

Smarter Balanced Assessment Consortium:

Mathematics Practice Test Scoring Guide Grade 7

08/14/2019



About the Practice Test Scoring Guides

The Smarter Balanced Mathematics Practice Test Scoring Guides provide details about the items, student response types, correct responses, and related scoring considerations for the Smarter Balanced Practice Test items. The items selected for the Practice Test are designed to reflect

- a broad coverage of claims and targets that closely mirror the summative blueprint.
- a range of student response types.
- a breadth of difficulty levels across the items, ranging from easier to more difficult items.

It is important to note that all student response types are not fully represented on every practice test, but a distribution can be observed across all the practice tests. The items presented are reflective of refinements and adjustments to language based on pilot test results and expert recommendations from both content and accessibility perspectives.

Within this guide, each item is presented with the following information¹:

- Claim: statement derived from evidence about college and career readiness
- Domain: a broad content area that contains related targets and standards (i.e., Geometry)
- Target: statement that bridges the content standards and the assessment evidence that supports the claim
- Depth of Knowledge (DOK): measure of complexity considering the student's cognitive process in response to an item. There are four DOK levels, a 4 being the highest level.
- Common Core State Standards for Mathematical Content (CCSS-MC)
- Common Core State Standards for Mathematical Practice (CCSS-MP)
- Static presentation of the item: static presentation of item from test administration system
- Static presentation of student response field(s): static presentation of response field from test administration system
- Answer key or exemplar: expected student response or example response from score point value
- Rubric and applicable score points for each item: score point representations for student responses

The following items are representative of the kinds of items that students can expect to experience when taking the Computer Adaptive Test (CAT) portion of the summative assessment for grade 7. A separate document is available that provides a grade 7 sample performance task and scoring guide.

¹ Most of these terms (Claim, Domain, Target, DOK, etc.) are defined in various other Smarter Balanced documents, as well as the Common Core State Standards for Mathematics. Refer to the *Content Specifications for the Summative Assessment of the Common Core State Standards for Mathematics* for more information.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#1	1	EE	D	1	7.EE.B.3	N/A

Enter the value of $5 \cdot (13.5 - 4.5)$.

←
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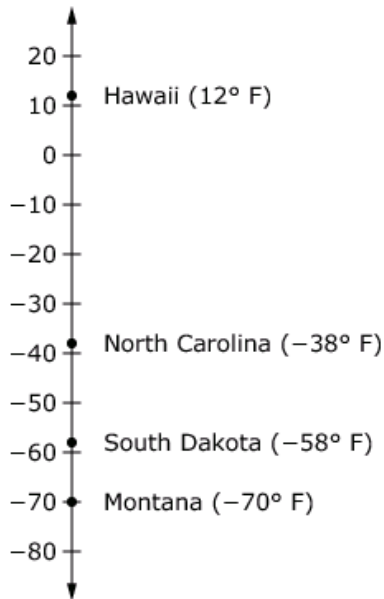
1	2	3
4	5	6
7	8	9
0	.	-

Key: 45

Rubric: (1 point) The student enters the correct value.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#2	1	NS	B	1	7.NS.A.1d	N/A

The number line shows record low temperatures for four states.



Enter the difference, in degrees, between the record low temperatures in Hawaii and South Dakota.

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1	2	3
4	5	6
7	8	9
0	.	-

Key: 70

Rubric: (1 point) The student enters the difference between the temperatures.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#3	1	EE	C	1	7.EE.A.1	7

Select the expression equivalent to $(4x + 3) + (-2x + 4)$.

- Ⓐ $-2x + 12$
- Ⓑ $-8x + 12$
- Ⓒ $6x + 7$
- Ⓓ $2x + 7$

Key: D

Rubric: (1 point) The student selects the equivalent expression.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#4	1	EE	C	2	7.EE.A.1	7

Select **all** expressions that are equivalent to $-3.75 + 2(-4x + 6.1) - 3.25x$.

- ☐ $7x - 2x + 8.1$
- ☐ $8.45 - 8x - 3.25x$
- ☐ $-1.75 - 7.25x + 6.1$
- ☐ $-11.25x + 12.2 - 3.75$

Exemplar: (shown at right)

Rubric: (1 point) The student selects both equivalent expressions.

- ☐ $7x - 2x + 8.1$
- ☒ $8.45 - 8x - 3.25x$
- ☐ $-1.75 - 7.25x + 6.1$
- ☒ $-11.25x + 12.2 - 3.75$

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#5	1	NS	B	1	7.NS.A.2d	N/A

Enter the decimal equivalent of $\frac{11}{8}$.

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1	2	3
4	5	6
7	8	9
0	.	-

Key: 1.375

Rubric: (1 point) The student enters the decimal equivalent.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#6	1	EE	C	1	7.EE.A.1	N/A

Enter the value of c when the expression $21.2x + c$ is equivalent to $5.3(4x - 2.6)$.

←
→
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✕

1	2	3
4	5	6
7	8	9
0	.	-

Key: -13.78

Rubric: (1 point) The student enters the correct value.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#7	1	NS	B	1	7.NS.A.2	N/A

Select **all** values equivalent to $-\frac{10}{7}$.

☐ $\frac{-10}{-7}$

☐ $-3\frac{1}{7}$

☐ $1\frac{3}{7}$

☐ $-\frac{-10}{-7}$

☐ $-1\frac{3}{7}$

Exemplar: (shown at right)

Rubric: (1 point) The student selects the equivalent values.

☐ $\frac{-10}{-7}$

☐ $-3\frac{1}{7}$

☐ $1\frac{3}{7}$

☒ $-\frac{-10}{-7}$

☒ $-1\frac{3}{7}$

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#8	1	SP	G	1	7.SP.A.1	N/A

A principal wants to know if students at a particular high school are in favor of a new dress code at their school. The principal is not able to ask the opinion of every student at the school, so she needs to select an appropriate sample of the students to represent the high school.

Select which sample of students the principal should choose.

- Ⓐ Students randomly selected from a list of all students at the school.
- Ⓑ Students sitting at randomly selected tables in the library.
- Ⓒ Students she selects from the hallway between classes.
- Ⓓ Students selected by the teachers.

Key: A

Rubric: (1 point) The student selects an appropriate sample.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#9	1	EE	D	2	7.EE.B.4	N/A

Jenny has \$25 and she earns \$10 for each lawn that she mows. Jenny wants to buy a concert ticket that costs \$65.

Enter the minimum number of lawns Jenny needs to mow to be able to buy the concert ticket.

← → ↶ ↷ ✖

1	2	3
4	5	6
7	8	9
0	.	-

Key: 4

Rubric: (1 point) The student enters the minimum number of lawns.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#10	1	RP	A	2	7.RP.A.1	N/A

This table shows a proportional relationship between the grams of peanuts and raisins in a bag of trail mix.

Grams of Peanuts	Grams of Raisins
14	4
21	6
35	10

Enter the number of grams of peanuts in a bag for every 1 gram of raisins.

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	-

Key: 3.5 or equivalent

Rubric: (1 point) The student enters the number of grams of peanuts.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#11	1	SP	I	1	7.SP.C.5	N/A

A bag contains 16 marbles. There are 5 blue, 9 yellow, and 2 red marbles. One marble is selected at random.

Determine whether each statement correctly describes the likelihood of an event based on the given bag of marbles. Select True or False for each statement.

	True	False
It is impossible that a green marble will be selected.	☐	☐
It is unlikely that a yellow marble will be selected.	☐	☐
It is certain that a blue marble will be selected.	☐	☐
It is unlikely that a red marble will be selected.	☐	☐

Key: T, F, F, T

Rubric: (1 point) The student correctly identifies the statements as true or false.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#12	2	EE	C	2	7.EE.B.4	2

David goes into a candy store with \$5.00. He buys 9 peppermints for \$0.15 each, and some sour candies. Each sour candy costs \$0.25.

Enter the maximum number of sour candies David can buy.

←
→
↶
↷
✖

1	2	3
4	5	6
7	8	9
0	.	-

Key: 14

Rubric: (1 point) The student enters the maximum number of candies David can buy.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#13	1	RP	A	2	7.RP.A.3	N/A

Sara buys a sweater at a department store. The sweater costs \$30. The store is having a 25% off sale on everything in the store.

Enter the amount of money, in dollars, Sara saves from the sale. Do not consider the sales tax.

←
→
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↷
✖

1	2	3
4	5	6
7	8	9
0	.	-

Key: 7.50 or equivalent

Rubric: (1 point) The student enters the correct number of dollars.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#14	3	RP	A	2	7.RP.A.2	3

An electrician is hired to install outdoor lighting. The electrician claims that the relationship between the number of hours worked and the total work fee is proportional. The fee for 5 hours of work is \$225.

Select **all** combinations of values for the electrician's work hours and total work fee that support the claim that the relationship between the two values is proportional.

- ☐ 6 hours and \$270
- ☐ 6.5 hours and \$315
- ☐ 8 hours and \$360
- ☐ 8.75 hours and \$380
- ☐ 9.5 hours and \$427.50

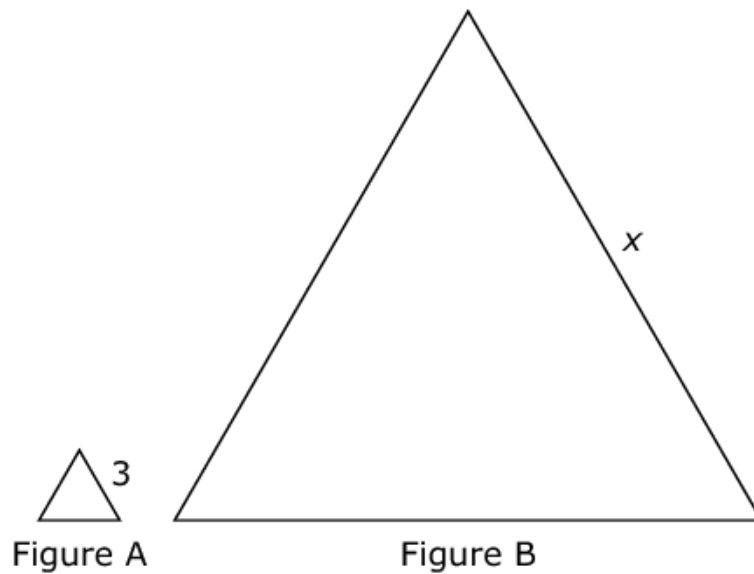
Exemplar: (shown at right)

Rubric: (1 point) The student selects all three correct combinations.

- ☒ 6 hours and \$270
- ☐ 6.5 hours and \$315
- ☒ 8 hours and \$360
- ☐ 8.75 hours and \$380
- ☒ 9.5 hours and \$427.50

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#15	1	G	E	2	7.G.A.1	N/A

Figure A is a scale image of Figure B, as shown.



The scale that maps Figure A onto Figure B is $1:7\frac{1}{4}$.

Enter the value of x .

← → ↶ ↷ ✕

1	2	3	+	-	*	÷	
4	5	6	<	≤	=	≥	>
7	8	9	$\frac{\Box}{\Box}$	$\Box^\Box$	()		π
0	.	-					

Key: 21.75 or $21\frac{3}{4}$

Rubric: (1 point) The student enters the value of x .

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#16	3	EE	E	2	7.EE.A.1	3, 7

Lisa wrote the expression $(3 + 6x) - 2(x + 1) + 5$. She simplified the expression using the following steps:

Step 1: $3(1 + x) - 2(x + 1) + 5$

Step 2: $3(x + 1) - 2(x + 1) + 5$

Step 3: $(x + 1) + 5$

Step 4: $x + 6$

Lisa says that $(3 + 6x) - 2(x + 1) + 5 = x + 6$. Lisa's statement is incorrect.

In which step did Lisa first make a mistake, and what is a correct expression for that step?

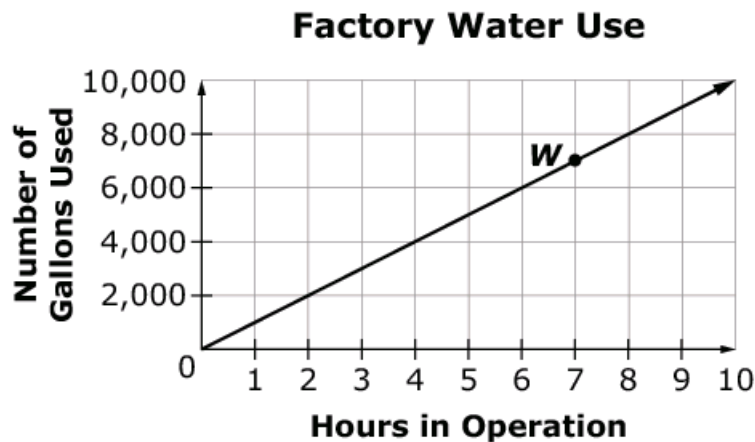
- Ⓐ Step 1; $3(1 + 3x) - 2(x + 1) + 5$
- Ⓑ Step 1; $3(1 + 2x) - 2(x + 1) + 5$
- Ⓒ Step 3; $5(x + 1) + 5$
- Ⓓ Step 3; $6(x + 1) + 5$

Key: B

Rubric: (1 point) The student selects the correct step and expression.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#17	1	RP	A	2	7.RP.A.2	N/A

This graph shows a proportional relationship between the number of hours a factory is in operation and the number of gallons of water used.



Select True or False for each statement about the graph.

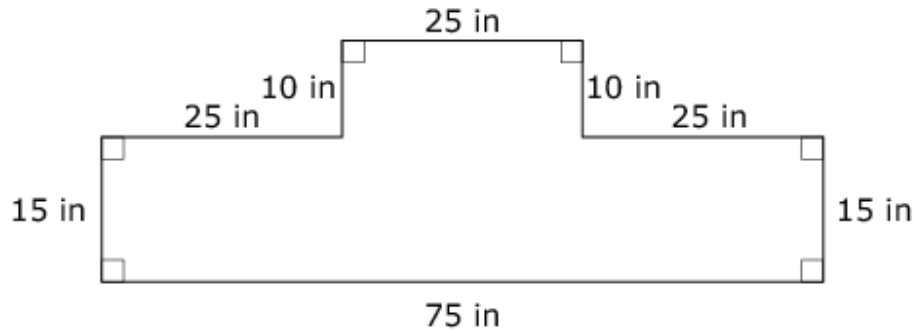
	True	False
The factory uses 4 gallons of water when it is in operation for 4000 hours.	☐	☐
Point W represents the number of gallons of water used when the factory is in operation for 7 hours.	☐	☐
The factory uses 9000 gallons of water when it is in operation for 9 hours.	☐	☐

Key: F, T, T

Rubric: (1 point) The student correctly identifies the statements as true and false.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#18	1	G	F	2	7.G.B.6	N/A

The figure shown is created by joining two rectangles.



Enter the area, in square inches, of the figure.

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→
↶
↷
✖

1	2	3
4	5	6
7	8	9
0	.	-

Key: 1375

Rubric: (1 point) The student enters the area of the figure.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#19	3	RP	C	2	7.RP.A.3, 6.RP.A.3	1, 2

Alfonso went to Famous Sam's Appliance Store and purchased a refrigerator and a stove. The sale price of the refrigerator was 40% off the original price and the sale price of the stove was 20% off the original price.

Which statement must be true to conclude that Alfonso received a 30% overall discount on the refrigerator and the stove together?

- Ⓐ The sale prices of the refrigerator and the stove were the same.
- Ⓑ The original prices of the refrigerator and the stove were the same.
- Ⓒ The sale price of the refrigerator was twice the sale price of the stove.
- Ⓓ The original price of the refrigerator was twice the original price of the stove.

Key: B

Rubric: (1 point) The student selects the correct statement.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#20	1	RP	A	2	7.RP.A.2	N/A

Select **all** tables that represent a proportional relationship between x and y .

☐

x	0	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$
y	0	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$

☐

x	0	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
y	0	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$

☐

x	0	1	3	5
y	0	1	9	25

☐

x	0	1	3	4
y	0	5	15	20

Exemplar: (shown at right)

Rubric: (1 point) The student selects the tables that represent the given relationship.

☒

x	0	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$
y	0	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$

☐

x	0	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
y	0	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$

☐

x	0	1	3	5
y	0	1	9	25

☒

x	0	1	3	4
y	0	5	15	20

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#21	1	G	F	2	7.G.B.4	N/A

The circumference of a circle is approximately 37.7 centimeters.

Enter the radius of the circle, in centimeters. Round your answer to the nearest whole number.

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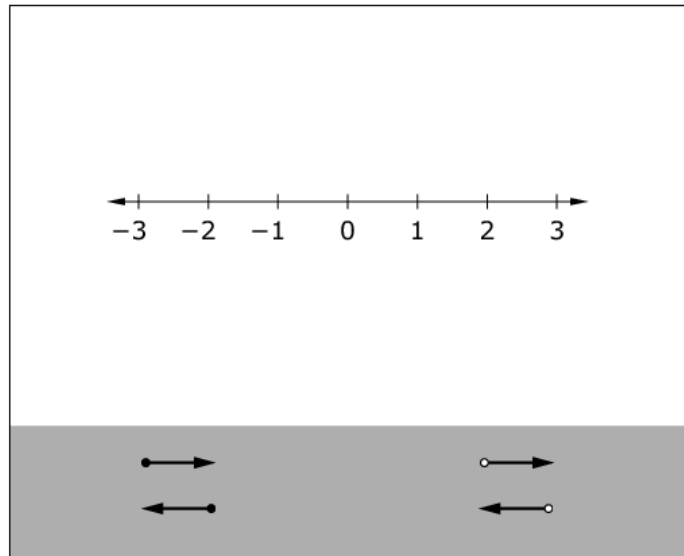
1	2	3
4	5	6
7	8	9
0	.	-

Key: 6

Rubric: (1 point) The student enters the radius of the circle.

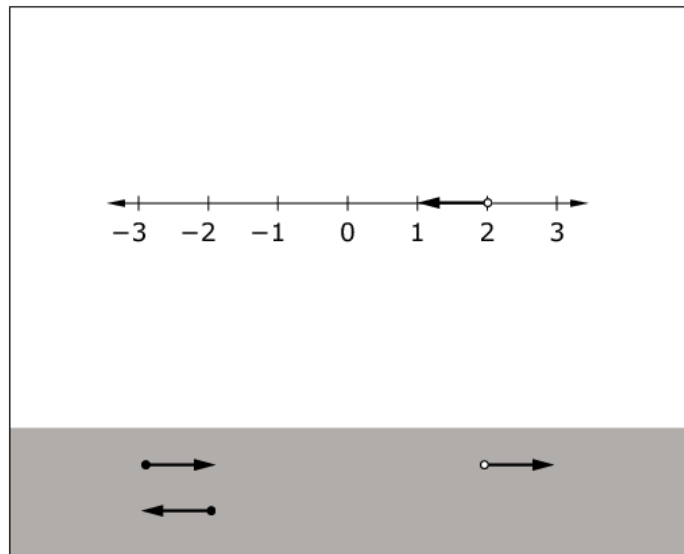
Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#22	1	EE	D	2	7.EE.B.4b	N/A

Drag the correct arrow onto the number line to represent the solution of the inequality $6x - 4 < 8$.



Exemplar: (shown at right)

Rubric: (1 point) The student adds the correct arrow to the number line.



Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#23	3	NS	A	2	6.NS.C.7	2, 3

Maria claims that any fraction located between $\frac{1}{5}$ and $\frac{1}{7}$ on a number line must have a denominator of 6.

Enter a fraction that shows Maria's claim is incorrect.

← → ↶ ↷ ✕

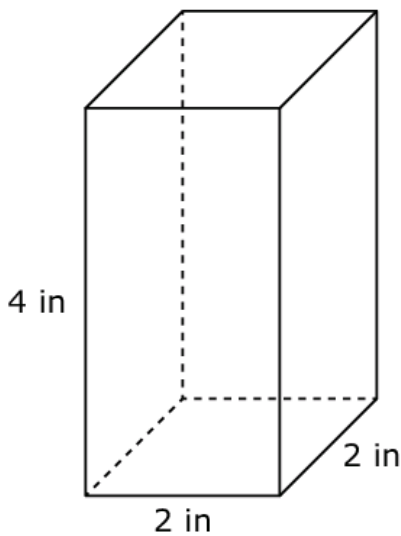
1	2	3	+	-	*	÷	
4	5	6	<	≤	=	≥	>
7	8	9	$\frac{\Box}{\Box}$	$\Box^\Box$	()		π
0	.	-					

Key: 6/35, 13/70, or any fraction between $\frac{1}{7}$ and $\frac{1}{5}$

Rubric: (1 point) The student enters a fraction between $\frac{1}{5}$ and $\frac{1}{7}$ that does not have a denominator of 6.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#24	4	G	D	2	7.G.B.6	1, 4, 7

A company makes two sizes of boxes shaped like rectangular prisms. The large box is 16 inches tall, 10 inches wide, and 10 inches long. The drawing shows the dimensions of the small box.



Part A

What is the maximum number of small boxes that can fit inside the large box?

Part B

The company plans to increase the width and length of the large box by 4 inches each to create a new larger box. How many more of the small boxes will be able to fit inside this new larger box compared to the original large box?

Part A

Part B

←	→	↶	↷	✖
1	2	3		
4	5	6		
7	8	9		
0	.	-		

Key: Part A: 100

Part B: 96

Rubric: (2 points) The student enters the correct value for Part A AND Part B.

(1 point) The student enters the correct value for Part A OR Part B.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#25	2	RP	A	2	7.RP.A.3	1, 7

Lenny bought a motorcycle. He paid 12.5% in tax. The tax added \$1437.50 to the price of the motorcycle.

What was the price of the motorcycle, not including the tax?

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	-

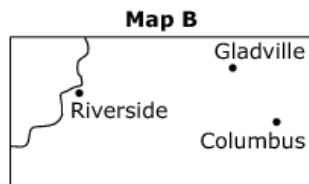
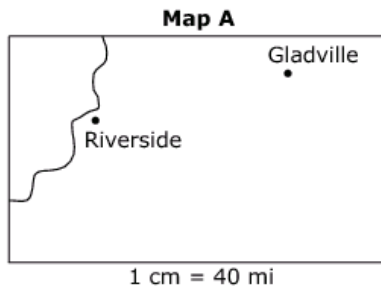
Key: 11,500

Rubric: (1 point) The student enters the correct price.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#26	4	RP	F	3	7.RP.A.3	2, 5, 7

These two maps show the same area at two different scales.

- Columbus is not on Map A.
- Map B does not have a scale written on it.
- Riverside and Gladville are 6.8 cm apart on Map A.
- Riverside and Gladville are 3.4 cm apart on Map B.
- Gladville and Columbus are 1.8 cm apart on Map B.



Determine the straight line distance, in miles, from Gladville to Columbus.

←
→
↶
↷
✖

1	2	3
4	5	6
7	8	9
0	.	-

Key: 144

Rubric: (1 point) The student enters the correct distance.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#27	2	G	A	2	7.G.B.6	1, 7

Johnny uses a wheelbarrow to move planting soil to a delivery truck. The volume of planting soil that fits in the wheelbarrow measures 2 feet by 3 feet by 1.5 feet. The delivery truck measures 11 feet by 8 feet and is 6 feet tall. Johnny puts planting soil in the delivery truck until the truck is 70% full.

What is the minimum number of times Johnny needs to use the wheelbarrow until the delivery truck is 70% full?

←
→
↶
↷
✖

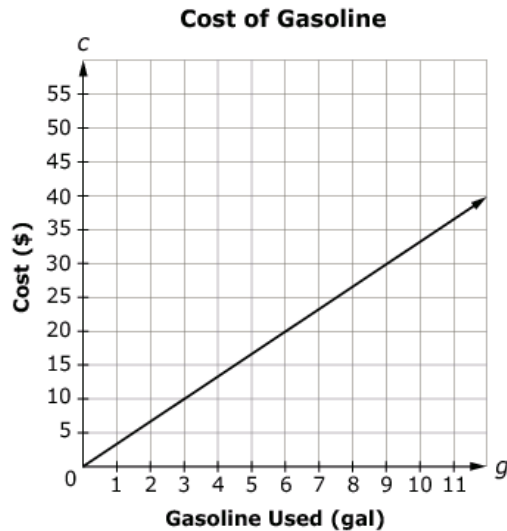
1	2	3
4	5	6
7	8	9
0	.	-

Key: 42

Rubric: (1 point) The student enters the minimum number of times Johnny needs to use the wheelbarrow.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#28	1	RP	A	2	7.RP.A.2	N/A

This graph shows a proportional relationship between the number of gallons of gasoline used (g) and the total cost of gasoline (c).



Find the constant of proportionality (r). Using the value for r , enter an equation in the form of $c = rg$ that represents the relationship between the number of gallons of gasoline used (g) and the total cost (c).

← → ↶ ↷ ✖

1	2	3	c	g			
4	5	6	+	-	*	÷	
7	8	9	<	≤	=	≥	>
0	.	-	$\frac{\Box}{\Box}$	$\Box^\Box$	()		π

Key: $c = (10/3)g$ or equivalent

Rubric: (1 point) The student enters a correct equation.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#29	3	RP	D	3	6.RP.A.3	7

When playing basketball, Jan makes 4 out of every 10 shots she takes.

Select **all** the statements that describe Jan's situation.

- ☐ The ratio of the number of shots Jan makes to the number of shots she takes is 2:5.
- ☐ The ratio of the number of shots Jan makes to the number of shots she does not make is 2:3.
- ☐ The equation $4x = 10y$ shows the relationship between x , the number of shots Jan makes, and y , the number of shots she takes.
- ☐ The equation $6x = 4z$ shows the relationship between x , the number of shots Jan makes, and z , the number of shots she does not make.

Exemplar: (shown below)

- ☒ The ratio of the number of shots Jan makes to the number of shots she takes is 2:5.
- ☒ The ratio of the number of shots Jan makes to the number of shots she does not make is 2:3.
- ☐ The equation $4x = 10y$ shows the relationship between x , the number of shots Jan makes, and y , the number of shots she takes.
- ☒ The equation $6x = 4z$ shows the relationship between x , the number of shots Jan makes, and z , the number of shots she does not make.

Rubric: (1 point) The student selects all three statements that describe the situation.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#30	4	EE	E	3	7.EE.B.4	1, 4

Mary and Jerry are exercising on a track.

- Mary is walking at a rate of 3 miles per hour.
- Jerry starts jogging at a rate of 4 miles per hour after Mary has been walking for 15 minutes.
- Jerry jogs 2 miles as Mary continues walking, and they both stop at the same time.

Enter the **total** distance, in miles, that Mary walks around the track.

←
→
↶
↷
✕

1	2	3
4	5	6
7	8	9
0	.	-

Key: 2.25 or equivalent

Rubric: (1 point) The student enters the total distance.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#31	1	EE	D	2	7.EE.B.4	4

Marcus has a pool that can hold a maximum of 4500 gallons of water. The pool already contains 1500 gallons of water. Marcus begins to add more water at a rate of 30 gallons per minute.

Enter an inequality that shows the number of minutes, m , Marcus can continue to add water to the pool without exceeding the maximum number of gallons.

← → ↶ ↷ ✕

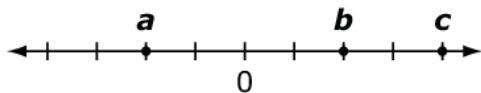
1	2	3	m				
4	5	6	+	-	*	÷	
7	8	9	<	≤	=	≥	>
0	.	-	$\frac{\Box}{\Box}$	$\Box^\Box$	()		π

Key: $4500 \geq 1500 + 30m$ or equivalent

Rubric: (1 point) The student enters a correct inequality.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#32	3	NS	F	2	7.NS.A.1	7, 8

Values for variables a , b , and c are graphed on the number line shown.



Use the graph to evaluate the expressions in the table. Select one column for each row in the table to indicate whether the expression is less than 0, equal to 0, or greater than 0.

Expression	< 0	$= 0$	> 0
$a - b$			
$a + b$			
$b - c$			
$c - a$			
$a + c$			

Exemplar: (shown at right)

Rubric: (1 point) The student correctly evaluates each expression.

Expression	< 0	$= 0$	> 0
$a - b$			
$a + b$			
$b - c$			
$c - a$			
$a + c$			



Smarter Balanced Assessment Consortium:

Let's Paint a Room Performance Task
Grade 7 Mathematics Practice Test
Scoring Guide
08/14/2019



Grade 7 Mathematics

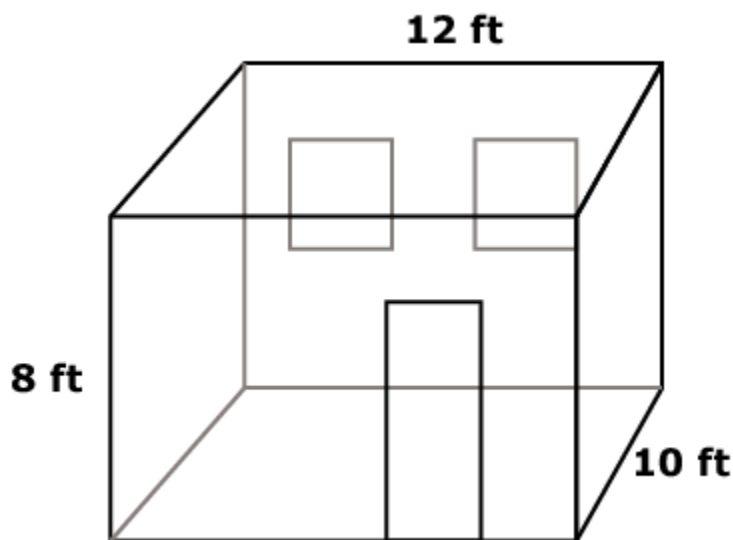
Let's Paint a Room Performance Task

Let's Paint a Room

Your friend Sam wants to paint her room. She wants to paint the ceiling white and the four walls purple.

You are helping Sam determine the cost and the amount of time needed to paint her room.

The room is shaped like a rectangular prism with a height of 8 feet, length of 12 feet, and width of 10 feet as shown.



Additional information about Sam's room:

- The door has an area of 22 square feet.
- The room has 2 square windows.
- Each window opening is 2 feet by 2 feet.

Grade 7 Mathematics

Let's Paint a Room Performance Task

1

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

2

Sam needs to figure out how much purple paint to buy.

Calculate for her the total area, in square feet, of the four **walls**.

She will **not** paint the door or windows.

3

Part way through painting her room, Sam runs out of paint.

- She estimates that there are about 125 square feet left to paint.
- The purple paint that Sam is using is **only** available in 1-quart cans.
(Assume she must buy whole cans of paint.)
- Each can of paint covers 40 square feet.

How many cans of paint does Sam **need** to buy to finish painting her room?
Explain to Sam why she needs this many cans of paint.

Grade 7 Mathematics

Let's Paint a Room Performance Task

4

You would also like your room painted.

Your room has 300 square feet of wall space to paint.

Sam says it took her 10 minutes to paint 25 square feet.

At this rate, if Sam painted your room, how many **hours** would it take?

5

Sam and you are going to paint your room together.

Sam takes 10 minutes to paint 25 square feet.

It takes you 5 minutes to paint 25 square feet.

Sam says, "If we paint together, then it will take 15 minutes for us to cover 50 square feet."

Give an explanation to convince Sam that she is **incorrect**.

Grade 7 Mathematics

Let's Paint a Room Performance Task

1

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

#1 Equation/Numeric – 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#1	4	G, MD	4F	2	6.G.A, 4.MD.A.3	1,5	120

Rubric:

1 point: Correct response – 120

0 points: All other responses

Commentary: The purpose of the question is primarily to assess whether the student (1) understands the context and the representation and (2) can identify and infer relevant quantities and perform typical calculations. In this question, the student is given a fairly typical 2-dimensional diagram representing a 3-dimensional room. The context is reasonably authentic. Many students have had experience with painting. The context is also a natural place for important mathematics of proportional relationships, rates, and geometry.

Rationale for Content:

The content is essentially the Grade 6 Geometry Domain header:

6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.

Additionally, this content builds on Grade 4 Measurement:

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

Since this question is intended to be accessible for most students, the numbers have been kept simple so as not to create arithmetic computational obstacles in obtaining evidence of Claims 2, 3, or 4.

The mathematical work of this question involves identifying the quantities (lengths of relevant edges). The ceiling is a rectangle. One side is *directly labeled* (12 ft). The other side length must be inferred from the parallel side of the wall (10 ft).

The next step for the student is choosing the relevant mathematical tool or procedure. For this question, the formula for the area of a rectangle is $A = l \times w$. So the solution is $12 \times 10 = 120$ square feet.

Rationale for Claim:

The fact that the student must extract the quantities, choose the procedure, and calculate the answer is what makes this a Target 4F.

Claim 4, Target F: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).

By design, the representation does not label all of the edge lengths, making it unlikely that students could guess (e.g., select random numbers and perform a computation) and get the correct answer.

Rationale for DOK:

The fact that this question requires a couple of steps and inferences and is not a direct recall or single-step application of a known and identified procedure makes this a DOK 2. Recall that difficulty is not the same as depth of knowledge. This is not intended to be a particular difficult question, but it involves more than one-step recall or rote procedures. This is not a DOK 3 since the representation is fairly standard, the formulas are applied in a typical way, and there is not really a choice of strategies.

Grade 7 Mathematics

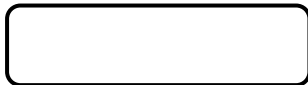
Let's Paint a Room Performance Task

2

Sam needs to figure out how much purple paint to buy.

Calculate for her the total area, in square feet, of the four **walls**.

She will **not** paint the door or windows.



#2 Equation/Numeric – 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#2	2	G	2A	2	6.G.A	1,5	322

Rubric:

1 point: Correct response – 322

0 points: All other responses

Commentary: This question continues with the same context and representation as question #1. The mathematical work now is focused on problem solving in the sense that students need to "find a solution path" using readily available tools. The expectation is that students know the area of a rectangle, can infer the relevant quantities from the diagram, as in question #1, but this time they have to combine several steps and have several options.

Students can calculate the area of each wall and subtract the areas of the door and windows, or add up the area of all the walls and then subtract the total area of the door and windows. Students may even do more complex decomposition of the figure. Regardless, the primary mathematics involve applying a known tool multiple times after choosing a particular solution path.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Rationale for Content:

The content is essentially the Grade 6 Geometry Domain header:

6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.

Additionally, this content builds on Grade 5 Measurement:

5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

Rationale for Claim:

The question is completely formulated. There are a variety of solution paths that involve readily available mathematical tools (area of a rectangle, concept of area, strategy of decomposing figures). This work qualifies as evidence for Target 2A.

Claim 2, Target A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. Under Claim 2, the problems should be completely formulated, and students should be asked to find a solution path from among their readily available tools.

Rationale for DOK:

Because this question requires organizing or managing several pieces of information, this qualifies for DOK 2. It does not cross the threshold for DOK 3 since the mathematical tools are expected to be known (area of a rectangle) and the combination is fairly typical. Students are expected to know how to find areas of figures by decomposing or subtracting areas.

3

Part way through painting her room, Sam runs out of paint.

- She estimates that there are about 125 square feet left to paint.
- The purple paint that Sam is using is **only** available in 1-quart cans. (Assume she must buy whole cans of paint.)
- Each can of paint covers 40 square feet.

How many cans of paint does Sam **need** to buy to finish painting her room? Explain to Sam why she needs this many cans of paint.

#3 Short-answer – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#3	4	RP	4D	2	6.RP.A	1,6	See sample responses

Rubric:

2 points: Correct response – 4 cans AND correct explanation

1 point: Correct response, 4 cans, BUT no correct explanation OR 3.15 or equivalent with an acceptable explanation that clearly leaves out the fact that only whole cans can be bought

0 points: All other responses; including 3, 3.15 cans, or $3\frac{5}{40}$ cans without an explanation

Note: Due to the fact that 3.15 is very close to 3 cans, a student might successfully argue for just 3 cans if he/she acknowledges that Sam's estimate may in fact be too high (it could be just 120 feet) or that she could possibly stretch the paint to finish the job. The key is that the explanation is thorough enough to show understanding that 3 cans is not enough unless some other factor is considered.

Commentary: This question is a fairly typical ratio reasoning problem. The key is that it is asking for an interpretation of the division in the context AND asking for an explanation. Students do not get full credit for merely indicating the correct number of cans. The explanation has to in some way state that cans must be bought in whole numbers of cans. The division of $125/40$ results in 3.125 cans.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Rationale for Content:

The content is securely held, being essentially about ratio reasoning in the Grade 6 Domain header:

6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.

The numbers are kept simple so as not to create arithmetic computational obstacles in obtaining evidence of Claim 4. The purpose is to provide evidence for students to show proficiency in Claim 4.

Rationale for Claim:

There are a variety of approaches. Students may list or make a table showing the amount of paint covered for a given number of cans: 1 can covers 40 sq ft, 2 cans 80 sq ft, 3 cans 120 sq ft, 4 cans 160 sq ft, hence because you must buy a whole number of cans, 4 cans are needed. Or they can do the division: $125/40$ and interpret accordingly. The student must interpret the remainder in the context as requiring an additional can, hence 4 cans are needed. This is explicitly called out in the specifications:

Claim 4, Target D: Interpret results in the context of a situation. Tasks used to assess this target should ask students to link their answer(s) back to the problem's context. In early grades, this might include a judgment by the student of whether to express an answer to a division problem using a remainder or not based on the problem's context. In later grades, this might include a rationalization for the domain of a function being limited to positive integers based on a problem's context (e.g., understanding that the number of buses required for a given situation cannot be $32\frac{1}{2}$, or that the negative values for the independent variable in a quadratic function modeling a basketball shot have no meaning in this context).

Rationale for DOK:

As described in the text for Claim 4 Target D, interpreting the results in the context of a situation qualifies as a DOK 2.

What follows are sample responses and scoring annotations for Item 3.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Sample Response 3a

B I U I_x $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{8}$      **ABC** Ω

$125/40 = 3.125$

She needs to buy 4 cans of paint because although the exact amount she needs is 3.125, she can't buy partial cans of paint and she should buy more to cover all of the walls in purple paint.

SCORE POINT

2

The student accurately calculated the exact amount of paint that Sam would need (3.125 cans) and then explained why Sam would actually need to purchase whole cans of paint. The response contains evidence of the student's competence in problem solving and/or modeling to the full extent that these processes apply to this item.

Sample Response 3b

B I U I_x $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{7}{8}$      **ABC** Ω

$125/40 = 3+$

$160/40 = 4$

Sam, you should buy 4 quarts though you need 3 and a little bit, you can't buy a part of the can so you would have to buy 4 cans of paint.

SCORE POINT

2

The student accurately calculated that Sam would need a little more than 3 cans of paint and provided an explanation as to why 4 cans of paint would be needed. The response contains evidence of the student's competence in problem solving and/or modeling to the full extent that these processes apply to this item.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Sample Response 3c

If I divide 125 by 40 I get $3 \frac{1}{8}$. So Sam needs a little more than 3 cans of paint to finish painting her room. However, if Sam uses the paint sparingly, she might be able to just buy 3 quarts. Otherwise, she'd need 4 quarts.

SCORE POINT

2

The student accurately calculated that Sam would need a little more than 3 cans of paint and provided an explanation as to why 3 cans of paint might be enough (...uses the paint sparingly). The student completely understands that 4 cans might still be needed, but adding this extra statement wasn't necessary to receive full credit. The response contains evidence of the student's competence in problem solving and/or modeling to the full extent that these processes apply to this item.

Sample Response 3d

$40 \cdot 2 = 80$
 $40 \cdot 3 = 120$
 $40 \cdot 4 = 160$

Sadly she will need to buy 4 cans. She will have a lot left over, but that's good because she can have some left for touch-ups.

SCORE POINT

1

The student arrived at the correct answer; however, he/she did not adequately explain why 4 cans was needed (i.e., 3 cans is not enough because I have to cover 125 sq ft). The response contains some of the attributes of an appropriate response but lacks convincing evidence that the student fully comprehends the essential ideas addressed by this task.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Sample Response 3e

B
I
U
***I*_x**
 $\frac{1}{2}$
 $\frac{3}{4}$
 $\frac{5}{8}$
 $\frac{7}{8}$

$$\begin{array}{r}
 3.125 \\
 40 \overline{) 125.000} \\
 \underline{120} \\
 50 \\
 \underline{- 40} \\
 100 \\
 \underline{- 80} \\
 200 \\
 \underline{- 200} \\
 0
 \end{array}$$

By doing long division, she needs to buy 3.125 cans of paint. So, by rounding, my estimate is 3 cans of paint.

SCORE POINT

1

The student explained his/her process (long division), which is an appropriate tool; however, he/she failed to realize Sam needs 4 cans because partial cans cannot be bought. The response contains some of the attributes of an appropriate response but lacks convincing evidence the student fully comprehends the essential ideas addressed by this task.

Sample Response 3f

B
I
U
***I*_x**
 $\frac{1}{2}$
 $\frac{3}{4}$
 $\frac{5}{8}$
 $\frac{7}{8}$

$$125 \div 40 = 3.125$$

3.1 quarts of paint

SCORE POINT

0

The student does an appropriate calculation ($125 \div 40 = 3.125$), but there is no connection to the context, nor an explanation provided. There are significant omissions that indicate a lack of comprehension in regard to the essential ideas addressed by this task.

4

You would also like your room painted.

Your room has 300 square feet of wall space to paint.

Sam says it took her 10 minutes to paint 25 square feet.

At this rate, if Sam painted your room, how many **hours** would it take?

#4 Equation/Numeric – 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#4	2	RP	2A	2	6.RP.A.3b	1	2

Rubric:

1 point: Correct response – 2

0 points: All other responses

Commentary: The purpose is to provide an opportunity for students to solve a problem that requires coordinating several quantities (area, time, rate) and track change of units (minutes to hours). By design, the numbers are kept simple to avoid arithmetic computational obstacles.

Rationale for Content:

The content in this question is grounded in Grade 6 Ratios and Proportional Relationships, namely:

- 6.RP.A.3.b Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
- b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

Rationale for Claim:

This question is fully formulated, asking how long it would take to paint the room and the student is provided with the quantities. The student must select how to relate these quantities and how to combine them to find the solution. This qualifies the question for Claim 2, Target A.

Claim 2, Target A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. Under Claim 2, the problems should be completely formulated, and students should be asked to find a solution path from among their readily available tools.

Rationale for DOK:

The problem is formulated and the relevant quantities are given (and no extraneous quantities are given). So this does *not* cross the threshold of DOK 3. The student is required to select how the quantities relate and how to combine them. This coordination, including the unit conversion, makes this more than a rote one-step computation, so it does cross the threshold into DOK 2.

5

Sam and you are going to paint your room together.

Sam takes 10 minutes to paint 25 square feet.

It takes you 5 minutes to paint 25 square feet.

Sam says, "If we paint together, then it will take 15 minutes for us to cover 50 square feet."

Give an explanation to convince Sam that she is **incorrect**.

#5 Short text – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#5	3	RP	3B	3	6.RP.A	3	See sample responses

Rubric:

2 points: Correct explanation

1 point: Elements of the explanation are correct, but the logic of the argument is fragmented or flawed.

0 points: All other responses

Commentary: This question requires students to confront and refute a common misconception about combining rates. Part of the design is that students are not required to actually solve the problem of figuring out how much time it would take to paint a room together. Rather, the purpose is to give Sam a convincing explanation that her reasoning is incorrect. This design allows for multiple logical approaches for refuting a claim.

Rationale for Content:

The content in this question is grounded in Grade 6 Ratios and Proportional Relationships, namely:

- 6.RP.3.b Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
 - b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

However, by asking about the combination of rates (i.e., two people who paint at different rates, what is their rate if they paint together?), this provides an opportunity for more sophisticated reasoning. By design, the numbers are selected to be simple and easy to work with so as to avoid arithmetic computational obstacles. Furthermore, although some students will opt to calculate the combined rate, others can choose to refute the claim more directly by providing a logical counterargument (see the student responses for examples).

Let's Paint a Room Performance Task

Rationale for Claim:

This question is directly asking students to "refute a proposition" posed by another person. This squarely lands in the descriptor for Claim 3, Target B.

Claim 3, Target B: Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. By “autonomous” we mean that the student responds to a single prompt, without further guidance within the task. Tasks used to assess this target should ask students to develop a chain of reasoning to justify or refute a conjecture. Tasks for Target B might include the types of examples called for in Target A as part of this reasoning, but they should do so with a lesser degree of scaffolding than tasks that assess Target A alone.

Rationale for DOK:

There is very little scaffolding and many possible methods of refuting the claim. Although the content is technically Grade 6 rates, the combining of rates is typically challenging for Grade 7 students. Again, noting that the student does not need to determine the actual combined rate, there are methods that only use securely held content available, including the use of counterexample. All these reasons qualify this question as DOK 3.

What follows are sample responses and scoring annotations for Item 5.

Sample Response 5a

No, because by the time 5 minutes passes, Sam will only have painted 12.5 ft and I will paint 25. So if you calculate my amount to paint 25 ft in 5 min by 3, I'll paint 75 ft in 15 min. For Sam, you'd add the amount for 10 min (25 ft) to the 12.5 ft in 5 min to get 37.5 ft. If you add $75 + 37.5$, you'll get 112.5 ft. We'll have painted 112.5 ft in 15 minutes.

Sam's thinking of the ft we'll paint together is if we did it at different times like if I painted for 5 minutes and Sam painted 10 minutes after I painted 5 minutes.

SCORE POINT

2

The student is able to refute Sam's claim by correctly calculating the amount painted together in 15 minutes (112.5) and also describes the problem with Sam's reasoning – making the assumption that Sam must think they *took turns* painting rather than painting at the same time. Note that the minor flaw in units (using ft instead of sq ft throughout the explanation) does not detract from receiving full credit. The response contains evidence of the student's competence in reasoning to the full extent that these processes relate to the specified task.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Sample Response 5b

Sam is incorrect because you can work w/Sam at the same time and in 15 minutes you will do 75 ($25 \cdot 3$) square feet and Sam will do 37.5 ($25 \cdot 1.5$) which adds up to 112.5 ($75 + 37.5$) ft^2 in 15 minutes.

SCORE POINT

2

The student is able to provide an argument as to why Sam's claim is incorrect and supports it with calculations. The response contains adequate evidence of the student's competence in reasoning to the extent that these processes relate to the specified task.

Sample Response 5c

Different rates of painting does not necessarily mean separate times to paint. Both Sam and I are not one entity. Due to the different rates, I would paint 50 sq ft in 10 minutes while Sam would still paint 25 sq ft in 10 minutes.

SCORE POINT

1

The student seems to understand the nature of Sam's error; however, he/she does not provide a clear argument as to why Sam's claim is incorrect. The response contains only partial evidence of the student's competence in reasoning to the extent that these processes relate to the specified task.

Grade 7 Mathematics

Let's Paint a Room Performance Task

Sample Response 5d

Since I work 2 times faster than Sam, I would paint 50 square feet alone! And Sam would paint only 25 square feet in the same time. The total would end up being 75 square feet painted.

SCORE POINT

1

The student correctly indicates that more square feet would be painted (75) but fails to indicate the amount of time he/she and Sam painted and does not address how that makes Sam's claim incorrect. The response contains only partial evidence of the student's competence in reasoning to the extent that these processes relate to the specified task.

Sample Response 5e

Sam is incorrect because if we both paint together it wouldn't take us more time, it would take us less time to paint.

SCORE POINT

0

The student seems to indicate an initial understanding as to why Sam is incorrect; however, he/she did not disprove Sam's claim with any evidence or logical explanation. Since the prompt already stated that Sam's claim was incorrect, the student must provide convincing evidence as to why Sam is incorrect . . . not just restate the given information. The response lacks sufficient evidence of the reasoning required of this task and earns no credit.

Grade 7 Mathematics

Let's Paint a Room Performance Task

The handscored items in this guide are both 2-point short-text items. The general rubric that is used as a basis for scoring all 2-point short-text items is shown below. Although item-specific rubrics are also provided to scorers to facilitate the handscored of short-text items, every response should be able to map back to this general rubric in a consistent and reliable manner.

Smarter Balanced Mathematics General Rubric for 2-Point Items

Score	Description
2	The student has demonstrated a full and complete understanding of all mathematical content and practices essential to this task. The student has addressed the task in a mathematically sound manner. The response contains evidence of the student's competence in problem solving, reasoning, and/or modeling to the full extent that these processes apply to the specified task. The response may, however, contain minor flaws that do not detract from a demonstration of full understanding.
1	The student has demonstrated a partial understanding of the mathematical content and practices essential to this task. The student's response contains some of the attributes of an appropriate response but lacks convincing evidence that the student fully comprehends the essential mathematical ideas addressed by this task. Such deficits include evidence of insufficient mathematical knowledge; errors in fundamental mathematical procedures; and other omissions or irregularities that bring into question the student's competence in problem solving, reasoning, and/or modeling related to the specified task.
0	The student has demonstrated merely an acquaintance with the topic, or provided a completely incorrect or uninterpretable response. The student's response may be associated with the task, but contains few attributes of an appropriate response. There are significant omissions or irregularities that indicate a lack of comprehension in regard to the mathematical content and practices essential to this task. No evidence is present that demonstrates the student's competence in problem solving, reasoning, and/or modeling related to the specified task.