The Pennsylvania System of School Assessment

Mathematics
Item and Scoring Sampler

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INTRODUCTION

General Introduction

The Pennsylvania Department of Education 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 Anchor 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. It can also be useful in preparing students for the statewide assessment.

Pennsylvania Core Standards (PCS)

This sampler contains examples of test questions that are aligned to the new Pennsylvania Core Standards-based 2013 PSSA Assessment Anchors and Eligible Content. 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 2013 PCS-aligned Assessment Anchor and Eligible Content documents are posted on this portal:

> ➢ *www.education.pa.gov* [Hover over "K–12," select "Assessment and Accountability," and select "Pennsylvania System of School Assessment (PSSA)." Then select "Assessment Anchors" from the "Other Materials" list on the right side of the screen.]

What Is Included

This sampler contains test questions (items) that have been written to align to the Assessment Anchors that are based on the Pennsylvania Core Standards (PCS). The test questions provide an idea of the types of items that will appear on an operational, PCS-based PSSA. Each sample test question has been through a rigorous review process to ensure alignment with the Assessment Anchors.

Purpose and Uses

The items in this sampler may be used as examples for creating assessment items at the classroom level, and they may also be copied and used as part of a local instructional program.[1] Classroom teachers may find it beneficial to have students respond to the open-ended items in this sampler. Educators can then use the sampler as a guide to score the responses either independently or together with colleagues within a school or district.

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 open-ended (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.

The sampler also includes the *General Description of Scoring Guidelines for Mathematics Open-Ended Questions* that students will have access to during a PSSA mathematics administration. The general description of scoring guidelines can be distributed to students for use during local assessments and can also be used by educators when scoring local assessments.[1]

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

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.

Testing Time and Mode of Testing Delivery for the PCS-Based PSSA

The PSSA is delivered in 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. During an official testing administration, students are given additional time as necessary to complete the test questions. The following table shows the estimated response time for each item type.

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

MATHEMATICS REPORTING CATEGORIES

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

- ○ A = Numbers and Operations
- ○ B = Algebraic Concepts
- ○ C = Geometry
- ○ 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 5.

- ○ 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 multiple-choice and open-ended items assessing these categories are included in this booklet.

GENERAL DESCRIPTION OF SCORING GUIDELINES
FOR MATHEMATICS OPEN-ENDED QUESTIONS

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. 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.

Response may show only information copied from the question.

DESCRIPTION OF SAMPLE QUESTIONS

The mathematics multiple-choice questions begin on page 7. Each question is preceded by the Assessment Anchor and Eligible Content coding to which it aligns. Incorrect answer options are followed by the "rationale" which supports the student's response. All correct answer options are indicated by an asterisk (*).

Five open-ended questions follow the multiple-choice questions. Each open-ended question includes question-specific scoring guidelines and examples of student responses with scores and annotations.

Since the PSSA is delivered in both paper-and-pencil and online formats, OE items of each method of test delivery are included in this sampler. The online OE sample items are presented as screen shots in a landscape orientation in order to best approximate the view of a computer monitor. The examples of student responses that follow the online OE sample items are also presented as screen shots.

A calculator is permitted for use in solving questions numbered 6–50 in this sampler. Questions numbered 1–5 are to be solved without the use of a calculator. Scratch paper may be used in solving all questions.

MATHEMATICS FORMULA SHEET

Below is a Mathematics formula sheet that will be available to students during the test. The formula sheet reflects the mathematical approach included in the Assessment Anchors that are based on the Pennsylvania Core Standards (PCS). The formula sheet is also available in Spanish.

> Formulas and conversions that you may need to work questions on this test are found below. You may refer back to this page at any time during the mathematics test.
>
> 2016
> Grade 5

Standard Conversions
1 mile (mi) = 1,760 yards (yd)
1 mile = 5,280 feet (ft)
1 yard (yd) = 3 feet (ft)
1 foot = 12 inches (in.)

1 ton (T) = 2,000 pounds (lb)
1 pound = 16 ounces (oz.)

1 gallon (gal) = 4 quarts (qt)
1 quart = 2 pints (pt)
1 pint = 2 cups (c)
1 cup = 8 fluid ounces (fl oz.)

Metric Conversions
1 kilometer (km) = 1,000 meters (m)
1 meter = 100 centimeters (cm)
1 centimeter = 10 millimeters (mm)

1 kilogram (kg) = 1,000 grams (g)

1 liter (L) = 1,000 milliliters (mL)

Time Conversions
1 century = 10 decades
1 decade = 10 years (yr)
1 year (yr) = 12 months (mo)
1 year = 52 weeks (wk)
1 year = 365 days
1 week = 7 days
1 day = 24 hours (hr)
1 hour = 60 minutes (min)
1 minute = 60 seconds (sec)

Rectangular Prism
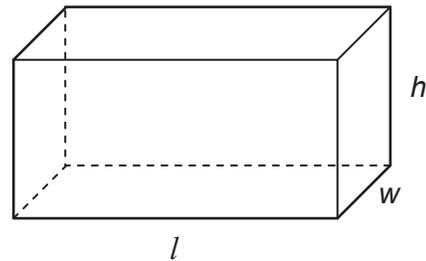
Volume = length × width × height
$V = l \times w \times h$

Volume = area of the base × height
$V = B \times h$

Volume = area of the base × width
$V = B \times w$

Volume = area of the base × length
$V = B \times l$

On the following pages are the mathematics questions.

- You may <u>not</u> use a calculator for questions 1–5. You may use a calculator for all other questions 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 answer 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 answer 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 answer booklet.

MULTIPLE-CHOICE QUESTIONS

> **Questions 1–5 in this sampler are to be solved <u>without</u> the use of a calculator.**

A-T.2.1.1

1. Multiply: 270×30

   A.   810 | *incorrect number of zeros* |

   B.   6,100 | *does not carry 2,000 when multiplying 30×70* |

   C.   6,210 | *$3 \times 2 = 6$ (the first digit), $3 \times 7 = 21$ (second and third digits), and includes a 0 at the end in the ones place* |

   D.   8,100   *

A-T.2.1.1

2. Multiply: 260×72

   A.   2,340 | *$260 \times 7 + 260 \times 2$* |

   B.   14,620 | *does not carry to the hundreds place when multiplying* |

   C.   18,720   *

   D.   23,400 | *$260 \times 70 + 260 \times 20$* |

A-F.1.1.1

3. Nora hiked $8\frac{1}{3}$ miles on Monday and $5\frac{3}{4}$ miles on Tuesday. What was the total number of miles Nora hiked on Monday and Tuesday?

A. $13\frac{1}{12}$ *does not carry the 1 from 13/12*

B. $13\frac{4}{7}$ *adds numerators and denominators*

C. $14\frac{1}{12}$ *

D. $14\frac{1}{4}$ *finds common denominator of 12 but multiplies the numerator of 1/3 by 3 and the numerator of 3/4 by 4*

A-F.2.1.2

4. Multiply: $3\frac{1}{2} \times 4\frac{2}{3}$

A. 4 *converts to 3/2 and 8/3, then multiplies*

B. $8\frac{1}{6}$ *adds instead of multiplies*

C. $12\frac{1}{3}$ *multiplies whole numbers and multiplies fractions*

D. $16\frac{1}{3}$ *

A-F.2.1.4

5. Divide: $24 \div \dfrac{1}{8}$

   A. $\dfrac{1}{192}$ *inverts 24 and multiplies (1/24) x (1/8)*

   B. $\dfrac{1}{3}$ *inverts both 24 and 1/8 and multiplies (1/24) x 8*

   C. 3   *multiplies 24 x (1/8)*

   D. 192   *

A calculator is permitted for use in solving questions numbered 6–50 in this sampler.

A-T.1.1

6. Martha makes the statement shown below.

   > When multiplying two whole numbers that end in zeros, the product always has the exact same number of zeros at the end as the number of zeros from the end of the two numbers combined.

   For example, the product of 80 × 400 has exactly three zeros at the end since 80 ends in one zero and 400 ends in two zeros. Which expression proves Martha's statement is **not** correct?

   A. 10 × 100   *uses only powers of 10, but does not disprove Martha's statement*

   B. 20 × 200   *thinks not using powers of 10 is enough to disprove Martha's statement*

   C. 30 × 400   *product of 3 × 4 is greater than 10*

   D. 40 × 500   *

A-T.1.1.1
A-T.1.1.3

7. A number has an 8 in the hundredths place. The number also contains a digit whose value is $\frac{1}{10}$ the value of the 8 in the hundredths place. Which could be the expanded form of the number?

A. $(1 \times 100) + (8 \times 0.1) + (8 \times 0.01) + (2 \times 0.001)$

> locates hundredths correctly but uses 10 times value instead of 1/10

B. $(3 \times 100) + (8 \times 10) + (2 \times 1) + (2 \times 0.1) + (8 \times 0.01) + (7 \times 0.001)$

> locates hundredths correctly but uses 100 times value instead of 1/10

C. $(8 \times 100) + (8 \times 10) + (1 \times 0.1) + (7 \times 0.01) + (9 \times 0.001)$

> uses hundreds instead of hundredths

D. $(2 \times 100) + (7 \times 10) + (2 \times 1) + (8 \times 0.01) + (8 \times 0.001)$
*

A-T.1.1.2

8. In the expression shown below, *a* and *b* represent different whole numbers.

$$10^a \times 10^b$$

How many zeros must be in the product of the expression?

A. $a + b$ *

B. $a \times b$ uses multiplication sign from expression

C. 2   number of zeros in expression as shown

D. 100   10 x 10

A-T.1.1.3

9. Lucy's dog weighs nine and seventy-five hundredths kilograms. What is the weight, in kilograms, of Lucy's dog written in expanded notation?

   A. 9 + 0.07 + 0.005 | *wrong place value for the 7 and the 5* |

   B. 9 + 0.07 + 0.05 | *wrong place value for the 7* |

   C. 9 + 0.7 + 0.005 | *wrong place value for the 5* |

   D. 9 + 0.7 + 0.05   *

A-T.1.1.4
A-T.1.1.3

10. Which inequality correctly compares six and fifty-nine hundredths to six and ninety-five thousandths?

   A. 6.059 < 6.95 | *confuses hundredths and thousandths, but compares written decimals correctly* |

   B. 6.059 > 6.95 | *confuses hundredths and thousandths, but compares word forms of numbers correctly* |

   C. 6.59 < 6.095 | *decimals written correctly but incorrect comparison* |

   D. 6.59 > 6.095   *

A-T.1.1.5
A-T.2.1.3

11. Tyler's bag of shells weighs 4.97 pounds. He finds 2 stones that weigh the same as each other and adds them to the bag. Tyler's bag now weighs 6.31 pounds. What is the weight of each stone to the nearest tenth of a pound?

A. 0.6 | *rounds down or truncates* |

B. 0.7   *

C. 1.3 | *does not divide by 2 but rounds correctly* |

D. 2.6 | *multiplies by 2 and rounds down or truncates* |

A-T.2

12. Four friends ate together at a restaurant. The cost for each meal, without a tip, is shown below.

$$\$11 \quad \$13 \quad \$13 \quad \$14$$

The total cost of the 4 meals with the tip was 1.2 times the total cost of the meals without the tip. The friends equally shared the total cost of the meals with the tip. How much did each friend pay?

A. $10.20 | *amount of tip* |

B. $12.75 | *average cost of each meal without tip* |

C. $13.05 | *adds 1.2 to the total cost of the meals without tip* |

D. $15.30   *

A-T.2.1.1
A-T.2.1.2

13. A store has 108 boxes of model cars. Each box contains 18 cars. After all the cars are unpacked, they are arranged into 27 rows with the same number of cars in each row. How many cars are in each row?

A. 72   *

B. 153 | *adds all numbers* |

C. 162 | *reverses multiplication and division* |

D. 972 | *subtracts 18 from 27, then multiplies 108 by result* |

A-F.1

14. An expression is shown below.

$$1\frac{4}{5} + 1.25 - 2.1$$

The value of the expression is represented as a fraction. The numerator of the fraction is a whole number. What is the **smallest** number that could be the denominator of the fraction?

A. 5 | *only denominator shown in given expression* |

B. 10 | *translates to mixed numbers with denominators of 10 and 100 and chooses smallest denominator* |

C. 20   *

D. 50 | *translates to mixed numbers 1-1/25 and 2-1/10, finds result of 74/100, and reduces to 37/50* |

A-F.1.1
D-M.1.1.1

15. Neal uses $1\frac{1}{4}$ **gallons** of water and 8 **cups** of apple cider in a recipe. How many combined **gallons** of water and apple cider does Neal use in the recipe?

A. $1\frac{1}{6}$ | *adds 1/4 and 1/2 by adding the denominators*

B. $1\frac{1}{3}$ | *adds 1/4 + 1/2 = (1 + 1)/(4 + 2) = 2/6 = 1/3*

C. $1\frac{3}{4}$ | *

D. $2\frac{1}{4}$ | *uses 8 cups = 1 gallon and then adds 1-1/4 + 1*

A-F.2

16. Aubrey has a shelf full of books.

- Exactly $\frac{1}{3}$ of the books on the shelf are mysteries.

- Aubrey has read 10 of the mysteries on the shelf.

- The number of mysteries Aubrey has read is greater than $\frac{1}{5}$ of the number of mysteries on the shelf and less than $\frac{1}{4}$ of the number of mysteries on the shelf.

Which could be the number of books on the shelf?

A. 120 | *number of books on the shelf if Aubrey read exactly 1/4 of the mysteries*

B. 142 | *within acceptable range but is not a multiple of 3*

C. 147 | *

D. 150 | *number of books on the shelf if Aubrey read exactly 1/5 of the mysteries*

A-F.2.1.1

17. Kelly spends 5 hours making pizzas. Each pizza takes her $\frac{1}{4}$ hour to make. When she is finished, all of the pizzas are shared equally among 6 families. How many pizzas does each family receive?

A. $\frac{5}{24}$ | *multiplies instead of divides: (5 × 1/4) ÷ 6* |

B. $\frac{3}{10}$ | *reverses unit fraction division and then multiplies instead of divides: (1/4 ÷ 5) × 6* |

C. $3\frac{1}{3}$ *

D. $7\frac{1}{2}$ | *multiplies all numbers: 5 × 1/4 × 6* |

A-F.2.1.2
A-F.2.1.4

18. Janet has $\frac{4}{9}$ gallon of paint. She uses $\frac{1}{8}$ of the paint she has to cover 3 canvases. She uses the same amount of paint to cover each canvas. What amount of paint does Janet use to cover each canvas?

A. $\frac{1}{54}$ gallon   *

B. $\frac{5}{72}$ gallon | *subtracts 3 × 1/8 from 4/9 thinking each canvas needed 1/8 gallon* |

C. $\frac{1}{6}$ gallon | *multiplies by 3 instead of 1/3* |

D. $\frac{23}{24}$ gallon | *subtracts 1/8 from 4/9 and then multiplies by 3* |

A-F.2.1.2
A-F.2.1.1

19. Wendell has 12 cups of rice. He puts an equal amount of rice into each of 5 bowls. Wendell eats $\frac{1}{3}$ of a bowl of rice. How many cups of rice does Wendell eat?

A. $\frac{5}{36}$ | *reverses initial division: 5/12 instead of 12/5, then multiplies 5/12 x 1/3 correctly* |

B. $\frac{4}{5}$ *

C. $1\frac{1}{4}$ | *reverses initial division: 5/12 instead of 12/5; then multiplies by the reciprocal, 3, not 1/3* |

D. $7\frac{1}{5}$ | *correctly uses 12/5 but then multiplies by the reciprocal, 3, not 1/3* |

A-F.2.1.3

20. The product of $\frac{3}{8}$ and any whole number is less than the whole number. Which statement about the fraction $\frac{3}{8}$ is a reason why this is true?

A. The numerator is greater than 1.
   | *does not realize value of entire fraction is important, not just the value of the numerator* |

B. The denominator is greater than 1.
   | *does not realize value of entire fraction is important, not just the value of the denominator* |

C. The denominator is greater than the numerator.
   *

D. The difference between the denominator and the numerator is greater than the numerator.
   | *knows a comparison between the numerator and denominator is important, but does not use the correct comparison* |

A-F.2.1.4
A-F.2.1.2

21. Paul has $\frac{1}{2}$ gallon of liquid fertilizer. He puts an equal amount of the fertilizer into each of 5 bottles. Paul then uses $\frac{1}{3}$ of the fertilizer from one of the bottles on a flower. What fraction of a gallon of fertilizer does Paul use on the flower?

A. $\frac{1}{30}$ *

B. $\frac{7}{30}$ correctly calculates 1/10 gallon per bottle but then subtracts 1/10 from 1/3

C. $\frac{3}{10}$ correctly calculates 1/10 gallon per bottle but then divides 1/10 by 1/3

D. $\frac{5}{6}$ incorrectly calculates 5/2 gallon per bottle (1/2 × 5)

A-F.2.1.4
A-F.1.1.1

22. Greg makes a pan of brownies.

- He takes $\frac{2}{3}$ of the brownies to his friend's house.

- He freezes $\frac{1}{4}$ of the brownies.

- He gives the remaining brownies to his 4 sisters.

- His sisters equally share the remaining brownies.

What fraction of the pan of brownies does each sister get?

A. $\frac{1}{48}$ *

B. $\frac{1}{16}$ | *adds 4 to denominator instead of dividing 1/12 by 4* |

C. $\frac{1}{8}$ | *subtracts 4 from denominator instead of dividing 1/12 by 4* |

D. $\frac{1}{3}$ | *divides denominator by 4 instead of dividing 1/12 by 4* |

B-O.1.1.1
B-O.2.1

23. Mark makes a pattern that starts with 5 and uses the rule "subtract 1, and then multiply by 3." Which expression can be used to find the third number in Mark's pattern?

A. $5 - 1 \times 3 - 1 \times 3$ | *does not use any parentheses and evaluates the expession from left to right* |

B. $3(5 - 1) + 3(5 - 1)$ | *writes an expression for the second number and then repeats that expression* |

C. $3[3(5) - 1]$ | *multiplies 5 and 3 before subtracting 1, and omits a subtraction step* |

D. $3[3(5 - 1) - 1]$ *

B-O.1.1.2

24. Which expression has half the value of 2 + 898 × 950?

A. 1 + 449 × 475 | takes half of each number |

B. 1 + 898 × 475 *

C. 2 + 449 × 475 | takes half of both 898 and 950 |

D. 2 + 898 × 475 | takes half of 950 but not half of 2 |

B-O.1.1.2
B-O.1.1.1

25. All the students in a class are sitting at tables.

- There are 6 round tables, and 3 boys and 4 girls are sitting at each round table.

- There are 7 square tables, and 5 boys and 3 girls are sitting at each square table.

- Ms. Martin gives each student in the class 2 books.

Which expression can be used to find the total number of books Ms. Martin gives to the students?

A. 2 (6 + 3 + 4 + 7 + 5 + 3) | adds all the numbers and multiplies by number of books |

B. 6 (3 + 4) + 7 (5 + 3) + 2 | adds number of books per student instead of multiplying |

C. 2 [6 (3 + 4) + 7 (5 + 3)] *

D. 6 [(3 + 4) + 2] + 7 [(5 + 3) + 2] | adds 2 books per student to number of students |

B-O.2

26. Linda has a jar that contains 6 coins. She adds coins to the jar each day for 5 days. The pattern below shows the number of coins in Linda's jar at the end of each of the 5 days.

13 20 27 34 41

Nancy also has a jar containing 6 coins. She adds twice as many coins to her jar each day as Linda does for each of the 5 days. What is the total number of coins in Linda's and Nancy's jars at the end of the 5 days?

A.   103   thinks there are 6 coins in Nancy's jar after day 1

B.   111   forgets to add Nancy's 6 initial coins

C.   117   *

D.   123   calculates Nancy's coins by doubling Linda's coins

B-O.2.1
A-F.1.1.1

27. A chef bakes a turkey in one oven and a cake in another oven. The turkey and the cake start baking at the same time. The table below shows the amount the turkey and the cake are baked based on the amount of baking time, in minutes.

Amount Baked

Baking Time (minutes)	5	10	15	20
Turkey	$\frac{1}{24}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{6}$
Cake	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$

The patterns continue. Which statement **best** describes the relationship between the baking time for the turkey and the baking time for the cake?

A. The turkey bakes $\frac{1}{6}$ as fast as the cake. | *incorrectly adds 1/6 + 1/6*

B. The turkey bakes $\frac{1}{4}$ as fast as the cake. | *

C. The turkey bakes $\frac{1}{3}$ as fast as the cake. | *thinks 2/3 is 1/3 more than 1/6*

D. The turkey bakes $\frac{1}{2}$ as fast as the cake. | *compares numerators and denominators of 1/6 and 2/3*

B-O.2.1.1

28. Daniel and Jessica each make a pattern.

- Daniel's pattern starts with 12 and uses the rule subtract 6, then multiply by 3.

- Jessica's pattern starts with 8 and uses the rule multiply by 2, then add 2.

Which pair of patterns shows Daniel's and Jessica's patterns?

A. Daniel's pattern: 12, 18, 36, 90, 252
   Jessica's pattern: 8, 20, 44, 92, 188

> *Daniel's pattern is correct, but Jessica's pattern has operations reversed, adds 2, then multiplies by 2*

B. Daniel's pattern: 12, 36, 108, 324, 972
   Jessica's pattern: 8, 16, 32, 64, 128

> *only multiplies, does not add or subtract*

C. Daniel's pattern: 12, 18, 36, 90, 252
   Jessica's pattern: 8, 18, 38, 78, 158
   *

D. Daniel's pattern: 12, 30, 84, 246, 732
   Jessica's pattern: 8, 18, 38, 78, 158

> *Jessica's pattern is correct, but Daniel's pattern has operations reversed, multiplies by 3, then subtracts 6*

B-O.2.1.2

29. John and Megan each make a pattern. Each pattern starts with the number 1. The first five terms in each pattern are shown below.

John's pattern: 1, 4,   7, 10, 13

Megan's pattern: 1, 8, 15, 22, 29

The patterns continue. Which statement about the relationship between the corresponding terms in the patterns is true?

A. Each term in Megan's pattern is 7 more than the corresponding term in John's pattern.
> *the terms in Megan's pattern increase by 7*

B. Each term in Megan's pattern is less than double the corresponding term in John's pattern.
> *only true for 1st terms, and the opposite is true for terms 3 and later*

C. The difference between any term in Megan's pattern and the corresponding term in John's pattern is always 3.
> *the difference between the terms in John's pattern is 3*

D. The difference between any term in Megan's pattern and the corresponding term in John's pattern is always a multiple of 4.
> *

C-G.1

30. Two vertices of a right triangle are located at (2, 1) and (2, 4) on a coordinate grid. The location of the third vertex of the triangle can be described by an ordered pair in which the whole number *x*-coordinate is **less** than the whole number *y*-coordinate. What is the greatest number of ordered pairs that could describe the location of the third vertex of the triangle?

- A. 1 | *thinks there is only one possible location of the third vertex* |
- B. 2 | *does not include ordered pairs located on y-axis* |
- C. 4   *
- D. 6 | *adds the 4 possible third vertices to the 2 given vertices* |

C-G.1.1

31. Selena is using a coordinate grid to graph information about the last few baseball games in which she pitched.

- The *x*-coordinate of each point she graphs is the number of runs she allowed.
- The *y*-coordinate of each point she graphs is the number of strikeouts she recorded.

Which statement about Selena's graph is true?

- A. A point other than the origin graphed on the *x*-axis means Selena allowed no runs.
  | *confuses axes labels* |

- B. A point graphed at (2, 3) means Selena allowed 3 runs and recorded 2 strikeouts.
  | *reverses coordinates* |

- C. A point other than the origin graphed on the *y*-axis means Selena recorded at least one strikeout.
  *

- D. A point graphed at (3, 4) means Selena allowed 1 more run than the number of strikeouts recorded.
  | *reverses coordinates* |

C-G.1.1.1

32. Zach creates a map of his neighborhood on a coordinate grid as shown below.

Zach's Neighborhood
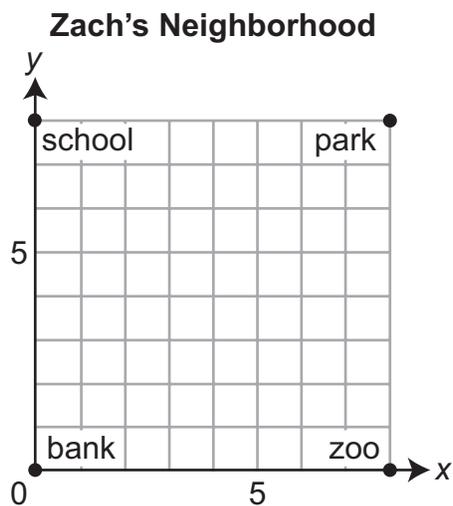
Which location is on the *x*-axis but **not** on the *y*-axis of Zach's map?

A. bank | *selects point that is on both x- and y-axes*

B. park | *selects point that is on neither axis*

C. school | *confuses the axes*

D. zoo | *

C-G.1.1.2

33. The locations of four buildings in a town can be shown on a coordinate grid. The ordered pairs below describe the locations of the buildings.

- movie theater: (4, 6)
- city hall: (1, 3)
- post office: (4, 1)
- market: (5, 3)

Harriet is standing closer to the market than to any of the other buildings. Which ordered pair could describe the location at which Harriet is standing?

A. (3, 3)   *same y-coordinate as market, but equidistant from city hall and market*

B. (4, 3)   *

C. (5, 1)   *same x-coordinate as market, but closest to post office*

D. (5, 6)   *same x-coordinate as market, but closest to movie theater*

C-G.1.1.2

34. A garage has a rectangular floor. The four points graphed on the coordinate grid below represent the locations of the four corners of the floor.
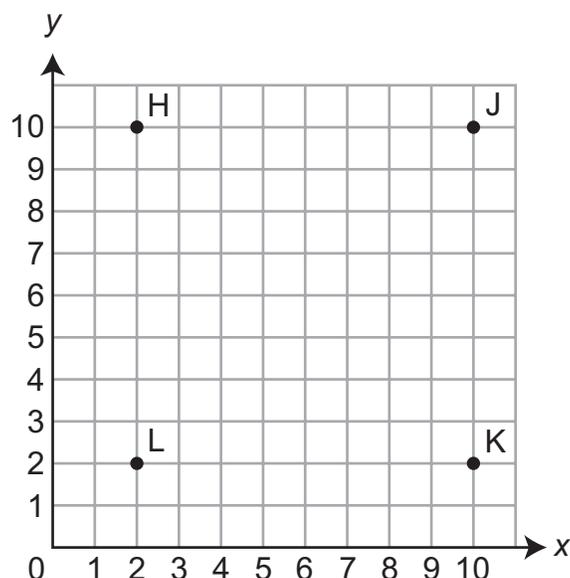
The opening for the garage door can be represented by a line segment. Each point on the line segment has an *x*-coordinate of 10. The opening for the garage door lies between which corners of the floor?

A. H and J | *confuses x-coordinates and y-coordinates* |

B. J and K   *

C. K and L | *confuses x-coordinate and y-coordinate and chooses ordered pairs that have the same y-coordinate, but one that is 2 rather than 10* |

D. L and H | *identifies points whose ordered pairs have same x-coordinate, but one that is 2 rather than 10 (opposite wall)* |

C-G.1.1.2

35. The coordinate grid below shows the location of a school library.
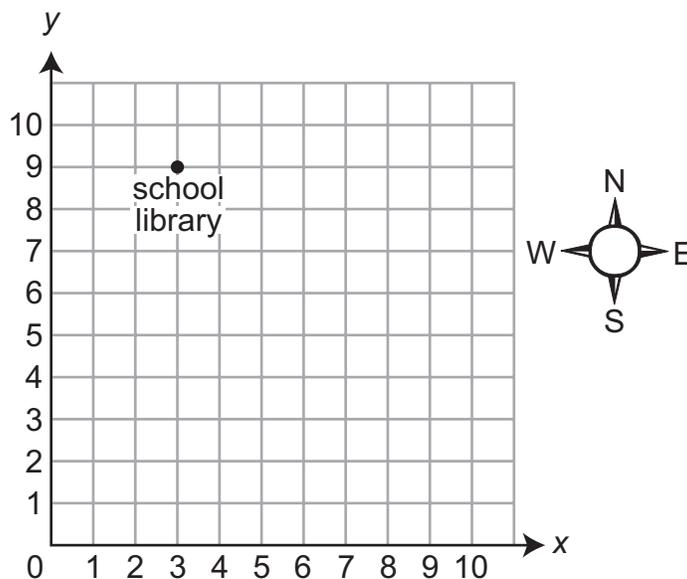
The school office is located at the origin of the coordinate grid. Which describes a path that could be followed to walk from the school library to the school office?

A. walk 2 units north, then 3 units west | misidentifies origin as (0, 11) |

B. walk 3 units west, then 9 units south   *

C. walk 8 units east, then 2 units north | misidentifies origin as (11, 11) |

D. walk 9 units north, then 3 units east | describes office to library |

C-G.1.1.2

36. The graph below shows the number of cans of green paint a store had on a shelf during a 7-day period.

Green Paint on Shelf
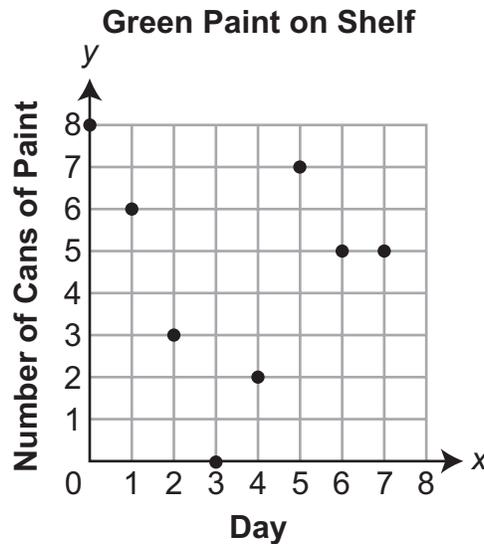
Based on the graph, which statement about the point graphed on the *x*-axis **must** be true?

A.   The store sold 3 cans of green paint on day 3.
   not enough information to determine from graph

B.   There were 8 cans of green paint on the shelf on day 8.
   not enough information to determine from graph

C.   There were 0 cans of green paint on the shelf on day 3.
   *

D.   The store had 8 cans of green paint on the shelf at the start of the 7-day period.
   interprets point graphed on y-axis

C-G.2

37. Two sides of a polygon are parallel and have the same length. Which statement about the polygon **must** be true?

A.   The polygon has exactly 3 sides. | *never true* |

B.   The polygon has exactly 4 sides. | *sometimes true* |

C.   The polygon has at least 4 sides.   *

D.   The polygon has an even number of sides. | *sometimes true* |

C-G.2.1.1
C-G.1.1.2

38. The coordinate grid below has three points plotted.
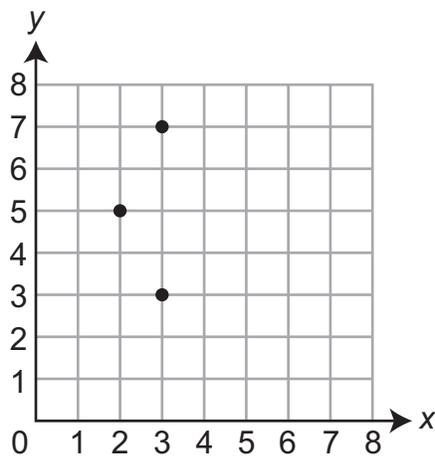
Which point could also be plotted on the grid so that the four points form the vertices of a parallelogram, but **not** a rhombus?

A.   (2, 1)   *

B.   (2, 6)   makes a trapezoid, not a parallelogram

C.   (4, 5)   makes a rhombus

D.   (6, 5)   makes a kite (i.e., pairs of adjacent sides are congruent), not a parallelogram

D-M.1.1.1
D-M.2.1.2

39. The bar graph below shows the heights, in **centimeters** (cm), of four vases.
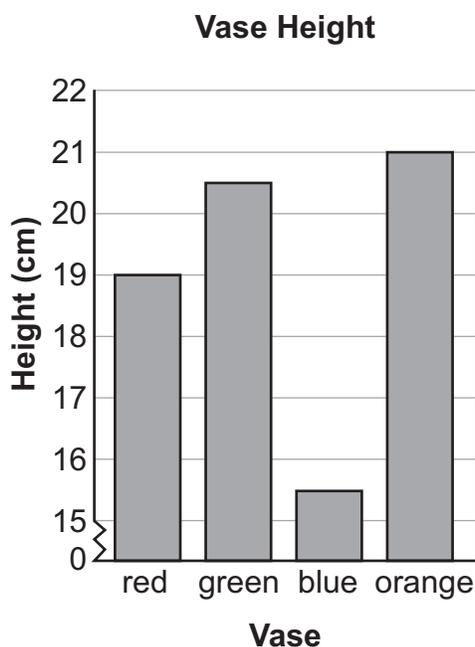
Vase Height

Based on the bar graph, what is the height, in **millimeters** (mm), of the vase with the greatest height?

A. 2.1 mm   *reads graph correctly but then divides by 10*

B. 21.0 mm   *reads graph correctly but does not convert to mm*

C. 210 mm   *

D. 2,100 mm   *reads graph correctly but multiplies by 100 instead of 10*

D-M.2.1

40. Kenny made the pictograph below to show the number of DVDs a library purchased in each of three months.

DVDs Purchased Each Month

Month	Number of DVDs
January	
February	
March	

Key: = 30 DVDs

Which statement explains why there **must** be an error in Kenny's pictograph?

A. The pictograph shows the library purchased $1\frac{1}{2}$ DVDs in January.

   does not use the key

B. The pictograph shows the library purchased $30\frac{1}{2}$ DVDs in January.

   does not correctly interpret the half-DVD symbol

C. The pictograph shows the library purchased no DVDs in February.

   assumes each row has to have some icons in it

D. The pictograph shows the library purchased $97\frac{1}{2}$ DVDs in March.

   *

D-M.2.1.1
D-M.1.1.1

41. Frankie measures and records the lengths, in **feet**, of nine worms. The line plot below shows the information she records.

Worm Lengths

Length (feet)
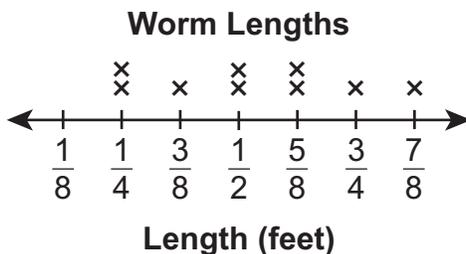
Based on the line plot, what is the difference between the lengths, in **inches**, of the longest worm and the shortest worm?

A. $4\frac{1}{2}$ inches | subtracts lengths of both shortest worms from longest: 7/8 – (1/4 + 1/4) |

B. $7\frac{1}{2}$ inches   *

C. 9 inches | uses greatest and least lengths shown on plot: 7/8 – 1/8 |

D. 18 inches | subtracts numerators and denominators |

D-M.2.1.2
D-M.1.1.1

42. The pictograph below shows the number of **gallons** of lemonade served each day at a carnival.

Lemonade Served at the Carnival

Day	Number of Gallons
Monday	◉ ◉
Tuesday	◉ ◉ ◉ ◖
Wednesday	◉ ◉ ◉ ◉ ◉ ◉
Thursday	◉ ◉ ◉ ◉ ◖
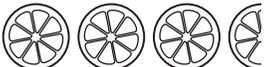
Key: ◉ = 1 gallon

How many **quarts** of lemonade were served on Thursday?

A. 16 quarts | *does not include half symbol* |

B. 17 quarts | *counts half symbol as 1 more quart* |

C. 18 quarts   *

D. 20 quarts | *interprets half symbol as a whole gallon* |

D-M.2.1.2
D-M.1.1.1

43. The bar graph below shows the annual rainfalls, in **inches**, of four cities.

Annual Rainfall
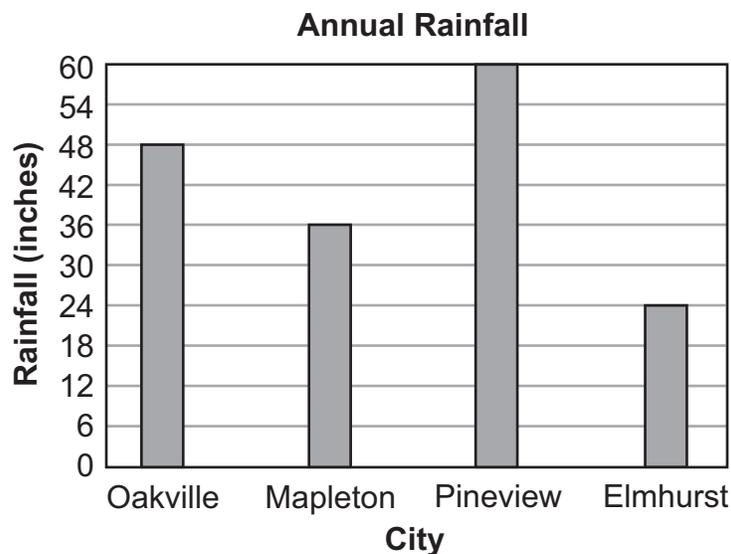
What is the difference, in **feet**, of the rainfalls of the city with the greatest rainfall and the city with the least rainfall?

A. 2 feet | *difference between first and last columns* |

B. 3 feet   *

C. 7 feet | *the sum of the greatest and least rainfalls* |

D. 36 feet | *does not convert from inches to feet* |

D-M.3.1.1
D-M.1.1.1

44. A fish tank is in the shape of a rectangular prism. The dimensions of the tank are shown in the picture below.
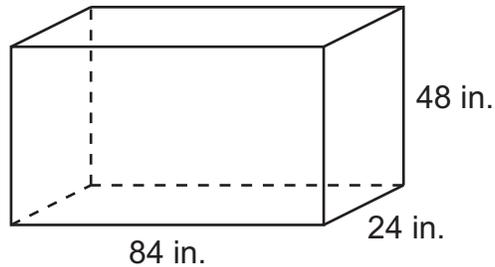
What is the volume of the tank in **cubic feet**?

A.   13 cubic feet | *converts correctly but adds dimensions* |

B.   56 cubic feet   *

C.   672 cubic feet | *correctly calculates volume in cubic inches, then divides by 144* |

D.   8,064 cubic feet | *correctly calculates volume in cubic inches, then divides by 12* |

D-M.3.1.2

45. The object pictured below is made from two rectangular prisms.

6 in.

50 in.

8 in.

30 in.

10 in.
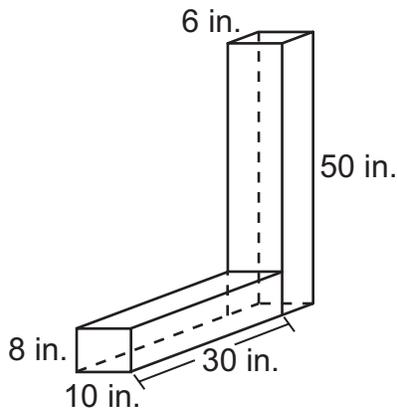
Which expression can be used to find the total volume, in cubic inches, of the object?

A. (8 × 10 × 30) + (50 × 10 × 6)   *

B. (8 × 10 × 30) + (50 × 8 × 6)   *uses 8 as the third dimension of the vertical prism*

C. (8 × 10 × 30) + (50 × 6)   *does not account for the third dimension of the vertical prism*

D. (8 × 10 × 30 × 50 × 6)   *multiplies all given numbers*

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FIRST OPEN-ENDED QUESTION

A-T.1.1.2
A-T.1.1.3

46. Greg and Holly compete in a track meet.

> Greg ran the 800-meter dash in $19{,}265 \div 10^2$ seconds.
>
> **A.** Write Greg's time for the 800-meter dash, in seconds, in standard form. Explain how you determined the correct placement of the decimal point.

Go to the next page to finish question 46.

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

Holly ran the 200-meter dash in 26.43 seconds. Greg ran the 200-meter dash in 26.425 seconds. Holly makes the statement shown below.

> I ran the 200-meter dash in less time than
> Greg did because 43 is less than 425.

B. Explain the error in Holly's statement. As part of your explanation, find the correct difference, in seconds, between the two times.

ITEM-SPECIFIC SCORING GUIDELINE

Question #46

Grade 5

Assessment Anchor this item will be reported under:

M05.A-T.1—Understand the place-value system.

Specific Anchor Descriptor addressed by this item:

M05.A-T.1.1—Demonstrate understanding of place-value of whole numbers and decimals, and compare quantities or magnitudes of numbers.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of the place-value system by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of the place-value system by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of the place-value system by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of the place-value system.
0	The response has no correct answer and insufficient evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-Scorables	B – Blank R – Refusal K – Off task/topic F – Foreign language U – Illegible

Top Scoring Student Response And Training Notes:

Score	Description
4	Student earns 4 points.
3	Student earns 3.0 – 3.5 points.
2	Student earns 2.0 – 2.5 points.
1	Student earns 0.5 – 1.5 points. OR Student demonstrates minimal understanding of the place-value system.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #46

Top Scoring Response:

Part A Answer	
What?	**Why?**
192.65 (seconds)	**Sample Explanation:** Since the number 19,265 is being divided by 10^2 the actual number is smaller than 19,265, so I need to move the decimal point to the left. The exponent 2 tells me I need to move the decimal point 2 places. So the time in standard form is 192.65 seconds. **OR equivalent**

(2 score points)

      1 point for correct answer
      1 point for correct and complete explanation
          OR ½ point for correct but incomplete explanation

Part B Answer	
What?	**Why?**
0.005 (second)	**Sample Explanation:** Holly did not recognize that she is comparing tenths, hundredths, and thousandths rather than tens and hundreds. 0.43 is more than 0.425 because $\frac{43}{100} = \frac{430}{1,000}$ is more than $\frac{425}{1,000}$. **OR equivalent**

(2 score points)

      1 point for correct answer
      1 point for correct and complete explanation
          OR ½ point for correct but incomplete explanation

FIRST OPEN-ENDED QUESTION RESPONSES

A-T.1.1.2
A-T.1.1.3   Response Score: 4

46. Greg and Holly compete in a track meet.

Greg ran the 800-meter dash in $19{,}265 \div 10^2$ seconds.

A. Write Greg's time for the 800-meter dash, in seconds, in standard form. Explain how you determined the correct placement of the decimal point.

192.65 seconds

When dividing by exponents, move the decimal to the left the number of places that the exponent is. So here it is 10^2 so the 2 tells me to go 2 places left.

$$19{,}625 \div 10^2 = 192.65$$

> The student has given a correct answer.
> The student has given a complete explanation.

Go to the next page to finish question 46.

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

Holly ran the 200-meter dash in 26.43 seconds. Greg ran the 200-meter dash in 26.425 seconds. Holly makes the statement shown below.

I ran the 200-meter dash in less time than
Greg did because 43 is less than 425.

B. Explain the error in Holly's statement. As part of your explanation, find the correct difference, in seconds, between the two times.

43 is less than 425 but Holly forgot that this is on the <u>right</u> side of the decimal so it is tenths not tens and hundred<u>ths</u> not hundreds and then thousand<u>ths</u> too. So her time is really 26 and $\frac{430}{1000}$ and Greg's time is really 26 and $\frac{425}{1000}$ so his time is less than Holly's by .005 second.

The student has given a correct answer.
The student has given a complete explanation.

A-T.1.1.2
A-T.1.1.3   Response Score: 3

46. Greg and Holly compete in a track meet.

Greg ran the 800-meter dash in $19{,}265 \div 10^2$ seconds.

A. Write Greg's time for the 800-meter dash, in seconds, in standard form. Explain how you determined the correct placement of the decimal point.

$$19{,}265 \div 10^2$$

$$192.65$$

> The student has given a correct answer.
> The student has given a correct but incomplete explanation.

Go to the next page to finish question 46.

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

Holly ran the 200-meter dash in 26.43 seconds. Greg ran the 200-meter dash in 26.425 seconds. Holly makes the statement shown below.

> I ran the 200-meter dash in less time than
> Greg did because 43 is less than 425.

B. Explain the error in Holly's statement. As part of your explanation, find the correct difference, in seconds, between the two times.

$$26.4\overset{2}{\cancel{3}}\overset{1}{0} \quad \text{Holly}$$
$$-26.425 \quad \text{Greg}$$
$$\overline{00.005} \quad \text{seconds}$$

Holly thinks she is faster but you can see she is not but it is very, very close. She forgot that numbers are different when they are decimals.

> The student has given a correct answer.
> The student has given a correct but incomplete explanation.

A-T.1.1.2
A-T.1.1.3   Response Score: 2

46. Greg and Holly compete in a track meet.

Greg ran the 800-meter dash in $19{,}265 \div 10^2$ seconds.

A. Write Greg's time for the 800-meter dash, in seconds, in standard form. Explain how you determined the correct placement of the decimal point.

The number will get smaller since Greg is dividing and he should move the decimal that you don't see after the 5 over to the left 2 places because the exponent is 2. So the new number is 192.65.

> The student has given a correct answer.
> The student has given a complete explanation.

Go to the next page to finish question 46.

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

Holly ran the 200-meter dash in 26.43 seconds. Greg ran the 200-meter dash in 26.425 seconds. Holly makes the statement shown below.

> I ran the 200-meter dash in less time than
> Greg did because 43 is less than 425.

B. Explain the error in Holly's statement. As part of your explanation, find the correct difference, in seconds, between the two times.

Holly almost won but she is wrong even though it looks like she is faster.
Greg beat her by 5 seconds.

The student has given an incorrect answer.
The student has given an incorrect explanation.

A-T.1.1.2
A-T.1.1.3   Response Score: 1

46. Greg and Holly compete in a track meet.

Greg ran the 800-meter dash in $19{,}265 \div 10^2$ seconds.

A. Write Greg's time for the 800-meter dash, in seconds, in standard form. Explain how you determined the correct placement of the decimal point.

move the decimal place over.

$19{,}265 \div 10^2 = 192.65$

> The student has given a correct answer.
> The student has given an incorrect explanation.

Go to the next page to finish question 46.

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

Holly ran the 200-meter dash in 26.43 seconds. Greg ran the 200-meter dash in 26.425 seconds. Holly makes the statement shown below.

> I ran the 200-meter dash in less time than
> Greg did because 43 is less than 425.

B. Explain the error in Holly's statement. As part of your explanation, find the correct difference, in seconds, between the two times.

$$425 - 43 = 382$$

So Holly is faster than Greg.

> The student has given an incorrect answer.
> The student has given an incorrect explanation.

A-T.1.1.2
A-T.1.1.3   Response Score: 0

46. Greg and Holly compete in a track meet.

Greg ran the 800-meter dash in $19{,}265 \div 10^2$ seconds.

A. Write Greg's time for the 800-meter dash, in seconds, in standard form. Explain
how you determined the correct placement of the decimal point.

19,265,00

One thousand nine hundred
and two hundred sixty
five

The student has given an incorrect answer.
The student has given an incorrect explanation.

Go to the next page to finish question 46.

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

Holly ran the 200-meter dash in 26.43 seconds. Greg ran the 200-meter dash in 26.425 seconds. Holly makes the statement shown below.

> I ran the 200-meter dash in less time than
> Greg did because 43 is less than 425.

B. Explain the error in Holly's statement. As part of your explanation, find the correct difference, in seconds, between the two times.

Greg and Holly are both very fast but Holly is faster because she has only 2 place values and Greg has 3 after the decimal point.

> The student has given an incorrect answer.
> The student has given an incorrect explanation.

SECOND OPEN-ENDED QUESTION

A-F.1

47. Pamela made a metal plate in the shape of a rectangle. The metal plate is represented in the diagram below.

Metal Plate

$3\dfrac{1}{2}$ in.

$5\dfrac{5}{8}$ in.
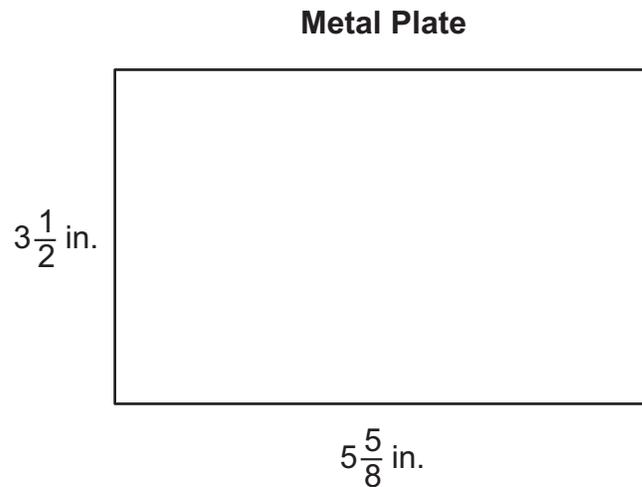
A. What is the area, in square inches, of the metal plate?

(Hint: Area = length × width)

Go to the next page to finish question 47.

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

Pamela cut an opening in the metal plate in the shape of a rectangle as represented below.

Metal Plate

width

$3\frac{1}{2}$ in. $1\frac{1}{4}$ in.   opening $2\frac{3}{8}$ in.

$5\frac{5}{8}$ in.
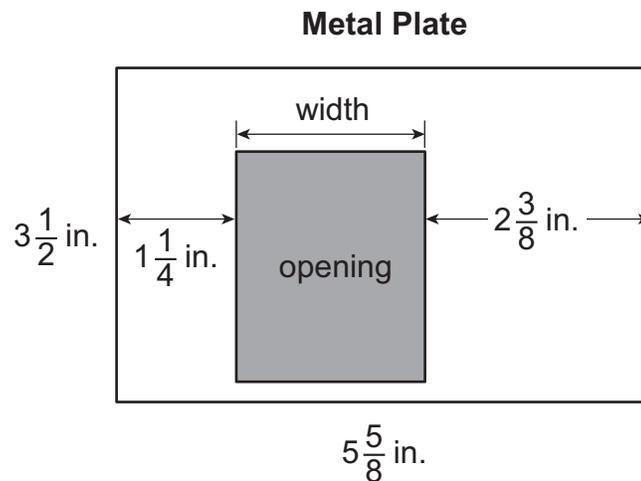
B. What is the width, in inches, of the opening? Show or explain all your work.

Pamela calculates that the area of the opening is 9 square inches, but her calculation is incorrect.

C. Explain why Pamela's calculation **must** be incorrect.

(Hint: Area = length × width)

ITEM-SPECIFIC SCORING GUIDELINE

Question #47

Grade 5

Assessment Anchor this item will be reported under:

> M05.A-F.1—Use equivalent fractions as a strategy to add and subtract fractions.

Specific Anchor Descriptor addressed by this item:

> M05.A-F.1.1—Solve addition and subtraction problems involving fractions (straight computation or word problems).
>
> M05.A-F.2.1—Solve multiplication and division problems involving fractions and whole numbers (straight computation or word problems).

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of how to use equivalent fractions as a strategy to add and subtract fractions by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to use equivalent fractions as a strategy to add and subtract fractions by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to use equivalent fractions as a strategy to add and subtract fractions by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to use equivalent fractions as a strategy to add and subtract fractions.
0	The response has no correct answer and insufficient evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-Scorables	B – Blank R – Refusal K – Off task/topic F – Foreign language U – Illegible

Top Scoring Student Response And Training Notes:

Score	Description
4	Student earns 4 points.
3	Student earns 3.0 – 3.5 points.
2	Student earns 2.0 – 2.5 points.
1	Student earns 0.5 – 1.5 points. OR Student demonstrates minimal understanding of how to use equivalent fractions as a strategy to add and subtract fractions.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #47

Top Scoring Response:

Part A Answer	
What?	**Why?**
$19\frac{11}{16}$ (square inches)	

(1 score point)

      1 point for correct answer

Part B Answer	
What?	**Why?**
2 (inches)	**Sample Work:** $5\frac{5}{8} - 1\frac{1}{4} - 2\frac{3}{8} = 2$ **OR** **Sample Explanation:** I subtracted $1\frac{1}{4}$ and $2\frac{3}{8}$ from $5\frac{5}{8}$ to get 2 inches for the width of the hole.

(2 score points)

      1 point for correct answer
      1 point for complete support
           OR ½ point for correct but incomplete support

Part C Answer	
What?	**Why?**
	Sample Explanation: Since the area of the hole is the product of the width and the length, I can divide the area by the width to find the length, $9 \div 2 = 4\frac{1}{2}$. That means the hole would be $4\frac{1}{2}$ inches in length. However, the width of the entire metal plate is only $3\frac{1}{2}$ inches, so Pamela's calculation must be incorrect.

(1 score point)

      1 point for complete explanation
           OR ½ point for correct but incomplete explanation

SECOND OPEN-ENDED QUESTION RESPONSES

A-F.1   Response Score: 4

47. Pamela made a metal plate in the shape of a rectangle. The metal plate is represented in the diagram below.

Metal Plate

$3\frac{1}{2}$ in.

$5\frac{5}{8}$ in.

A. What is the area, in square inches, of the metal plate?

(Hint: Area = length × width)

$$19\frac{11}{16}$$

The student has given a correct answer.

Go to the next page to finish question 47.

47. **_Continued._** Please refer to the previous page for task explanation.

Pamela cut an opening in the metal plate in the shape of a rectangle as represented below.

Metal Plate

width γ

$3\frac{1}{2}$ in.

$1\frac{1}{4}$ in.

opening

$2\frac{3}{8}$ in.

$5\frac{5}{8}$ in.
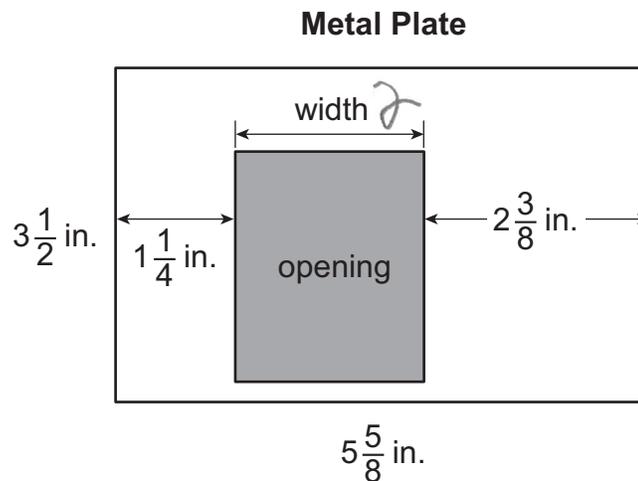
B. What is the width, in inches, of the opening? Show or explain all your work.

$$5\frac{5}{8} - 1\frac{1}{4} = 4\frac{3}{8} \qquad 4\frac{3}{8} - 2\frac{3}{8} = \textcircled{2}$$

> The student has given a correct answer.
> The student has shown complete support.

Pamela calculates that the area of the opening is 9 square inches, but her calculation is incorrect.

C. Explain why Pamela's calculation **must** be incorrect.

(Hint: Area = length × width)

$$2 \times ? = 9, \quad \frac{9}{2} = 4\frac{1}{2}$$

The length is $4\frac{1}{2}$" if the width is 2" but width of whole plate is only $3\frac{1}{2}$" and area is 9 sq. in. So she is wrong.

> The student has given a complete explanation.

A-F.1   Response Score: 3

47. Pamela made a metal plate in the shape of a rectangle. The metal plate is represented in the diagram below.

Metal Plate

$3\frac{1}{2}$ in.

$5\frac{5}{8}$ in.
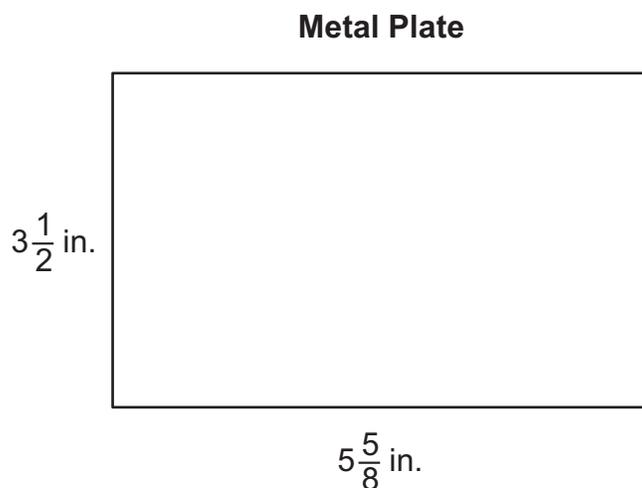
A. What is the area, in square inches, of the metal plate?

(Hint: Area = length × width)

$$3\frac{1}{2} + 5\frac{5}{8} = \frac{7}{2} + \frac{45}{8} = \frac{315}{16} = 19\frac{11}{16}$$

The student has given a correct answer.

Go to the next page to finish question 47.

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

Pamela cut an opening in the metal plate in the shape of a rectangle as represented below.

Metal Plate

$3\frac{1}{2}$ in. $1\frac{1}{4}$ in. width opening $2\frac{3}{8}$ in.

$5\frac{5}{8}$ in.
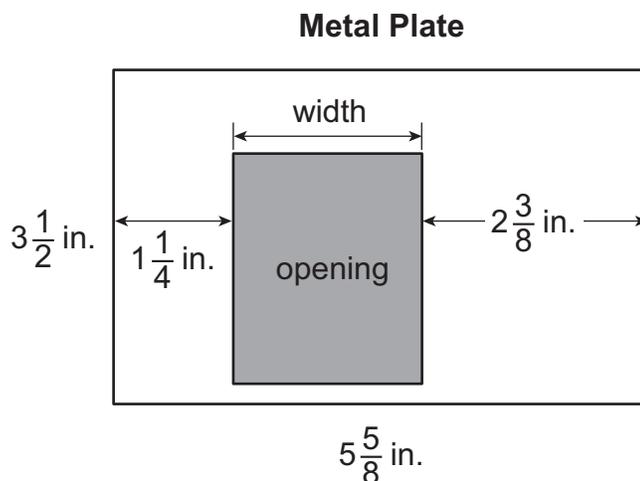
B. What is the width, in inches, of the opening? Show or explain all your work.

I subtracted $1\frac{2}{4}$ and $2\frac{3}{8}$ from $5\frac{5}{8}$ and got 2

> The student has given a correct answer.
> The student has shown complete support.

Pamela calculates that the area of the opening is 9 square inches, but her calculation is incorrect.

C. Explain why Pamela's calculation **must** be incorrect.

(Hint: Area = length × width)

$3 \times 3 = 9$ but this is not 3"

> The student has given an incorrect explanation.

A-F.1   Response Score: 2

47. Pamela made a metal plate in the shape of a rectangle. The metal plate is represented in the diagram below.

Metal Plate

$3\frac{1}{2}$ in.

$5\frac{5}{8}$ in.
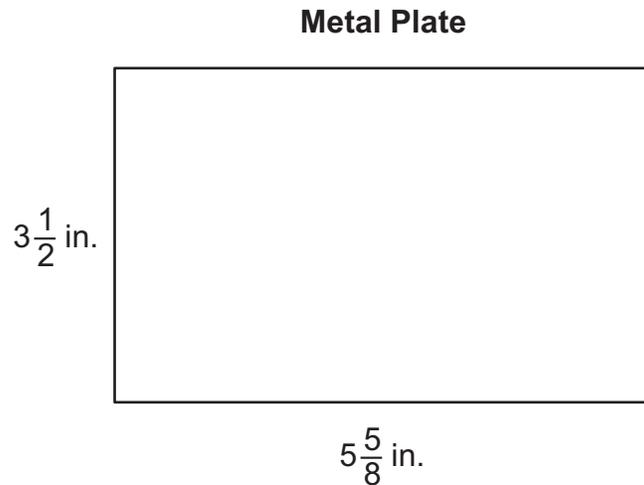
A. What is the area, in square inches, of the metal plate?

(Hint: Area = length × width)

$$3\frac{1}{2} \cdot 5\frac{5}{8} = 15\frac{6}{10}$$

The student has given an incorrect answer.

Go to the next page to finish question 47.

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

Pamela cut an opening in the metal plate in the shape of a rectangle as represented below.

Metal Plate

$3\frac{1}{2}$ in. $1\frac{1}{4}$ in.   width $2\frac{3}{8}$ in.   opening

$5\frac{5}{8}$ in.
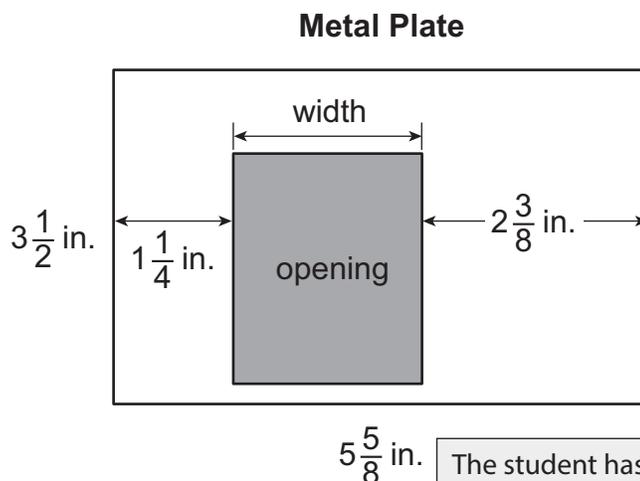
> The student has given a correct answer.
> The student has shown complete support.

B. What is the width, in inches, of the opening? Show or explain all your work.

just subtract the parts from the length like this $5\frac{5}{8} - 2\frac{3}{8} - 1\frac{1}{4}$

= 2

Pamela calculates that the area of the opening is 9 square inches, but her calculation is incorrect.

C. Explain why Pamela's calculation **must** be incorrect.

(Hint: Area = length × width)

Because $3\frac{1}{2} \cdot 2 = 6\frac{1}{2}$

> The student has given an incorrect explanation.

A-F.1 Response Score: 1

47. Pamela made a metal plate in the shape of a rectangle. The metal plate is represented in the diagram below.

Metal Plate

$3\frac{1}{2}$ in.

$5\frac{5}{8}$ in.
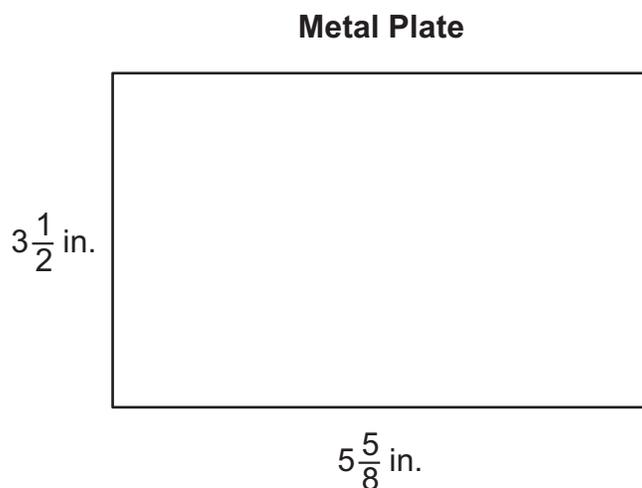
A. What is the area, in square inches, of the metal plate?

(Hint: Area = length × width)

I think it is $19\frac{11}{16}$

The student has given a correct answer.

Go to the next page to finish question 47.

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

Pamela cut an opening in the metal plate in the shape of a rectangle as represented below.

Metal Plate

$5\frac{5}{8}$ in.
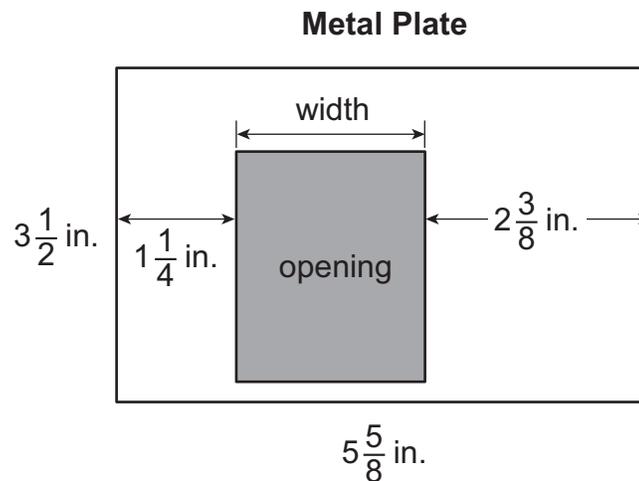
B. What is the width, in inches, of the opening? Show or explain all your work.

$$5\frac{5}{8} - 3\frac{1}{2} = 2\frac{4}{6}$$

> The student has given an incorrect answer. The student has shown incorrect support.

Pamela calculates that the area of the opening is 9 square inches, but her calculation is incorrect.

C. Explain why Pamela's calculation **must** be incorrect.

(Hint: Area = length × width)

It doesnt add up to 9.

> The student has given an incorrect explanation.

A-F.1   Response Score: 0

47. Pamela made a metal plate in the shape of a rectangle. The metal plate is represented in the diagram below.

Metal Plate

$3\frac{1}{2}$ in.

$5\frac{5}{8}$ in.
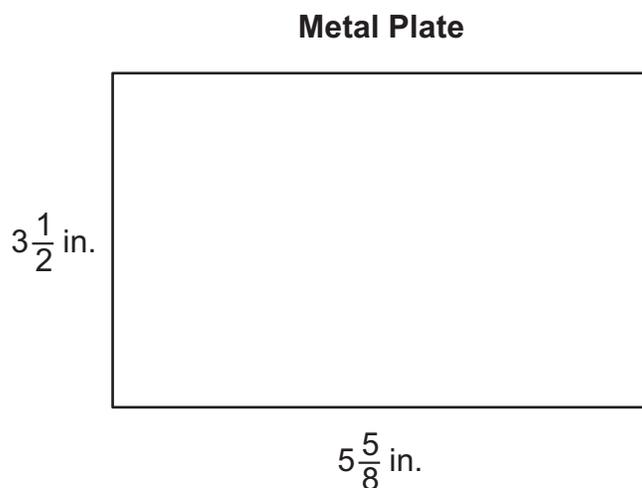
A. What is the area, in square inches, of the metal plate?

(Hint: Area = length × width)

$$5 + 3 = 8$$

The student has given an incorrect answer.

Go to the next page to finish question 47.

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

Pamela cut an opening in the metal plate in the shape of a rectangle as represented below.

Metal Plate

width

$3\frac{1}{2}$ in. $1\frac{1}{4}$ in. opening $2\frac{3}{8}$ in.

$5\frac{5}{8}$ in.
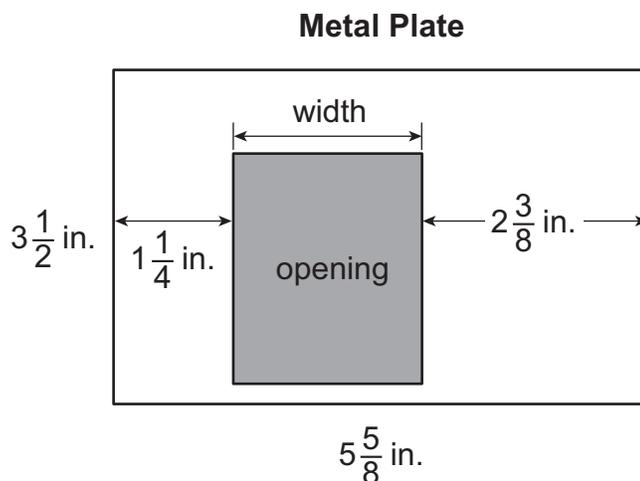
B. What is the width, in inches, of the opening? Show or explain all your work.

$$2 + 1 = 3$$

> The student has given an incorrect answer.
> The student has shown incorrect support.

Pamela calculates that the area of the opening is 9 square inches, but her calculation is incorrect.

C. Explain why Pamela's calculation **must** be incorrect.

(Hint: Area = length × width)

IDK

> The student has given an incorrect explanation.

THIRD OPEN-ENDED QUESTION

B-O.2

Marsha makes a number pattern. Her pattern starts with 8. To find the next number, she uses the rule multiply by 2, then subtract 4.

A. In the blanks provided below, write the next three terms in Marsha's pattern.

Marsha's pattern: 8, ☐ , ☐ , ☐

Steve makes the number pattern shown below.

Steve's pattern: 4, 25, 130, 655

B. What is the rule for Steve's pattern?

Question 48
Page 2 of 3

Brenda and Javier each make a number pattern. The first five terms in each pattern are shown below.

Brenda's pattern: 7, 10, 13, 16, 19

Javier's pattern: 7, 11, 15, 19, 23

Both patterns continue.

C. Explain why the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

Question 48 ▷
Page 3 of 3

Claire and Dan also make number patterns.

- The starting number for both patterns is the same and is between 17 and 27.
- Claire's pattern uses the rule add 9.
- The sum of any term in Claire's pattern and the corresponding term in Dan's pattern is a multiple of 7.

D. In the blanks provided below, write the first three terms of a possible pattern Dan might have made.

Dan's possible pattern: ☐ , ☐ , ☐

ITEM-SPECIFIC SCORING GUIDELINE

Question #48

Grade 5

Assessment Anchor this item will be reported under:

> M05.B-O.2—Analyze patterns and relationships.

Specific Anchor Descriptor addressed by this item:

> M05.B-O.2.1—Create, extend, and analyze patterns.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of how to analyze patterns and relationships by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to analyze patterns and relationships by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to analyze patterns and relationships by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to analyze patterns and relationships.
0	The response has no correct answer and insufficient evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-Scorables	B – Blank R – Refusal K – Off task/topic F – Foreign language U – Illegible

Top Scoring Student Response And Training Notes:

Score	Description
4	Student earns 4 points.
3	Student earns 3.0 – 3.5 points.
2	Student earns 2.0 – 2.5 points.
1	Student earns 0.5 – 1.5 points. OR Student demonstrates minimal understanding of how to analyze patterns and relationships.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #48

Top Scoring Response:

Part A Answer	
What?	**Why?**
8, _12_ , _20_ , _36_	

(1 score point)

    1 point for all 3 correct answers

Part B Answer	
What?	**Why?**
add 1, then multiply by 5 **OR** multiply by 5, then add 5	

(1 score point)

    1 point for correct answer

Part C Answer	
What?	**Why?**
	Sample Explanation: The sum of the terms in the patterns forms a new pattern. This pattern begins with $7 + 7 = 14$, which is a multiple of 7 (7×2). Since the rule for Brenda's pattern is "add 3" and the rule for Javier's pattern is "add 4", the rule for the sum pattern is "add 7". Since the first term is a multiple of 7 and the rule is "add 7", the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

(1 score point)

    1 point for complete explanation

Part D Answer		
What?		**Why?**

Answers may vary. First term must start with 21. The rule for the patterns must be +5 OR +12 OR +19 OR +26 OR …
   OR
−2 OR −9 OR −16 OR −23 OR …
 	
Sample answers:
Dan's possible pattern: 21, 19, 17 [uses a −2 rule]
   OR
Dan's possible pattern: 21, 40, 59 [uses a + 19 rule]		

(1 score point)

    1 point for correct answer

THIRD OPEN-ENDED QUESTION RESPONSES

B-O.2   Response Score: 4

Question 48 ▷
Page 1 of 3

Marsha makes a number pattern. Her pattern starts with 8. To find the next number, she uses the rule multiply by 2, then subtract 4.

A. In the blanks provided below, write the next three terms in Marsha's pattern.

Marsha's pattern: 8, | 12 | - | 20 | - | 36 |

> The student has given all correct answers.

Steve makes the number pattern shown below.

Steve's pattern: 4,   25,   130,   655

B. What is the rule for Steve's pattern?

EQ

x5 +5

> The student has given a correct answer.

Question 48
Page 2 of 3

Brenda and Javier each make a number pattern. The first five terms in each pattern are shown below.

Brenda's pattern: 7, 10, 13, 16, 19

Javier's pattern: 7, 11, 15, 19, 23

Both patterns continue.

C. Explain why the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

The sum of the 1st terms is a multiple of 7 because 7 x 2 = 14. Brendas pattern is +3 and Javier is +4 so the rule for the sum of pattern is +7. Because it starts with multiple of 7 and adding 7 it will stay a multiple of 7.

The student has given a complete explanation.

Question 48 ▷
Page 3 of 3

Claire and Dan also make number patterns.

- The starting number for both patterns is the same and is between 17 and 27.

- Claire's pattern uses the rule add 9.

- The sum of any term in Claire's pattern and the corresponding term in Dan's pattern is a multiple of 7.

D. In the blanks provided below, write the first three terms of a possible pattern Dan might have made.

Dan's possible pattern: 21 , 19 , 17

The student has given a correct answer.

B-O.2   Response Score: 3

Question 48 ▷
Page 1 of 3

Marsha makes a number pattern. Her pattern starts with 8. To find the next number, she uses the rule multiply by 2, then subtract 4.

A. In the blanks provided below, write the next three terms in Marsha's pattern.

Marsha's pattern: 8, | 12 | , | 20 | , | 36 |

The student has given all correct answers.

Steve makes the number pattern shown below.

Steve's pattern: 4,   25,   130,   655

B. What is the rule for Steve's pattern?

add 1 then times by 5

The student has given a correct answer.

Question 48 ▷
Page 2 of 3

Brenda and Javier each make a number pattern. The first five terms in each pattern are shown below.

Brenda's pattern: 7, 10, 13, 16, 19
Javier's pattern: 7, 11, 15, 19, 23

Both patterns continue.

C. Explain why the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

they add up to multiples of seven

The student has given an insufficient explanation.

Question 48 ▷
Page 3 of 3

Claire and Dan also make number patterns.

- The starting number for both patterns is the same and is between 17 and 27.

- Claire's pattern uses the rule add 9.

- The sum of any term in Claire's pattern and the corresponding term in Dan's pattern is a multiple of 7.

D. In the blanks provided below, write the first three terms of a possible pattern Dan might have made.

Dan's possible pattern: [21] , [40] , [59]

The student has given a correct answer.

B-O.2   Response Score: 2

Question 48
Page 1 of 3

Marsha makes a number pattern. Her pattern starts with 8. To find the next number, she uses the rule multiply by 2, then subtract 4.

A. In the blanks provided below, write the next three terms in Marsha's pattern.

Marsha's pattern: 8,   12 ,   20 ,   36

The student has given all correct answers.

Steve makes the number pattern shown below.

Steve's pattern: 4,   25,   130,   655

B. What is the rule for Steve's pattern?

EQ

add 1 then multiply by 5

The student has given a correct answer.

Next

Options

Flag

Exit

Review/End Test

Question 48
Page 2 of 3

Brenda and Javier each make a number pattern. The first five terms in each pattern are shown below.

Brenda's pattern: 7, 10, 13, 16, 19

Javier's pattern: 7, 11, 15, 19, 23

Both patterns continue.

C. Explain why the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

they are 22 25 28 and 27 31 35 so they just keep going

The student has given an incorrect explanation.

Question 48 ▷
Page 3 of 3

Claire and Dan also make number patterns.

- The starting number for both patterns is the same and is between 17 and 27.

- Claire's pattern uses the rule add 9.

- The sum of any term in Claire's pattern and the corresponding term in Dan's pattern is a multiple of 7.

D. In the blanks provided below, write the first three terms of a possible pattern Dan might have made.

Dan's possible pattern: [17] , [27] , [36]

The student has given an incorrect answer.

B-O.2 Response Score: 1

Question 48 ▷
Page 1 of 3

Marsha makes a number pattern. Her pattern starts with 8. To find the next number, she uses the rule multiply by 2, then subtract 4.

A. In the blanks provided below, write the next three terms in Marsha's pattern.

Marsha's pattern: 8,   [12]   ,   [20]   ,   [36]

The student has given all correct answers.

Steve makes the number pattern shown below.

Steve's pattern: 4,   25,   130,   655

B. What is the rule for Steve's pattern?

EQ

multiply by 4

The student has given an incorrect answer.

Next

Review/End Test   Exit   Flag   Options   ▲ ● ■

Brenda and Javier each make a number pattern. The first five terms in each pattern are shown below.

Brenda's pattern: 7, 10, 13, 16, 19

Javier's pattern: 7, 11, 15, 19, 23

Both patterns continue.

C. Explain why the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

7 + 7 = 14

The student has given an incorrect explanation.

Claire and Dan also make number patterns.

- The starting number for both patterns is the same and is between 17 and 27.
- Claire's pattern uses the rule add 9.
- The sum of any term in Claire's pattern and the corresponding term in Dan's pattern is a multiple of 7.

D. In the blanks provided below, write the first three terms of a possible pattern Dan might have made.

Dan's possible pattern: $\boxed{+9}$, $\boxed{+7}$, $\boxed{+9}$

The student has given an incorrect answer.

B-O.2   Response Score: 0

Question 48
Page 1 of 3

Marsha makes a number pattern. Her pattern starts with 8. To find the next number, she uses the rule multiply by 2, then subtract 4.

A. In the blanks provided below, write the next three terms in Marsha's pattern.

Marsha's pattern: 8,   [x2]   -   [-4]   -   [x2]

The student has given an incorrect answer.

Steve makes the number pattern shown below.

Steve's pattern: 4,   25,   130,   655

B. What is the rule for Steve's pattern?

EQ

add them up

The student has given an incorrect answer.

Question 48 ▷
Page 2 of 3

Brenda and Javier each make a number pattern. The first five terms in each pattern are shown below.

Brenda's pattern: 7, 10, 13, 16, 19
Javier's pattern: 7, 11, 15, 19, 23

Both patterns continue.

C. Explain why the sum of any term in Brenda's pattern and the corresponding term in Javier's pattern will always be a multiple of 7.

EQ
you just keep adding 7

The student has given an incorrect explanation.

Next

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Options

Flag

Exit

Review/End Test

Question 48 ▷
Page 3 of 3

Claire and Dan also make number patterns.

- The starting number for both patterns is the same and is between 17 and 27.

- Claire's pattern uses the rule add 9.

- The sum of any term in Claire's pattern and the corresponding term in Dan's pattern is a multiple of 7.

D. In the blanks provided below, write the first three terms of a possible pattern Dan might have made.

Dan's possible pattern: 26 , 35 , 44

The student has given an incorrect answer.

FOURTH OPEN-ENDED QUESTION

C-G.1.1.2

Question 49
Page 1 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

To represent one corner of the floor of the playhouse, Catherine plots a point at (2, 0) and labels it Q. To represent the opposite corner of the floor of the playhouse, she plots a point at (8, 6) and labels it S.

A. On the coordinate grid shown below, plot and label both point Q and point S.

Question 49
Page 2 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

All four edges of the playhouse floor are the same length. Catherine plots another corner on the x-axis and labels it R. She then plots the last corner and labels it T.

B. What are the ordered pairs for point R and point T? Explain how you determined the values in each ordered pair.

0 / 1000

point R:

point T:

Back

Review/End Test   Pause   Flag   Options

ITEM-SPECIFIC SCORING GUIDELINE

Question #49

Grade 5

Assessment Anchor this item will be reported under:

> M05.C-G.1—Graph points on the coordinate plane to solve real-world and mathematical problems.

Specific Anchor Descriptor addressed by this item:

> M05.C-G.1.1—Identify parts of a coordinate grid and describe or interpret points given an ordered pair.
> M05.C-G.2.1—Use basic properties to classify two-dimensional figures.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of how to graph points on the coordinate plane to solve real-world problems by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to graph points on the coordinate plane to solve real-world problems by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to graph points on the coordinate plane to solve real-world problems by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to graph points on the coordinate plane to solve real-world problems.
0	The response has no correct answer and insufficient evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-Scorables	B – Blank R – Refusal K – Off task/topic F – Foreign language U – Illegible

Top Scoring Student Response And Training Notes:

Score	Description
4	Student earns 4 points.
3	Student earns 3.0 – 3.5 points.
2	Student earns 2.0 – 2.5 points.
1	Student earns 0.5 – 1.5 points. OR Student demonstrates minimal understanding of how to graph points on the coordinate plane to solve real-world problems.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #49

Top Scoring Response:

Part A Answer	
What?	**Why?**

(2 score points)

> ½ point for <u>each</u> correct point
> ½ point for <u>each</u> correct label

Part B Answer	
What?	**Why?**
point R: (8, 0) point T: (2, 6)	**Sample Explanation:** Since point R is on the *x*-axis, its *y*-coordinate must be 0. It also has to be the same distance from point Q and point S, so point R must be at (8, 0) since this point is 6 units away from both point Q and point S. Point T must also be 6 units away from point Q and point S, so it must be at (2, 6) since that point is 6 units above point Q and 6 units to the left of point S. **OR equivalent**

(2 score points)

> ½ point for <u>each</u> ordered pair
> 1 point for correct and complete explanation
>   OR ½ point for correct but incomplete explanation

Note: Student must write the ordered pairs with parentheses and commas for credit; no credit for writing the correct order pairs in the wrong space.

FOURTH OPEN-ENDED QUESTION RESPONSES

C-G.1.1.2   Response Score: 4

Question 49
Page 1 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

To represent one corner of the floor of the playhouse, Catherine plots a point at (2, 0) and labels it Q. To represent the opposite corner of the floor of the playhouse, she plots a point at (8, 6) and labels it S.

A. On the coordinate grid shown below, plot and label both point Q and point S.

The student has plotted two correct points.
The student has given two correct labels.

Question 49
Page 2 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

All four edges of the playhouse floor are the same length. Catherine plots another corner on the x-axis and labels it R. She then plots the last corner and labels it T.

B. What are the ordered pairs for point R and point T? Explain how you determined the values in each ordered pair.

It says that point R is on the x-axis so it's y-coordinate has to be 0. Since it also has to be the same distance from point Q and point S the only place it can be is (8, 0). It is 6 units away from oth those points. Point T must also be 6 units from point Q and 6 units from point S so it is at (2, 6). that makes it 6 above point Q and 6 left of point S.

356 / 1000

point R: (8, 0)

point T: (2, 6)

The student has given two correct answers.
The student has given a complete explanation.

Back

Review/End Test   Pause   Flag   Options

C-G.1.1.2   Response Score: 3

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

To represent one corner of the floor of the playhouse, Catherine plots a point at (2, 0) and labels it Q. To represent the opposite corner of the floor of the playhouse, she plots a point at (8, 6) and labels it S.

A. On the coordinate grid shown below, plot and label both point Q and point S.

The student has plotted two correct points.
The student has given two correct labels.

Question 49
Page 2 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

All four edges of the playhouse floor are the same length. Catherine plots another corner on the x-axis and labels it R. She then plots the last corner and labels it T.

B. What are the ordered pairs for point R and point T? Explain how you determined the values in each ordered pair.

Point R is on the x-axis so it is (8, 0). Point T is the other corner to be a square.

85 / 1000

point R: (8, 0)

point T: (2, 6)

The student has given two correct answers.
The student has given a correct but incomplete explanation.

Pause   Flag   Options   Review/End Test   Back

C-G.1.1.2   Response Score: 2

Question 49
Page 1 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

To represent one corner of the floor of the playhouse, Catherine plots a point at (2, 0) and labels it Q. To represent the opposite corner of the floor of the playhouse, she plots a point at (8, 6) and labels it S.

A. On the coordinate grid shown below, plot and label both point Q and point S.

The student has plotted two correct points.
The student has given no correct labels.

Question 49
Page 2 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

All four edges of the playhouse floor are the same length. Catherine plots another corner on the x-axis and labels it R. She then plots the last corner and labels it T.

B. What are the ordered pairs for point R and point T? Explain how you determined the values in each ordered pair.

Catherine knows that point R is on the same line as point Q (x-axis) so that means that it doesn't go up at all for the y. It is 6 over to the right from point Q and 6 down from point S so those sides are the same size. Then she counted 6 up on the line from point Q and 6 over to the left from point S for point T so that all the sides would be the same. These are where Catherine has to put the other points.

409 / 1000

point R: (0, 8)

point T: (6, 2)

The student has given no correct answers.
The student has given a complete explanation.

Back

Options

Flag

Pause

Review/End Test

C-G.1.1.2   Response Score: 1

Question 49
Page 1 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

To represent one corner of the floor of the playhouse, Catherine plots a point at (2, 0) and labels it Q. To represent the opposite corner of the floor of the playhouse, she plots a point at (8, 6) and labels it S.

A. On the coordinate grid shown below, plot and label both point Q and point S.
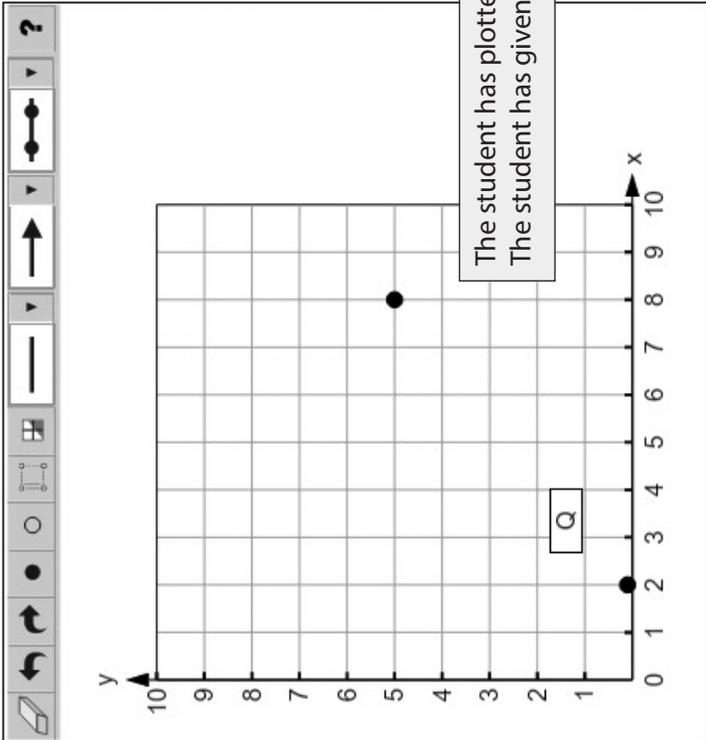
The student has plotted one correct point.
The student has given one correct label.

Options   Flag   Pause   Review/End Test   Next

Question 49
Page 2 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

All four edges of the playhouse floor are the same length. Catherine plots another corner on the x-axis and labels it R. She then plots the last corner and labels it T.

B. What are the ordered pairs for point R and point T? Explain how you determined the values in each ordered pair.

They both have to be 8 squares away.

36 / 1000

point R: (8, 0)

point T: (0, 8)

The student has given one correct answer.
The student has given an incorrect explanation.

Back

Review/End Test   Pause   Flag   Options

C-G.1.1.2   Response Score: 0

Question 49
Page 1 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

To represent one corner of the floor of the playhouse, Catherine plots a point at (2, 0) and labels it Q. To represent the opposite corner of the floor of the playhouse, she plots a point at (8, 6) and labels it S.

A. On the coordinate grid shown below, plot and label both point Q and point S.

The student has plotted no correct points.
The student has given no correct labels.

Question 49
Page 2 of 2

Catherine uses a coordinate grid to make a floor plan for a playhouse. The floor of the playhouse will be a quadrilateral.

All four edges of the playhouse floor are the same length. Catherine plots another corner on the x-axis and labels it R. She then plots the last corner and labels it T.

B. What are the ordered pairs for point R and point T? Explain how you determined the values in each ordered pair.

I think that they will make a aplayhouse floor, because they are the same numbers for each.

91 / 1000

point R: (2, 0)

point T: (8, 6)

The student has given no correct answers.
The student has given an incorrect explanation.

Back

Review/End Test   Pause   Flag   Options

FIFTH OPEN-ENDED QUESTION

D-M.2

50. Grace is sorting her buttons for a craft project. Her buttons are shown below. Each button is labeled with its width.

1 inch

$\frac{1}{2}$ inch

$\frac{1}{2}$ inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$\frac{3}{4}$ inch

A. Create a line plot for the widths of the buttons.

Grace's Buttons

```
←—+—+—+—+—+—+—+—+—+—+—+—+—+—+—+—+→
   0                1                2
```

Width (inches)
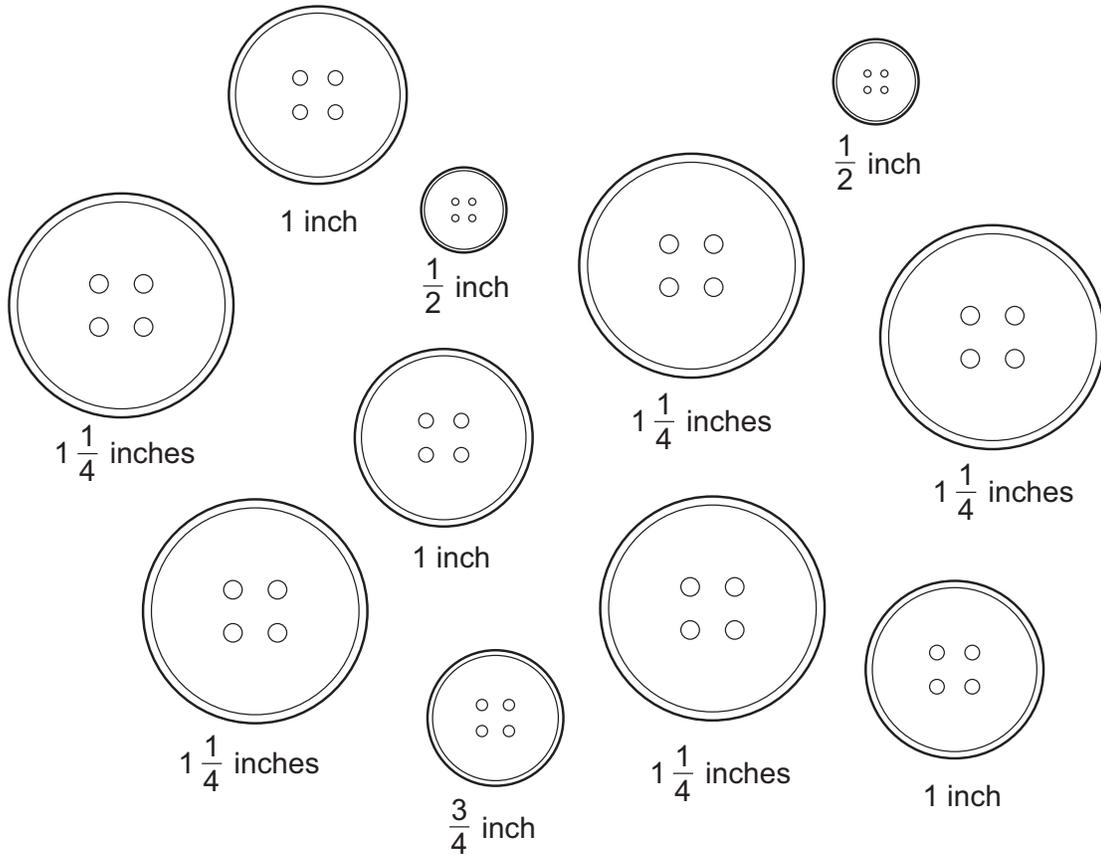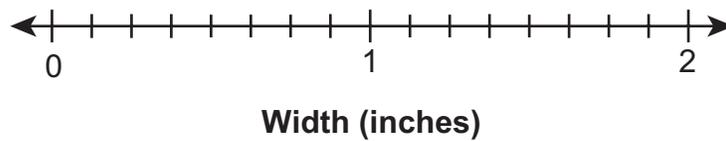
Go to the next page to finish question 50.

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

Grace lines up only the widest buttons in a row. There are no spaces between the buttons.

B. What is the length, in inches, of the row of buttons?

Grace finds another button. The button does not match the width of any of her other buttons. It is not the biggest nor the smallest button in her collection. She could add the width of the button to the line plot without adding any new tick marks on the number line.

C. Explain how to determine all the possible widths of Grace's new button. As part of your explanation, include all the possible widths.

ITEM-SPECIFIC SCORING GUIDELINE

Question #50

Grade 5

Assessment Anchor this item will be reported under:

M05.D-M.2—Represent and interpret data.

Specific Anchor Descriptor addressed by this item:

M05.D-M.2.1—Organize, display, and answer questions based on data.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of how to represent and interpret data by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to represent and interpret data by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to represent and interpret data by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to represent and interpret data.
0	The response has no correct answer and insufficient evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-Scorables	B – Blank R – Refusal K – Off task/topic F – Foreign language U – Illegible

Top Scoring Student Response And Training Notes:

Score	Description
4	Student earns 4 points.
3	Student earns 3.0 – 3.5 points.
2	Student earns 2.0 – 2.5 points.
1	Student earns 0.5 – 1.5 points. OR Student demonstrates minimal understanding of how to represent and interpret data.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #50

Top Scoring Response:

Part A Answer	
What?	**Why?**

Grace's Buttons

Width (inches)

(1 score point)

> 1 point for correct answer
>> OR ½ point for 10 correct Xs
> [Note: Students cannot receive a "4" if they incorrectly add additional number labels]

Part B Answer	
What?	**Why?**
$6\frac{1}{4}$ (inches) [Note: Carry over any error from Part A]	

(1 score point)

> 1 point for correct answer

Part C Answer	
What?	**Why?**
	Since the button is not the biggest or smallest in Grace's collection, it must be between $\frac{1}{2}$ and $1\frac{1}{4}$. Also, since it does not match the width of any of her other buttons, there are three possible widths for Grace's new button: $\frac{5}{8}$ inch, $\frac{7}{8}$ inch, or $1\frac{1}{8}$ inches. [Note: Carry over any error from Part A]

(2 score points)

> 1 point for all 3 correct widths
> 1 point for complete explanation
>> OR ½ point for correct but incomplete explanation

FIFTH OPEN-ENDED QUESTION RESPONSES

D-M.2 Response Score: 4

50. Grace is sorting her buttons for a craft project. Her buttons are shown below. Each button is labeled with its width.

1 inch

$\frac{1}{2}$ inch

$\frac{1}{2}$ inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$\frac{3}{4}$ inch

A. Create a line plot for the widths of the buttons.

Grace's Buttons

Width (inches)
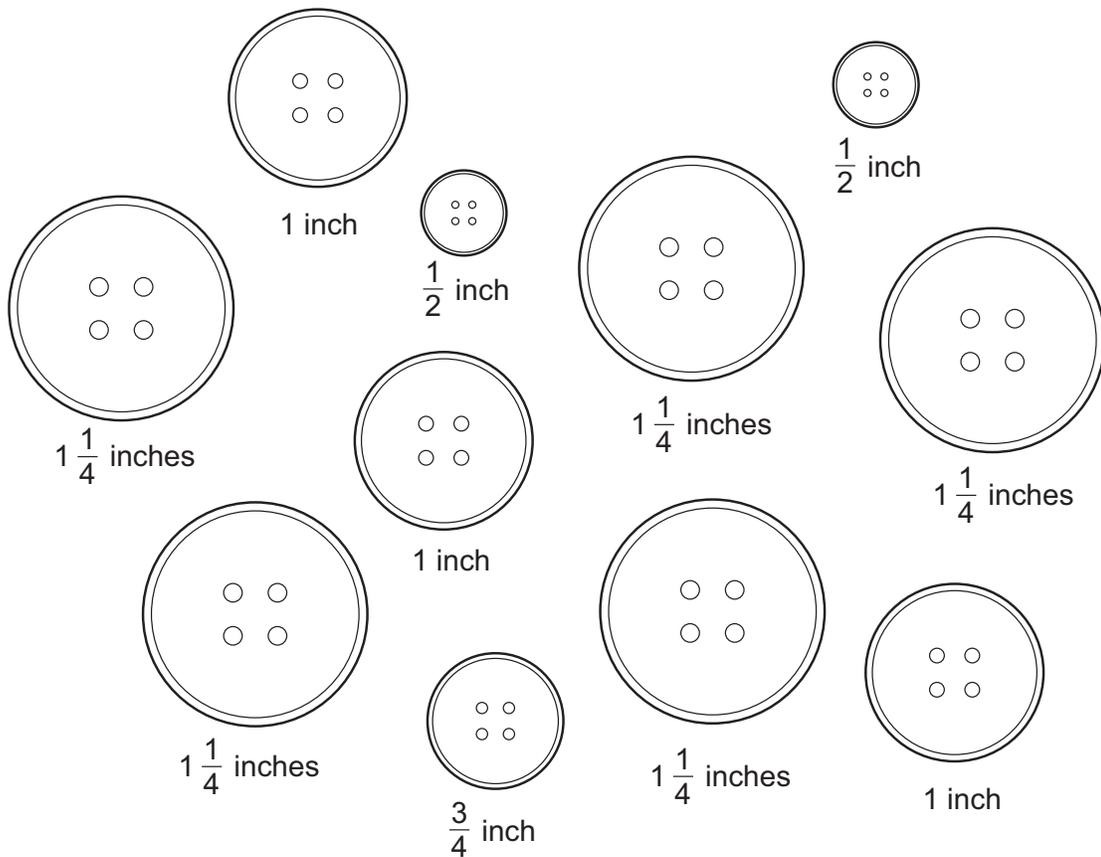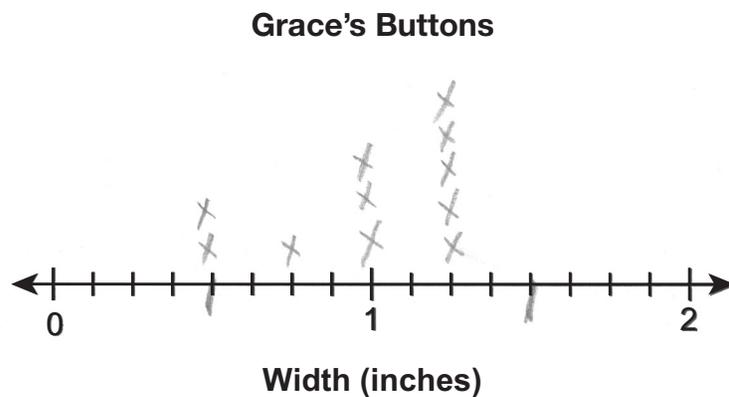
The student has given a correct answer.

Go to the next page to finish question 50.

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

Grace lines up only the widest buttons in a row. There are no spaces between the buttons.

B. What is the length, in inches, of the row of buttons?

$$\left(1\tfrac{1}{4}\right)\left(1\tfrac{1}{4}\right)\left(1\tfrac{1}{4}\right)\left(1\tfrac{1}{4}\right)\left(1\tfrac{1}{4}\right) = 6\tfrac{1}{4}$$

> The student has given a correct answer.

Grace finds another button. The button does not match the width of any of her other buttons. It is not the biggest nor the smallest button in her collection. She could add the width of the button to the line plot without adding any new tick marks on the number line.

C. Explain how to determine all the possible widths of Grace's new button. As part of your explanation, include all the possible widths.

The smallest is $\tfrac{1}{2}$ the biggest is $1\tfrac{1}{4}$ so it is between but not one of them. It can't be $\tfrac{3}{4}$ or 1 either so what is left are the other tick marks $\tfrac{5}{8}$ $\tfrac{7}{8}$ $1\tfrac{1}{8}$

> The student has given 3 correct widths.
> The student has given a complete explanation.

D-M.2   Response Score: 3

50. Grace is sorting her buttons for a craft project. Her buttons are shown below. Each button is labeled with its width.

$\frac{1}{2}$ inch

1 inch

$\frac{1}{2}$ inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$\frac{3}{4}$ inch

A. Create a line plot for the widths of the buttons.

Grace's Buttons

Width (inches)
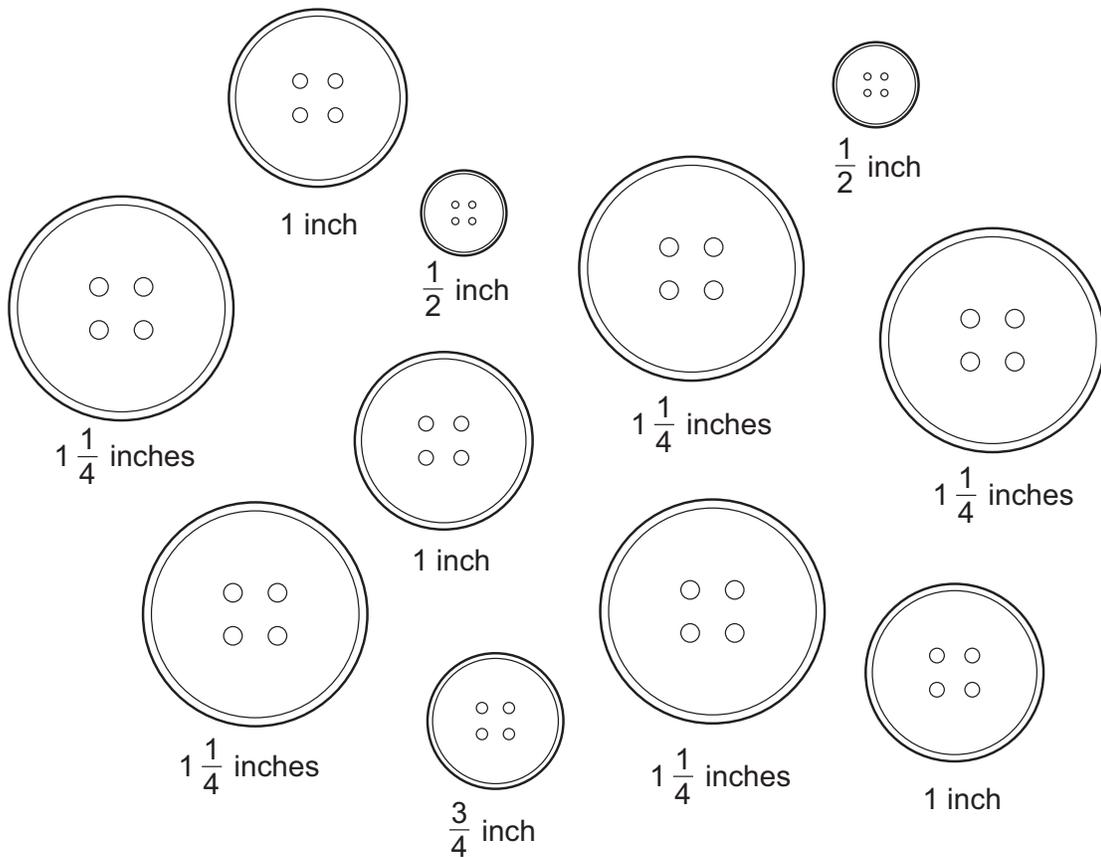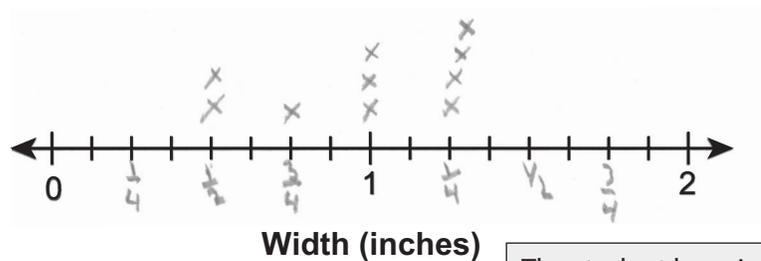
The student has given 10 correct Xs.

Go to the next page to finish question 50.

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

Grace lines up only the widest buttons in a row. There are no spaces between the buttons.

B. What is the length, in inches, of the row of buttons?

$$4 \cdot 1\frac{1}{4} = 5"$$

> The student has given a correct answer, based on part A.

Grace finds another button. The button does not match the width of any of her other buttons. It is not the biggest nor the smallest button in her collection. She could add the width of the button to the line plot without adding any new tick marks on the number line.

C. Explain how to determine all the possible widths of Grace's new button. As part of your explanation, include all the possible widths.

The spaces between the buttons there are $\frac{5}{8}$

$\frac{7}{8}$ $1\frac{1}{8}$

> The student has given 3 correct widths.
> The student has given a correct but incomplete explanation.

D-M.2   Response Score: 2

50. Grace is sorting her buttons for a craft project. Her buttons are shown below. Each button is labeled with its width.

1 inch

$\frac{1}{2}$ inch

$\frac{1}{2}$ inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$\frac{3}{4}$ inch

A. Create a line plot for the widths of the buttons.

Grace's Buttons

Width (inches)
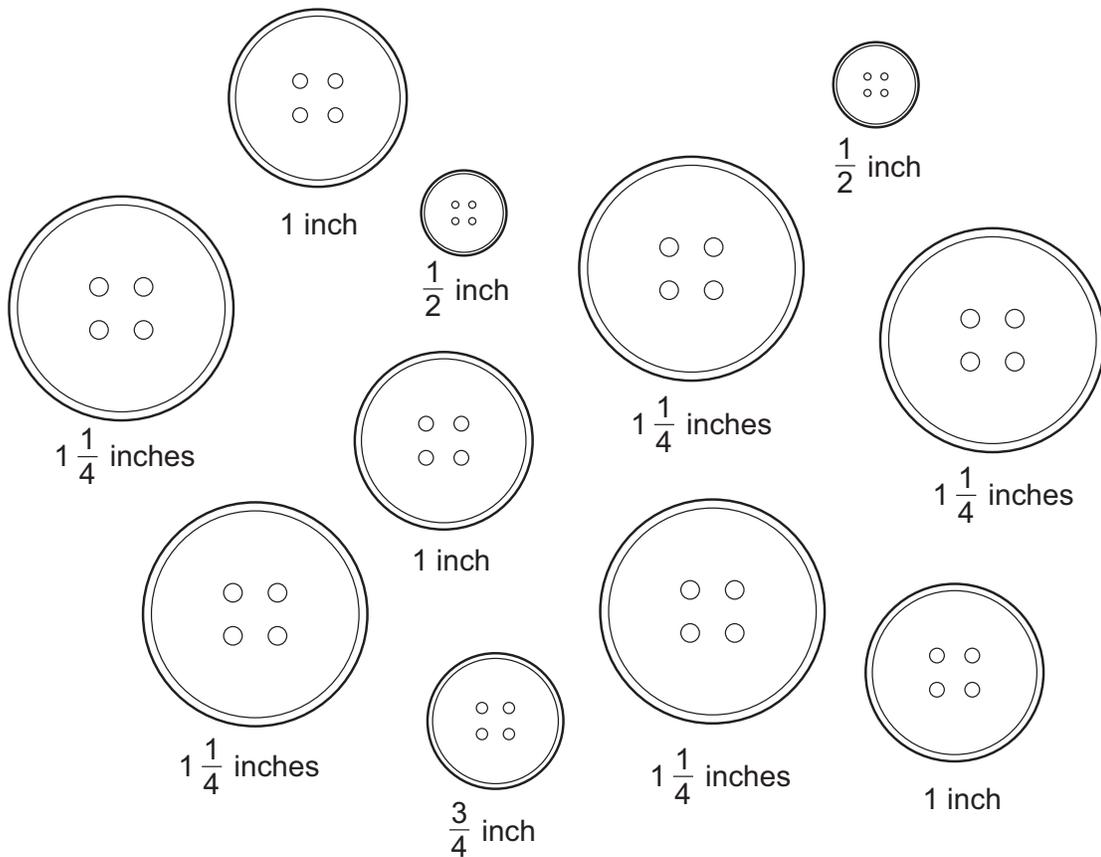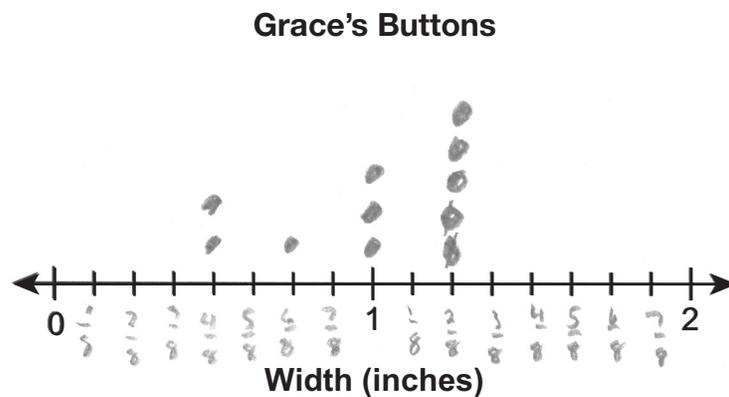
The student has given a correct answer.

Go to the next page to finish question 50.

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

Grace lines up only the widest buttons in a row. There are no spaces between the buttons.

B. What is the length, in inches, of the row of buttons?

$$1\tfrac{1}{4} \times 5 = 6\tfrac{1}{4}$$

> The student has given a correct answer.

Grace finds another button. The button does not match the width of any of her other buttons. It is not the biggest nor the smallest button in her collection. She could add the width of the button to the line plot without adding any new tick marks on the number line.

C. Explain how to determine all the possible widths of Grace's new button. As part of your explanation, include all the possible widths.

all the places where there are no buttons now.

> The student has given an incorrect explanation.

D-M.2   Response Score: 1

50. Grace is sorting her buttons for a craft project. Her buttons are shown below. Each button is labeled with its width.

1 inch

$\frac{1}{2}$ inch

$\frac{1}{2}$ inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$\frac{3}{4}$ inch

A. Create a line plot for the widths of the buttons.

Grace's Buttons

0   1   2

Width (inches)
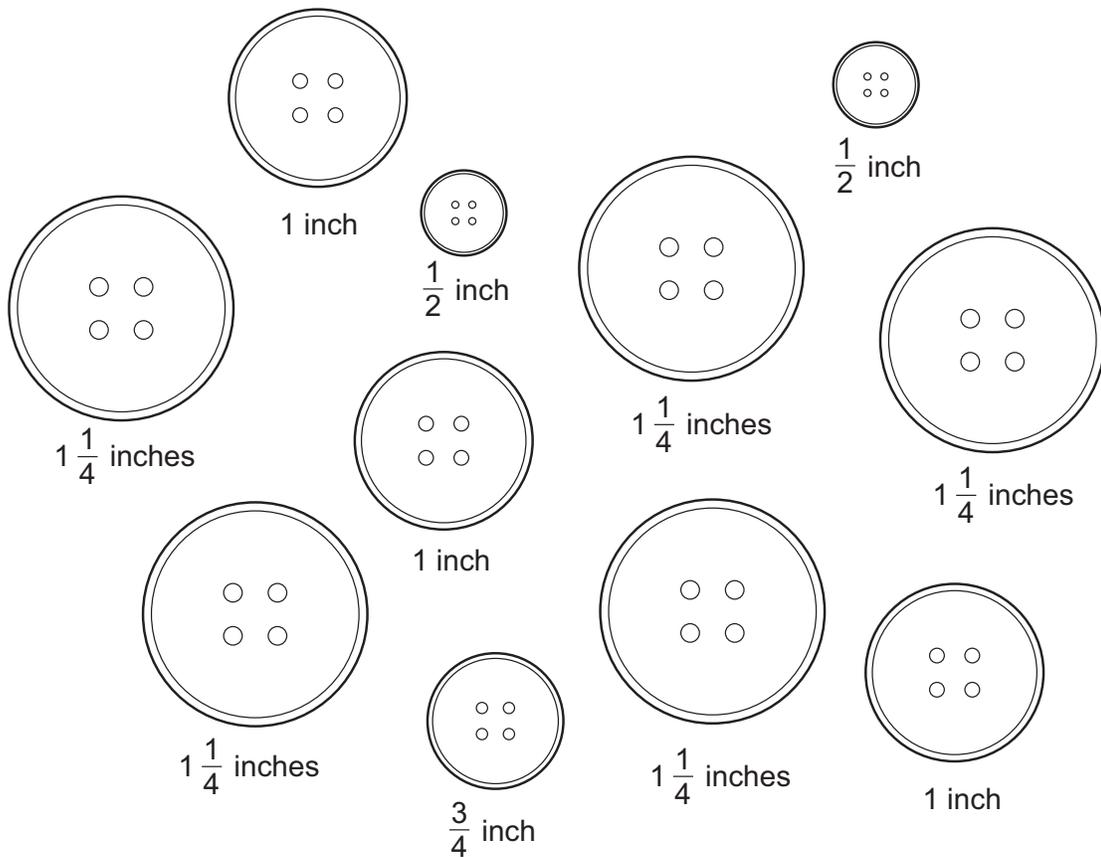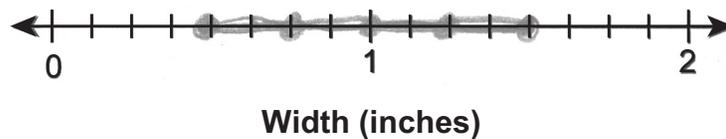
The student has given an incorrect answer.

Go to the next page to finish question 50.

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

Grace lines up only the widest buttons in a row. There are no spaces between the buttons.

B. What is the length, in inches, of the row of buttons?

$2 - 0 = 2$

> The student has given an incorrect answer.

Grace finds another button. The button does not match the width of any of her other buttons. It is not the biggest nor the smallest button in her collection. She could add the width of the button to the line plot without adding any new tick marks on the number line.

C. Explain how to determine all the possible widths of Grace's new button. As part of your explanation, include all the possible widths.

they are all different and cant be $\frac{1}{2}$ or $1\frac{1}{4}$

> The student has given a correct but incomplete explanation.

D-M.2   Response Score: 0

50. Grace is sorting her buttons for a craft project. Her buttons are shown below. Each button is labeled with its width.


1 inch

$\frac{1}{2}$ inch

$\frac{1}{2}$ inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$1\frac{1}{4}$ inches

$1\frac{1}{4}$ inches

1 inch

$\frac{3}{4}$ inch

A. Create a line plot for the widths of the buttons.

Grace's Buttons

Width (inches)
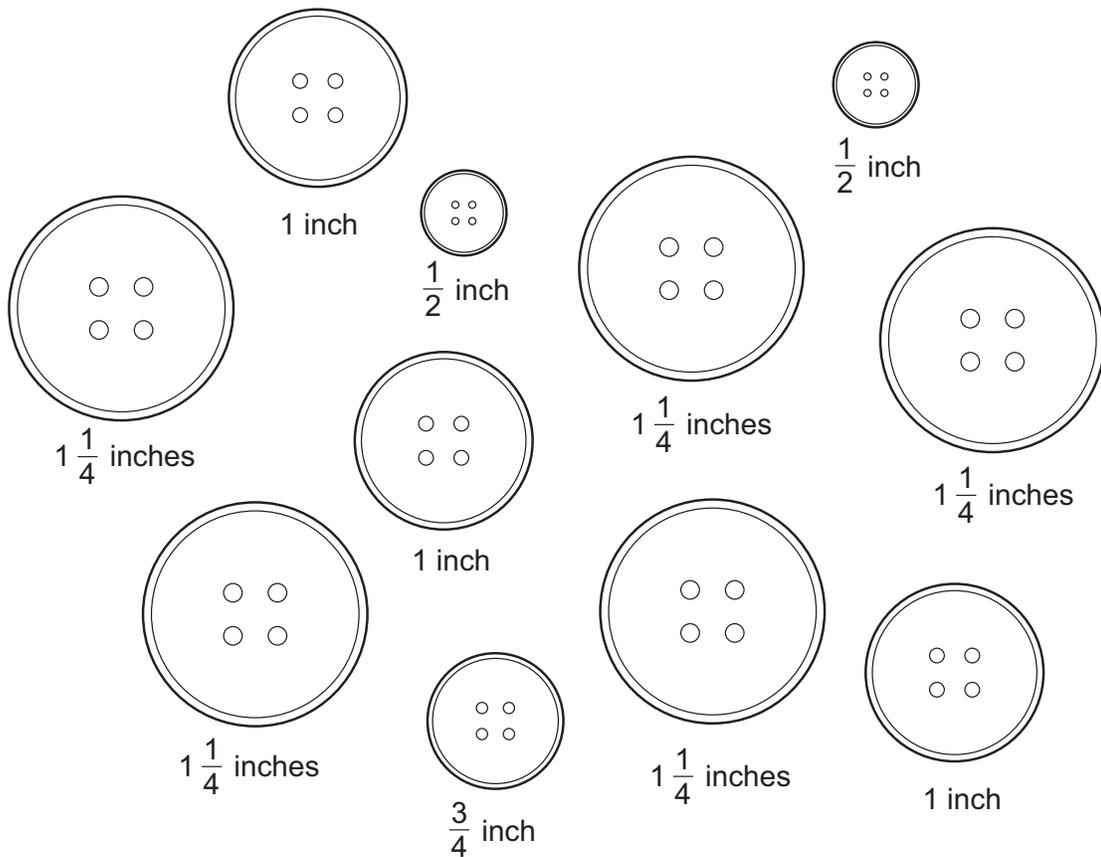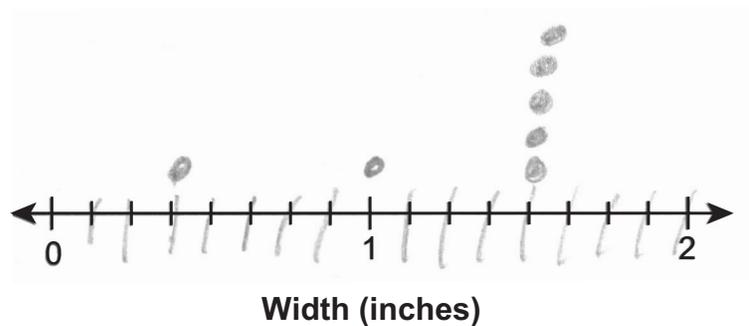
The student has given an incorrect answer.

Go to the next page to finish question 50.

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

Grace lines up only the widest buttons in a row. There are no spaces between the buttons.

B. What is the length, in inches, of the row of buttons?

$1\frac{1}{4}$

> The student has given an incorrect answer.

Grace finds another button. The button does not match the width of any of her other buttons. It is not the biggest nor the smallest button in her collection. She could add the width of the button to the line plot without adding any new tick marks on the number line.

C. Explain how to determine all the possible widths of Grace's new button. As part of your explanation, include all the possible widths.

then got bigger

> The student has given an incorrect explanation.

PSSA Grade 5 Mathematics
Item and Scoring Sampler