

LESSON
8.3**Practice A**

For use with pages 502–508

Match the equivalent expressions.

1. $\left(\frac{2}{3}\right)^{-2}$

2. $2^{-2} \cdot 3^{-2}$

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

A. $\frac{1}{36}$

B. $\frac{4}{9}$

C. $\frac{9}{4}$

Evaluate the expression.

4. 5^{-3}

5. 8^{-2}

6. 2^{-5}

7. $(-3)^{-4}$

8. $(-9)^{-1}$

9. 6^0

10. $(-5)^0$

11. $\left(\frac{1}{2}\right)^0$

12. $\left(\frac{1}{6}\right)^{-2}$

13. $\left(\frac{3}{4}\right)^{-1}$

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

15. 0^{-2}

Simplify the expression. Write your answer using only positive exponents.

16. x^{-5}

17. m^{-9}

18. $6y^{-3}$

19. $8a^{-10}$

20. $(3b)^{-4}$

21. x^3y^{-2}

22. $x^{-4}y^3$

23. $a^{-1}b^{-2}$

24. $2x^{-3}y^1$

25. Finger Thickness Your friend tells you that her finger is $\left(\frac{4}{3}\right)^{-1}$ inch thick. Evaluate the expression that represents the thickness of your friend's finger.

26. Floor Tile The minimum recommended width of the space between 6-inch by 6-inch tiles is 2^{-2} inch and the maximum recommended width is 2^{-1} inch. Simplify the expressions for the minimum and maximum widths of the space between the 6-inch by 6-inch floor tiles.

27. Hole Punch Your hole punch makes holes in your paper that have a diameter of 4^{-1} inch.

- Write an expression for the area of one punched hole. Use the formula for the area of a circle $A = \pi r^2$.
- Your hole punch makes three holes in a page. Write an expression for the total area punched out of one sheet of paper.

LESSON
8.3**Practice B**

For use with pages 502–508

Evaluate the expression.

- | | | |
|------------------------------------|---------------------------------|---------------------------------|
| 1. 3^{-5} | 2. 10^{-3} | 3. $(-2)^{-6}$ |
| 4. 5^0 | 5. $(-6)^0$ | 6. $\left(\frac{4}{3}\right)^0$ |
| 7. $\left(\frac{5}{8}\right)^{-2}$ | 8. $\left(\frac{7}{4}\right)^3$ | 9. 0^{-5} |
| 10. $10^{-2} \cdot 10^{-3}$ | 11. $4^{-6} \cdot 4^3$ | 12. $\frac{1}{5^{-4}}$ |

Simplify the expression. Write your answer using only positive exponents.

- | | | |
|--------------------------|---------------------------|-------------------------------|
| 13. x^{-7} | 14. $6y^{-4}$ | 15. $(2b)^{-5}$ |
| 16. $(-3m)^{-4}$ | 17. a^2b^{-4} | 18. $3x^{-2}y^{-5}$ |
| 19. $(4x^{-4}y^2)^{-3}$ | 20. $(8mn^3)^0$ | 21. $\frac{c^{-3}}{d^{-5}}$ |
| 22. $\frac{x^2}{y^{-4}}$ | 23. $\frac{x^{-6}}{4y^5}$ | 24. $\frac{1}{3x^{-3}y^{-7}}$ |

25. **Paper** A sheet of 67-pound paper has a thickness of 100^{-1} inch.
- Write and evaluate an expression for the total thickness of 5 sheets of 67-pound paper.
 - Write and evaluate an expression for the total thickness of 2^3 sheets of 67-pound paper.
26. **Frogs** A frog egg currently has a radius of 5^{-1} centimeter. Write an expression using positive exponents for the volume of the frog egg. Use the formula for the volume of a sphere $V = \frac{4}{3}\pi r^3$.
27. **Metric System** The metric system has names for very small lengths.
- One micrometer is 10^3 times the length of one nanometer. One nanometer is 10^{-9} meter. Write one micrometer in meters.
 - One femtometer is 10^3 times the length of one attometer. One attometer is 10^{-18} meter. Write one femtometer in meters.
 - One centimeter is 10^{10} times the length of one picometer. One picometer is 10^{-12} meter. Write one centimeter in meters.