Properties of exponents are rules used to create equivalent expressions.

Properties of exponents can only be used when exponential expressions have the same base.

$\frac{Multiplying}{3^2 \times 3^5}$	Keep the <u>base</u> , add the exponents .	$3^2 \times 3^5 = 3^{2+5}$ = 3 ⁷ $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^7$
Dividing 47 42	Keep the <u>base</u> , subtract the exponents .	$\frac{4^{7}}{4^{2}} = 4^{7-2}$ $= 4^{5}$ $\frac{4 \times 4 \times 4 \times 4 \times 4 \times 4}{4 \times 4} = 4^{5}$
•	CANNOT be used s are different:	$5^2 \times 4^3$ $\frac{3^4}{4^3}$

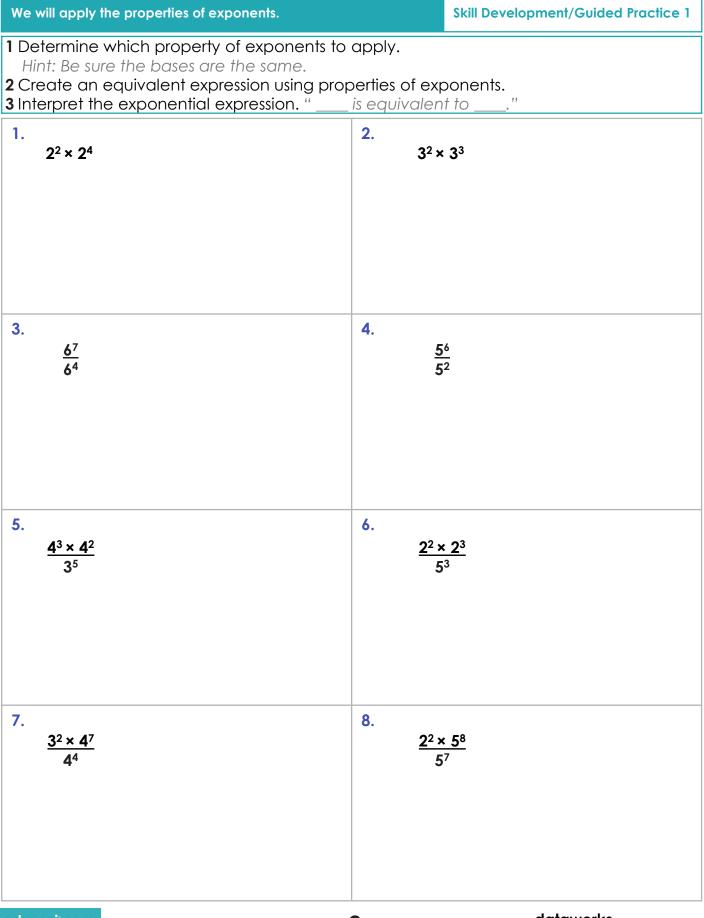
Which exponential expression can use an exponential rule? Explain.

- $3^4 \times 2^4$ Α
- $4^3 \times 4^2$ B

Which exponential expression can use an exponential rule? Explain.

- 7⁸
- . 75
- **9**² В
- <u>3</u>2





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$\frac{\text{Multiplying}}{3^2 \times 3^5}$	Keep the <u>base</u> , add the exponents .	$3^2 \times 3^5 = 3^{2+5}$ = 3 ⁷
Dividing 47 42	Keep the <u>base</u> , subtract the exponents .	$\frac{4^{7}}{4^{2}} = 4^{7-2}$ $= 4^{5}$
<u>Raising to a power</u> (5 ⁴) ³	Keep the <u>base</u> , multiply the exponents .	$(5^4)^3 = 5^4 \times 3$ = 5 ¹² $5^4 \times 5^4 \times 5^4 = 5^{12}$

Exponent rules <u>CANNOT</u> be used	5 ² × 4 ³	<u>34</u>	5(4 ³)
when the bases are different :	5- ~ 4°	4 ³	5(4°)

👤 CFU

Which exponential expression can use an exponential rule? Explain.

A 4³ × 3⁴

B (4³)²



We will apply the properties of exponents.	Skill Development/Guided Practice 2			
 Determine which property of exponents to apply. Hint: Be sure the bases are the same. Create an equivalent expression using properties of exponents. Interpret the exponential expression. " is equivalent to" 				
9.	10.			
(3 ³) ⁴	(5 ²) ³			
11.	12.			
(2 ⁴) ² × 2 ²	(3 ²) ⁴ × 3 ³			
13.	14.			
(5 ³) ²	<u>(6⁵)²</u>			
5 ⁴	6 ⁷			

Properties of exponents are rules used to create equivalent expressions.

Properties of exponents can only be used when exponential expressions have the same base.

<u>Any</u> base raised to a zero power is 1.	7 ⁰ = 1 15 ⁰ = 1	1 <i>,</i> 359 ⁰ = 1
Numbers with exponents can be moved between numerator and	$\frac{6^3}{1} = \frac{1}{6^{-3}}$	$\frac{1}{6^3} = 6^{-3}$
denominator by <u>reversing the sign of the</u> <u>exponent</u> .	$\frac{6^{-3}}{1} = \frac{1}{6^3}$	$\frac{1}{6^{-3}} = 6^3$

Which expression is equivalent to the exponential expression **3**°? Explain.

- A 3
- B 1
- .
- **C** 0

Which expression is equivalent to the exponential expression **3**²? Explain.

A
$$\frac{2^{3}}{1}$$

B $\frac{1}{3^{2}}$
C $\frac{1}{3^{-2}}$

We will apply the properties of exponents.	Skill Development/Guided Practice 3			
 Determine which property of exponents to apply. Hint: Be sure the bases are the same. Create an equivalent expression using properties of exponents. Interpret the exponential expression. " is equivalent to" 				
15. 29 ⁰	16. 16 ⁰			
17. 5 -3	18. 3 ⁻²			
19. 1 7 -2	20. 1 4 ⁻³			
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We will apply the properties of expo	onents.	Closure
Skill Closure		
 Determine which property of Hint: Be sure the bases are t Create an equivalent exprese Interpret the exponential exponential exponential exponential 	he same. ssion using properties of exp	
1.	2.	3.
4 ³ × 4 ²	(4 ³) ²	4 -3

Concept Closure

Caroline made a mistake applying the properties of exponents. Explain the error she made.

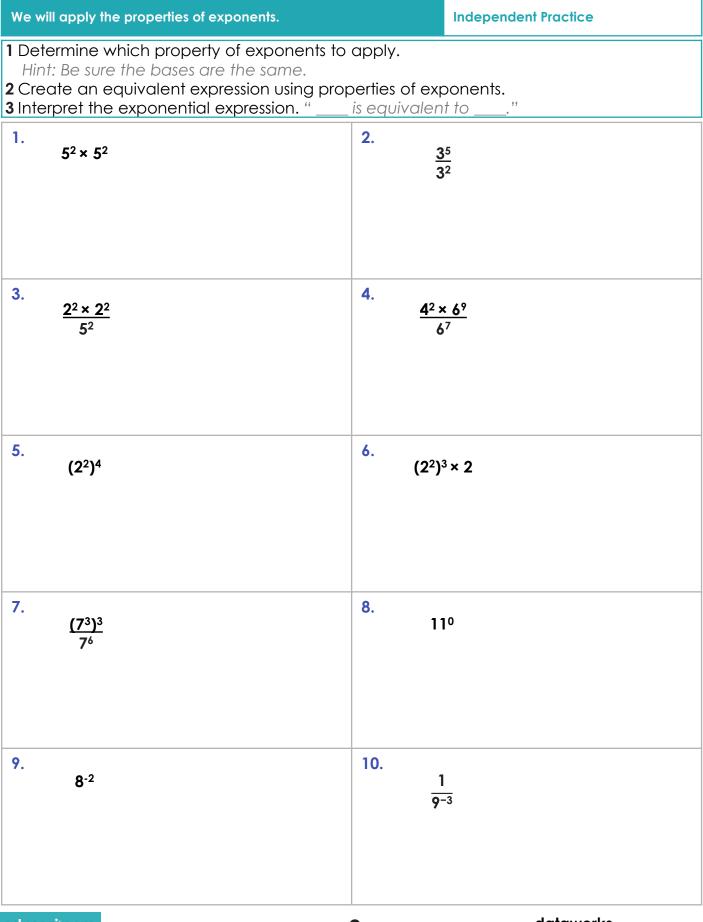
$$\frac{4^8}{2^5} = 2^{8-5} = 2^3$$

Summary Closure

What did you learn today about applying properties of exponents?



negative



We will apply the properties of exponents.	Periodic Review 1
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Create equivalent exponential expressions.

1.	<u>(94)3</u> 9 ¹²	2. <u>6</u> ⁴	⁵ × 6 ⁴ 6 ¹¹
3.	(2 ³) ² × 5 ²	4.	<u>4</u> ⁵ <u>4</u> ⁶
5.	(5 ²) ² × 6 ⁰	6 . (5	3 ²) ⁻²

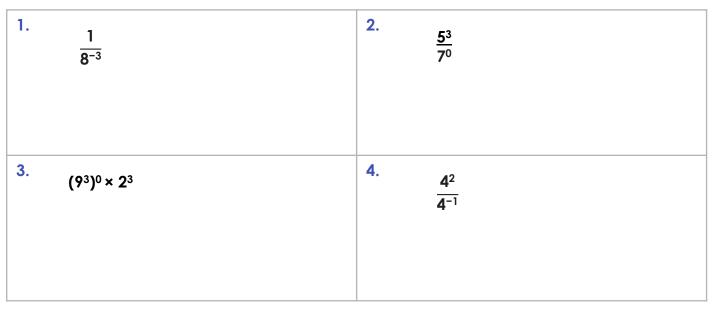
For each exponential expression, mark whether it is greater than or less than 3⁴.

	Greater than 3 ⁴	Less than 3 ⁴
7. 3 ² × 3		
8. $\frac{(3^5)^2}{3^{10}}$		
9. $\frac{3^3}{3^{-4}}$		
10. (3 ²) ¹		
11. $\frac{3^2 \times 3^5}{3^{12}}$		
12. $\frac{1}{3^{-6}}$		





Create equivalent exponential expressions.



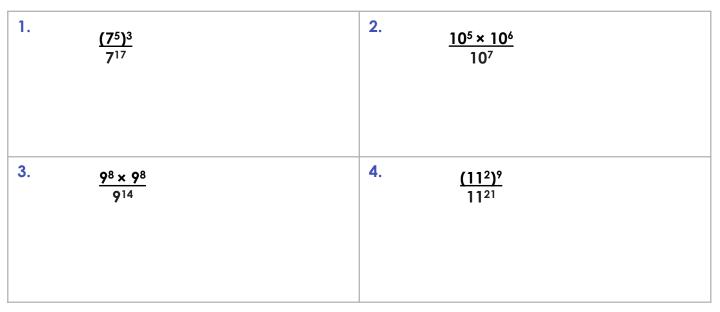
Describe the error made in applying the properties of exponents.

5.
$$6^4 \times 6^5 = 6^{4 \times 5} = 6^{20}$$

 $7^3 \times 7^2 = 7^{3 \times 2} = 7^6$
6. $3^2 \times 2^3 = 6^{2+3} = 6^5$
 $4^3 \times 3^1 = 12^{3+1} = 12^4$
7. $\frac{10^6}{5^3} = 2^{6-3} = 2^3$
 $\frac{9^8}{3^6} = 3^{8-6} = 3^2$
8. $\frac{7^6}{7^3} = 7^{6+3} = 7^2$
 $\frac{5^{10}}{5^2} = 5^{10+2} = 5^5$
educeri.com 10

We will apply the properties of exponents.	Periodic Review 3
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Create equivalent exponential expressions.



Select Yes or No to indicate whether the expression is equivalent to 5^{-4} .

5.

A (5 ⁻⁴) ² × 5 ⁴	O Yes	O No
B $\frac{1}{5^{-3} \times 5^{-1}}$	O Yes	O No
C $5^2 \times 5^{-6}$	O Yes	O No
D $\frac{5^{-9}}{5^{5}}$	O Yes	O No

Select Yes or No to indicate whether the expression is equivalent to 10^2 .

6.

A $10^{1} \times 10^{1}$	O Yes	O No
B $\frac{10^2 \times 10^{-1}}{10^{-3} \times 10^{-2}}$	O Yes	O No
C $\frac{10^{-5}}{10^3}$	O Yes	O No
D (10 ²) ² × 10 ⁻²	O Yes	O No