

Multiplying Exponential Expressions

Part A

Exponents allow you to rewrite some multiplication problems in a simpler form. Some exponent expressions can also be simplified. Copy and complete the table below in your notebook. Expand each expression into factored form and then rewrite it with new exponents as shown in the example.

Original Form	Factored Form	Simplified Exponent Form
$5^2 \cdot 5^5$	$(5 \cdot 5) \cdot (5 \cdot 5 \cdot 5 \cdot 5 \cdot 5)$	5^7
$2^2 \cdot 2^4$		
$3^7 \cdot 3^2$		
$x^3 \cdot x^5$		
$x^3 y^2 \cdot xy^2$		
$7^2 \cdot x^3 \cdot 7 \cdot x^2$		
$2 \cdot x^4 \cdot 3 \cdot xy^2$		

1. Work with your group to compare the bases and exponents of the original form to the base and exponent of the simplified exponent form. **Write a statement to describe the relationship you see.**

2. Visualize how you would expand $20^{12} \cdot 20^8$ in your mind. What would this expression be in simplified exponent form? Describe your reasoning.

3. A group of students rewrote the expression $10^3 \cdot 5^4$ as 50^7 . Is their simplification correct? Explain your reasoning.

Part B

When a number is raised to a power and then raised to a power again, the result follows a consistent pattern. Copy and complete the table below in your notebook. Expand each expression into factored form and then rewrite it with new exponents as shown in the example.

Original Form	Factored Form	Simplified Exponent Form
$(5^2)^5$	$(5 \cdot 5)(5 \cdot 5)(5 \cdot 5)(5 \cdot 5)(5 \cdot 5)$	5^{10}
$(2^2)^4$		
$(3^7)^2$		
$(x^3)^5$		
$(x^3y^2)^2$		

1. Work with your group to describe the pattern between the exponents in the original form and the exponent(s) in the simplified exponent form. **Write a statement to describe the relationship you see.**
2. Visualize $(20^{12})^8$ written in factored form.
 - a. What is multiplied (what is the base)?
 - b. How many times is it multiplied?
 - c. Use the expression you visualized to help you rewrite the expression in simplified exponent form.
 - d. Describe in detail how you figured out what exponent to use in the simplified exponent form.
 - e. In Part A, #2 you visualized the factored form of the expression $20^{12} \cdot 20^8$. Compare the **factored** form of that expression to the **factored** form of $(20^{12})^8$ from above. How are the two expressions different?