^0 = 1$

Evaluate each expression for the given value(s) of the variable(s).

10.  $x^{-4} y^3$  for  $x = 2$  and  $y = 3$       11.  $5r^{-3} s^{-6}$  for  $r = 3$  and  $s = 0$   
 $\frac{27}{16}$        $\frac{5}{27}$   
 12.  $(3 - m)^{-4}$  for  $m = 6$       13.  $-2a^{-1} b^{-3}$  for  $a = 2$  and  $b = 3$   
 $\frac{1}{81}$        $-\frac{1}{27}$   
 14.  $(-2xy)^{-3}$  for  $x = -2$  and  $y = \frac{1}{2}$       15.  $(\frac{4}{5}m)^{-3}$  for  $m = 10$   
 $\frac{1}{8}$        $\frac{1}{512}$

Simplify.

16.  $x^{-3} = \frac{1}{x^3}$       17.  $z^0 = 1$       18.  $t^{-9} = \frac{1}{t^9}$   
 19.  $3n^{-2} = \frac{3}{n^2}$       20.  $\frac{2}{3}x^{-4} = \frac{2}{3x^4}$       21.  $-a^{-2} = -\frac{1}{a^2}$   
 22.  $10r^{-3} s^4 = \frac{10s^4}{r^3}$       23.  $\frac{b^3}{c^{-2} d^5} = \frac{b^3 c^2}{d^5}$       24.  $\frac{5x^{-2} y^{-3}}{z^0} = \frac{5}{x^2 y^3}$   
 25.  $\frac{p^{-9} q^{-4}}{r^2 s^{-3}} = \frac{s^3}{p^9 q^4 r^2}$       26.  $\frac{a^0 b^{-2} c^3}{c^{-3} d} = \frac{c^3}{b^2 d}$       27.  $\frac{g^3 h^{-2}}{k^{-1} j^{-5}} = \frac{g^3 k j^5}{h^2}$

28. A micrometer is an instrument that can measure the thickness of an object very accurately. One micrometer is accurate to within  $10^{-4}$  inches. Evaluate this expression.  $\frac{1}{10,000}$  inch or 0.0001 inch  
 29. An object is being measured by a micrometer. It has a thickness of  $6^{-3}$  inches. Evaluate this expression.  $\frac{1}{216}$  inch or 0.00463 inch

**LESSON 7-1 Reteach**  
**Integer Exponents**

Remember that  $2^3$  means  $2 \times 2 \times 2 = 8$ . The base is 2, the exponent is positive 3. Exponents can also be 0 or negative.

	Zero Exponents	Negative Exponents	Negative Exponents in the Denominator
<b>Definition</b>	For any nonzero number $x$ , $x^0 = 1$ .	For any nonzero number $x$ and any integer $n$ , $x^{-n} = \frac{1}{x^n}$ .	For any nonzero number $x$ and any integer $n$ , $\frac{1}{x^{-n}} = x^n$ .
<b>Examples</b>	$6^0 = 1$ $(\frac{1}{2})^0 = 1$	$5^{-3} = \frac{1}{5^3}$ $2^{-4} = \frac{1}{2^4}$	$\frac{1}{8^{-2}} = 8^2$ $\frac{1}{2^{-4}} = 2^4$
$0^0$ and $0^{-n}$ are undefined.			

Simplify  $4^{-2}$ .

$4^{-2} = \frac{1}{4^2} = \frac{1}{4 \cdot 4} = \frac{1}{16}$   
 Write without negative exponents.  
 Write in expanded form.  
 Simplify.

Simplify  $x^2 y^{-3} z^0$ .

$x^2 y^{-3} z^0 = \frac{x^2}{y^3} \cdot 1 = \frac{x^2}{y^3}$   
 Write without negative exponents.  
 $z^0 = 1$ .  
 Simplify.

Fill in the blanks to simplify each expression.

1.  $2^{-5} = \frac{1}{2^5} = \frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{32}$       2.  $10^{-3} = \frac{1}{10^3} = \frac{1}{10 \cdot 10 \cdot 10} = \frac{1}{1000}$       3.  $\frac{1}{5^{-4}} = 5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$   
 $2^{-5} = \frac{1}{2^5} = \frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{32}$        $10^{-3} = \frac{1}{10^3} = \frac{1}{10 \cdot 10 \cdot 10} = \frac{1}{1000}$        $5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$

Simplify.

4.  $5y^{-4} = \frac{5}{y^4}$       5.  $\frac{8}{a^{-3}} = 8a^3$       6.  $9x^3 y^{-2} = \frac{9x^3}{y^2}$   
 7.  $\frac{x^{-3}}{x^{-1} y} = \frac{x^4}{y}$       8.  $\frac{a^{-1} b^2}{a^{-1} b^5} = \frac{a}{b^3}$       9.  $5x^{-4} y^2 = \frac{5y^2}{x^4}$