NJSLA Grade 7 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

- **7.RP.2** Recognize and represent proportional relationships between quantities. | b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Objectives

- Students will practice interpreting the constant of proportionality in various representations: graphs, table, and verbal descriptions.

- Students will be exposed to items that reflect the 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

- Constant of Proportionality Cards. (Can be provided as a worksheet: one per student. Or cut into cards(laminated): one set per student pair)

- Calculator

- Dry Erase markers and erasers or pencil.

- Scratch paper

- Check for Understanding- Constant of Proportionality Worksheet

Procedure

- Form student pairs or small groups.

- Pass out the Constant of Proportionality Cards. Students work together. The students need to check for understanding with each other.

- The students should use scratch paper to create the proportion for each situation.

- Each student pair agrees upon the constant of proportionality for each card and records them in the text box. Notice the labels are provided.

Teacher & Teachers' Aide Observations During the Group Work

Be sure to circulate the classroom and monitor students while they are creating the proportions and unit rates. Try to observe the following and note the information:

- Are students sharing their reasoning and strategies?

- Are the students rounding the answers correctly?

- Which constant of proportionality 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 4 items. These items can serve as a formative assessment.

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. **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:

The square represents a 1-foot by 1-foot square. You may want to use the square to decide where to make the two cuts by drawing two lines. Click on 2 pairs of opposite points to draw the lines where Janice can make the cuts.

Delete

- 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.**

- 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.

6-8 grade NJSLA Basic Equation Editor -Type I
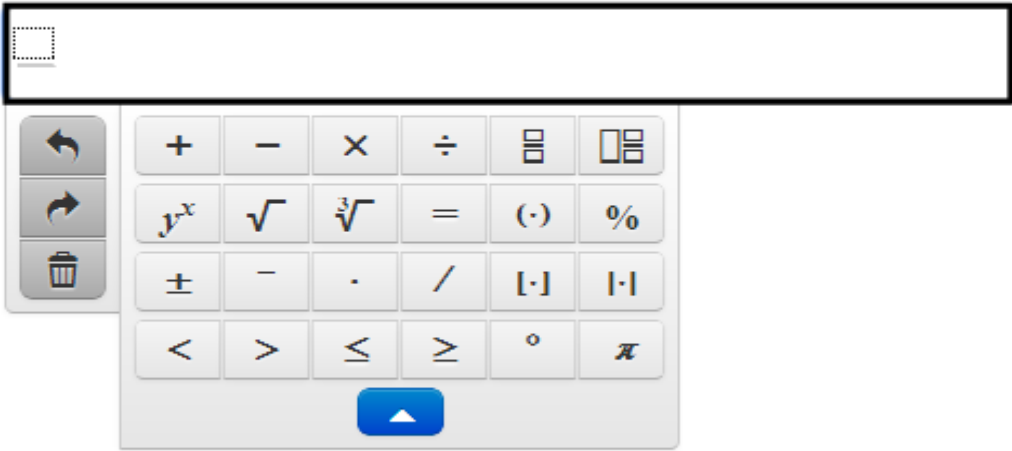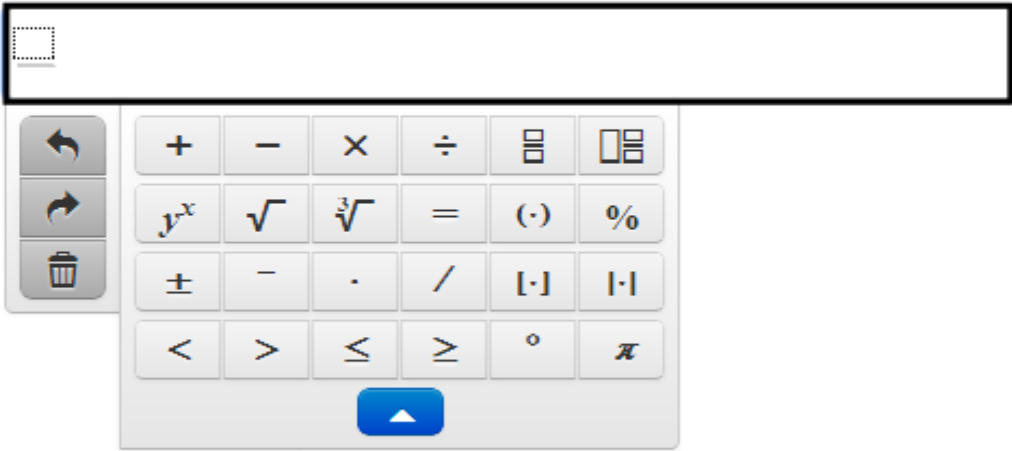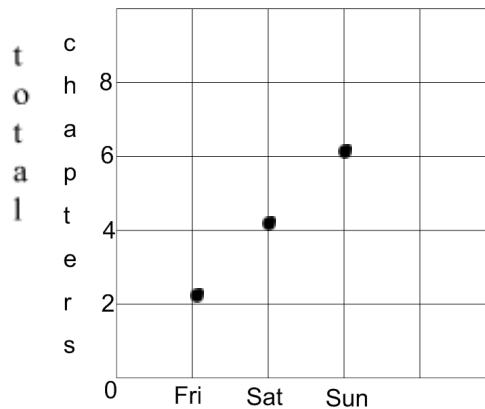
Constant of Proportionality Cards

1. Ted kept a maintenance record of the oil changes for his car. What was the constant of proportionality?

   [____] miles per oil change

Oil Changes	
change	miles
1	4,500
2	9,000
3	13,500
4	18,000

2. Sarah loves to read. The graph shows the number of chapters she read over the weekend. What was the constant of proportionality evident in the graph?

   [____] chapters per day

3. Terry used the following equation to determine his gas mileage:

   384 miles = p × 16 gallons

   p represents the constant of proportionality

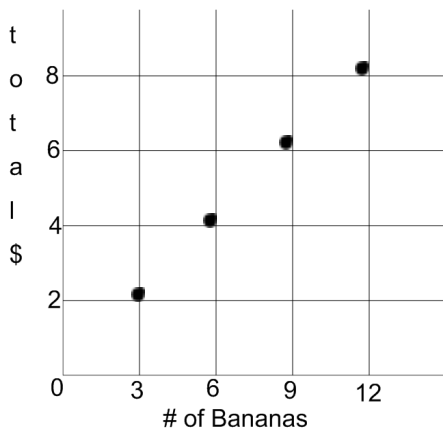   What is the constant of proportionality?

   [____] miles per gallon

4. John earned money delivering newspapers. He kept a record of his earnings, shown is the table. What was the constant of proportionality?

$ [ ] per month

Earnings	
Month	Total
Jan	$123.00
Feb	$246.00
March	$369.00
April	$492.00
May	$615.00
June	$738.00
July	$861.00

5.

# of Bananas

What is the constant of proportionality represented in the graph?

$ [ ] for each banana

6. Sam mixed frozen lemonade concentrate according to the package chart. He made several servings. According to the chart, what is the constant of proportionality?

Servings	1	2	3	4
concentrate (oz)	1	2	3	4
water (oz)	3	6	9	12

[ ] oz. of water per oz. of lemonade concentrate
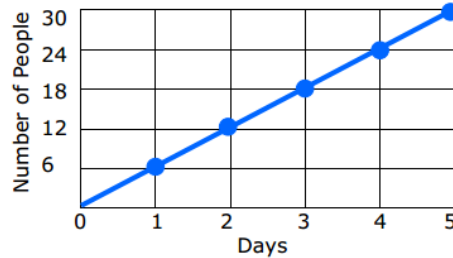
Name_____ Date_____
Check for Understanding –Constant of Proportionality

1. The graph represents the cups of cocoa and the pounds of sugar needed to make hot chocolate. What is the constant of proportionality?
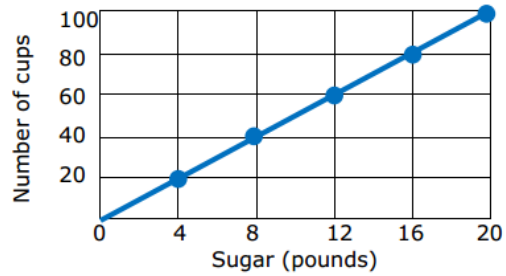
   [ ] **cups per pound**

2. The graph represents the number of people who go to the gym during the week. What is the constant of proportionality?

   [ ] **people per day**

3. The table represents the number of hours it takes to bake batches of cookies. What is the constant of proportionality?

Batches	Hours
2	3
4	6
6	9

   [ ] **batches per hour**

4. There were 324 students in grade 7. There were 12 teachers. If the students are equally distributed among the teachers, what is the constant of proportionality?

   [ ] **students per teacher**

Constant of Proportionality Cards-Answer Key

1. 4,500

2. 2

3. 24

4. $123

5. $0.67

6. 3

Check for Understanding-Answer Key

1. 5

2. 6

3. $\frac{2}{3}$

4. 27