

8.4 Practice



Go to BigIdeasMath.com to get HELP with solving the exercises.

▶ Review & Refresh

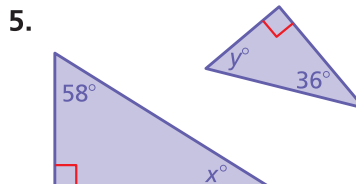
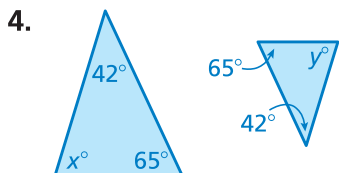
Simplify the expression. Write your answer as a power.

1. $\frac{10^8}{10^4}$

2. $\frac{y^9}{y^7}$

3. $\frac{(-3)^8 \cdot (-3)^3}{(-3)^2}$

Tell whether the triangles are similar. Explain.



6. Which data display best orders numerical data and shows how they are distributed?

A. bar graph

B. line graph

C. scatter plot

D. stem-and-leaf plot

▶ Concepts, Skills, & Problem Solving

UNDERSTANDING NEGATIVE EXPONENTS Copy and complete the table.

(See Exploration 2, p. 337.)

	Product	Product of Powers Property	Power	Value
7.	$7^{-4} \cdot 7^4$			
8.	$(-2)^5 \cdot (-2)^{-5}$			

EVALUATING EXPRESSIONS Evaluate the expression.

9. $\frac{8^7}{8^7}$

10. $5^0 \cdot 5^3$

11. $(-2)^{-8} \cdot (-2)^8$

12. $9^4 \cdot 9^{-4}$

13. 6^{-2}

14. 158^0

15. $\frac{4^3}{4^5}$

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

17. $2^2 \cdot 2^{-4}$

18. $3^{-3} \cdot 3^{-2}$

19. $\frac{1}{5^{-3}} \cdot \frac{1}{5^6}$

20. $\frac{(1.5)^2}{(1.5)^{-2} \cdot (1.5)^4}$

21. **MP YOU BE THE TEACHER** Your friend evaluates 4^{-3} . Is your friend correct? Explain your reasoning.

$$4^{-3} = (-4)(-4)(-4) = -64$$

22. **CRITICAL THINKING** How can you write the number 1 as a power with base 2? a power with base 10?

23. **MP NUMBER SENSE** Without evaluating, order 5^0 , 5^4 , and 5^{-5} from least to greatest. Explain your reasoning.

SIMPLIFYING EXPRESSIONS Simplify. Write the expression using only positive exponents.

24. $6y^{-4}$

25. $8^{-2} \cdot a^7$

26. $\frac{9c^3}{c^{-4}}$

27. $\frac{5b^{-2}}{b^{-3}}$

28. $\frac{8x^3}{2x^9}$

29. $3d^{-4} \cdot 4d^4$

30. $m^{-2} \cdot n^3$

31. $\frac{3^{-2} \cdot k^0 \cdot w^0}{w^{-6}}$

32. **OPEN-ENDED** Write two different powers with negative exponents that have the same value. Justify your answer.

MP REASONING In Exercises 33–36, use the table.

33. How many millimeters are in a decimeter?
 34. How many micrometers are in a centimeter?
 35. How many nanometers are in a millimeter?
 36. How many micrometers are in a meter?

Unit of Length	Length (meter)
Decimeter	10^{-1}
Centimeter	10^{-2}
Millimeter	10^{-3}
Micrometer	10^{-6}
Nanometer	10^{-9}

37. **MP MODELING REAL LIFE** A bacterium is 100 micrometers long. A virus is 1000 times smaller than the bacterium.

- Using the table above, find the length of the virus in meters.
- Is the answer to part (a) *less than*, *greater than*, or *equal to* 1 micrometer?



38. **DIG DEEPER!** Every 2 seconds, someone in the United States needs blood. A sample blood donation is shown.

- One cubic millimeter of blood contains about 10^4 white blood cells. How many white blood cells are in the donation? ($1 \text{ mm}^3 = 10^{-3} \text{ mL}$)
- One cubic millimeter of blood contains about 5×10^6 red blood cells. How many red blood cells are in the donation?
- Compare your answers for parts (a) and (b).

39. **MP PRECISION** Describe how to rewrite a power with a positive exponent as a fraction with a power in the denominator. Use the definition of negative exponents to justify your reasoning.

40. **MP REASONING** The definition of a negative exponent states that $a^{-n} = \frac{1}{a^n}$. Explain why this rule does not apply when $a = 0$.