NJSLA Grade 8 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

- 8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- 8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Objectives

- Students will practice applying the Pythagorean Theorem to find the missing length on a right triangle and to find the distance between two points.
- 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.

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Materials

- Pythagorean Board (Can be provided as a worksheet or place in sheet protector)
- Calculator
- Dry Erase markers and erasers or pencil.
- Scratch paper
- Check for Understanding- Exit Slip

Procedure

- Form student pairs or small groups.
- Pass out the Pythagorean Board. Students collaborate together. The students need to check for understanding with each other.
- The students should use scratch paper to solve for each answer.
- The students record the answers in the text box provided with each question. For this lesson, irrational solutions should be rounded to the nearest hundredth. Notice the units are provided.

Teacher & Teachers' Aide Observations During the Group Work

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

- Are students sharing their reasoning and strategies?
- Are the students rounding the answers correctly?
- Which problem was 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 exit slip. 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:

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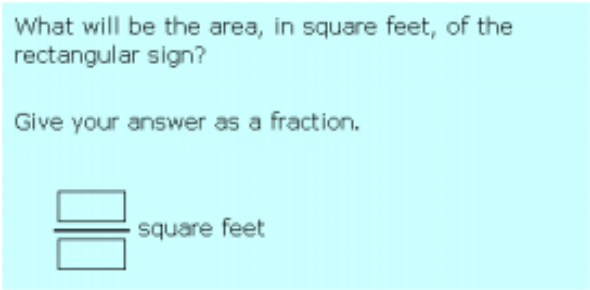
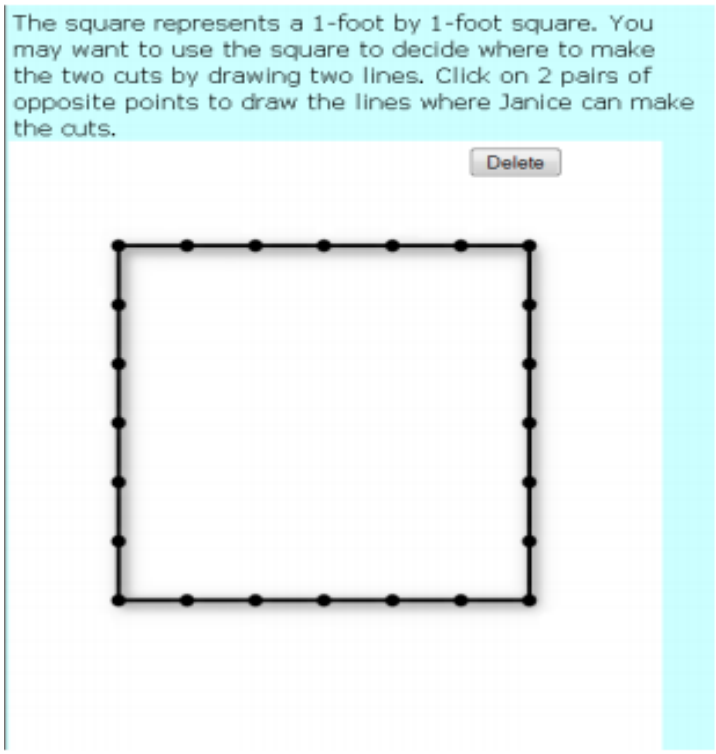


https://nj.mypearsonsupport.com/

- On the computer, the answer will be entered using the key pad. Notice the label is given next to the text box. **Students must use scratch paper and other tools to solve the problems.** The computer only allows for the answer to be recorded; the actual problem solving cannot be completed on the computer.

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



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- It will benefit the students to practice **on the computer** any technology enhanced mathematical model items 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.**

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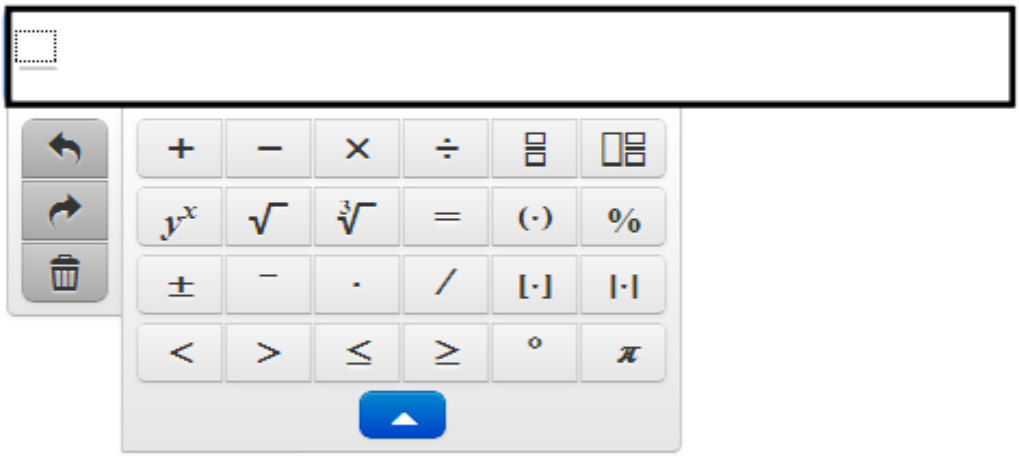
- Simulating the constructed-response items with paper/pencil practice is simple for the single-answer text box. On the NJSLA, the constructed-response item is recorded in the text box and/or the Basic Equation Editor (as provided with the question). The simple text box is provided when an answer can 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.



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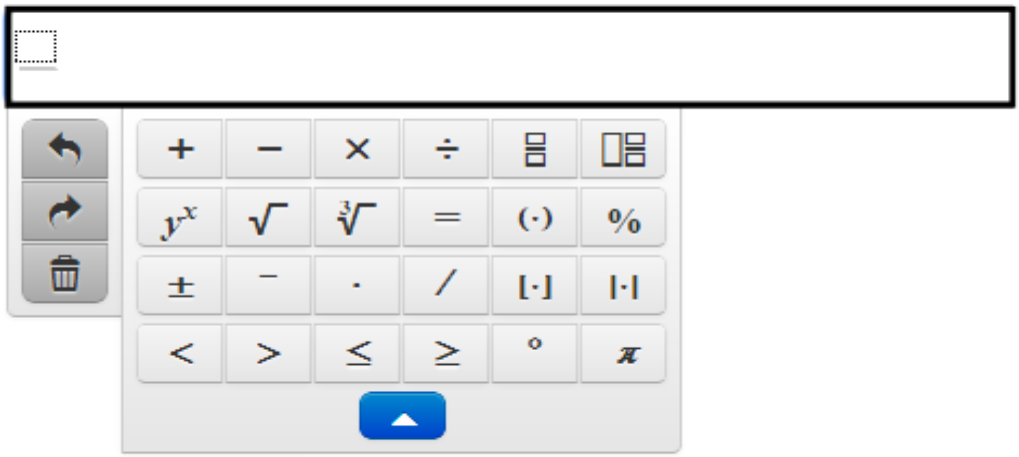

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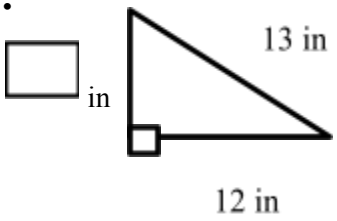
Pythagorean Board

1.



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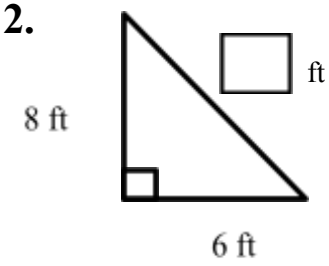

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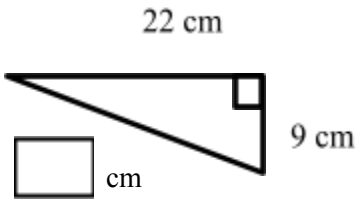
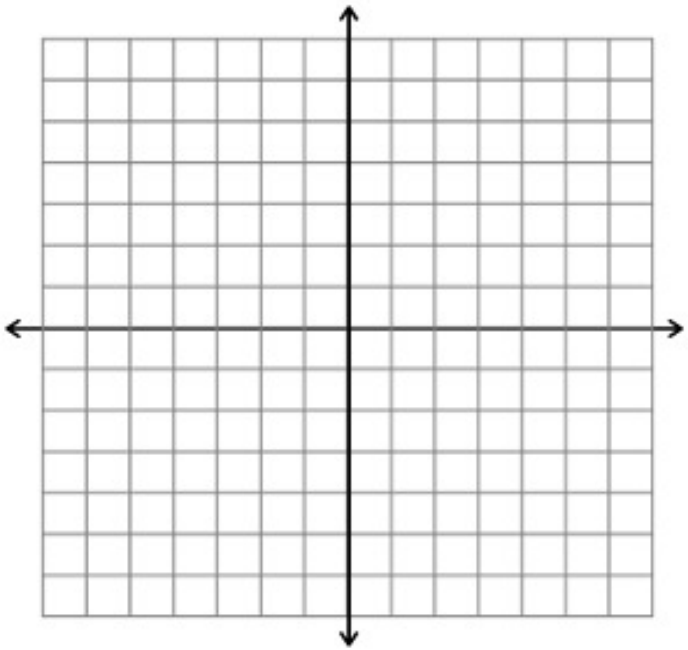


Graph the points.
Find the distance between the points.

4. (0, 6) and (3, –4) _____ **units**

5. (–2, 3) and (5, –5) _____ **units**

6. (–4, –3) and (–3, 6) _____ **units**



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Answer Key

1. **5**

2. **10**

3. **23.77**

4. **10.44**

5. **10.63**

6. **9.06**

Exit Slip **9.434 units**

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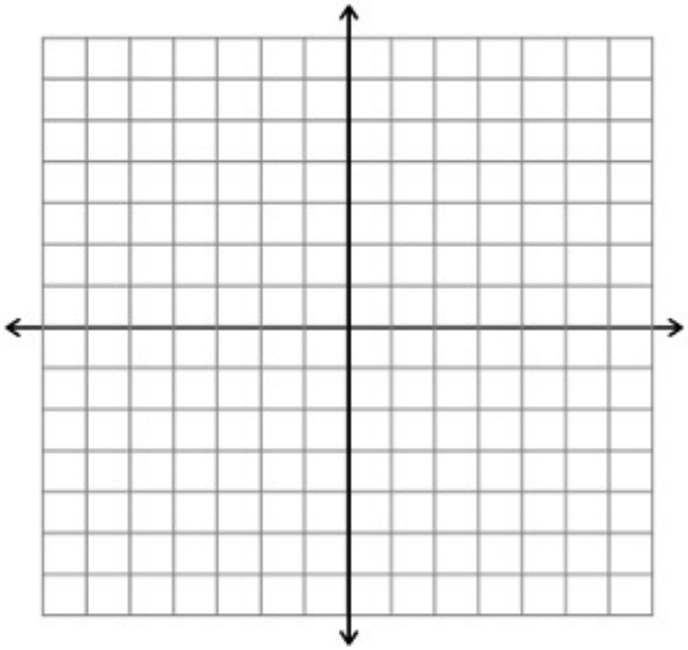
Name_____ Date_____

Exit Slip-Pythagorean Theorem

Graph the points. Find the distance between the points (to the nearest thousandths).
Show the solution steps.

Points: (1, –3) and (–4, 5)



units

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