pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Mathematics
Item and Scoring Sampler

2023–2024
Grade 3

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—August 2023

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INTRODUCTION

General Introduction

The Pennsylvania Department of Education (PDE) provides districts and schools with tools to assist in delivering focused instructional programs aligned with the Pennsylvania Core Standards (PCS). These tools include Academic Standards, Assessment Anchors and Eligible Content (AAEC) documents, assessment handbooks, and content-based item and scoring samplers. This Item and Scoring Sampler is a useful tool for Pennsylvania educators in preparing local instructional programs by providing samples of test item types and scored student responses. The item sampler is not designed to be used as a pretest, a curriculum, or any other benchmark for operational testing.

This Item and Scoring Sampler is available in Braille format. For more information regarding Braille, call (717) 901-2238.

Pennsylvania Core Standards (PCS)

This sampler contains examples of test questions designed to assess the Pennsylvania Assessment Anchors and Eligible Content aligned to the PCS. The Mathematics, Reading, and Writing PSSA transitioned to PCS-based operational Mathematics and English Language Arts assessments starting with the spring 2015 PSSA administration.

The PCS-aligned Assessment Anchors and Eligible Content documents are posted on this portal:

- *www.education.pa.gov* [Hover over "Data and Reporting," select "Assessment and Accountability," and select "PSSA-PA System of School Assessment." Then select "Assessment Anchors/Eligible Content" on the right side of the screen.]

What Is Included

This sampler contains test questions, or test "items," that have been written to align to the Assessment Anchors that are based on the PCS. The sample test questions model the types of items that may appear on an operational PSSA. Each sample test question has been through a rigorous review process to ensure alignment with the Assessment Anchors prior to being piloted in an embedded field test within a PSSA assessment and then used operationally on a PSSA assessment. Answer keys, scoring guidelines, and any related stimulus material are also included. Additionally, sample student responses are provided with each open-ended (OE) item to demonstrate the range of responses that students provided in response to these items.

Purpose and Uses

The items in this sampler may be used[1] as examples for creating assessment items at the classroom level. Classroom teachers may find it beneficial to have students respond to the open-ended item in this sampler. Educators may then use the sampler as a guide to score the responses either independently or together with colleagues within a school or district. This sampler also includes the *General Description of Scoring Guidelines for Mathematics Open-Ended Items* that students will have access to during a PSSA mathematics administration. The general description of scoring guidelines may be distributed to students for use during local assessments and may also be used by educators when scoring local assessments.

Item Format and Scoring Guidelines

The multiple-choice (MC) items have four answer choices. Each correct response to an MC item is worth one point.

Each OE item is designed to take approximately ten to fifteen minutes to complete. During the administration of the PSSA, students are given additional time as necessary to complete the test items. Each OE item in mathematics is scored using an item-specific scoring guideline based on a 0–4-point scale. In this sampler, every item-specific scoring guideline is combined with examples of student responses that represent each score point to form a practical, item-specific scoring guide.

Item Alignment

All PSSA items are aligned to statements and specifications included in the *Assessment Anchors and Eligible Content Aligned to the Pennsylvania Core Standards.* The mathematics content, process skills, directives, and action statements included in the PSSA mathematics questions align with the Assessment Anchor Content Standards. The Eligible Content statements represent the limits of the content of the mathematics questions.

[1] The permission to copy and/or use these materials does not extend to commercial purposes.

Testing Time and Mode of Testing Delivery for the PSSA

The PSSA is delivered in a traditional paper-and-pencil format as well as in an online format. The estimated time to respond to a test question is the same for both methods of test delivery. The following table shows the estimated response time for each item type.

Mathematics Item Type	MC	OE
Estimated Response Time (minutes)	2	10 to 15

During an official test administration, students are given as much additional time as is necessary to complete the test questions.

Mathematics Reporting Categories

The Assessment Anchors are organized into four classifications as listed below.

• A = Numbers and Operations	• C = Geometry
• B = Algebraic Concepts	• D = Data Analysis and Probability

These four classifications are used throughout the grade levels. In addition to these classifications, there are five Reporting Categories for each grade level. The first letter of each Reporting Category represents the classification; the second letter represents the Domain as stated in the Common Core State Standards for Mathematics. Listed below are the Reporting Categories for Grade 3.

- A-T = Numbers and Operations in Base Ten
- A-F = Numbers and Operations—Fractions
- B-O = Operations and Algebraic Thinking
- C-G = Geometry
- D-M = Measurement and Data

Examples of MC and OE items assessing these categories are included in this sampler.

Item and Scoring Sampler Format

This sampler includes the test directions and scoring guidelines that appear in the PSSA Mathematics assessments. Each MC item is followed by a table that includes the item alignment, the answer key, the depth of knowledge (DOK) level, the percentage[2] of students who chose each answer option, and a brief answer-option analysis or rationale. The OE item is followed by a table that includes the item alignment, the DOK level, and the mean student score. Additionally, each of the included item-specific scoring guidelines is combined with sample student responses representing each score point to form a practical item-specific scoring guide. The *General Description of Scoring Guidelines for Mathematics Open-Ended Items* used to develop the item-specific scoring guidelines should be used if any additional item-specific scoring guidelines are created for use within local instructional programs. The student responses in this item and scoring sampler are actual student responses; however, the handwriting has been changed to protect the students' identities and to make the item and scoring sampler accessible to as many people as possible.

Example Multiple-Choice Item Information Table

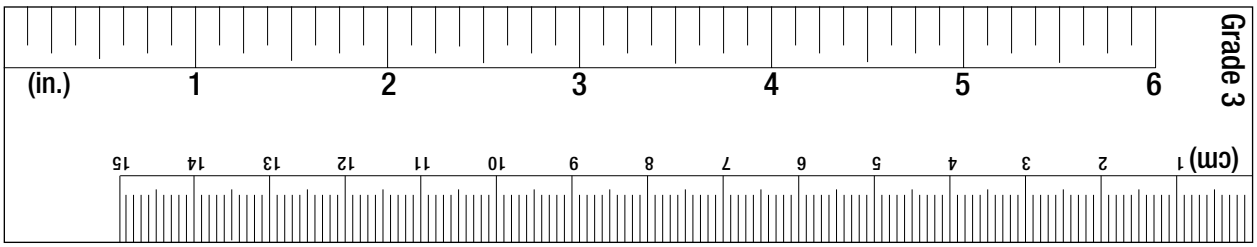
Item Information	
Alignment	Assigned AAEC
Answer Key	Correct Answer
Depth of Knowledge	Assigned DOK
p-value A	Percentage of students who selected option A
p-value B	Percentage of students who selected option B
p-value C	Percentage of students who selected option C
p-value D	Percentage of students who selected option D
Option Annotations	Brief answer-option analysis or rationale

Example Open-Ended Item Information Table

Alignment	Assigned AAEC	**Depth of Knowledge**	Assigned DOK	**Mean Score**	Average Score

Grade 3 Ruler

The ruler shown below is not intended to be used to measure. It has been included as a representation of the rulers that will be provided for students when they take the test. Due to differences in printers, the ruler and measurement questions within this sampler may not accurately reproduce to scale.



[2] All *p*-value percentages listed in the item information tables have been rounded.

General Description of Scoring Guidelines for Mathematics Open-Ended Items

4—The response demonstrates a *thorough* understanding of the mathematical concepts and procedures required by the task.

The response provides correct answer(s) with clear and complete mathematical procedures shown and a correct explanation, as required by the task. The response may contain a minor "blemish" or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

3—The response demonstrates a *general* understanding of the mathematical concepts and procedures required by the task.

The response and explanation (as required by the task) are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a *general* understanding.

2—The response demonstrates a *partial* understanding of the mathematical concepts and procedures required by the task.

The response is somewhat correct with *partial* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

1—The response demonstrates a *minimal* understanding of the mathematical concepts and procedures required by the task.

0—The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures required by the task for that grade level.

The response may show only information copied from the question.

Special Categories within zero reported separately:

BLK (blank).....Is blank, is entirely erased, or gives a written refusal to respond

OT.....Is off-task

LOE.....Is in a language other than English

IL.....Is illegible

MATHEMATICS TEST DIRECTIONS

Directions: On the following pages are the Mathematics questions.

- You may not use a calculator on this test.
- You may need a ruler for question(s) on this test.

Directions for Multiple-Choice Questions

Some questions will ask you to select an answer from among four choices.

For the multiple-choice questions:

- First solve the problem on scratch paper.
- Choose the correct answer and record your choice in the booklet.
- If none of the choices matches your answer, go back and check your work for possible errors.
- Only one of the answers provided is the correct response.

Directions for Open-Ended Questions

Some questions will require you to write your response.

For the open-ended questions:

- These questions have more than one part. Be sure to read the directions carefully.
- You cannot receive the highest score for an open-ended question without completing all tasks in the question. For example, if the question asks you to show your work or explain your reasoning, be sure to show your work or explain your reasoning in the space provided.
- If the question does **not** ask you to show your work or explain your reasoning, you may use the space provided, but only those parts of your response that the question specifically asks for will be scored.
- Write your response in the appropriate location within the response box in the booklet. Some answers may require graphing, plotting, labeling, drawing, or shading. If you use scratch paper, be sure to transfer your final response and any needed work or reasoning to the booklet.

MULTIPLE-CHOICE ITEMS

1. Devon rode his bike a total of 4 miles.

When he stopped for lunch, he had ridden his bike 2 miles.

Which number shows the fraction of the bike ride Devon had completed when he stopped for lunch?

Ⓐ $\frac{2}{1}$

Ⓑ $\frac{2}{4}$

Ⓒ $\frac{4}{2}$

Ⓓ $\frac{4}{4}$

2. Susan and Tamara each make a pizza.

Their pizzas are the same size.

Susan cuts her pizza into 3 equal slices.

Tamara cuts her pizza into 6 equal slices.

Which pair of sentences correctly describes whose slices of pizza are bigger?

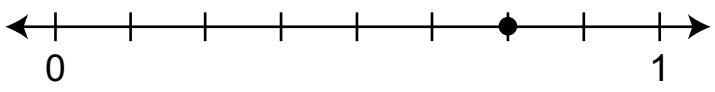
Ⓐ Susan's slices are bigger.
Each slice is $\frac{2}{6}$ of the pizza.

Ⓑ Susan's slices are bigger.
Each slice is $\frac{4}{6}$ of the pizza.

Ⓒ Tamara's slices are bigger.
Each slice is $\frac{1}{6}$ of the pizza.

Ⓓ Tamara's slices are bigger.
Each slice is $\frac{1}{3}$ of the pizza.

3. A fraction is represented on the number line shown below.



Which fraction is represented on the number line?

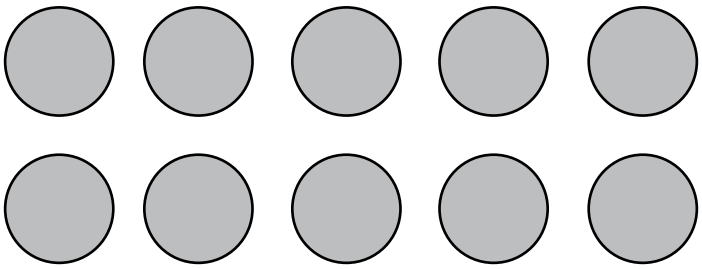
Ⓐ $\frac{6}{8}$

Ⓑ $\frac{7}{9}$

Ⓒ $\frac{8}{6}$

Ⓓ $\frac{6}{2}$

4. The group of circles below represents the expression 2×5.



Which expression can the group of circles also represent?

Ⓐ $5 + 2$

Ⓑ $10 \div 2$

Ⓒ $5 \div 2$

Ⓓ 10×2

5. Colby is making a comic book.

He draws 48 pictures for his comic book.

There are 6 pictures on each page.

How many pages are in Colby's comic book?

Ⓐ 6

Ⓑ 7

Ⓒ 8

Ⓓ 12

6. Maddison makes beaded bracelets.

She uses 9 beads for each bracelet.

Maddison uses the equation below to find the number of bracelets (□) she can make with 72 beads.

$$9 \times \square = 72$$

How many bracelets can Maddison make with 72 beads?

Ⓐ 8

Ⓑ 9

Ⓒ 63

Ⓓ 81

7. Bruce has 8 baskets and 56 apples.

He wants to put an equal number of apples into each basket.

Which number sentence shows a way Bruce could find the number of apples in each basket?

Ⓐ $56 - 8 = ?$

Ⓑ $8 \div ? = 56$

Ⓒ $8 \times ? = 56$

Ⓓ $56 \times 8 = ?$

8. Which method describes a way to find the value of 6×9?

Ⓐ Multiply 6×1 and then add 8.

Ⓑ Multiply 1×9 and then add 5.

Ⓒ Multiply 6×10 and then subtract 1.

Ⓓ Multiply 6×10 and then subtract 6.

9. Malcolm learned to spell 8 new words during the first week of school.

The table below shows the total number of new words he has learned to spell by the end of each week.

Spelling New Words

Week	Total Number of New Words
1	8
2	14
3	20
4	26
5	
6	38

The total number of new words Malcolm learns to spell makes a pattern.

How many new words had Malcolm learned to spell by the end of week 5?

Ⓐ 28

Ⓑ 30

Ⓒ 32

Ⓓ 34

10. Which statement about polygons is true?

Ⓐ The sides may be curved.

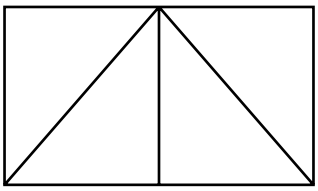
Ⓑ All polygons have exactly 4 sides.

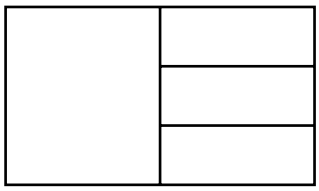
Ⓒ All polygons have at least 3 sides.

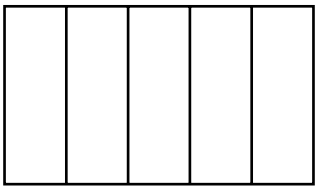
Ⓓ The sides are always the same length.

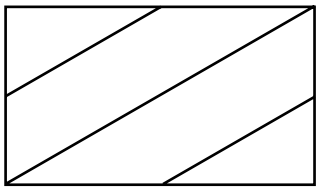
11. Jackie will cut a piece of paper into equal-sized parts to share with three of her friends.

Which shape shows how Jackie could cut the paper so that she and her three friends can each have $\frac{1}{4}$ of the paper?

Ⓐ 

Ⓑ 

Ⓒ 

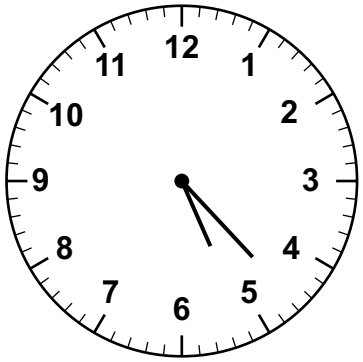
Ⓓ 

12. Jill worked on her homework for 23 minutes.

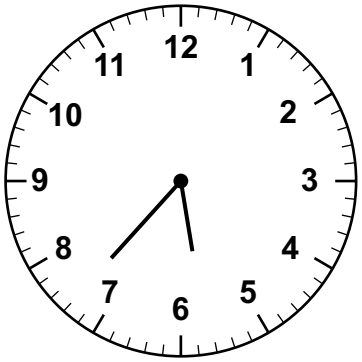
She had to stop at 6:00 for dinner.

Which clock shows the time Jill began her homework?

Ⓐ



Ⓑ



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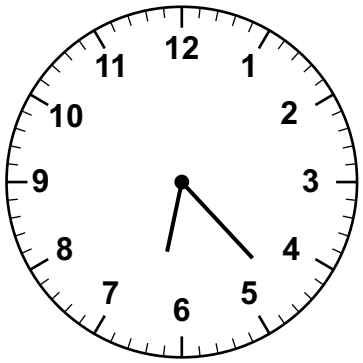

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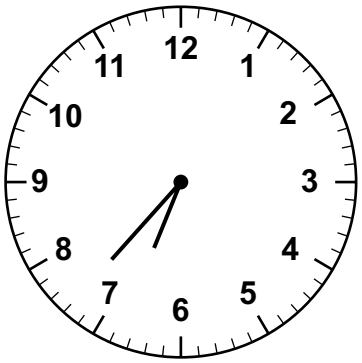
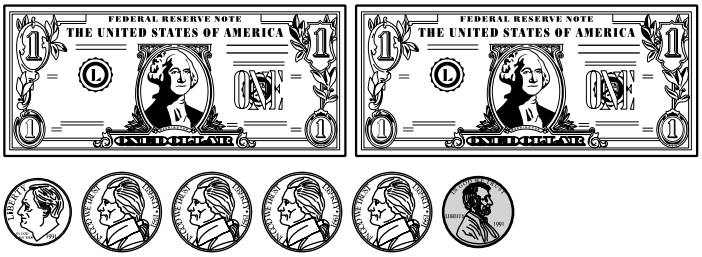
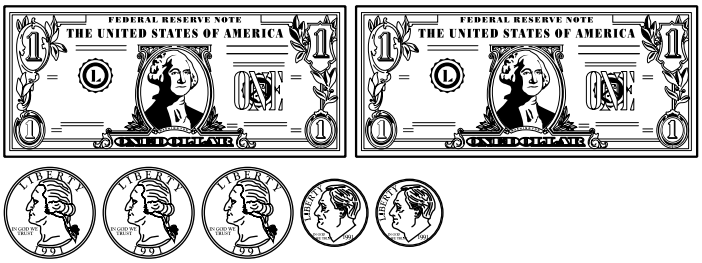


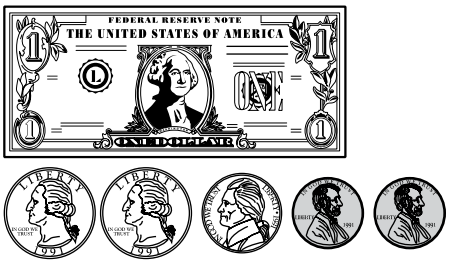
13. Kendra has $2.31, and Logan has $2.76.

Bella has more money than Kendra, but she has less money than Logan.

Which amount of money could be the money Bella has?

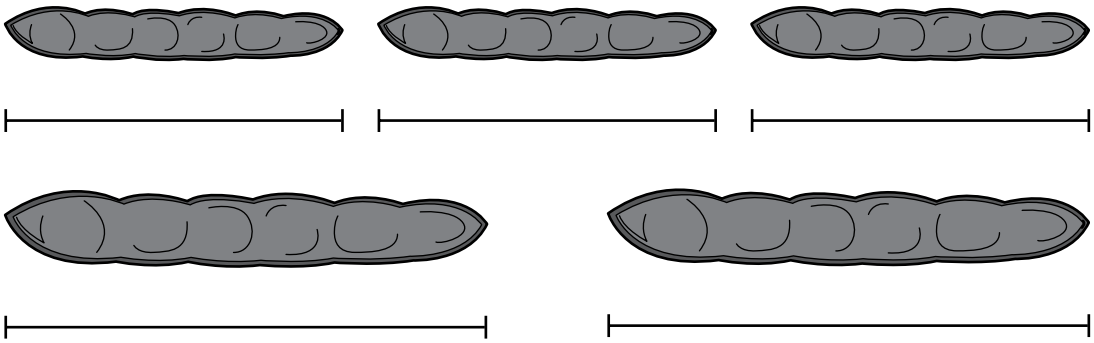
Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

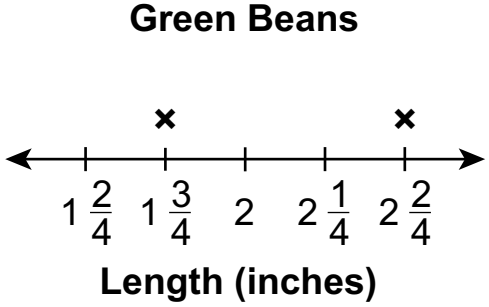
14. Mr. Arden grew some green beans as shown below.



Use your ruler to measure the lengths, to the nearest quarter inch, of the green beans.

Which line plot represents the lengths, to the nearest quarter inch, of the green beans?

Ⓐ



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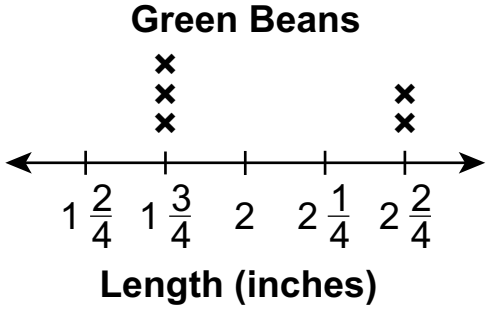

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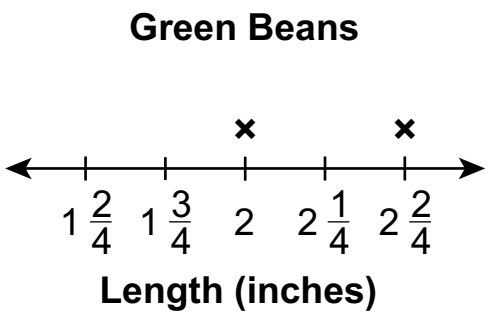
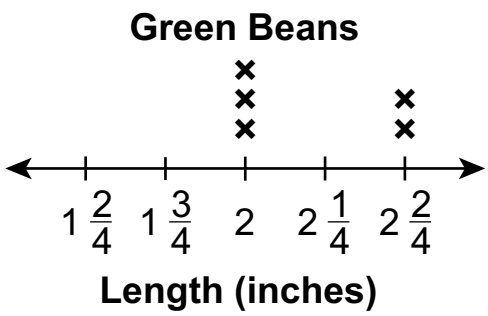
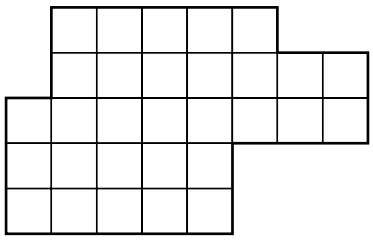


Ⓓ



15. Mr. Gomez uses square tiles to cover the kitchen floor as shown below.



Each square tile has an area of one square foot.

What is the area, in square feet, of the kitchen floor?

Ⓐ 19

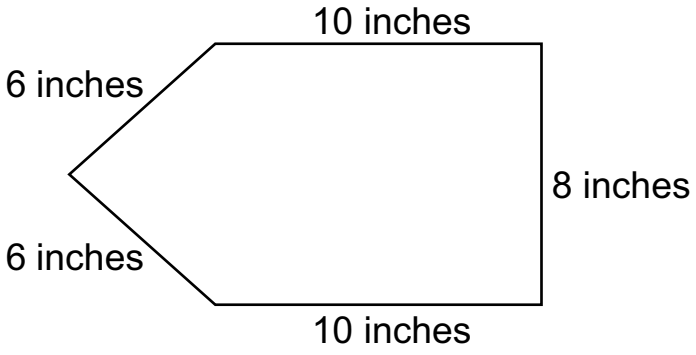
Ⓑ 26

Ⓒ 30

Ⓓ 40

16. William makes the sign shown.

William's Sign



What is the perimeter, in inches, of William's sign?

Ⓐ 30

Ⓑ 34

Ⓒ 40

Ⓓ 42

OPEN-ENDED QUESTION

17. Elyssa, Kendra, Hendrix, and Mike played a game.

- Elyssa scored 132 points.
- Kendra scored 97 points.
- Hendrix scored 105 points.
- Mike scored 68 points.

A. What is the difference between the number of points Elyssa scored and the number of points Kendra scored?

PUT your answer in the **BLANK BELOW**.

Answer: _____ points

B. **WRITE** a number sentence using <, >, or = to compare the number of points Elyssa scored to the number of points Kendra scored.

Number Sentence: _____

Go to the next page to finish question 17.

17. ***Continued***. Please refer to the previous page for task explanation.

C. **LIST** the four scores in order from the **greatest** number of points to the **least** number of points.

EXPLAIN how you used place value to determine which score is the **greatest**.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____ _____ _____

greatest **least**

After you have finished your work, close this booklet so your teacher will know you are finished.