Lesson 1.3 Powers of Powers Property

Objective

*Understand raising a power to a power

*Use properties of exponents to simplify expressions

- **Common Core State Standards** *8.EE.1*
- **Mathematical Practices** 4. Model mathematics. 5. Use tools strategically. 6. Attend to precision.

Lesson 1.3 Powers of Powers Property

Connect (What's your first thought?)	**Collect** (Collect information from video. Be sure to expand and evaluate)	**Correct/Compare** (Any new learning or corrections?)
Does $(4^2)^3$ equal 4^5 or 4^6?		
Simplify and write in exponential notation $(4^2)(4^3)$		
Example 2: Simplify $(z^5)^2$		
What happens when you raise an exponentic expression to a power?		

Write your response here

Write your response here

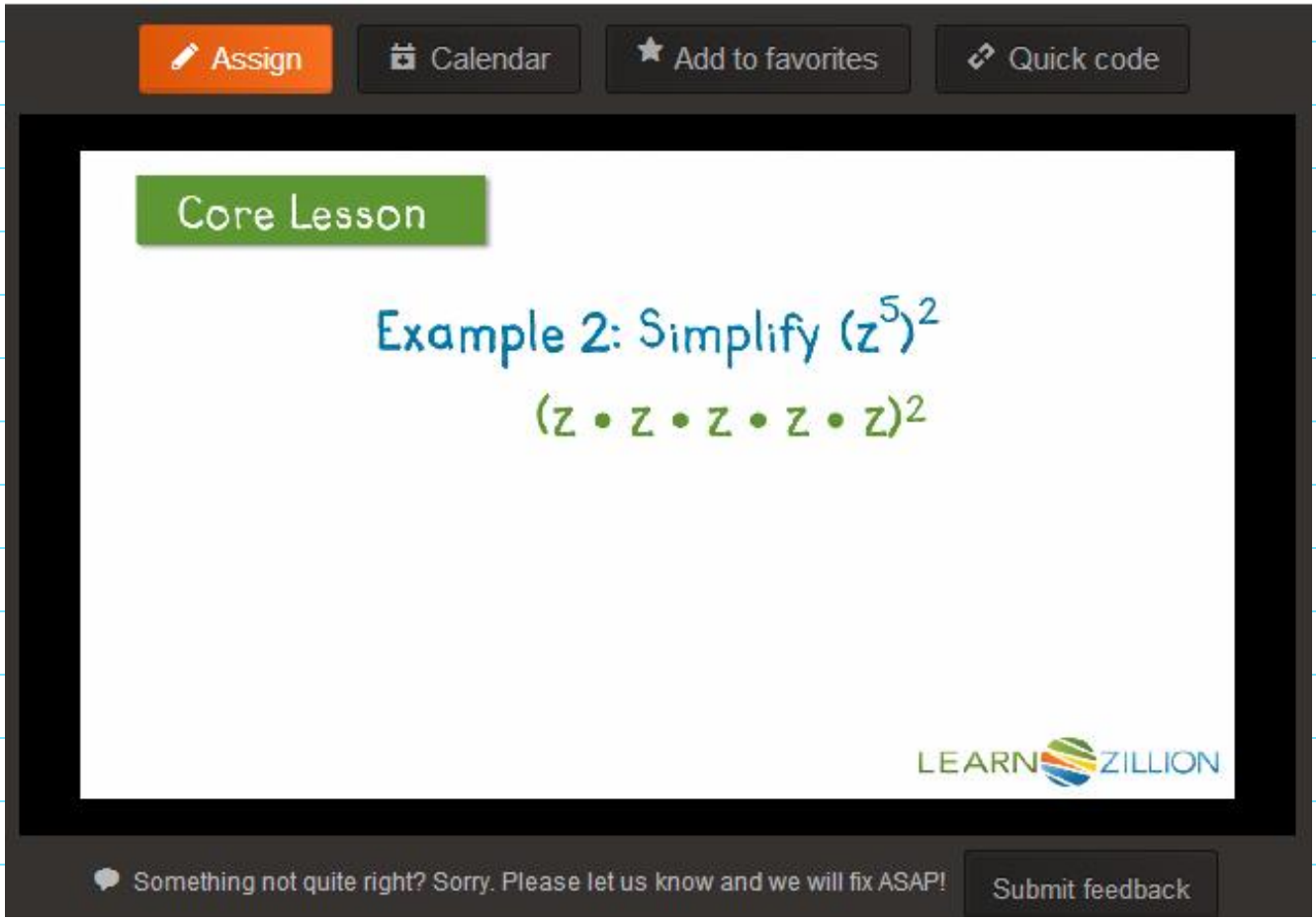
Write your response here

Write your response here

Objec

Standards *8.EE.1*

Lesson 1.3 Powers of Powers Property



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Lesson 1.3 Powers of Powers

Powers of Powers Property

When you raise a power to a power, keep the base and multiply the exponents.

$$(a^m)^n = a^{m \cdot n} = a^{mn}$$

Lesson 1.3 Powers of Powers

Simplify each expression. Write your answer in exponential notation.

Example

a) $(3^4)^2$

b) $\left[\left(\frac{2}{7}\right)^6\right]^4$

Lesson 1.3 Powers of Powers

Simplify each expression. Write your answer in exponential notation.

Example

a) $(3^4)^2$

Solution

$(3^4)^2 = 3^{4 \cdot 2}$ Use the power of a power property.

$= 3^8$ Simplify.

b) $\left[\left(\frac{2}{7}\right)^6\right]^4$

Solution

$\left[\left(\frac{2}{7}\right)^6\right]^4 = \left(\frac{2}{7}\right)^{6 \cdot 4}$ Use the power of a power property.

$= \left(\frac{2}{7}\right)^{24}$ Simplify.

Lesson 1.3 Powers of Powers

Simplify each expression. Write your answer in exponential notation.

Example

c) $[(2a)^5]^3$

d) $[(-x)^4]^3$

Lesson 1.3 Powers of Powers

Simplify each expression. Write your answer in exponential notation.

c) $[(2a)^5]^3$

Solution

$[(2a)^5]^3 = (2a)^{5 \cdot 3}$ Use the power of a power property.

$= (2a)^{15}$ Simplify.

$(2a)^{15}$ means "Use the expression $2a$ as a factor 15 times."

d) $[(-x)^4]^3$

Solution

$[(-x)^4]^3 = (-x)^{4 \cdot 3}$ Use the power of a power property.

$= (-x)^{12}$ Simplify the exponent.

$= x^{12}$ Simplify.

Lesson 1.3 Powers of Powers Property

Independent Practice #1-13

Practice 1.3

Simplify each expression. Write your answer in exponential notation.

1. $(2^6)^2$
2. $(3^4)^3$
3. $(10^5)^4$
4. $(10^7)^2$
5. $(25^3)^3$
6. $(x^6)^3$
7. $\left[\left(\frac{1}{8}\right)^3\right]^6$
8. $\left[\left(\frac{4}{5}\right)^2\right]^4$
9. $[(2y)^3]^8$
10. $[(57p)^4]^4$
11. $[(-6)^4]^3$
12. $[(-p)^2]^{11}$

Lesson Check 1, 9

*can raise a power to a power & express the answer with a single exponent

Lesson 1.3 Powers of Powers

Understanding of Learning

Lesson 1.3 The Power of a Power

Ticket Out the Door

Using your own words and algebraic notation, explain how to raise a power to a power.