

EXPLORATION

7-3

Multiplication Properties of Exponents

- The expression $(x \cdot x \cdot x) \cdot (x \cdot x)$ can be evaluated two ways. As a product of two powers, it can be written as $x^3 \cdot x^2$. As a single power, it can be written as x^5 . Use this information to complete the table below.

Expression	Product of Powers	Single Power
$(x \cdot x \cdot x) \cdot (x \cdot x)$	$x^3 \cdot x^2$	x^5
$(y \cdot y \cdot y \cdot y) \cdot (y \cdot y)$	$y^4 \cdot y^2$	y^6
$(a \cdot a \cdot a \cdot a \cdot a) \cdot (a \cdot a \cdot a \cdot a)$	$a^5 \cdot a^4$	a^9
$m \cdot (m \cdot m \cdot m \cdot m \cdot m)$	$m^1 \cdot m^5$	m^6

- Describe any patterns you see in the table above.
- Use a similar method to complete the table below.

Expression	Product of Powers	Single Power
$(y \cdot y \cdot y) \cdot (y \cdot y) \cdot (y \cdot y)$	$y^3 \cdot y^2 \cdot y^2$	y^7
$(b \cdot b \cdot b) \cdot (b \cdot b) \cdot (b \cdot b \cdot b \cdot b)$	$b^3 \cdot b^2 \cdot b^4$	b^9
$(z \cdot z) \cdot (z \cdot z \cdot z) \cdot (z \cdot z \cdot z \cdot z \cdot z)$	$z^2 \cdot z^3 \cdot z^5$	z^{10}
$x \cdot (x \cdot x) \cdot (x \cdot x \cdot x) \cdot (x \cdot x)$	$x^1 \cdot x^2 \cdot x^3 \cdot x^2$	x^8

THINK AND DISCUSS

- Describe any patterns you see in the second table.
- Explain how you can use your findings to write $x^{10} \cdot x^4$ as a single power.
- The exponent in the right column is the sum of the exponents in the left column.
- The pattern is the same.
- Add the exponents: $x^{10} \cdot x^4 = x^{14}$.