NJSLA Grade 5 Mathematics

Lesson 6: Constructed-Response Strategies

Rationale

- There are a variety of mathematical models, methods and strategies that students can employ to respond to mathematical items. Many students employ a combination of strategies. During this lesson, students will share and employ strategies, and begin considering how they can most efficiently respond to assessment questions.

- Students need to explore using different strategies for each style of item they will encounter on the NJSLA. Students need to practice constructed-response problems in which students are providing the solution to the given problem or completing a mathematical model that represents the problem and has missing features.

Goals

- To provide the opportunity to complete constructed-response items. Students will identify which strategies are the most efficient.

- To complete a pencil/paper version of technology enhanced items.

Content Standard

- 5.NBT.2-2 Use whole-number exponents to denote powers of 10.*
  * This is one part of the standard.
  NJSLA Evidence Statements https://nj.mypearsonsupport.com/manuals/

Objectives

- Students will complete the various representations of the powers of 10 with whole number exponents.

- Students will be exposed to items that reflect the content of CCSS and the format of NJSLA.

- Students will reflect upon the approaches, items and strategies that are the most and least difficult for him or her personally.

Materials

- Powers of 10 Chart. (Can be provided as a worksheet or laminated chart (one per student)
- Dry Erase markers and erasers or pencil.
- Check for Understanding Exit Slip

Procedure

- Form student pairs or small groups.
- The student pairs work collaboratively to complete the chart. The student pairs should have discussion about their reasoning, making generalizations about the patterns.

Teacher & Teachers' Aide Observations During the Group Work

Be sure to circulate the classroom and monitor students while they are completing the chart. Try to observe the following and note the information:

- Are students sharing their reasoning and strategies?
- Which items were the most challenging? The least challenging?
- Are students using math vocabulary in their discussion?

Check for Understanding

- Have students reflect upon this experience by generating a class discussion of responses and strategies used.
- Students independently complete the items. These items can serve as a formative assessment.

Follow up

- Constructed-response is a solution style that needs to be reinforced throughout the year across the domains.

Technology Enhanced NJSLA Items

- Constructed-response style items will appear on the NJSLA assessments. In some constructed- response questions, the answer or missing value will be indicated by a small, single-answer text box. Here is an example:

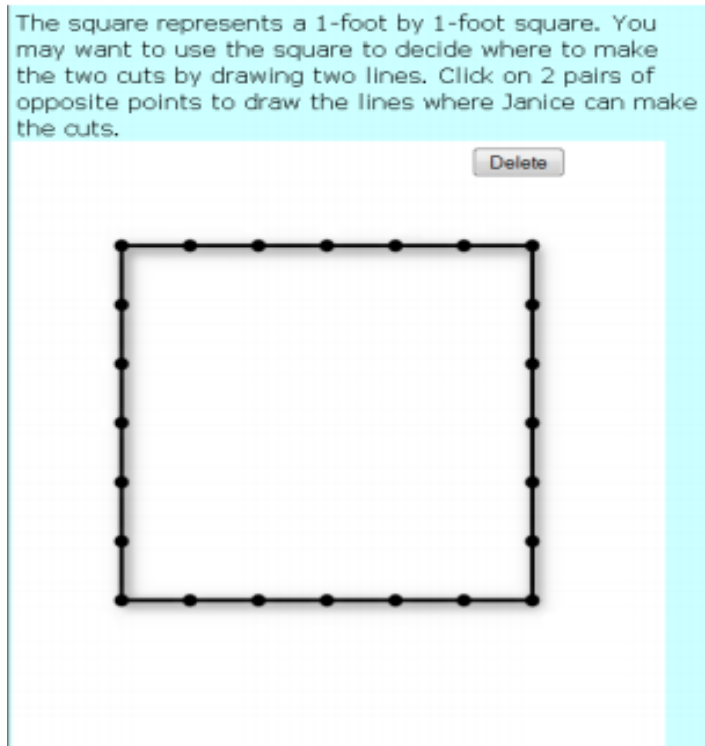What will be the area, in square feet, of the rectangular sign?

Give your answer as a fraction.

☐/☐ square feet

On the computer, the answer will be entered using the key pad. Notice the label is given next to the text box.

- In other constructed-response questions, a model is to be completed. Special directions and technology tools are provided. Here is an example:

- It will benefit students to practice any technology enhanced mathematical model items **on the computer** that are released. The students need to be able to **read the directions carefully** and engage the technology tools to complete the response; the tools are specific to the item model. **Following the directions for each problem is very important.**

- Simulating the constructed-response items with paper/pencil practice is simple for the single-answer text box. On the NJSLA, the constructed-response item is recorded in the text box and/or the Basic Equation Editor (as provided with the question). The simple text box is provided when an answer can be entered with the standard keyboard; only the answer is to be entered (not a label). A decimal answer can be entered using the period on the keyboard; a negative can be entered using the minus sign on the keyboard. When an answer is an expression, equation, fraction or any other answer requiring special functions, the Basic Equation Editor will be provided.

- Simulating the constructed-response items with paper/pencil is challenging for items that require the completion of a mathematical model. It is most beneficial to provide classroom instruction and learning experiences with **all** the mathematical models indicated in the CCSS. When students can interpret, create, and reason with the models, they are more likely to transfer their understanding in the context of the assessment. Models are used throughout the CCSS to build conceptual understanding.

NJSLA Basic Equation Editor

- NJSLA equation editors are provided as the answer boxes for responses that include math, utilizing special mathematical functions. In some NJSLA constructed-response Type I items, the Basic Equation Editor is provided as the answer box because special math symbols/functions are needed to construct the answer. Students need to work with the Basic Equation Editor online. https://nj.mypearsonsupport.com/ provides the editor for practice.

- Attached on the following page is a screen capture of the Basic Equation Editor for paper/pencil practice. By utilizing the screen capture in the classroom, students can become familiar with the functions and the display of the functions.

3-5 Grade NJSLA Basic Equation Editor -Type I

Powers of Ten Chart

Directions: Complete the chart.

	Standard Form	**Expanded Form**	**Exponential Form**
Example	1,500	$15 \times 10 \times 10$	15×10^2
1.			25×10^4
2.		$9 \times 10 \times 10 \times 10 \times 10$	
3.	254,000		
4.			7.89×10^3
5.		$9.2 \times 10 \times 10 \times 10 \times 10 \times 10$	
6.			581.4×10^2

	Standard Form	Expanded Form	Exponential Form
Example	1,500	$15 \times 10 \times 10$	15×10^2
1.	250,000	$25 \times 10 \times 10 \times 10 \times 10$	25×10^4
2.	90,000	$9 \times 10 \times 10 \times 10 \times 10$	9×10^4
3.	254,000	$254 \times 10 \times 10 \times 10$	254×10^3
4.	7, 890	$7.89 \times 10 \times 10 \times 10$	7.89×10^3
5.	920,000	$9.2 \times 10 \times 10 \times 10 \times 10 \times 10$	9.2×10^5
6.	58,140	$581.4 \times 10 \times 10$	581.4×10^2

Name_____ Date_____

Check for Understanding: Identify the form of each expression.
Rewrite the expression in a different form.

Expression	Name the Form (standard, expanded or exponential)	Rewrite in a **Different** Form Name the Form
Example: **34,000**	**standard**	**3.4×10^4 exponential**
1. 2.5×10^2		
2. $4 \times 10 \times 10$		
3. 34×10^4		
4. $65.8 \times 10 \times 10$		
5. 967×10^5		
6. 5×10^3		
7. 220,000		
8. $1,568 \times 10^2$		
9. 43.1		
Bonus $19 \div 10^2$		