Unit 6, Lesson 3

Properties of Exponents

Let's recall the properties of exponents.

3.1 Math Talk: Comparing Expressions

Decide mentally which expression is greater.

- 2^3 and $2 \cdot 3$
- 5^2 and 2^5
- 100^1 and 1^{100}
- $3 \cdot \frac{8}{2}$ and $\frac{8 \cdot 3}{2}$

3.2 Reviewing the Properties of Exponents

1. Complete the table to explore patterns in multiplying powers of 3.

expression	expanded	single power of 3
$3^2 \cdot 3^4$	$(3 \cdot 3) \cdot (3 \cdot 3 \cdot 3 \cdot 3)$	3^6
$3^5 \cdot 3^2$		
$3^3 \cdot 3^6 \cdot 3^2$		
$3^{17} \cdot 3^{41}$	(You can skip this box.)	

2. Use any patterns you found to write an expression equivalent to $3^a \cdot 3^b$.

3. Use your rule to write $3^4 \cdot 3^0$ with a single exponent. What does this tell you about the value of 3^0?

4. Complete the table to explore patterns in dividing powers of 3.

expression	expanded	single power of 3
$3^6 \div 3^4$	$\frac{3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3}{3 \cdot 3 \cdot 3 \cdot 3} = \frac{3 \cdot 3 \cdot 3 \cdot 3}{3 \cdot 3 \cdot 3 \cdot 3} \cdot 3 \cdot 3 = 1 \cdot 3 \cdot 3$	3^2
$3^7 \div 3^2$		
$3^5 \div 3^1$		
$3^{100} \div 3^{98}$	(You can skip this box.)	

5. Use any patterns you found to write an expression equivalent to $3^a \div 3^b$.

6. Use your rule to write $3^7 \div 3^0$ with a single exponent. What does this tell you about the value of 3^0?

3.3 Row Game: Use Your Powers!

Use a single exponent to write each expression. One partner works only on Set A, the other partner works only on Set B. In each row, you should get the same answer. Pause after each problem to check if you got the same answer as your partner. If not, work together to check each other's work and come to an agreement.

	Set A	Set B
row 1	$3^2 \cdot 3^7$	$3^5 \cdot 3^4$
row 2	$3^0 \cdot 3^{101}$	$3^{99} \cdot 3^2$
row 3	$x^{20} \cdot x^{17}$	$x^{37} \cdot x^0$
row 4	$\frac{3^{10}}{3^4}$	$\frac{3^8}{3^2}$
row 5	$\frac{b^{19}}{b^{10}}$	$\frac{b^{100}}{b^{91}}$
row 6	$3^0 \cdot 3^{10}$	$\frac{3^{12}}{3^2}$
row 7	$\frac{a^{20}}{a^3}$	$a^{17} \cdot a^0$
row 8	$\frac{7^{15}}{7^0 \cdot 7^{10}}$	$\frac{7^9 \cdot 7^2}{7^6}$
row 9	$m^4 \cdot \frac{m^{12}}{m^9}$	$\frac{m^{17}}{m^{10}} \cdot m^0$