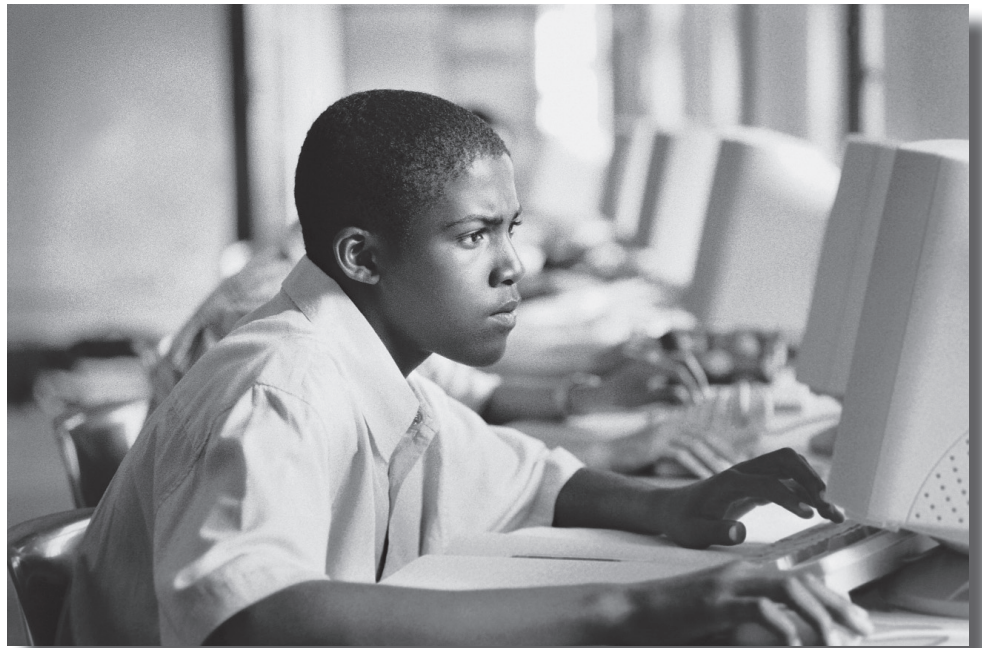




pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Mathematics Preliminary Item and Scoring Sampler



2014–2015
Grade 7

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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 will transition to PCS-based operational Mathematics and English Language Arts assessments starting with the spring 2015 PSSA administration; however, multiple-choice and open-ended test questions appearing on the operational portions of the 2014 PSSA will align to both the current Pennsylvania Academic Standards and the new PCS.

The 2013 PCS-aligned Assessment Anchor and Eligible Content documents are posted on this portal: www.education.state.pa.us [Click on the green check mark and select “Pennsylvania System of School Assessment (PSSA).”]

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* used to develop the item-specific guidelines. The general description of scoring guidelines can be used if any additional item-specific scoring guidelines are created for use within local instructional programs.¹

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 will 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)	1.5	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 7.

- A-N = The Number System
- A-R = Ratios and Proportional Relationships
- B-E = Expressions and Equations
- C-G = Geometry
- D-S = Statistics and Probability

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.

Special Categories within zero reported separately:

BLK (blank) Blank, entirely erased, or written refusal to respond
OT Off-task
LOE Response in a language other than English
IL Illegible

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 (*).

Three 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 5–43 in this sampler. Questions numbered 1–4 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 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.

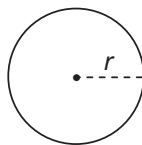
You may use calculator π or the number 3.14.

2014
Grade 7

Simple Interest

$$I = Prt$$

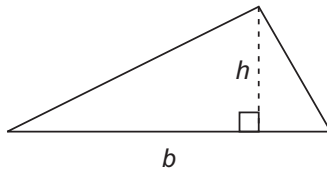
Circle



$$C = 2\pi r$$

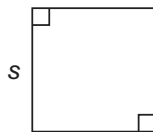
$$A = \pi r^2$$

Triangle



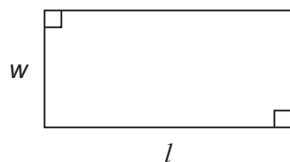
$$A = \frac{1}{2}bh$$

Square



$$A = s^2$$

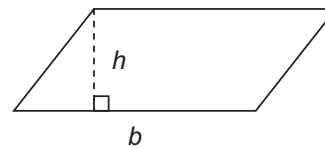
Rectangle



$$A = lw$$

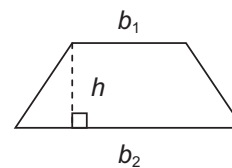
$$P = 2l + 2w$$

Parallelogram



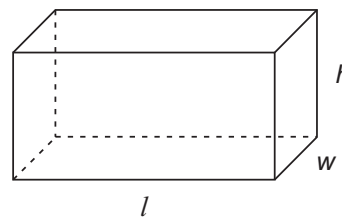
$$A = bh$$

Trapezoid



$$A = \frac{1}{2}h(b_1 + b_2)$$

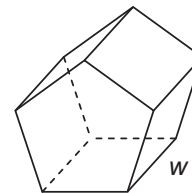
Rectangular Prism



$$V = lwh$$

$$SA = 2lw + 2lh + 2wh$$

Polygonal Prism



$$V = Bw, \text{ where } B = \text{area of the base}$$

$$SA = Pw + 2B, \text{ where } P = \text{perimeter of base}$$

On the following pages are the mathematics questions.

- You may not use a calculator for questions 1–4. 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:

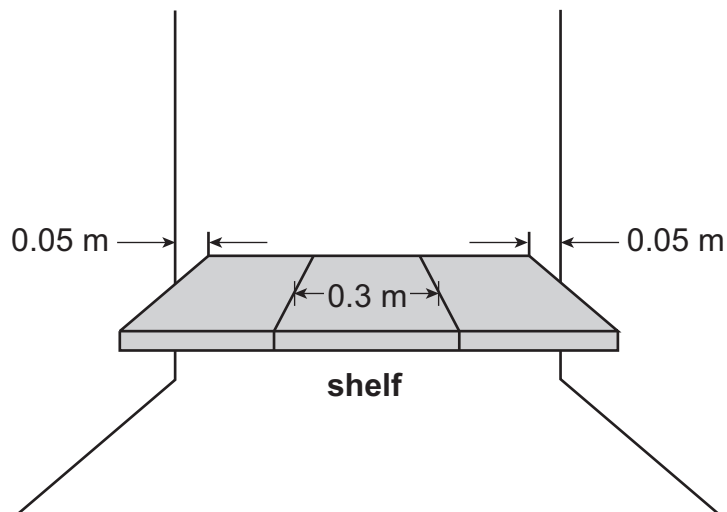
- These questions have more than one part. Be sure to read the directions carefully.
- You cannot receive the highest score for an open-ended question without completing all tasks in the question. For example, if the question asks you to show your work or explain your reasoning, be sure to show your 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

You may not use a calculator for questions 1–4.

A-N.1.1.1

1. Joslyn built the shelf shown below to fit into a narrow closet.



The shelf is made of 3 pieces of wood, each 0.3 meter wide. There is also 0.05 meter of space between the shelf and the wall on each side. What is the width, in meters, of Joslyn's closet?

- A. 0.4
- B. 0.8
- C. 1 *
- D. 1.9

A-N.1.1.3

2. Multiply: $\frac{7}{8} \times 1\frac{2}{3}$

A. $1\frac{11}{24}$ *

B. $1\frac{7}{12}$ *multiplies the fractions together and keeps the whole number*

C. $1\frac{19}{21}$ *converts to improper fractions and then cross-multiplies to get 40/21*

D. $2\frac{1}{3}$ *incorrectly converts 1-2/3 to 8/3 instead of 5/3*

A-N.1.1.3

3. Which value is equivalent to $0.45 \div \frac{9}{10}$?

A. $\frac{81}{200}$ *doesn't take the reciprocal of 9/10*

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

C. 40.5 *multiplies 45 × 9 and then divides by 10*

D. 50 *treats 0.45 as 45/1 and multiplies it by 10/9*

B-E.2.3.1

4. Which estimate is **closest** to the value of $3\frac{7}{8} \times 5\frac{1}{16}$?

- A. 15 *rounds both values down (to 3 and 5, respectively)*
- B. 18 *rounds down to 3 and up to 6*
- C. 20 *
- D. 24 *rounds both values up (to 4 and 6, respectively)*

A calculator is permitted for use in solving questions numbered 5–43 in this sampler.

A-N.1

5. Ty is determining the value of the expression below.

$$-0.25(-3.25 + 5.65)$$

Which shows two expressions that are equivalent to Ty’s expression?

A. $-0.25(8.9)$

$$\frac{-5.65}{4} + \frac{3.25}{4}$$

1st expression: adds 3.25 and 5.65; 2nd expression correct

B. $13 + 22.6$

$$-25(2.4) \div 100$$

1st expression: divides -3.25 and 5.65 by -0.25, forgets to change sign between addends; 2nd expression correct

C. $-\left(\frac{2}{4} + \frac{0.4}{4}\right)$

$$-25(-325 + 565)$$

1st expression correct; 2nd expression: multiplies each term by 100

D. $2.4 \div (-4)$

$$-0.25[(-3.25 + 3.25) + 2.4]$$

*

A-N.1.1

6. After a party, there are parts of three pizzas remaining. There is $\frac{3}{4}$ of a pepperoni pizza remaining, $\frac{5}{8}$ of a cheese pizza remaining, and $\frac{11}{12}$ of a sausage pizza remaining. The 5 friends who organized the party split the remaining pizza equally. What fraction of a whole pizza does each person get?

A. $\frac{5}{24}$

added numerator and denominator, subtracted from 1

B. $\frac{11}{24}$

*

C. $\frac{1}{2}$

converted 5/8 as 20/24

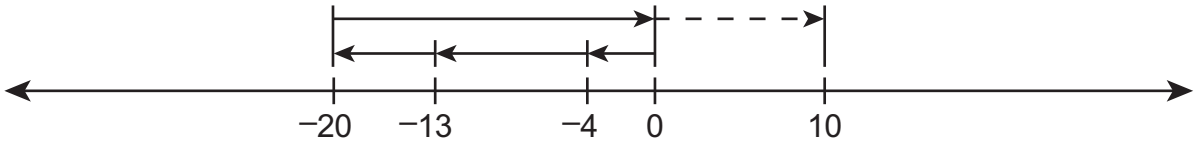
D. $\frac{11}{20}$

used common denominator of 12, thought 8 goes into 12 twice

A-N.1.1.2

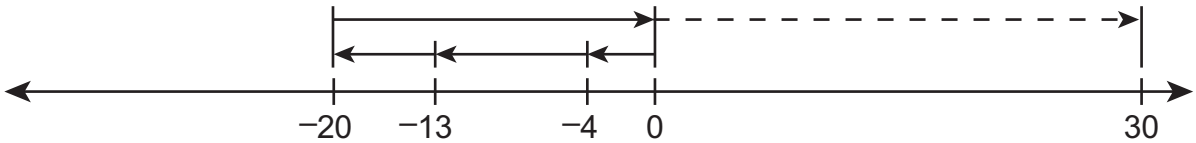
7. Corrine plans to spend \$20 on a new shirt, \$13 on dinner, and \$4 on a bus ticket. She knows that she will earn \$30 for baby-sitting. Which number line represents a strategy for determining how many more dollars Corrine needs to earn so that she earns exactly as much as she plans to spend?

A.



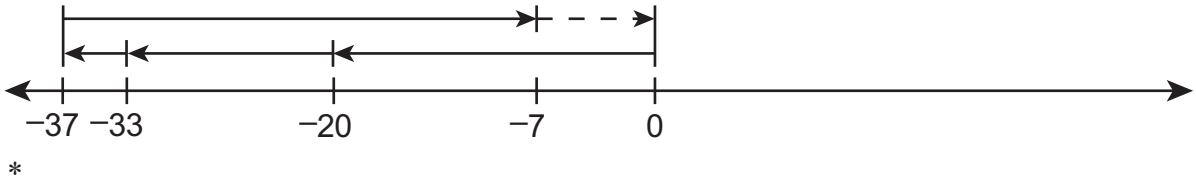
did not show operation $(-20) + (-13) + (-4) + 30 + x$; placed individual costs on number line then showed $(-20) + (20 + 10)$

B.

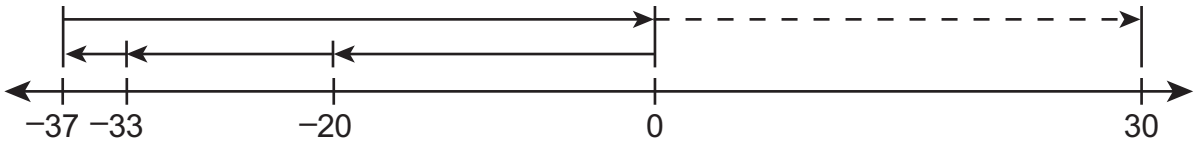


did not show operation $(-20) + (-13) + (-4) + 30 + x$; placed costs and earnings on number line

C.



D.



did not show operation $(-20) + (-13) + (-4) + 30$

A-N.1.1.3

8. Keyana put 0.83 liter of water into a bucket. Matt put 0.98 liter of water into another bucket. When they combined their water into a bigger bucket, 10% of the water spilled out. The water they collected had a weight of 1.021 kilograms per liter of water. The expression shown below represents the weight, in kilograms, of the water in the bigger bucket.

$$[0.9(0.83 + 0.98)] \times 1.021$$

Rounded to the nearest thousandth, what is the weight, in kilograms, of the water in the bigger bucket?

A. 1.663 *

B. 1.748 $0.9 \times 0.83 + 0.98 \times 1.021$, did not distribute 0.9 (90%) nor 1.021

C. 1.763 $(0.9 \times 0.83 + 0.98) \times 1.021$, distributed 1.021, but not 0.9

D. 1.848 $(0.83 + 0.98) \times 1.021$, did not multiply by 0.9 to account for 10% spilled

A-R.1.1.3

A-R.1.1.6

9. A technician tests batteries for a battery manufacturer several times each week. She determines that the number of defective batteries is proportional to the number of batteries tested. The table below shows the numbers of batteries the technician tested at two different times during week 1 and the number of defective batteries she found each time.

Battery Test Results for Week 1

Number Tested	Number Defective
160	4
600	15

Between week 1 and week 2, the battery manufacturer changed its process. The number of defective batteries is still proportional to the number of batteries tested, but the constant of proportionality is greater. The technician tested 480 batteries during week 2 and found that 18 were defective. By what percent did the constant of proportionality increase?

A. $33\frac{1}{3}\%$

$$160 \div 480$$

B. 50%

*

C. $66\frac{2}{3}\%$

finds the unit rate as 40 to 1 for week 1, and $26\frac{2}{3}$ to 1 for week 2; divides $26\frac{2}{3}$ by 40; changes to a percent

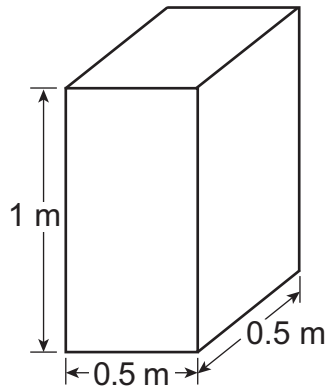
D. 125%

$$600 \div 480 = 1.25; \text{ changes to a percent}$$

A-R.1.1.1

C-G.2.2.2

10. Simon is filling the water tank shown below.



After 2 minutes, the tank is filled up to $\frac{1}{5}$ of its height. What is the rate, in cubic meters per minute, at which Simon is filling up the water tank?

A. 0.025 *

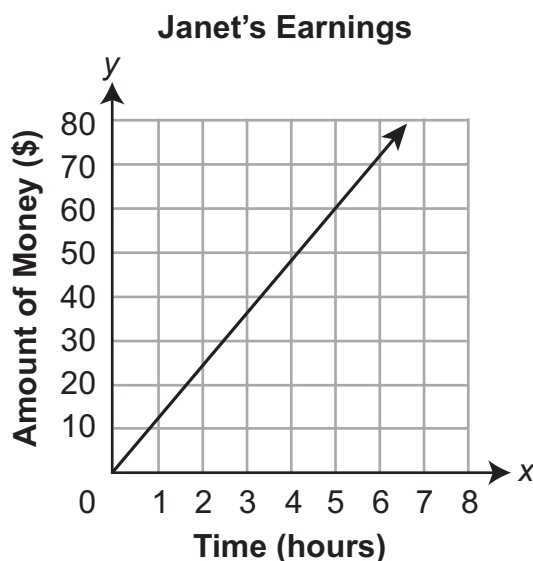
B. 0.050 *only multiplies $\frac{1}{5}$ of height by 1 side when determining volume (forgets width)*

C. 0.100 *calculates $\frac{1}{5} \div 2$*

D. 0.125 *forgets to take $\frac{1}{5}$ of height*

A-R.1.1.2

11. The graph below models the relationship between the time (x), in hours, Janet works and the amount of money (y), in dollars, she earns.



Which statement explains how Janet knows that the number of hours she works and the amount of money she earns are proportionally related?

- A. The graph is a straight line with a positive slope.

identifies a trait of the line

- B. The graph is a straight line that passes through $(0, 0)$.

*

- C. The graph is a straight line that passes through $(1, 12.5)$.

identifies the unit rate and thinks since it passes through $x = 1$ it must be a proportional relationship

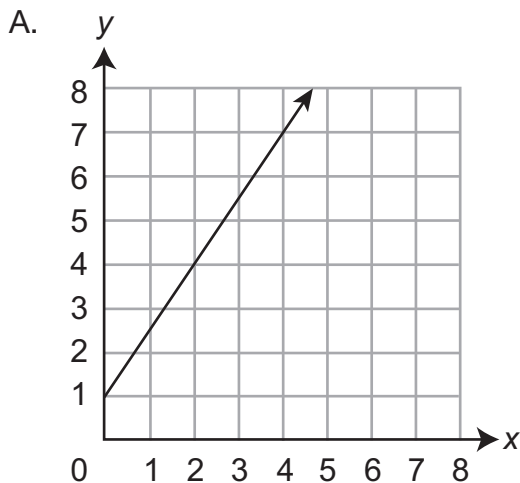
- D. The graph is a straight line with no negative x or y values.

thinks proportional relationships must represent positive quantities

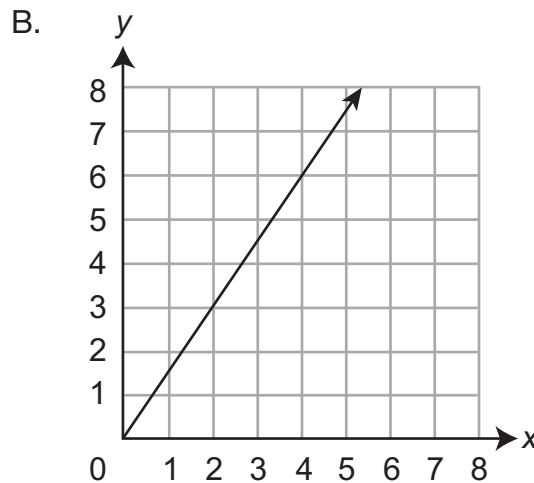
A-R.1.1.2

A-R.1.1.3

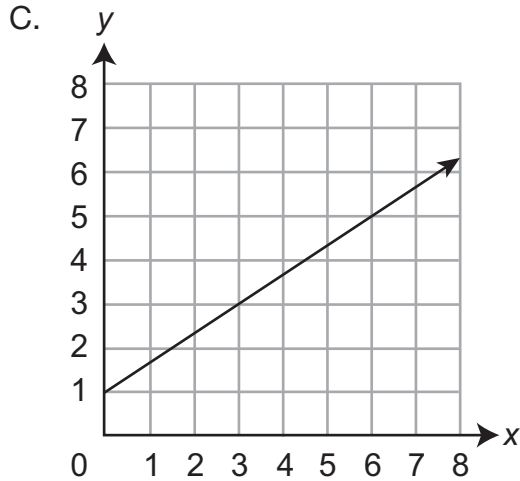
12. Which graph shows a proportional relationship with a unit rate of $\frac{3}{2}$?



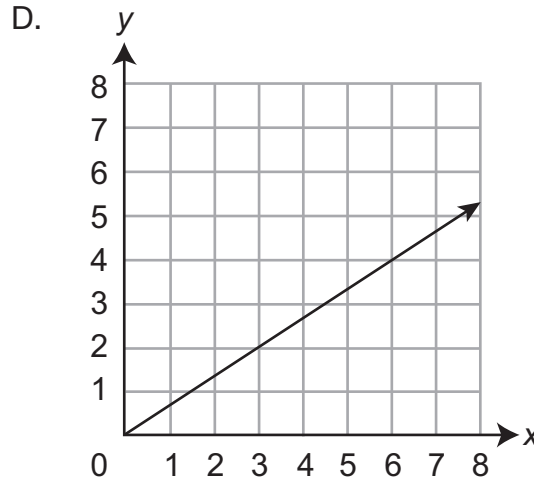
did not consider whether or not it passed through the origin



*



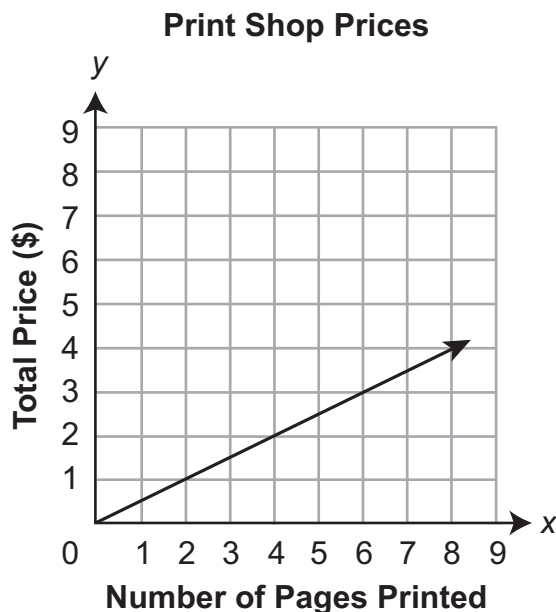
inverted the slope and did not consider whether it passed through the origin or not



inverted the slope, run/rise

A-R.1.1.3

13. The graph below shows the relationship between the number of pages printed (x) at a print shop and the total price (y), in dollars.



Based on the graph, what is the unit price at the print shop?

- A. \$0.10 per page
- B. \$0.20 per page
- C. \$0.25 per page
- D. \$0.50 per page

looks at the point (2, 1) and thinks the 1 represents 10 cents

looks at (2, 1) and thinks the 2 represents 20 cents

estimates the y-coordinate at $x = 1$

*

A-R.1.1.3

A-R.1.1.2

14. The table below shows the relationship between the number of water bottles at a park that are thrown away and the number of water bottles at the park that are recycled for each of five months.

Water Bottles at a Park

Month	Water Bottles Thrown Away	Water Bottles Recycled
1	40	12
2	50	15
3	80	24
4	110	33
5	140	42

Which statement correctly describes the relationship between the number of water bottles that are thrown away and the number of water bottles that are recycled at the park each month?

- A. The relationship is proportional. For every 3 bottles that are thrown away each month, 10 bottles are recycled.

reverses rate

- B. The relationship is proportional. For every 10 bottles that are thrown away each month, 3 bottles are recycled.

*

- C. The relationship is not proportional. The number of water bottles that are thrown away increases more from month to month than the number of water bottles that are recycled.

thinks change from month to month has to be the same for each

- D. The relationship is not proportional. The difference between the number of bottles that are thrown away and the number of bottles that are recycled is not the same for each month.

confuses rate with difference

A-R.1.1.4

A-R.1.1.2

15. A concert hall sells tickets in three different price ranges. For each price range, there are both adult and child rates.

Concert Hall Prices

Adult Tickets	Child Tickets
\$82.00	\$20.50
\$56.00	\$14.00
\$36.00	\$9.00

Which statement describes the relationship between the adult ticket prices (a), in dollars, and the child ticket prices (c), in dollars?

A. The relationship is proportional. It can be represented as $c = \frac{1}{4}a$.

*

B. The relationship is proportional. It can be represented as $c = 4a$.

confused 4 with 1/4

C. The relationship is not proportional. The change in a is not constant, and therefore the relationship cannot be expressed as one equation.

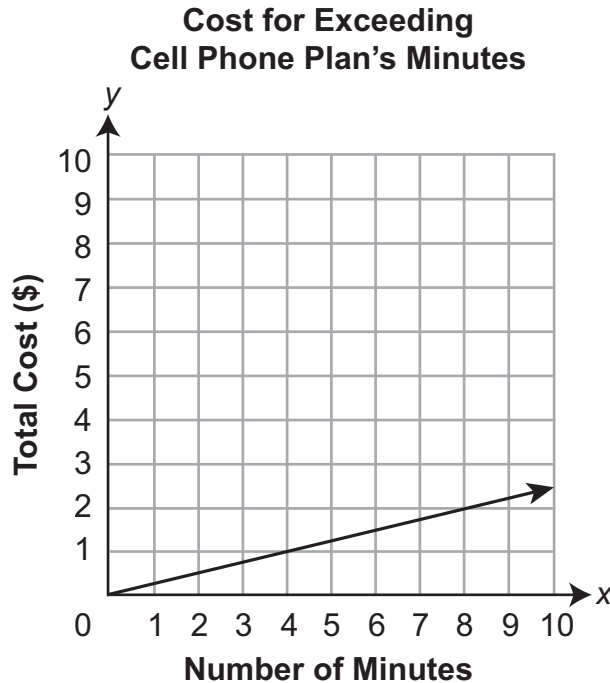
thinks proportional needs constant change in table x-values

D. The relationship is not proportional. The change in c is not constant, and therefore the relationship cannot be expressed as one equation.

thinks proportional needs constant change in table y-values

A-R.1.1.5

16. When Rachel exceeds the number of minutes on her cell phone plan, she is charged an extra cost for each minute. The graph below shows the total cost (y), in dollars, for exceeding her cell phone plan's minutes by x minutes.



What does the y -coordinate represent when the x -coordinate has a value of 1?

- A. Rachel pays \$0.25 for each minute she exceeds her cell phone plan's minutes.
*
- B. Rachel pays \$0.50 for each minute she exceeds her cell phone plan's minutes.
assumes the point is (1, 0.5)
- C. Rachel pays \$1.00 for each minute she exceeds her cell phone plan's minutes.
thinks the x -coordinate represents the cost per minute
- D. Rachel pays \$4.00 for each minute she exceeds her cell phone plan's minutes.
looks at the point (4, 1)

A-R.1.1.6

17. Kenneth is making chocolate cakes. For each cup of milk he uses, he needs to use $1\frac{3}{4}$ cups of flour. For each cup of flour he uses, he needs to use $\frac{3}{7}$ cup of cocoa powder. Kenneth is making enough cakes that he needs to use 4 cups of milk. How many cups of cocoa powder does Kenneth need to use?

A. $\frac{3}{28}$

B. $\frac{12}{7}$

C. 3

*

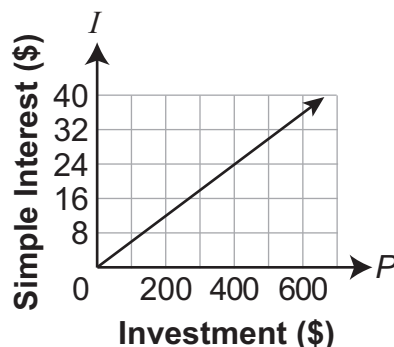
D. 7

A-R.1.1.6

A-R.1.1.3

18. The graph below represents the amount of simple interest (I), in dollars, earned on an investment of P dollars over one year. The interest rate is r .

Interest Earned over One Year



An investment of \$600 at a different interest rate (q) will earn \$24 in simple interest over one year. Which statement about interest rates r and q is true?

A. Interest rate r is 2% greater than interest rate q .

*

B. Interest rate r is 8% less than interest rate q .

(600 - 400)/24, rounded to the nearest whole number

C. Interest rate q is 12% less than interest rate r .

uses (600, 36) on graph; finds 36 - 24

D. Interest rate q is the same as interest rate r .

uses (400, 24) on graph, ignoring the difference in amount invested

B-E.2.1.1

B-E.2.3.1

19. Ryan is training for a bicycle race.

- The distance he rides is $44\frac{1}{2}$ miles long.
- He rides a portion of the distance at a slow speed both to warm up and to cool down.
- Ryan rides $\frac{4}{5}$ of the distance at a fast speed for training.
- Of the slow-speed portion, $\frac{1}{3}$ is for the warm-up.

Which estimate is **closest** to the distance, in miles, Ryan rides to cool down?

- A. 3
- B. 6 *
- C. 9
- D. 12

B-E.2.2.1

20. Kyle sold an antique through an online auction website. The website host charged Kyle \$15, plus 2.5% of the final selling price of the antique. After selling the antique, Kyle had to pay the website host \$32. What was the final selling price of the antique?

- A. \$68
- B. \$600
- C. \$680 *
- D. \$1,280

B-E.2.2.1

21. Mary earned \$35.00 for walking her neighbor's dogs.

- Mary charged a flat fee of \$5.00 to walk the dogs.
- Mary also charged \$2.50 for each $\frac{1}{4}$ hour she walked the dogs.

For exactly how many hours did Mary walk her neighbor's dogs?

- A. 3 *
- B. 4 *adds 35.00 and 5.00; divides result by 10 (2.50×4)*
- C. 6 *uses 1/2 hour rate instead of 1/4 hour rate*
- D. 12 *divides 30.00 by 2.50; neglects 1/4 hour rate*

B-E.2.2.1

22. Mr. Jones is taking his family to see a play. There are 10 people going to the play, and they take 2 cars. Mr. Jones pays \$5.50 for parking for each car. He pays the same price for each ticket. Mr. Jones is charged a total of \$142.00 for tickets and parking. What is the price of each ticket to the play?

- A. \$6.55 *divided by 2 first*
- B. \$13.10 *
- C. \$13.65 *only subtracted one parking cost*
- D. \$14.20 *the total was divided by 10*

B-E.2.2.1

23. Students in a dance class filled out a survey. There were 25 girls and some boys who participated in the survey. The results showed that 20% of the students prefer tap dance to ballroom dance. There are 9 students who prefer tap dance. Which equation can be used to find the number of boys (x) who participated in the survey?

A. $0.2x + 25 = 9$

forgets the parenthesis or distributes 20% only to the boys

B. $0.2(x + 25) = 9$

*

C. $0.2(25 - 9) = x$

takes 9 out of girls

D. $25 + x = 0.2 \times 9$

takes 20% of 9 and sets equal to sum of boys and girls

B-E.2.2.2

24. A real estate agent earns \$2,000 per month plus 5% of the selling price of each house sold. The agent wants to earn more than \$60,000 this year. Which inequality represents the possible combined selling price (x) of all the houses sold during the year for the real estate agent to meet his goal?

A. $x > 11,600$

solves $2,000 + 5x > 60,000$

B. $x > 180,000$

 $24,000 + 5x > 60,000$ but multiplies by 5 instead of dividing

C. $x > 720,000$

*

D. $x > 1,160,000$

solves $2,000 + 0.05x > 60,000$

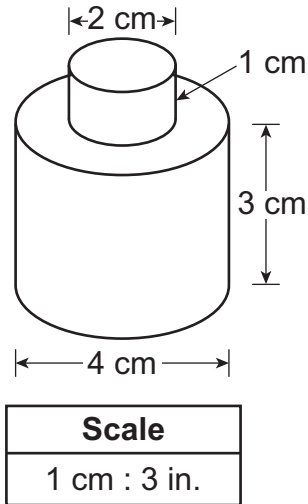
B-E.2.2.2

25. Heidi must correctly answer at least 80% of the questions on an exam to advance to the next level in her online course. Heidi has already correctly answered 26 questions and incorrectly answered 4 questions. How many of the 15 questions remaining must Heidi correctly answer to advance to the next level?

- A. at least 10 *
- B. at least 11 $26 - 15$
- C. at least 12 $80\% \text{ of } 15$
- D. at least 13 *solves* $30/26 = 15/x$

C-G.1.1.1
C-G.1.1.4

26. A machine part consists of two cylinders aligned along the same vertical axis. A scale drawing of the part is represented below.



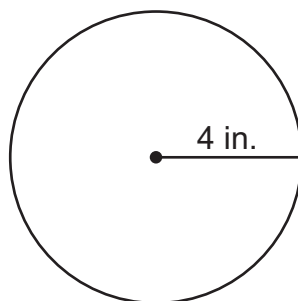
The part is cut in half through the vertical axis. What is the total area, in square inches, of the actual two-dimensional cross-section that is the result of the cut?

- A. 42 sq in. *calculates areas, then multiplies by 3*
- B. 72 sq in. *combines to a single set of dimensions: $6 \times 4 = 24$; $24 \times 3 = 72$*
- C. 126 sq in. *
- D. 216 sq in. *combines to a single set of dimensions of 6 by 4; applies scale and multiplies 18×12*

C-G.1.1.1

C-G.2.2.1

27. A city is building a new pool. A scale drawing of the pool is shown below.



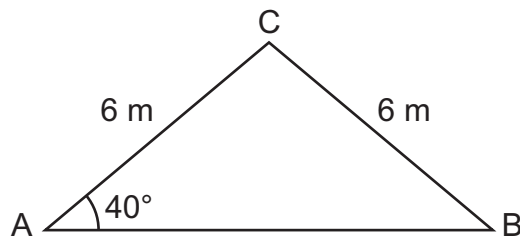
Scale
1 in. : 3 ft

What is the area, in square feet, of the pool?

- A. 16π
- B. 24π
- C. 48π
- D. 144π *

C-G.1.1.2

28. Triangle ABC is shown below.

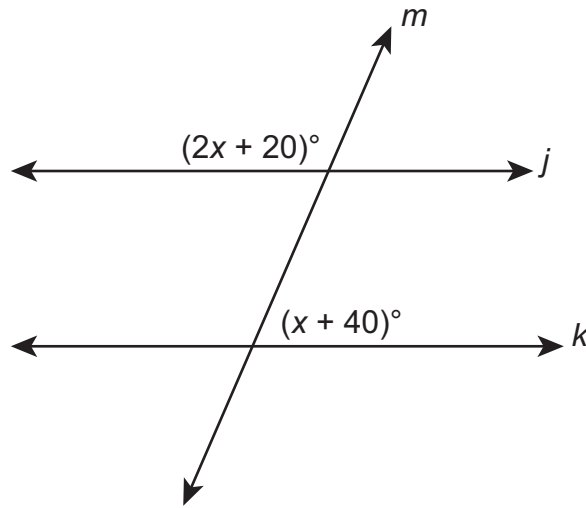


What is the measure of angle C?

- A. 40°
- B. 90°
- C. 100° *
- D. 140°

C-G.2.1.2

29. In the figure shown below, lines j and k are parallel.



Which equation can be used to find the value of x in the figure?

A. $(x + 40) = (2x + 20)$

thinks the two angles are congruent

B. $2(x + 40) = 2x + 20$

estimates based on the picture and thinks the larger angle is equal to twice the smaller

C. $(x + 40) + (2x + 20) = 90$

thinks the two angles are complementary

D. $(x + 40) + (2x + 20) = 180$

*

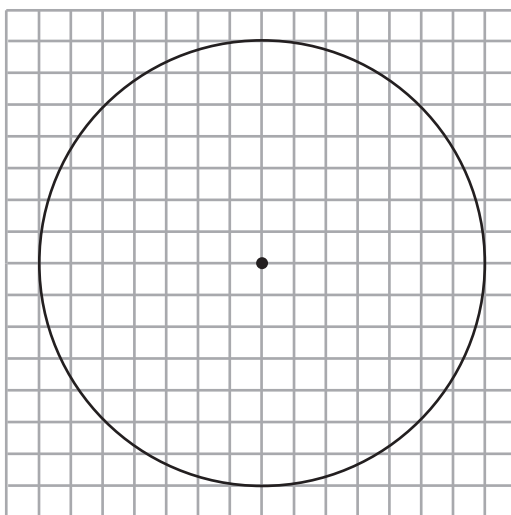
C-G.2.2.1

30. A circular lampshade with a diameter of 14 inches has a length of wire that goes around it exactly one time. How many inches of wire are needed to go around the lampshade exactly one time?

- A. 7π *uses $C = \pi r$ instead of $C = 2\pi r$*
- B. 14π *
- C. 49π *finds the area*
- D. 196π *squares the diameter*

C-G.2.2.1
C-G.1.1.1

31. The figure below represents a circular fountain.



Key	
□	= $\frac{1}{4}$ foot

Rounded to the nearest square foot, what is the area of the fountain?

- A. 10 *
- B. 11 *finds the circumference*
- C. 38 *$7^2 \times \pi$ and then divides it by 4*
- D. 44 *finds the circumference but doesn't adjust for the scale*

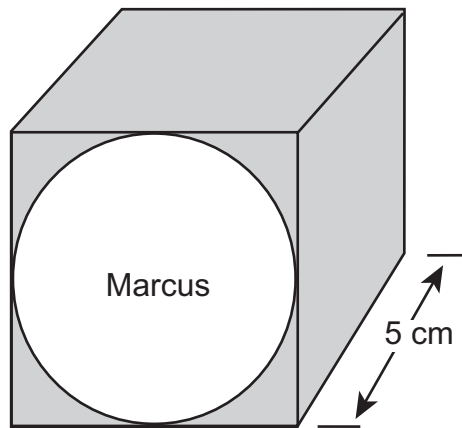
C-G.2.2.2

32. Shannon has several cubes. Each cube is 3 feet high. Shannon covers all but one face of each cube with foil. She uses a total of 360 square feet of foil to cover the faces. How many cubes does Shannon have?

- A. 8 *
- B. 10 4 faces of each cube covered
- C. 24 multiplies 3 by 5 to find surface area of 5 faces, divides 360 by 15
- D. 40 divides 360 by 3 squared

C-G.2.2.2
C-G.2.2.1

33. Marcus wants to decorate his box that is in the shape of a cube. He decides to cover the entire box with red colored paper except the circle with his name on it. The box is shown below.



Rounded to the nearest square centimeter, how much red paper is needed to cover Marcus's box?

- A. 72 correct surface area but takes 5 cm as radius of the circle instead of 2.5
- B. 105 takes the volume instead of area or forgets the bottom side but subtracts the area of the circle
- C. 130 *
- D. 150 takes entire surface area of the cube but does not subtract the area of the circle

D-S.1.1.2

34. Four candidates are running for school president. A random sample of students at the school are surveyed about which of the candidates they are likely to choose. The chart below shows the number of students from the random sample who chose each candidate.

School Election Survey

Deb	Janelle	Rasheed	Terry
10	20	12	8

A total of 800 students are expected to vote in the election for school president. Based on the information shown in the chart, which election outcome is **most likely**?

- A. Rasheed will win with 192 votes.

number of votes is correct, but outcome is incorrect

- B. Rasheed will win with 189 more votes than he had in the survey.

figures winner needs 201 (1 more vote than 1/4 of 800); subtracts 12 from this number

- C. Janelle will win with 8 more votes than the second-place finisher, Rasheed.

bases vote totals on sample only

- D. Janelle will win with 128 more votes than the second-place finisher, Rasheed.

*

D-S.3.2.1

D-S.3.2.2

35. The number of paper clips of each color in a box is shown in the table below.

Paper Clips in a Box

Color	Number of Paper Clips
red	50
blue	75
green	100

Margo randomly selects 1 paper clip from the box, records its color, and returns it to the box. She does this 10 times. Which table shows experimental results from Margo’s selections that are **closest** to the expected results when based on the probabilities of selecting a paper clip of each color from the box?

A. **Margo’s Selections**

Color	Number of Times Selected
red	3
blue	3
green	4

*

B. **Margo’s Selections**

Color	Number of Times Selected
red	1
blue	4
green	5

sees increase of 1, 4, 5 just as red, blue, green increases

C. **Margo’s Selections**

Color	Number of Times Selected
red	0
blue	2
green	8

since red is least color in box, thinks 0 selections would be OK

D. **Margo’s Selections**

Color	Number of Times Selected
red	1
blue	5
green	4

only focuses on red being least; blue should not be greater than green

D-S.3.2.2

36. The table below shows the numbers of game chips of different colors in a bag.

Chips in a Bag

Chip Color	Number of Chips
yellow	8
green	5
blue	4
red	3

Danielle randomly selects one chip from the bag. Which statement about the selection is true?

- A. The probability of selecting a red chip is $\frac{1}{3}$.

1 chip selected / 3 red chips in bag

- B. Selecting a yellow, green, or blue chip is certain.

missing red to be certain

- C. The probability of selecting a green chip is $\frac{1}{20}$.

1 chip selected / total number of chips in bag

- D. Selecting a blue or red chip is less likely than selecting a yellow chip.

*

D-S.3.2.2

37. Charlene has 12 plastic cups. Of the 12 plastic cups, 3 are green, 4 are red, and 5 are blue. She stacks the cups into a single stack in random order. What is the probability that the cup on top of the stack is **not** green?

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

finds probability of green

B. $\frac{2}{5}$

adds $\frac{1}{3}$ and $\frac{5}{12}$ by adding the numerators and denominators to get $\frac{6}{15}$, then reducing

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

assumes each color is equally likely (does not use 3, 4, 5)

D. $\frac{3}{4}$

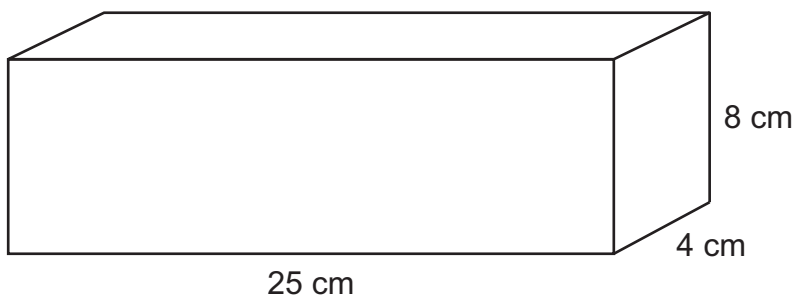
*

D-S.3.2.2

C-G.1.1.4

C-G.2.2.2

38. A carpenter will make a single, straight cut through the rectangular prism shown below by randomly choosing a face and cutting parallel to that face. The cut will be a whole number of centimeters from the chosen face.



What is the probability that the area, in square centimeters, of the cross section created by the cut will **not** be a multiple of 100?

- A. 0 *thinks there's only one cross section (which measures 8×4)*
- B. $\frac{1}{3}$ *
- C. $\frac{2}{3}$ *finds the number of cross sections with an area that is a multiple of 100*
- D. 1 *doesn't consider the 8×4 cross section*

D-S.3.2.3

39. Keisha has a bag containing blue, green, orange, and red marbles. The number of marbles of each color is shown in the table below.

Marble Colors

Color	Number of Marbles
blue	75
green	50
orange	100
red	25

Keisha randomly selects 1 marble from the bag, records its color, and returns the marble to the bag. She does this three times. What is the probability Keisha selects a red marble, then a green marble, and then a blue or orange marble?

- A. $\frac{3}{500}$ *probability of red \times probability of green \times probability of blue*
- B. $\frac{7}{500}$ *
- C. $\frac{7}{108}$ *probabilities as color out of not color: $(25/225)(50/200)(175/75) = (1/9)(1/4)(7/3) = (0.25)(7/27)$*
- D. $\frac{4}{25}$ *correct set-up for $(1/10)(1/5)(7/10)$, but then adds $1/10$ and $7/10$ instead of using multiplication*

D-S.3.2.3

D-S.3.2.2

40. Carla uses a special 12-sided number polyhedron for some experiments. Some information about the polyhedron is listed below.

- There is a $\frac{1}{3}$ probability that Carla will roll a number that is a multiple of 3.
- There is a $\frac{5}{12}$ probability that Carla will roll a prime number.

Carla rolls her 12-sided number polyhedron two times. What is the probability that Carla rolls a multiple of 3 on her first roll, and a number that is **not** a prime number on her second roll?

A. $\frac{5}{36}$

B. $\frac{7}{36}$ *

C. $\frac{5}{18}$

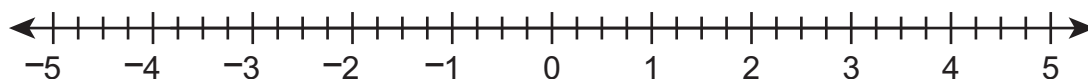
D. $\frac{7}{18}$

FIRST OPEN-ENDED QUESTION**A-N.1.1**

41. Jordan needs to determine the value of the expression below.

$$1.75 + \left(-2\frac{1}{2}\right)$$

- A.** Use the number line provided below to create a number line model of the expression that can be used to determine the value of the expression. Explain how the model can be used.



- B.** Determine the value of the expression.

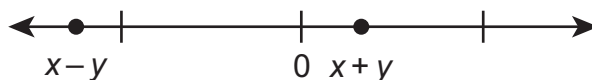
Go to the next page to finish question 41.

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

Cindy is using x and y to represent two rational numbers. She writes the two expressions below using x and y .

$$x - y \qquad x + y$$

Cindy correctly locates the value of each expression on the number line shown below.



- C. Explain why x must represent a negative rational number and y must represent a positive rational number.

ITEM-SPECIFIC SCORING GUIDELINE

Question #41

Grade 7

Assessment Anchor this item will be reported under:

M07.A-N.1 — Apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.

Specific Anchor Descriptor addressed by this item:

M07.A-N.1.1 — Solve real-world and mathematical problems involving the four operations with rational numbers.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of how to apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of how to apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of how to apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of how to apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.
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	BLK (blank) Blank, entirely erased, or written refusal to respond OT Off-task LOE Response in a language other than English IL 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 apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #41

Top Scoring Response:

Part A Answer	
What?	Why?
	<p>Sample Explanation: First, 1.75 is modeled on the number line by drawing an arrow starting at 0 and moving to the right 1.75 units. Since the number that is being added to 1.75 is negative, the next arrow needs to be drawn starting at 1.75 and moving left $2\frac{1}{2}$ units. OR equivalent</p>

(2 score points)

- 1 point for correct model
- 1 point for complete explanation
- OR $\frac{1}{2}$ point for correct but incomplete explanation

Part B Answer	
What?	Why?
-0.75	

(1 score point)

- 1 point for correct answer

Part C Answer	
What?	Why?
	<p>Sample Explanation: Since x is the number midway between $x - y$ and $x + y$, it would be located to the left of 0. This means $x < 0$, so x is negative. From the number line, $x + y$ is located to the right of 0, so $x + y$ must be positive. Since x is negative, the only way $x + y$ can be positive is if y is positive. If y is negative, then $x + y$ would be negative since adding two negative numbers always results in a negative number. So, x represents a negative rational number, and y represents a positive rational number. OR equivalent</p>

(1 score point)

- 1 point for complete explanation
- OR $\frac{1}{2}$ point for correct but incomplete explanation

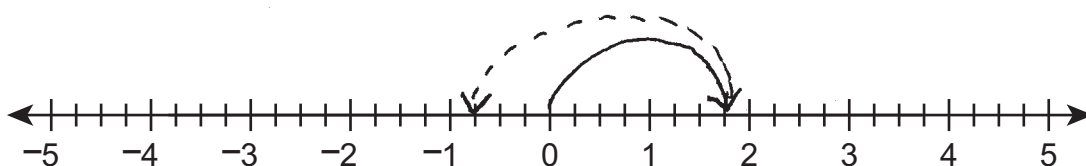
FIRST OPEN-ENDED QUESTION RESPONSES

A-N.1.1 Response Score: 4

41. Jordan needs to determine the value of the expression below.

$$1.75 + \left(-2\frac{1}{2}\right)$$

- A. Use the number line provided below to create a number line model of the expression that can be used to determine the value of the expression. Explain how the model can be used.



I STARTED AT 0 AND COUNTED 1.75 UNITS TO THE RIGHT. I DREW AN ARROW TO SHOW THIS. NEXT, I MOVED TO THE LEFT 2 AND $\frac{1}{2}$ UNITS BECAUSE I WAS ADDING A NEGATIVE NUMBER. I DREW AN ARROW TO SHOW THIS. I ENDED UP AT -0.75 ON THE NUMBER LINE.

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

- B. Determine the value of the expression.

-0.75

$$\begin{array}{r} -2.50 \\ +1.75 \\ \hline -0.75 \end{array}$$

The student has given a correct answer.

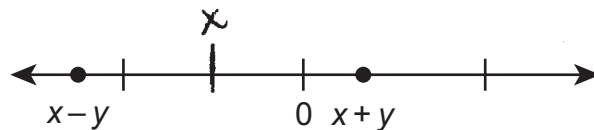
Go to the next page to finish question 41.

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

Cindy is using x and y to represent two rational numbers. She writes the two expressions below using x and y .

$$x - y \qquad x + y$$

Cindy correctly locates the value of each expression on the number line shown below.



- C. Explain why x must represent a negative rational number and y must represent a positive rational number.

I PUT x ON THE NUMBER LINE. IT HAS TO BE IN THE MIDDLE OF $x-y$ AND $x+y$ BECAUSE y IS THE SAME DISTANCE ON EITHER SIDE OF IT. $+y$ ON ONE SIDE AND $-y$ ON THE OTHER SIDE. YOU CAN SEE x IS TO THE LEFT OF ZERO SO IT IS NEGATIVE IN VALUE. y HAS TO BE POSITIVE IN VALUE BECAUSE IF IT WERE NEGATIVE, THEN $x+y$ WOULD BE NEGATIVE AND TO THE LEFT OF 0.

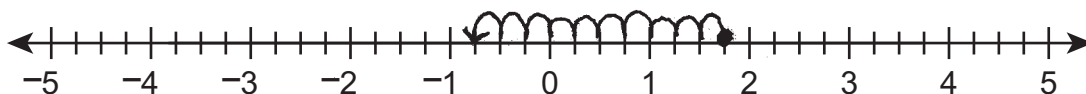
The student has given a complete explanation.

A-N.1.1 Response Score: 3

41. Jordan needs to determine the value of the expression below.

$$1.75 + \left(-2\frac{1}{2}\right)$$

A. Use the number line provided below to create a number line model of the expression that can be used to determine the value of the expression. Explain how the model can be used.



I started at 1.75 and marked it on the number line with a closed circle like this ●. Then, I counted by fourths to the left because I'm adding a negative number which is like subtracting a positive number and I counted 10/4ths which is the same as 2 1/2.

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

B. Determine the value of the expression.

$$\begin{array}{r} -1\frac{6}{4} \\ +1\frac{3}{4} \\ \hline -1 \end{array}$$

$$-1\frac{3}{4}$$

The student has given a correct answer.

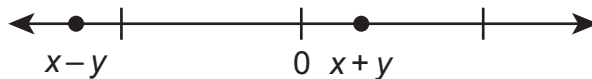
Go to the next page to finish question 41.

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

Cindy is using x and y to represent two rational numbers. She writes the two expressions below using x and y .

$$x - y \qquad x + y$$

Cindy correctly locates the value of each expression on the number line shown below.



- C. Explain why x must represent a negative rational number and y must represent a positive rational number.

I tried numbers, I said let $x = -1$, $y = +2$. $x - y = -3$ and $x + y = +1$. If x were positive and y were negative, it wouldn't work.

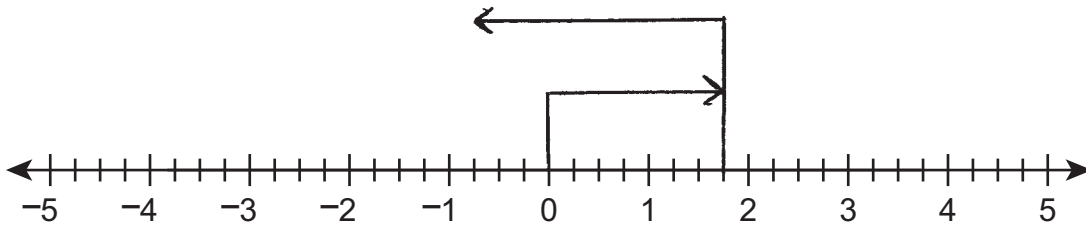
The student has given a correct but incomplete explanation.

A-N.1.1 Response Score: 2

41. Jordan needs to determine the value of the expression below.

$$1.75 + \left(-2\frac{1}{2}\right)$$

A. Use the number line provided below to create a number line model of the expression that can be used to determine the value of the expression. Explain how the model can be used.



You move to the right when the number is positive. You move to the left when the number is negative.

The student has given a correct model.
The student has given a correct but incomplete explanation.

B. Determine the value of the expression.

The value of the expression is negative .75

The student has given a correct answer.

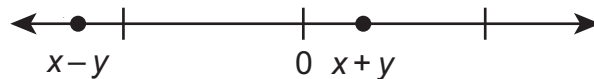
Go to the next page to finish question 41.

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

Cindy is using x and y to represent two rational numbers. She writes the two expressions below using x and y .

$$x - y \qquad x + y$$

Cindy correctly locates the value of each expression on the number line shown below.



- C. Explain why x must represent a negative rational number and y must represent a positive rational number.

if x and y were both positive, then, $x - y$ could be positive or negative depending on how big x and y are. If x and y were both negative, then, $x + y$ could only be negative which means it couldn't be to the right of 0.

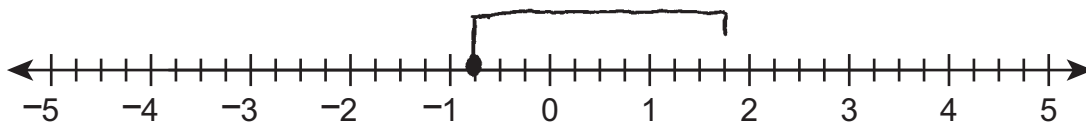
The student has given an incorrect explanation.

A-N.1.1 Response Score: 1

41. Jordan needs to determine the value of the expression below.

$$1.75 + \left(-2\frac{1}{2}\right)$$

A. Use the number line provided below to create a number line model of the expression that can be used to determine the value of the expression. Explain how the model can be used.



I started at 1.75 and stopped at .75

The student has given a correct model.
The student has given an incorrect explanation.

B. Determine the value of the expression.

.75

The student has given an incorrect answer.

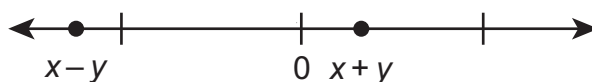
Go to the next page to finish question 41.

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

Cindy is using x and y to represent two rational numbers. She writes the two expressions below using x and y .

$$x - y \qquad x + y$$

Cindy correctly locates the value of each expression on the number line shown below.



- C. Explain why x must represent a negative rational number and y must represent a positive rational number.

Positive numbers are always to the right of 0 . The $+$ sign in $x + y$ means it's positive. The negative sign in $x - y$ means it's a negative number and has to be to the left of 0 which it is.

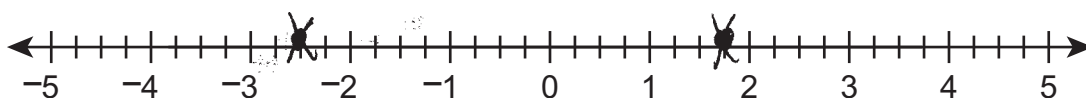
The student has given an incorrect explanation.

A-N.1.1 Response Score: 0

41. Jordan needs to determine the value of the expression below.

$$1.75 + \left(-2\frac{1}{2}\right)$$

- A. Use the number line provided below to create a number line model of the expression that can be used to determine the value of the expression. Explain how the model can be used.



I put the numbers on the number line where they belong.

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

- B. Determine the value of the expression.

I added. 4.25

The student has given an incorrect answer.

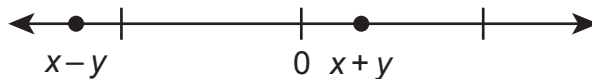
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41. **Continued.** Please refer to the previous page for task explanation.

Cindy is using x and y to represent two rational numbers. She writes the two expressions below using x and y .

$$x - y \qquad x + y$$

Cindy correctly locates the value of each expression on the number line shown below.



- C. Explain why x must represent a negative rational number and y must represent a positive rational number.

I know the $x-y$ point to the left of zero has to be negative because to the left of 0 is negative. The $x+y$ to the right of 0 can only be positive when y is bigger than a negative x .

The student has given an incorrect explanation.

SECOND OPEN-ENDED QUESTION

A-R.1.1.4

A-R.1.1.6

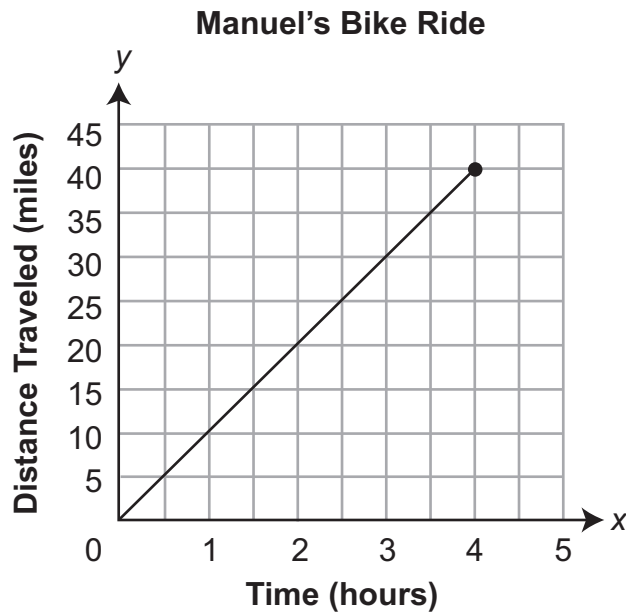
42. Valery and Manuel ride their bikes 40 miles every Saturday. Valery rides at an average speed of 9.6 miles per hour (mph).

A. Exactly how many hours does it take Valery to ride her bike 40 miles? Show or explain all your work.

Go to the next page to finish question 42.

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

Manuel's bike ride is represented by the graph shown below.



Valery increases her speed by 4% the next time she rides her bike so she can ride faster than Manuel.

- B.** Explain why the 4% increase is **not** enough for Valery to ride faster than Manuel. As part of your explanation, find how many fewer miles Valery rides than Manuel does when he finishes his 40-mile bike ride.

ITEM-SPECIFIC SCORING GUIDELINE

Question #42

Grade 7

Assessment Anchor this item will be reported under:

M07.A-R.1 — Demonstrate an understanding of proportional relationships.

Specific Anchor Descriptor addressed by this item:

M07.A-R.1.1 — Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of proportional relationships by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of proportional relationships by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of proportional relationships by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of proportional 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	BLK (blank) Blank, entirely erased, or written refusal to respond OT Off-task LOE Response in a language other than English IL 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 proportional relationships.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #42

Top Scoring Response:

Part A Answer	
What?	Why?
<p>4.1666... hours OR $4\frac{1}{6}$ hours OR 4 hours and 10 minutes OR $4.1\overline{6}$</p>	<p>Sample Work: $40 \div 9.6 = h$ $4.1666... = h$ OR Sample Explanation: Since Valery rode at an average speed of 9.6 miles per hour and she rode a distance of 40 miles, the total time it took her can be found by dividing 40 by 9.6. So it took her $4\frac{1}{6}$ hours. OR equivalent</p>

(2 score points)

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

Part B Answer	
What?	Why?
<p>0.064 (mile)</p>	<p>Sample Explanation: If Valery increases her speed by 4%, her new speed will be $9.6 \times 1.04 = 9.984$ mph. Manuel’s speed from the graph is 10 mph. Since $9.984 < 10$, she will not be faster than Manuel. It takes Manuel 4 hours to finish the ride, so Valery will only have finished $9.984 \times 4 = 39.936$ miles. This means she will have ridden 0.064 miles less than Manuel when he finished the 40-mile bike ride. OR equivalent</p>

(2 score points)

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

SECOND OPEN-ENDED QUESTION RESPONSES

A-R.1.1.4

A-R.1.1.6 Response Score: 4

42. Valery and Manuel ride their bikes 40 miles every Saturday. Valery rides at an average speed of 9.6 miles per hour (mph).

A. **Exactly** how many hours does it take Valery to ride her bike 40 miles? Show or explain all your work.

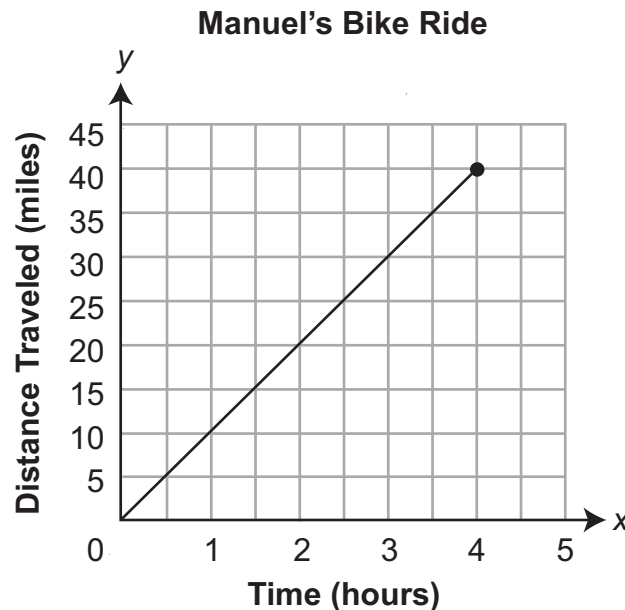
$$40 \div 9.6 = 4.\overline{16} \text{ HOURS}$$

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

Go to the next page to finish question 42.

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

Manuel's bike ride is represented by the graph shown below.



Valery increases her speed by 4% the next time she rides her bike so she can ride faster than Manuel.

- B.** Explain why the 4% increase is **not** enough for Valery to ride faster than Manuel. As part of your explanation, find how many fewer miles Valery rides than Manuel does when he finishes his 40-mile bike ride.

A 4% INCREASE OF 9.6, OR $1.04 \times 9.6 = 9.984$, IS STILL LESS THAN THE 10 MPH THAT MANUEL RIDES HIS BIKE. (I GOT THE 10 MPH FROM DIVIDING 40 MILES BY 4 HOURS.)

I TOOK THE 9.984 MPH AND MULTIPLIED IT BY 4 HOURS TO GET THE DISTANCE TRAVELED BY VALERY. I GOT 39.936 AND SUBTRACTED THAT FROM 40.000 AND GOT .064 FEWER MILES.

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

A-R.1.1.4

A-R.1.1.6 Response Score: 3

42. Valery and Manuel ride their bikes 40 miles every Saturday. Valery rides at an average speed of 9.6 miles per hour (mph).

A. **Exactly** how many hours does it take Valery to ride her bike 40 miles? Show or explain all your work.

$$\frac{40}{9.6} \approx 4.166 \text{ or about 4 hours and 10 minutes}$$

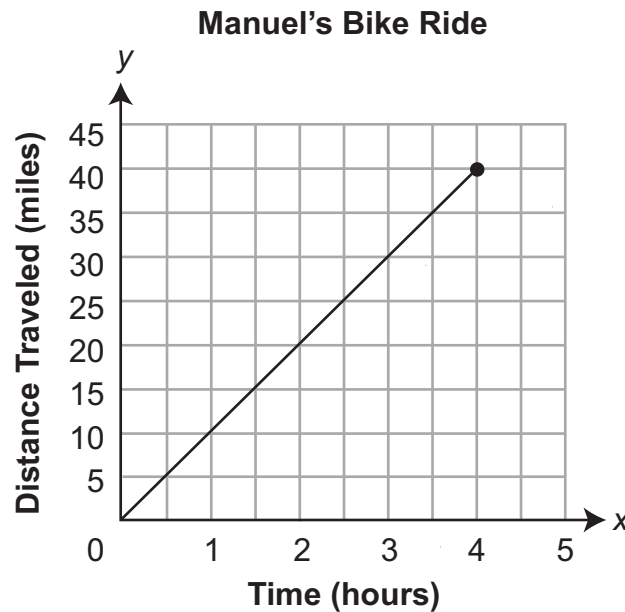
I divided 9.6 into 40.

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

Go to the next page to finish question 42.

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

Manuel's bike ride is represented by the graph shown below.



Valery increases her speed by 4% the next time she rides her bike so she can ride faster than Manuel.

- B.** Explain why the 4% increase is **not** enough for Valery to ride faster than Manuel. As part of your explanation, find how many fewer miles Valery rides than Manuel does when he finishes his 40-mile bike ride.

To go 10 mph, Valery would have to ride $10 - 9.6$ or $.4$ mph faster which is not 4% faster. It's $4.1\bar{6}\%$ faster. $100/96 = 1.041\bar{6}$ and you take away the 1 and move the decimal point over 2 places to get the percent.

$$10 - 9.884 = .016 \text{ fewer miles per hour}$$

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

A-R.1.1.4

A-R.1.1.6 Response Score: 2

42. Valery and Manuel ride their bikes 40 miles every Saturday. Valery rides at an average speed of 9.6 miles per hour (mph).

A. **Exactly** how many hours does it take Valery to ride her bike 40 miles? Show or explain all your work.

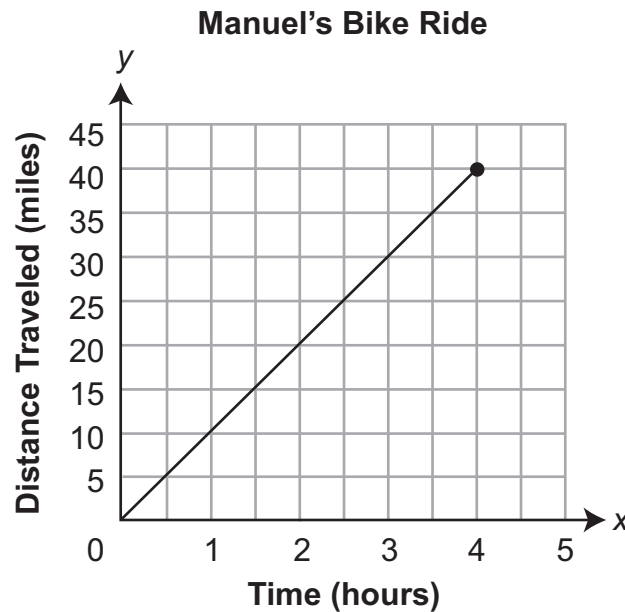
$$\frac{40}{1} (m) \times \frac{1}{9.6 \text{ mph}} = 4\frac{1}{6} h$$

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

Go to the next page to finish question 42.

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

Manuel's bike ride is represented by the graph shown below.



Valery increases her speed by 4% the next time she rides her bike so she can ride faster than Manuel.

- B.** Explain why the 4% increase is **not** enough for Valery to ride faster than Manuel. As part of your explanation, find how many fewer miles Valery rides than Manuel does when he finishes his 40-mile bike ride.

The 4% is not enough. I changed 4% to .04 and added that to 9.6 and got 9.64 which is not 10.

$$40 - 38.4 = 1.6 \text{ fewer miles}$$

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

A-R.1.1.4

A-R.1.1.6 Response Score: 1

42. Valery and Manuel ride their bikes 40 miles every Saturday. Valery rides at an average speed of 9.6 miles per hour (mph).

A. **Exactly** how many hours does it take Valery to ride her bike 40 miles? Show or explain all your work.

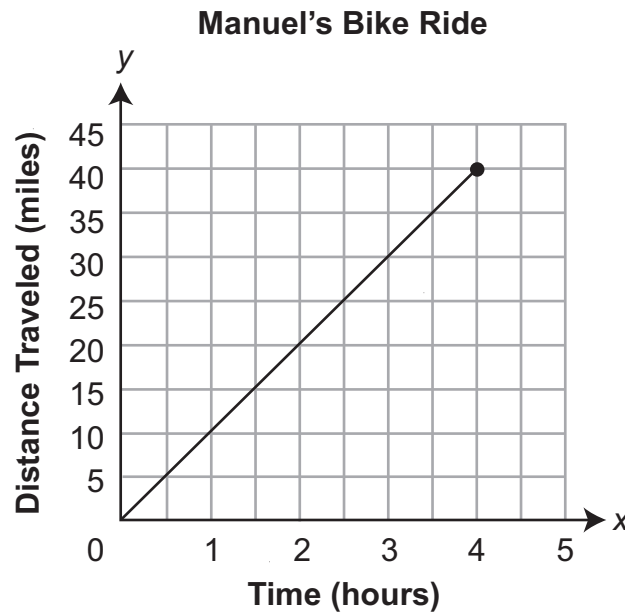
I DID $40 \div 9.6$ AND GOT .412 HOURS

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

Go to the next page to finish question 42.

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

Manuel's bike ride is represented by the graph shown below.



Valery increases her speed by 4% the next time she rides her bike so she can ride faster than Manuel.

- B.** Explain why the 4% increase is **not** enough for Valery to ride faster than Manuel. As part of your explanation, find how many fewer miles Valery rides than Manuel does when he finishes his 40-mile bike ride.

4% IS NOT 40%. 40% INCREASE WOULD BE ENOUGH. 4% IS ONLY .04 40% IS .40

$$4 \times (.40 - .04) = 4 \times .36 = 1.44 \text{ LESS MILES}$$

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

A-R.1.1.4

A-R.1.1.6 Response Score: 0

42. Valery and Manuel ride their bikes 40 miles every Saturday. Valery rides at an average speed of 9.6 miles per hour (mph).

A. **Exactly** how many hours does it take Valery to ride her bike 40 miles? Show or explain all your work.

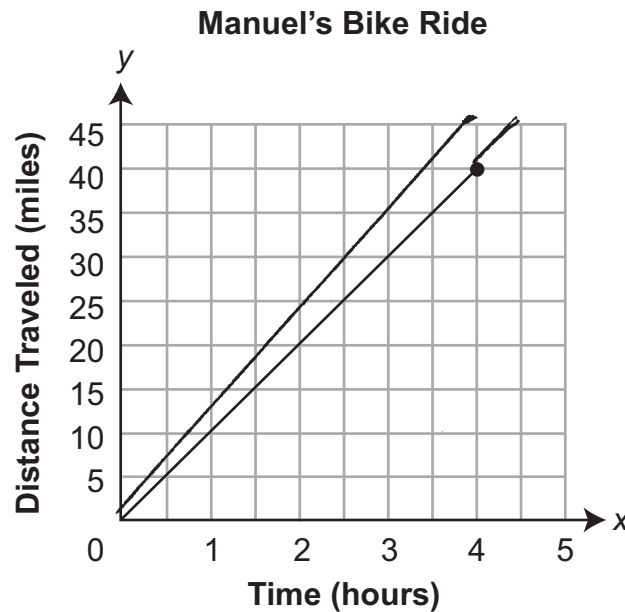
$$\frac{9.6}{40} = .24 \text{ hours or } 14.4 \text{ minutes}$$

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

Go to the next page to finish question 42.

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

Manuel's bike ride is represented by the graph shown below.



Valery increases her speed by 4% the next time she rides her bike so she can ride faster than Manuel.

- B.** Explain why the 4% increase is **not** enough for Valery to ride faster than Manuel. As part of your explanation, find how many fewer miles Valery rides than Manuel does when he finishes his 40-mile bike ride.

For Valery to be faster, her speed on the graph would have to have her line over Manuel's line by a little because 4% is very little. I drew a line that was a little bit more than Manuel's. I added 4 to 40 to get 44. It needs to be 45 so I subtracted 44 from 45 and got 1 fewer mile.

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

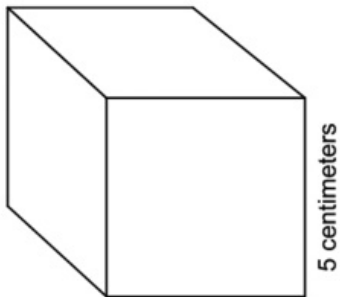
THIRD OPEN-ENDED QUESTION

C-G.2.2.2



Question 43
Page 1 of 2

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin paints every face of the wooden cube.

A. What is the total surface area, in square centimeters, of the cube Justin paints?

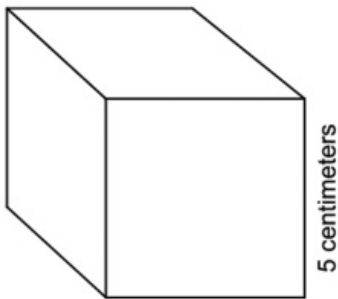
After the paint dries, Justin cuts the cube in half. He makes the cut along the diagonal of one pair of parallel faces. Rounded to the nearest thousandth, the diagonal has a length of 7.071 centimeters. Once the cut is made, Justin has two identical triangular prisms.

B. What is the combined area, in square centimeters, of the surfaces of the two prisms that were **not** painted?

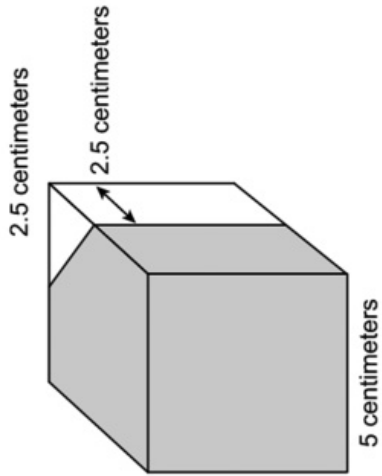
Question 43
Page 2 of 2



Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin has a second wooden cube identical to the first. He cuts off the triangular prism as shown below and throws it away.



C. What is the volume, in cubic centimeters, of the remaining solid? Show or explain all your work.

0 / 1000

Review/End Test

Pause

Flag

Options

Back

ITEM-SPECIFIC SCORING GUIDELINE

Question #43

Grade 7

Assessment Anchor this item will be reported under:

M07.C-G.2—Solve real-world and mathematical problems involving angle measure, circumference, area, surface area, and volume.

Specific Anchor Descriptor addressed by this item:

M07.C-G.2.2—Determine circumference, area, surface area, and volume.

Scoring Guide:

Score	In this item, the student –
4	Demonstrates a thorough understanding of problems involving area and surface area by correctly solving problems and clearly explaining procedures.
3	Demonstrates a general understanding of problems involving area and surface area by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	Demonstrates a partial understanding of problems involving area and surface area by correctly performing a significant portion of the required task.
1	Demonstrates minimal understanding of problems involving area and surface area.
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	BLK (blank) Blank, entirely erased, or written refusal to respond OT Off-task LOE Response in a language other than English IL 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 problems involving area and surface area.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

Question #43

Top Scoring Response:

Part A Answer	
What?	Why?
150 (square centimeters)	

(1 score point)

1 point for correct answer

Part B Answer	
What?	Why?
70.710 (square centimeters) OR 70.71 (square centimeters)	

(1 score point)

1 point for correct answer

Part C Answer	
What?	Why?
$109\frac{3}{8}$ OR 109.375	<p>Sample Work:</p> $5^3 = 125$ $\frac{1}{2}(2\frac{1}{2})(2\frac{1}{2})(5) = 15\frac{5}{8}$ $125 - 15\frac{5}{8} = 109\frac{3}{8}$ <p>OR</p> <p>Sample Explanation: The volume of the remaining part can be found by subtracting the volume of the triangular prism from the volume of the cube. The volume of the cube is $(5)(5)(5) = 125$ cubic cm. The volume of the triangular prism is $0.5(2.5)(2.5)(5) = 15.625$ cubic inches. So the volume of the remaining part is $125 - 15.625 = 109.375$ cubic cm.</p> <p>OR equivalent</p>

(2 score points)

1 point for correct answer
1 point for complete support

THIRD OPEN-ENDED QUESTION RESPONSES

C-G.2.2.2 Response Score: 4



Question 43
Page 1 of 2

?

Justin paints every face of the wooden cube.

A. What is the total surface area, in square centimeters, of the cube Justin paints?

EQ

150 cm²

The student has given a correct answer.

After the paint dries, Justin cuts the cube in half. He makes the cut along the diagonal of one pair of parallel faces. Rounded to the nearest thousandth, the diagonal has a length of 7.071 centimeters. Once the cut is made, Justin has two identical triangular prisms.

B. What is the combined area, in square centimeters, of the surfaces of the two prisms that were **not** painted?

EQ

70.71 cm²

The student has given a correct answer.

Next

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.

Options

Flag

Pause

Review/End Test

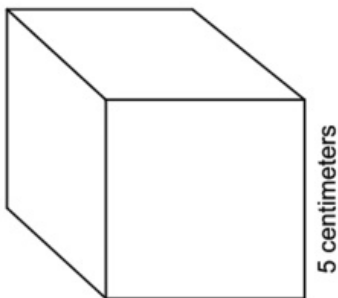
PSSA Grade 7 Mathematics Preliminary Item and Scoring Sampler—August 2014

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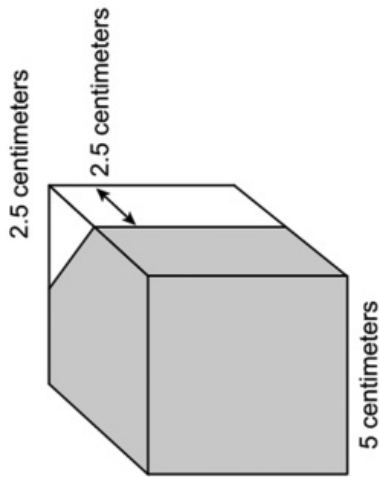
Question 43
Page 2 of 2



Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin has a second wooden cube identical to the first. He cuts off the triangular prism as shown below and throws it away.



C. What is the volume, in cubic centimeters, of the remaining solid? Show or explain all your work.

EQ

$$V(\text{cube}) = s \times s \times s = 5 \times 5 \times 5 = 125$$

$$V(\text{prism}) = B \times h = \frac{1}{2} \times 2.5 \times 2.5 \times 5 = 15.625$$

$$125 - 15.625 = 109.375 \text{ cm}^3$$

78 / 1000

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



C-G.2.2.2 Response Score: 3



Question 43
Page 1 of 2

Justin paints every face of the wooden cube.

A. What is the total surface area, in square centimeters, of the cube Justin paints?

EQ

150 cm^2

The student has given a correct answer.

After the paint dries, Justin cuts the cube in half. He makes the cut along the diagonal of one pair of parallel faces. Rounded to the nearest thousandth, the diagonal has a length of 7.071 centimeters. Once the cut is made, Justin has two identical triangular prisms.

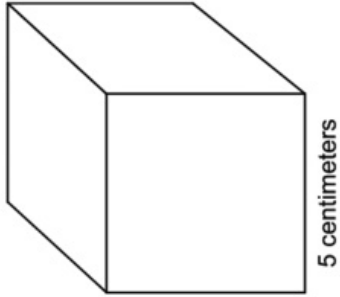
B. What is the combined area, in square centimeters, of the surfaces of the two prisms that were **not** painted?

EQ

70.71 cm^2

The student has given a correct answer.

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



?

Next

EQ

Options

EQ

Flag

EQ

Pause

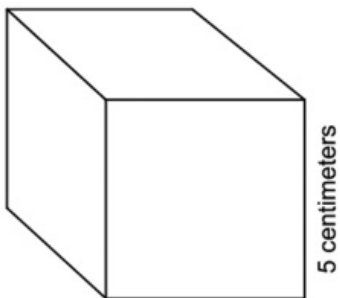
EQ

Review/End Test

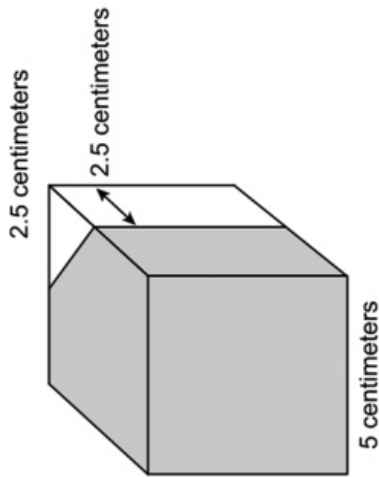
Question 43
Page 2 of 2



Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin has a second wooden cube identical to the first. He cuts off the triangular prism as shown below and throws it away.



C. What is the volume, in cubic centimeters, of the remaining solid? Show or explain all your work.

EQ

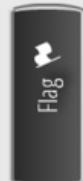
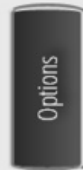
$$(5 \times 5) - \frac{1}{2}(2.5 \times 2.5)$$

$$25 - 3.125 = 21.875$$

$$21.875 \times 5 = 109.25$$

48 / 1000

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



C-G.2.2.2 Response Score: 2



Question 43
Page 1 of 2

Justin paints every face of the wooden cube.

A. What is the total surface area, in square centimeters, of the cube Justin paints?

EQ

$75 \times 2 = 150$

The student has given a correct answer.

After the paint dries, Justin cuts the cube in half. He makes the cut along the diagonal of one pair of parallel faces. Rounded to the nearest thousandth, the diagonal has a length of 7.071 centimeters. Once the cut is made, Justin has two identical triangular prisms.

B. What is the combined area, in square centimeters, of the surfaces of the two prisms that were **not** painted?

EQ

$5 \times \frac{7.071}{2} = 17.6775$

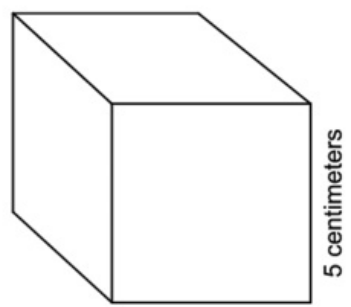
The student has given an incorrect answer.

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.

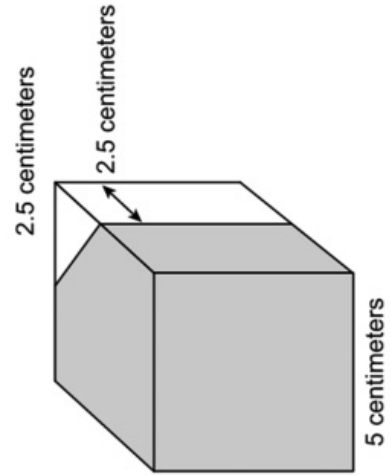
Question 43
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Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin has a second wooden cube identical to the first. He cuts off the triangular prism as shown below and throws it away.



C. What is the volume, in cubic centimeters, of the remaining solid? Show or explain all your work.

EQ

The top triangle is $\frac{1}{8}$ of the top face.

$$21\frac{7}{8} \times 5 = 109\frac{3}{8}$$

50 / 1000

The student has given a correct answer.
The student has given correct but incomplete support.









C-G.2.2.2 Response Score: 1



?

Next

Question 43
Page 1 of 2

Justin paints every face of the wooden cube.

A. What is the total surface area, in square centimeters, of the cube Justin paints?

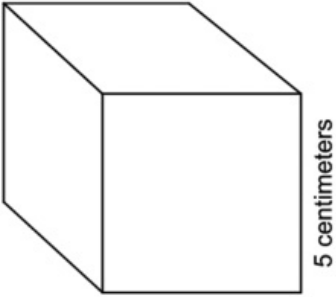
EQ 150
The student has given a correct answer.

After the paint dries, Justin cuts the cube in half. He makes the cut along the diagonal of one pair of parallel faces. Rounded to the nearest thousandth, the diagonal has a length of 7.071 centimeters. Once the cut is made, Justin has two identical triangular prisms.

B. What is the combined area, in square centimeters, of the surfaces of the two prisms that were **not** painted?

EQ 35.355
The student has given an incorrect answer.

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Options

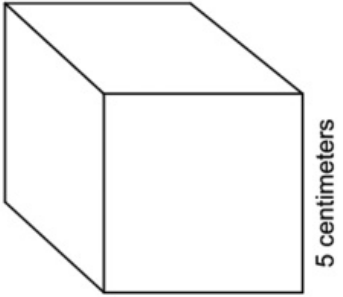
Flag

Pause

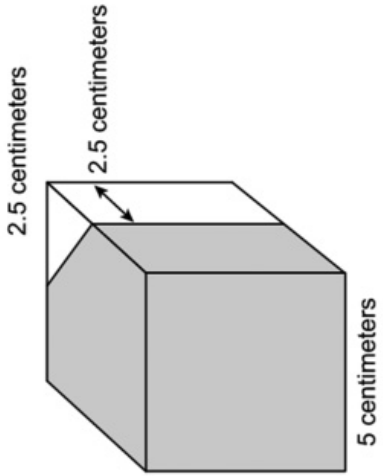
Review/End Test

Question 43
Page 2 of 2

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin has a second wooden cube identical to the first. He cuts off the triangular prism as shown below and throws it away.



C. What is the volume, in cubic centimeters, of the remaining solid? Show or explain all your work.

EQ

I found the volume of the large cube. It's 125.
 I found the volume of the smaller cube. 15.625
 I cut it in half because it's a triangle. 7.8125
 I found the difference. $125 - 7.8125 = 117.1875$

190 / 1000

The student has given an incorrect answer.
The student has given a correct but incomplete explanation.

C-G.2.2.2 Response Score: 0



Question 43
Page 1 of 2

Justin paints every face of the wooden cube.

A. What is the total surface area, in square centimeters, of the cube Justin paints?

EQ

$25 \times 3 = 75$

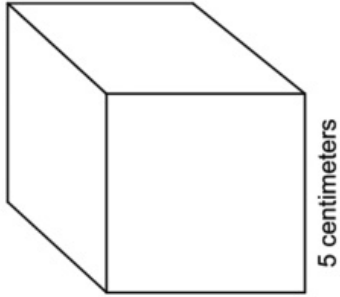
The student has given an incorrect answer.

EQ

$5 \times 5 = 25 \quad 25 \times 2 = 50$

The student has given an incorrect answer.

Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



B. After the paint dries, Justin cuts the cube in half. He makes the cut along the diagonal of one pair of parallel faces. Rounded to the nearest thousandth, the diagonal has a length of 7.071 centimeters. Once the cut is made, Justin has two identical triangular prisms.

B. What is the combined area, in square centimeters, of the surfaces of the two prisms that were **not** painted?

Next

Options

Flag

Pause

Review/End Test

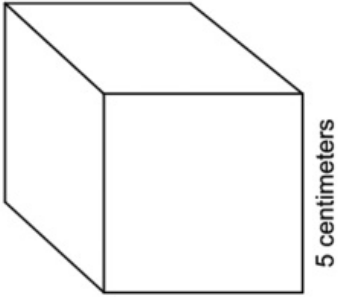
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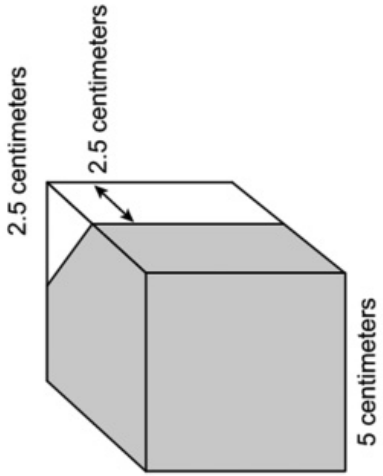





Justin has a wooden cube. Each edge of the cube is 5 centimeters long, as shown below.



Justin has a second wooden cube identical to the first. He cuts off the triangular prism as shown below and throws it away.



C. What is the volume, in cubic centimeters, of the remaining solid? Show or explain all your work.

EQ

I knew one side was 5. I knew the other side was 5 - 2.5 or 2.5. I knew the third side was also 5 - 2.5 or 2.5. I knew volume was $5 \times 2.5 \times 2.5 = 31.25$.

152 / 1000

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







PSSA Grade 7 Mathematics Preliminary Item and Scoring Sampler

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