

MeTEOR Performance Task

Sixth Grade

Mathematics
Sophie's Choice



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MeTEOR
CONNECTING THE DOTS

Performance Task Item: Sophie's Choice

Grade Level: 6th grade

Focus Area: Exponents

Essential Question: How is the idea of exponential growth connected to expressions using exponents?

Core Ideas:

- Understands the use of exponents in mathematical expressions.
- Understands and reasons logically about multiplication.
- Understands how to extend previous understandings of multiplication when solving real-world problems.
- Understands that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms.
- Understands how to rewrite expressions in different ways: Represent a relationship with a written description, creating a table, or creating a graph.

Learning Targets:

- Students will use exponents in mathematical expressions.
- Students will create equivalent expression using different properties.
- Students will graph an exponential expression.
- Students will explain their reasoning.

STANDARDS

Domain: Expressions and Equations

Content Standards:

- Write and evaluate numerical expressions involving whole-number exponents.
- Apply the properties of operations to generate equivalent expressions.
- Identify when two expressions are equivalent.

Supporting Standard:

- Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Math Practice Standards:

MP 1: Make sense of problems and persevere in solving them.

MP 2: Reason abstractly and quantitatively.

MP 3: Construct viable arguments and critique the reasoning of others.

MP 4: Model with mathematics.

MP 6: Attend to precision.

Materials:

- Performance Task
- Pencil
- Paper

Task/Question 1:

DOK Level 1: Recall & Reproduction

Math Practice Standard:

- MP 6: Attend to precision.

A. What is the vocabulary term for the 3 in 4^3 ?

B. Evaluate $4 \cdot 3$:

Task/Question 2:

DOK Level 2: Basic Application of Skills and Concepts

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 6: Attend to precision.
- MP 3: Construct viable arguments and critique the reasoning of others.

A. Write an expanded version of 4^3 , and evaluate:

B. Explain why the product of 4^3 is different than the product of $4 \cdot 3$. Be sure to specify the procedural differences.

Task/Question 3:**DOK Level 2:** Basic Application of Skills and Concepts**Math Practice Standards:**

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.

Sophie's Choice

While interviewing for a job, Sophie is posed this question, "Which of the following options would be the preferred salary?"

Option One: \$5,000 monthly

Option Two: Two cents on the first day, with the pay doubling each day up until the 28th day of the month.



Because the job description included quick decision-making skills, Sophie knew she had to make the best choice with only a few seconds of thought in order to be considered for the job.

- Which option do you think Sophie would have quickly chosen? Explain your thinking.
- Mentally calculate how much money Sophie would make annually if she chose Option One.
- Write an **expanded expression** for the amount of money she would have been paid on day three, if she had chosen Option Two.
- Write an **exponential expression** for the amount of money she would have been paid on day three, if she had chosen Option Two.

Task/Question 4:

DOK Level 3: Strategic Thinking and Complex Reasoning

Math Practice Standards:

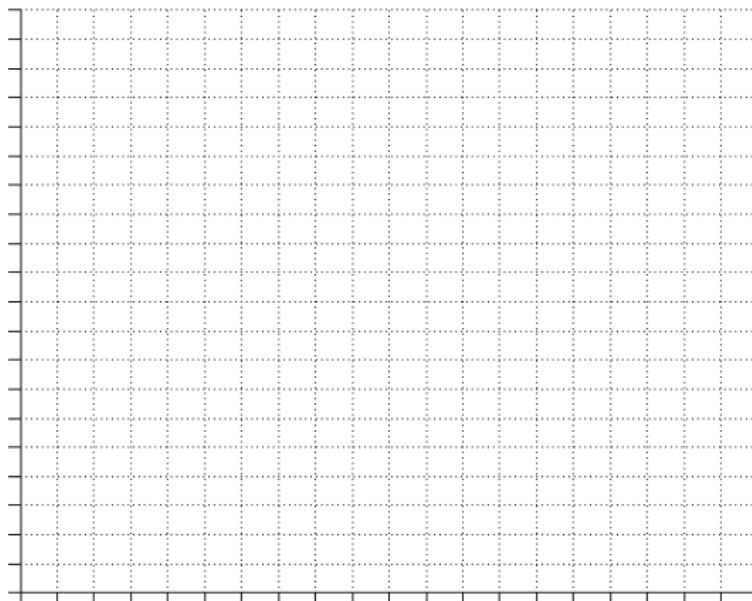
- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.
- MP 7: Look for and make use of structure.

Use Option Two in **Sophie's Choice** to complete the following:

- A.** Make a table, similar to the one below, to show how the number of cents grew by **day 10**. Include days, cents, and exponential expression.

Day	Amount of Cent	Exponential Expression
1	2	2^1
2	4	2^2

- B.** Using your exponential expression, graph how fast the two pay options increase each day. Label your axes. Write in Pencil, because you may have to adjust your intervals.



- C.** How did you choose the intervals for your graph? Explain how the understanding of exponents influenced your choice.

Task/Question 5:

DOK Level 3: Strategic Thinking and Complex Reasoning

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.
- MP 7: Look for and make use of structure.

- A.** Based on a pattern, how much money do you **estimate** would have been paid on the 28th day if Sophie had chosen Option 2? Defend your mathematics.
- B.** Based on what option you stated that Sophie would have chosen in task/question 3, do you believe she chose correctly? Do you believe she would have gotten the job? Defend your thinking.

Task/Question 6:

DOK Level 4: Extended Thinking

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.

A. Design a task or question that an employer could use to test both mathematical understandings and quick decision making skills.

B. What is the specific solution that the employer would be looking for in your task? How could it be used to demonstrate the characteristics that the employer would be looking for?

Complete Performance Task Scoring Rubric *Sophie's Choice*

30-53 Proficient 22-29 Good 18-21 Satisfactory 15-17 Poor 0-14 Unsatisfactory

	Depth of Knowledge Level	Points	Total Possible Points for Task	Total Points Earned by Student
<p>Task 1: A. Power or exponent</p> <p>B. 12</p>	1	<p>1</p> <p>1</p>	2	
<p>Task 2: A. $4 \times 4 \times 4 = 64$</p> <p>B. Answers will vary. Possible Explanation: 4 to the power of 3 is 64, because you multiply the product of 4×4 to another factor of 4. However, 4×3 means you only have 3 groups of 4, which is only 12.</p>	2	<p>1</p> <p>2</p>	3	
<p>Task 3: A. Answers will vary. Option One is more money. Option Two is only pennies a day.</p> <p>B. 60,000</p> <p>C. $2 \times 2 \times 2$</p> <p>D. 2^3</p>	2	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	4	

Task 6:	4		15	
A. Answers will vary. Look for demonstrations of clarifying any mathematical concept or misconception.		10		
B. Answers will vary, but should demonstrate complete understanding of mathematical concepts in Part A.		5		
TOTAL POINTS:				



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