Write and evaluate numerical expressions involving whole-number exponents.

LESSON: I DREAM OF DJINNI

Which prize should Kate choose?

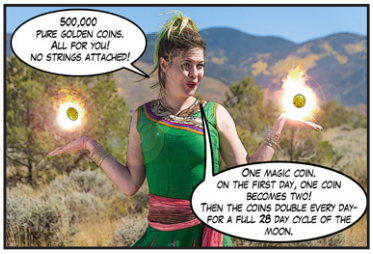
Being able to write and evaluate numerical expressions with exponents is a key part of deciphering and understanding numbers in expressions and equations. In *I Dream of Djinni*, Kate stumbles upon an old lamp while shooting a promotion. When she rubs the lamp, Djinni appears! Djinni explains that she loves to play games and invites Kate to play a game. When Kate agrees, Djinni explains the rules. She will give Kate two choices for a prize, and she is to pick the best prize. The data provided is an image of Djinni explaining the details of the two options.

Download the Detailed Lesson Plan
Available on the Teacher Dashboard

The Math Simulator™

1 Immersion

- Play *I Dream of Djinni Immersion* video, whole-class.
- Restate the question: **Which prize should Kate choose?**
- Consider taking an initial vote to see which option students think is best.



2 Data & Computation

- Print the *Data Artifact* and distribute to students.
- Allow students work time. Ask students: "Does your answer make sense?"
- Consider using a sharing protocol leading to mathematical insights and/or highlighting misconceptions.
- Allow students to revise their work.

3 Resolution

- Play *I Dream of Djinni Resolution* video, whole-class.
- Prepare and give brief lecture (*Teacher Instruction*).

+ Simulation Trainer (Use student headphones.)

- Assign the *Simulation Trainer*.
- Use protocols that encourage students to help each other.
- Use *Progress Monitoring* to access real-time data for the classroom.
- Provide individual help for students who are not making progress.

Instruction at a Glance

Gladys Graham

Kevin Simpson

Megan LeBleu

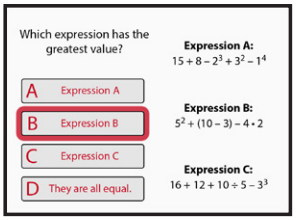
Gladys: Before beginning this standard, review concepts from 5.OA.A.1 – order of operations using simple expressions with the four basic operations and grouping symbols.

Kevin: Emphasize that students should use key vocabulary like *base*, *exponent*, *or power* when communicating their math reasoning.

Megan: Consider showing students examples of expressions that have been incorrectly evaluated, and ask them to identify the errors. Include errors specific to exponents.

Standard Math Procedures

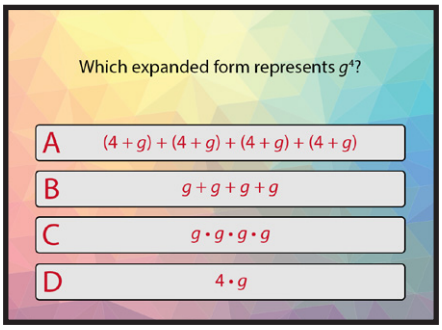
Ex. Clicker Quiz #6

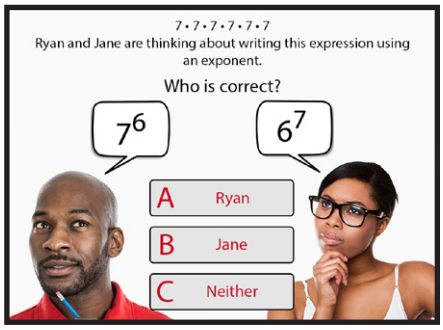


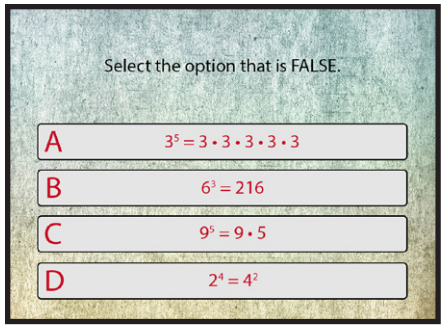
1. Evaluate each expression using order of operations.
   - Expression A: $15 + 8 - 2^3 + 3^2 - 1^4 = 23$
   - Expression B: $5^2 + (10 - 3) - 4 \cdot 2 = 24$
   - Expression C: $16 + 12 + 10 \div 5 - 3^3 = 3$
2. Select the option with the greatest value.
   - B: Expression B

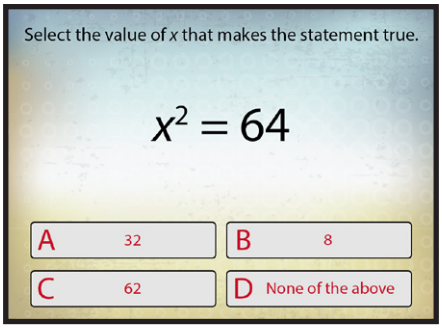
Clicker Quiz

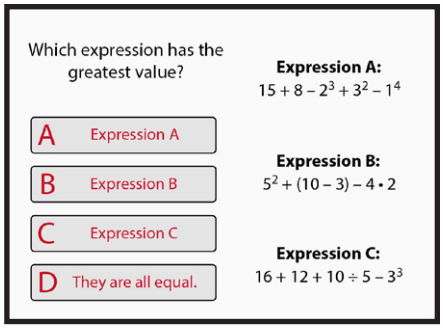
Launch the *Clicker Quiz*, whole-class.











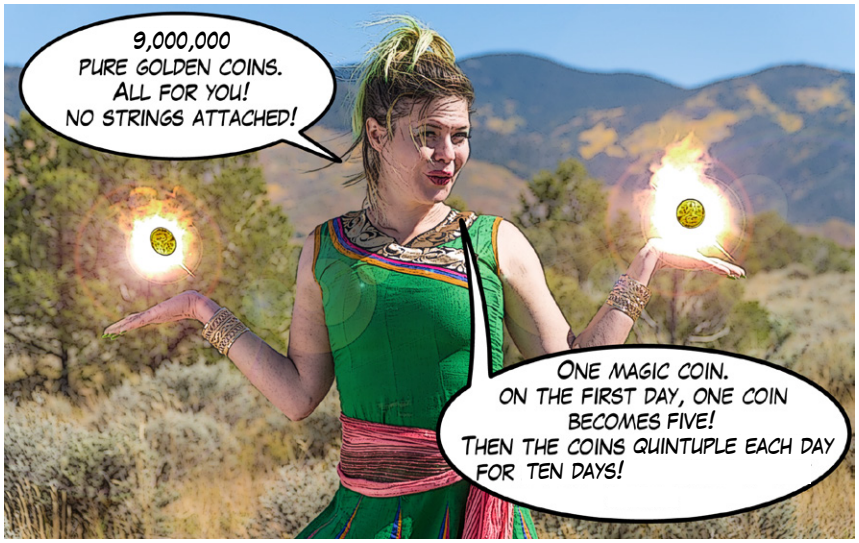
Name _____ Date _____ Period _____

I DREAM OF DJINNI

Which prize should Kate choose?

Djinni can't help herself; she loves games too much! She wants to play another game with Kate. This time the two choices are 9,000,000 pure gold coins with no strings attached, or one magic coin. On the first day the magic coin becomes 5 coins. On the second day, the 5 coins would become 25 coins. The third day, the 25 coins become 125 coins! The coins will continue in this pattern for a full 10 days.

Which prize should Kate choose?



6.EE.A.1

About this standard

Write and evaluate numerical expressions involving whole-number exponents.

Name _____ Date _____ Period _____

APPLYING THE STANDARD

How might this standard appear on a test?

CHECK OUT MY WORKED EXAMPLE #68

1) In each equation below, x can be replaced with a positive whole number to make each equation true. Write that number beneath each equation.

a) $64 = x^2$ **b)** $64 = x^3$ **c)** $2^x = 32$ **d)** $4^x = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

e) $x^3 = 9 \cdot 9 \cdot 9$ **f)** $14^x = 14 \cdot 14$ **g)** $1^x = 1$ **h)** $5^x = 125$

2) Order the following expressions from least to greatest.

2^4 5^2 2^5 3^3 4^3

3) Circle the equations that are TRUE. Be sure to circle **all** that apply.

$3^3 = 3 \cdot 3$ $5^2 = 5 \cdot 5$ $5^4 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$ $4^1 = 1 \cdot 1 \cdot 1 \cdot 1$

$101^4 = 101 \cdot 4$ $5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 6^5$ $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

4) Fill in the missing information for each row.

Exponential Form	Expanded Form	Standard Form
3^2		9
	$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$	
4^3		
	$7 \cdot 7 \cdot 7 \cdot 7$	
		8

5) Jolie babysat for her neighbor. The neighbor asked, "How much do you charge?" Jolie replied: "$7 each hour. So if I babysit for 5 hours you will owe me 7^5 dollars." Is Jolie correct? Explain your answer.

6) Evaluate each expression. Be sure to follow the order of operations.

a) $2 + 9^2 \div 3 \cdot 2 - 1$ **b)** $6 - 4 + 3^3 - 8 \div 2$ **c)** $8^2 - 2^4 + 1^3 - 3 \cdot 4$