

## ACTIVITY 8.1

### Developing Concepts

#### SETUP

Work in a small group.

#### MATERIALS

- paper
- pencil

Group Activity for use with Lesson 8.1

## Investigating Powers

► **QUESTION** How can you use addition to multiply exponential expressions? How can you use multiplication to raise an exponential expression to a power?

### ► EXPLORING THE CONCEPT: PRODUCT OF POWERS

- 1 Copy and complete the table. To simplify an expression, expand the product. Then count the factors.

Product of powers	Expanded product	Number of factors	Product as a power
$7^3 \cdot 7^2$	$(7 \cdot 7 \cdot 7) \cdot (7 \cdot 7)$	5	$7^5$
$2^4 \cdot 2^4$	$(2 \cdot 2 \cdot 2 \cdot 2) \cdot (2 \cdot 2 \cdot 2 \cdot 2)$	8	?
$x^4 \cdot x^5$	$(x \cdot x \cdot x \cdot x) \cdot (x \cdot x \cdot x \cdot x \cdot x)$	?	?

- 2 Add a column to your table that shows the sum of the exponents that are in the first column. What pattern do you notice?

### ► EXPLORING THE CONCEPT: POWER OF A POWER

- 3 Copy and complete the table. To simplify an expression, expand the product. Then count the factors.

Power of a power	Expanded product	Expanded product	Number of factors	Product as a power
$(5^2)^3$	$(5^2) \cdot (5^2) \cdot (5^2)$	$(5 \cdot 5) \cdot (5 \cdot 5) \cdot (5 \cdot 5)$	6	$5^6$
$[(-3)^2]^2$	$[(-3)^2] \cdot [(-3)^2]$	?	?	?
$(b^2)^4$	?	?	?	?

- 4 Add a column to your table that shows the product of the exponents that are in the first column. What pattern do you notice?

### ► DRAWING CONCLUSIONS

Expand the product. Then write your answer as a power.

- $6^3 \cdot 6^2$
- $(-2) \cdot (-2)^4$
- $p^4 \cdot p^6$
- $x^{12} \cdot x^7$
- $(4^2)^6$
- $[(-5)^2]^4$
- $(d^5)^5$
- $[(-n)^3]^8$

9. What operation do you use to simplify a product of powers? Give examples.

10. What operation do you use to simplify a power of a power? Give examples.

11. **CRITICAL THINKING** Does  $x^3 \cdot y^5 = xy^8$ ? Explain your answer.