

LESSON

7-1

Practice C

Integer Exponents

Simplify.

1. 4^{-2} _____ 2. 6^0 _____ 3. -6^{-2} _____
4. $(-1)^{-5}$ _____ 5. $(-3)^{-2}$ _____ 6. 5^{-3} _____
7. -7^{-3} _____ 8. $(-4)^{-5}$ _____ 9. $(-9)^0$ _____

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 $s = 1$ _____
12. $(3 - m)^{-4}$ for $m = 6$ _____
13. $-2a^{-1}b^{-3}$ for $a = 2$ and $b = 3$ _____
14. $(-2xy)^{-3}$ for $x = -2$ and $y = \frac{1}{2}$ _____
15. $(\frac{4}{5}m)^{-3}$ for $m = 10$ _____

Simplify.

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

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. _____
29. An object is being measured by a micrometer. It has a thickness of 6^{-3} inches. Evaluate this expression. _____

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. $\frac{m^0 n^{-4}}{p^0} = \frac{m^3}{n^4}$

13. $\frac{k^{-4}}{2} = \frac{1}{2k^4}$ 14. $\frac{f^4}{g^{-1}} = f^4 g$ 15. $\frac{r^2 p^0}{s^{-2}} = r^2 s^2$

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. $\frac{a^4 c^2 e^0}{b^{-1} d^{-3}} = a^4 bc^2 d^3$ 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. $(-1)^{-5} = \frac{-1}{1}$ 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 $s = 1$

$\frac{27}{16}$ $\frac{5}{27}$

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. $\frac{b^3}{c^{-2} d^3} = \frac{b^3 c^2}{d^3}$ 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. $\frac{a^0 b^{-2}}{c^{-3} d} = \frac{c^3}{b^2 d}$ 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 Review for Mastery
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
Definition	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 , $\frac{1}{x^{-n}} = x^n$.
Examples	$6^0 = 1$ $(\frac{1}{2})^0 = 1$	$5^{-3} = \frac{1}{5^3}$ $2^{-4} = \frac{1}{2^4}$	$\frac{1}{8^{-2}} = 8^2$ $\frac{1}{2^{-4}} = 2^4$
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 $x^2 y^{-3} z^0$.

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

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. $\frac{1}{5^{-4}} = 5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$

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