In these activities you will explore and write numerical multiplication expressions using whole number exponents. After completing the activities, discuss and/or present your findings to the rest of the class.

## Activity 1 [Page 1.3]

- 1. Find at least three ways to obtain each of the following:
  - a. 64
  - b. 531,441
- 2. Which seems like the best definition of an exponent? Explain your reasoning.

An exponent \_\_\_\_\_.

- a. is a multiplier
- b. is a factor
- c. tells how many times a number is used as a factor
- d. tells you to multiply a number by another number
- 3. Reset the page. Which of the following do you think is the base of the exponent in the expression 2<sup>3</sup>? Explain your thinking.
  - a. 2
- b. 3
- c.  $2^3$
- d. 8



## What is an Exponent?



## Activity 2 [Page 1.4]

- 1. Mari argued that  $6^3 \cdot 2^3$  was the same as  $3^3 \cdot 2^6$ .
  - a. Use the file to see if Mari is correct.
  - b. Explain how "When in doubt, write it out" can help you see if she is correct.
- 2. Work with a partner to decide whether the following statements are true. Use the files if they will help your thinking. Explain why or why not in each case.

a. 
$$5 \cdot 5^4 = 5^4$$

b. 
$$5 \cdot 5^4 = 25^4$$

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

d. 
$$11^4 \cdot 11^6 = 11^{24}$$

e. 
$$11^4 \cdot 11^6 = 121^{10}$$

f. 
$$11^4 \cdot 11^6 = 121^{24}$$

g. 
$$11^4 \cdot 11^6 = 11^{10}$$

h. 
$$10^4 \cdot 11^6 = 110^{24}$$

i. 
$$10^4 \cdot 11^6 = 110^{10}$$

3. a. Suppose the operation multiplication was replaced by the operation addition in both expressions. Do you think the top and bottom expressions will have the same value? Why or why not?

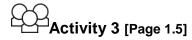
- b. Change the operation to addition and check your answer to 3a.
- c. Try the operations of subtraction and division. Do either of these produce the same outcome for both expressions?
- d. Find a mathematical argument to help decide whether exponents "distribute" over the four operations.
- 4. Which of the following are true statements? Explain your reasoning in each case.
  - a. The product of two factors raised to a power is the same as the product of each factor raised to that power.
  - b. The sum of two squared numbers is the same as the square of the sum of the numbers.
  - c. The quotient of two numbers to a power can be thought of as the product of the numerator to the power and the power of the unit fraction corresponding to the denominator.
  - d. If you cube two numbers and then subtract, you will get the same answer as if you subtract the two numbers and then cube the answer.



## What is an Exponent?

Student Activity

Name \_\_\_\_\_ Class



- 1. Explain the difference among:  $(7^3)^2$ ,  $(7^2)^3$ ,  $(3^7)^2$ , and  $(3^2)^7$ . Use the file to help your thinking.
- 2. Do you agree or disagree with the following statements? Explain your thinking in each case.
  - a. The number 5 has no exponent.
  - b. If you have five sets where each set has four 15's, you will have nine 15's.
  - c. If a multiplication problem has two factors of 5 and two factors of 9, you could write the problem as two factors of 45.