

Smarter Balanced Assessment Consortium:

Mathematics Practice Test Scoring Guide Grade 6

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:

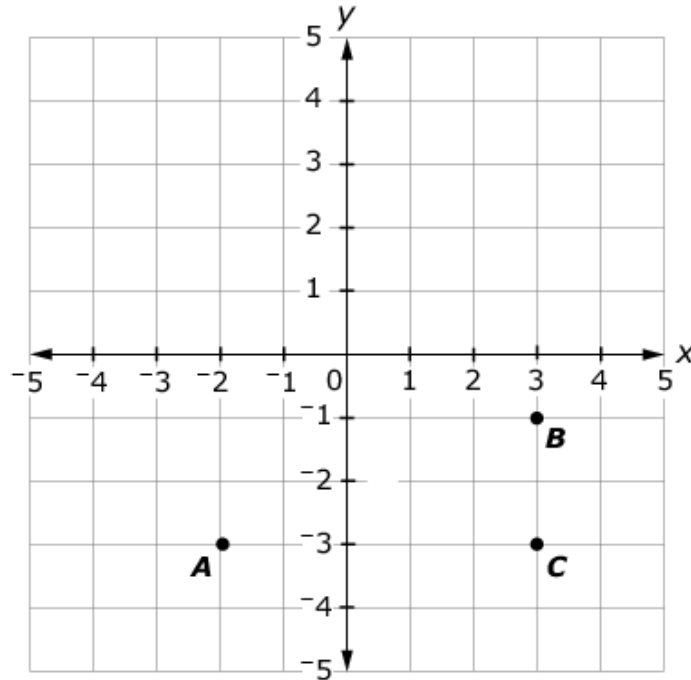
- Claim: statement derived from evidence about college and career readiness
- Domain: a broad content area that contains related targets and standards (i.e., Geometry)
- Target: statement that bridges the content standards and the assessment evidence that supports the claim
- Depth of Knowledge (DOK): 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 6. A separate document is available that provides a grade 6 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	NS	D	2	6.NS.C.8	N/A

This grid shows the location of three points.



Enter the distance, in units, between point A and point C.

←
→
↶
↷
✖

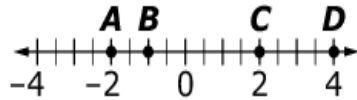
1	2	3
4	5	6
7	8	9
0	.	-

Key: 5

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#2	1	NS	D	1	6.NS.C.6c	N/A

Consider the points plotted on the number line.



Select True or False for each statement about the points on the number line.

	True	False
The value of Point A is less than -3.	☐	☐
The value of Point B is greater than the value of point A.	☐	☐
The value of Point D is -4.	☐	☐

Key: F, T, F

Rubric: (1 point) The student correctly identifies each statement as true or false.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#3	1	NS	B	2	6.NS.A.1	N/A

A recipe requires $\frac{1}{2}$ cup of flour for every batch of cookies. How many full batches of cookies can be made with $5\frac{1}{2}$ cups of flour?

← → ↶ ↷ ✕

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

Key: 11

Rubric: (1 point) The student enters the correct number of full batches of cookies.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#4	1	EE	F	2	6.EE.B.5	N/A

Consider the inequality $x > -1.5$.

Determine whether each value of x makes this inequality true. Select Yes or No for each value.

	Yes	No
$-2\frac{1}{2}$	☐	☐
15	☐	☐
4	☐	☐
-2	☐	☐
0.2	☐	☐

Exemplar: (shown below)

	Yes	No
$-2\frac{1}{2}$	☐	☒
15	☒	☐
4	☒	☐
-2	☐	☒
0.2	☒	☐

Rubric: (1 point) The student correctly classifies each value.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#5	1	EE	E	1	6.EE.A.3	N/A

Consider this expression: $7(10a + 3b)$

Enter an expression that shows the **sum of exactly two terms** that is equivalent to $7(10a + 3b)$.

←
→
↶
↷
✖

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

Key: $70a + 21b$ or $21b + 70a$

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#6	1	NS	C	1	6.NS.B.2	N/A

Divide.

$$21,900 \div 25$$

Enter the exact quotient.

←
→
↶
↷
✕

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

Key: 876

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

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

Paul could play 16 songs on his guitar. He learns some new songs. Now he can play 23 songs. In the first box, enter an **equation** to represent the number of new songs, s , that Paul learns. In the second box, enter the **number** of new songs represented by s in this situation.

Equation

Number of New Songs

←

→

↶

↷

✖

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

Key: $16 + s = 23$; 7

Rubric: (2 points) Student enters a correct equation (e.g., $16 + s = 23$ or an equivalent equation) and the correct solution (e.g., 7 or equivalent).

(1 point) Student enters the correct equation or the correct solution.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#8	1	EE	E	1	6.EE.A.3	N/A

Select all of the expressions that are equivalent to $4(5x + 2y)$.

- ☐ $9x + 6y$
- ☐ $4(5x) + 4(2y)$
- ☐ $20x + 8y$
- ☐ $20x + 2y$
- ☐ $4(7xy)$

Exemplar: (shown below)

- ☐ $9x + 6y$
- ☒ $4(5x) + 4(2y)$
- ☒ $20x + 8y$
- ☐ $20x + 2y$
- ☐ $4(7xy)$

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#9	1	RP	A	2	6.RP.A.3a	N/A

The table shows the relationship between the amounts of ginger ale and fruit juice needed to make punch.

Fill in the missing values to complete the table.

Ginger Ale (L)	Fruit Juice (oz)
	12
3	18
5	30
9	

Key: 2, 54

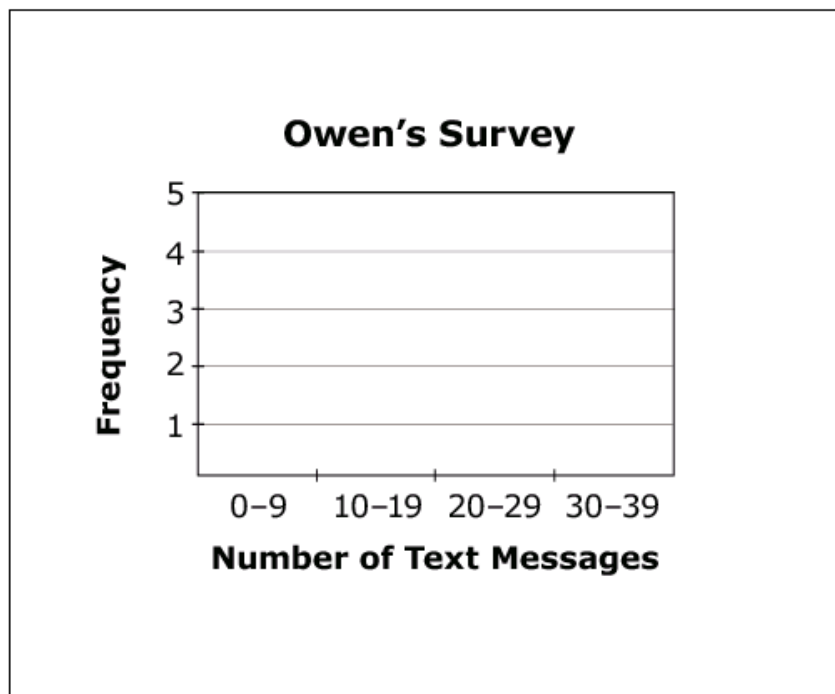
Rubric: (1 point) The student enters the correct values into the table.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#10	1	SP	J	2	6.SP.B.4	N/A

Owen asked 10 classmates how many text messages they each send per day. The results are in the list below.

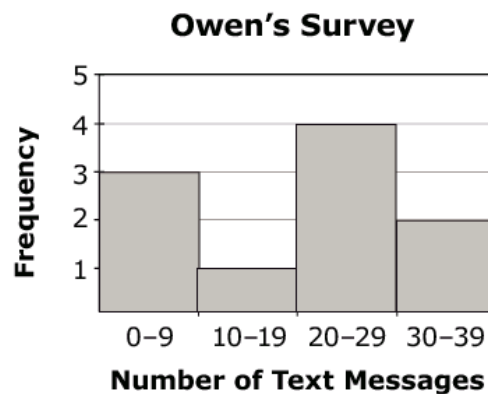
0, 5, 39, 29, 0, 30, 14, 23, 25, 22

Click within the graph area to create a histogram for the number of text messages Owen's classmates each send per day.



Exemplar: (shown at right)

Rubric: (1 point) The student creates a correct histogram.



Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#11	2	RP	A	2	6.RP.A.3	4

Allison is saving to buy a \$500 bicycle by working during summer vacation.

- The job pays her \$8 for every 1 hour worked.
- Allison works exactly 20 hours each week.

If she works for 4 weeks and buys the bicycle, how much money will she have left over?

←
→
↶
↷
✖

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

Key: 140

Rubric: (1 point) The student enters the correct amount of money.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#12	3	RP	F	2	6.RP.A.3	2, 3

Sam and Tyrone each build model cars. Altogether, Sam and Tyrone have built 42 model cars. The ratio of cars Sam has built to cars Tyrone has built is represented by the tape diagram shown.



Enter the number of cars represented by each square in the tape diagram.

←
→
↶
↷
✖

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

Key: 6

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#13	4	G	C	2	6.G.A, 6.G.A.3	4, 5

The coordinate grid shown represents a map of a park. A portion of the park is going to be upgraded with new playground equipment and flowers.

Part A

The portion of the park that is to receive upgrades has the following coordinates:

- Point A $(-4, 4)$
- Point B $(3, 4)$
- Point C $(3, -2)$
- Point D $(-4, -2)$

Use the Add Point and Connect Line tools to create the rectangle ABCD.

Part B

Each unit of the grid represents 1 yard. How much area, in square yards, will receive upgrades?

Part C

The triangular area between points A, B, and D will be decorated with red, white and blue flowers. $\frac{1}{3}$ of triangle ABD will have red flowers. How much area, in square yards, will have red flowers?

Exemplar: (shown at right)

3

7

12

14

18

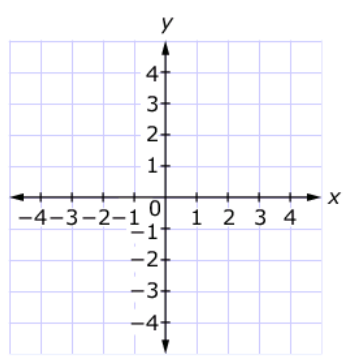
21

30

42

Delete
Add Point
Connect Line

Part A



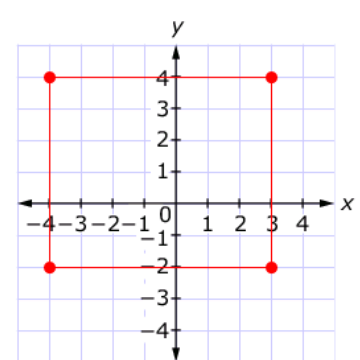
Part B

How much area, in square yards, will receive upgrades?

Part C

How much area, in square yards, will have red flowers?

Part A



Part B

How much area, in square yards, will receive upgrades?

Part C

How much area, in square yards, will have red flowers?

Rubric: (3 points) Student creates correct rectangle ABCD, gives the correct area of rectangle ABCD, and gives the correct area for red flowers.

(2 points) Student answers at least two parts of the problem correctly.

(1 point) Student answers only one part of the problem correctly.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#14	3	NS	A	2	6.NS.C.7	3

Will states, "There is no number greater than 0.59 that has a 5 in the tenths place."

Create a number that shows Will's statement is false.

0
1
2
3
4
5
6
7
8
9

Delete

0.□□□

Key: 0.591–0.599

Rubric: (1 point) The student creates a number greater than 0.59 with a 5 in the tenths place.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#15	1	EE	F	1	6.EE.B.7	N/A

Select **all** equations that have $n = 6$ as a solution.

- ☐ $2 + n = 6$
- ☐ $n + 6 = 12$
- ☐ $4 \cdot n = 24$
- ☐ $n \cdot 3 = 2$

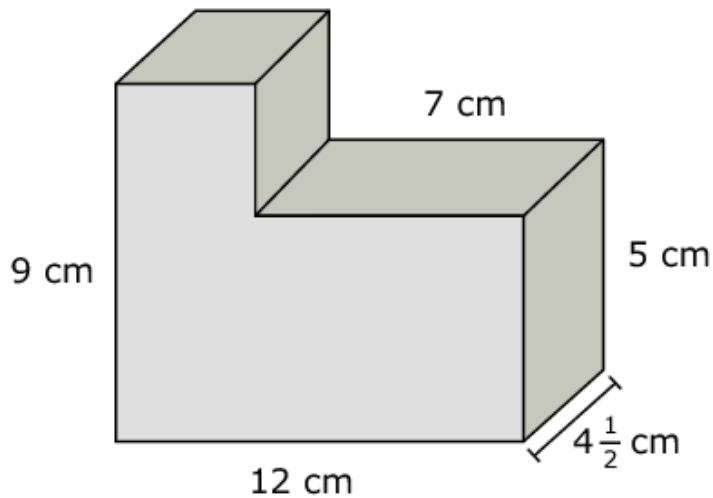
Exemplar: (shown below)

- ☐ $2 + n = 6$
- ☒ $n + 6 = 12$
- ☒ $4 \cdot n = 24$
- ☐ $n \cdot 3 = 2$

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#16	1	G	H	2	6.G.A.2	6

This solid was created by joining two right rectangular prisms.



Enter the volume of the solid in cubic centimeters.

←
→
↶
↷
✕

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

Key: 360

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#17	1	EE	G	2	6.EE.9	N/A

Raymond wants to know the costs of buying different numbers of songs for his MP3 player. The cost of each song is the same.

- Let s represent the possible number of songs Raymond could buy.
- Let d represent the amount of money, in dollars, Raymond would need to buy the songs.

Fill in the table for all missing values of s and d .

Number of Songs s	Amount of Money (\$) d
2	2.58
	5.16
7	
11	
	21.93

Exemplar: (shown at right)

Rubric: (1 point) The student fills in correct values for s and d .

Number of Songs s	Amount of Money (\$) d
2	2.58
4	5.16
7	9.03
11	14.19
17	21.93

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#18	1	RP	A	2	6.RP.A.3c	N/A

Ethan correctly answers 80% of the total questions on his history test. He correctly answers 32 questions.

Enter the number of questions on Ethan's history test.

←
→
↶
↷
✖

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

Key: 40

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

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

Julia needs to make a box in the shape of a rectangular prism with a height of 3 inches and a volume of 243 cubic inches. The dimensions, in inches, must be whole numbers greater than 1.

Julia claims that the length and width of the box must be equal.

Part A

What dimensions would support Julia's claim about the length and width of the box? Enter your answer in the boxes labeled Part A.

Part B

What dimensions would not support Julia's claim about the length and width of the box? Enter your answer in the boxes labeled Part B.

Part A Length

Part A Width

Part B Length

Part B Width

←

→

↶

↷

✖

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

Key: 9, 9 and 3, 27 (order doesn't matter)

Rubric: (1 point) The student enters correct values in all four response boxes.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#20	3	NS	D	2	6.NS.C.7	2, 3

David claims, "If the absolute value of x is greater than the absolute value of y , then x is greater than y ."

Determine whether each set of values for x and y supports or does not support David's claim.

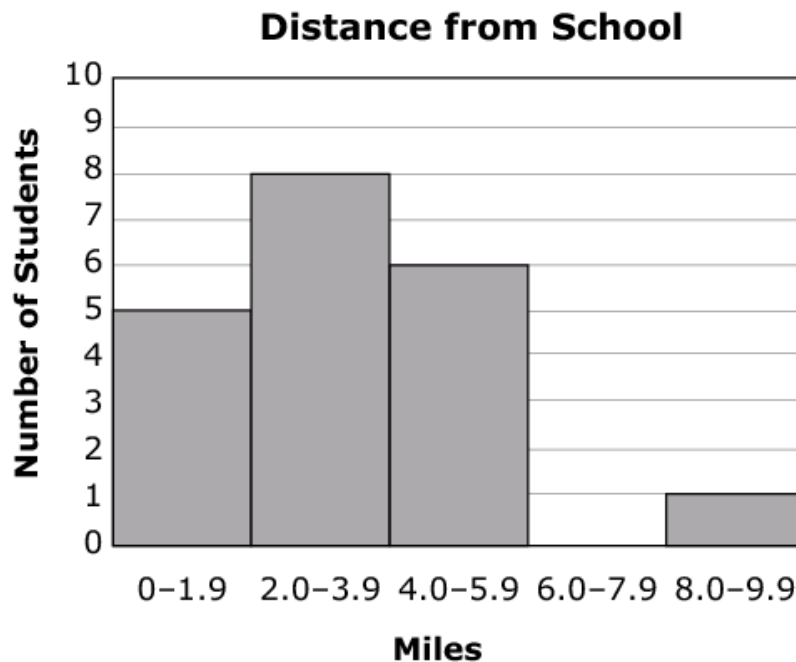
	Supports	Does not support
$x = -15, y = 14$	☐	☐
$x = -0.9, y = -0.8$	☐	☐
$x = \frac{1}{2}, y = \frac{1}{3}$	☐	☐

Key: D, D, S

Rubric: (1 point) The student correctly identifies each set of values as "supports" (S) or "does not support" (D) David's claim.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#21	1	SP	I	2	6.SP.A.2, 6.SP.B.5	N/A

Alyssa surveyed her classmates to determine how many miles they live from the school. The results are shown in the histogram below.



Determine whether each statement about the data is true. Select True or False for each statement.

	True	False
The shape of the data is skewed to the right.	☐	☐
The median of the data values is between 4.0 and 5.9 miles.	☐	☐
The interquartile range of the data values is greater than 6.0.	☐	☐

Key: T, F, F

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#22	1	RP	A	2	6.RP.A.3b	N/A

A bus travels 36 miles in 45 minutes.

Enter the number of miles the bus travels in 60 minutes at this rate.

← → ↶ ↷ ✕

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

Key: 48

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#23	2	RP	C	2	6.RP.A	6

A factory makes 1,200 shirts every 6 hours. The factory makes shirts for 9 hours each workday.

Enter the **fewest** number of workdays the factory will need to make 12,600 shirts.

←
→
↶
↷
✖

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

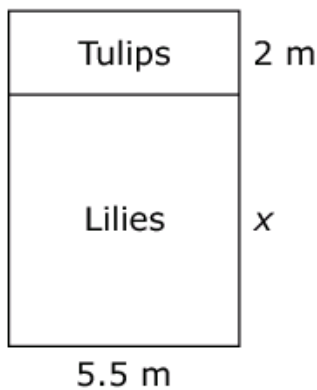
Key: 7

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#24	4	EE, G	E	3	6.EE.A.3, 6.G.A.1	3

Jeremiah planted tulips and lilies in a field with a width of 5.5 meters. The field of flowers is shown.

Area of Flowers



Identify each equation that could be used to find the area, in square meters, of the field of flowers for any length x , in meters.

- ☐ $A = x^2(5.5)$
- ☐ $A = 2x + 5.5$
- ☐ $A = 5.5x + 11$
- ☐ $A = 5.5(x + 2)$
- ☐ $A = x + 2 + 5.5$

Key: C and D

Rubric: (1 point) The student identifies the correct equations.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#25	4	RP	A	2	6.RP.A.3b	2, 4

Vicki bought some items from the store. The table shows the store price for these items.

Item	Store Price
Potato salad	\$2.25 per $1\frac{1}{2}$ pounds
Ham	\$2.00 per $\frac{1}{2}$ pound
Cheese	\$0.60 per $\frac{1}{4}$ pound
Turkey	\$3.50 per pound
Shrimp salad	\$5.50 per pound

Vicki spent between \$18 and \$20. Which combinations could she have purchased? Select **all** that apply.

- ☐ 4 pounds of turkey, 1 pound of ham, and $\frac{1}{2}$ pound of shrimp salad
- ☐ $1\frac{1}{2}$ pounds of cheese, 2 pounds of ham, and $1\frac{1}{2}$ pounds of shrimp salad
- ☐ $3\frac{1}{2}$ pounds of potato salad, $\frac{3}{4}$ pound of ham, 1 pound of cheese, and 2 pounds of turkey
- ☐ 2 pounds of shrimp salad, $\frac{1}{2}$ pound of ham, 1 pound of turkey, and 2 pounds of potato salad

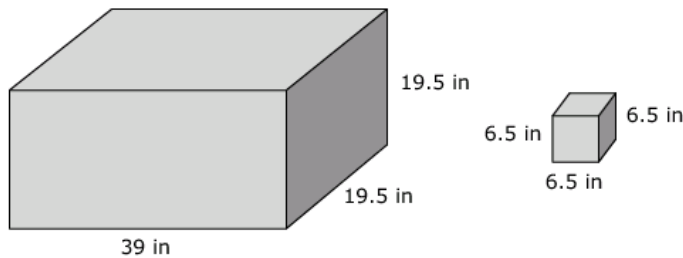
Key: B and D

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

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#26	2	G	A	2	6.G.A.2	1,5,7

Cube-shaped boxes of tissue are shipped to stores in containers. The containers are rectangular prisms.

- The edges of each tissue box measure 6.5 inches.
- The dimensions of the shipping container are 19.5 inches by 39 inches by 19.5 inches.



What is the greatest number of tissue boxes that will fit into one shipping container?

← → ↶ ↷ ✖

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

Key: 54

Rubric: (1 point) The student correctly determines the number of 6.5 by 6.5 by 6.5 tissue boxes the shipping container can hold.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#27	3	NF	F	3	5.NF.C.7	2, 7

Enter the lowest whole number in the numerator to make the comparison $\frac{\square}{5} > \frac{1}{4}$ true.

←
→
↶
↷
✕

1	2	3
4	5	6
7	8	9
0		

Key: 2

Rubric: (1 point) The student identifies the lowest whole number to make the comparison true.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#28	3	RP	E	2	6.RP.A.3	1, 3

Toni made a table that shows a relationship between the total number of apples and the number of boxes of apples. Each box has the same number of apples. Toni made an error in one row.

Toni's Table

Row Number	Number of Apples	Number of Boxes
1	15	2
2	75	5
3	105	7
4	150	10
5	180	12

Part A: Which row contains Toni's error? Enter the row number in the first response box.

Part B: What is the correct **number of apples** for the row you selected? Enter your answer in the second response box.

*Part A:**Part B:*

← → ↶ ↷ ✕

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

Key: Part A: 1

Part B: 30 (or any number equivalent to 30)

Rubric: (2 points) Student enters 1 in the first response box and 30 in the second response box.

(1 point) Student enters 1 in the first response box or 30 in the second response box.

(1 point) Student enters 30 in the first response box and 1 in the second response box.

Item	Claim	Domain	Target	DOK	CCSS-MC	CCSS-MP
#29	1	RP	A	1	6.RP.A.1	N/A

A quiz contains history and geography questions. The ratio of history questions to total questions is 4:5.

Select **all** the statements that are true about the quiz.

- ☐ The ratio of total questions to history questions is 5:4.
- ☐ The ratio of history questions to geography questions is 4:1.
- ☐ There is 1 more history question than geography questions.

Exemplar: (shown below)

- ☒ The ratio of total questions to history questions is 5:4.
- ☒ The ratio of history questions to geography questions is 4:1.
- ☐ There is 1 more history question than geography questions.

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

Smarter Balanced Assessment Consortium:

Picking a Pet Performance Task
Grade 6 Mathematics Practice Test
Scoring Guide
08/14/2019



Picking a Pet

Your class is trying to decide what type of animal to get for the class pet. Your teacher is letting the class vote to choose a goldfish, a turtle, or a hamster as the class pet.

All 20 students in your class voted for both their 1st choice and their 2nd choice for the class pet. The results are shown in Table 1.

Table 1: Class Pet Votes

Student	1st Choice	2nd Choice	Student	1st Choice	2nd Choice
1	Turtle	Hamster	11	Turtle	Hamster
2	Goldfish	Hamster	12	Turtle	Goldfish
3	Goldfish	Turtle	13	Hamster	Turtle
4	Hamster	Turtle	14	Hamster	Goldfish
5	Goldfish	Turtle	15	Turtle	Goldfish
6	Turtle	Goldfish	16	Goldfish	Turtle
7	Hamster	Goldfish	17	Turtle	Goldfish
8	Turtle	Goldfish	18	Turtle	Goldfish
9	Goldfish	Hamster	19	Turtle	Hamster
10	Goldfish	Hamster	20	Goldfish	Hamster

1

Using the class data shown in **Table 1**, complete the following frequency table.

Pet	Total 1st Choice Votes	Total 2nd Choice Votes
Goldfish		
Hamster		
Turtle		

2

Create your own method for using the votes to decide a winner. Explain your method using the information from **Table 1** to determine the winning pet.

3

Your teacher wants to use a point system to select the winning pet. She wants each pet to get a certain number of points for each 1st choice vote and a certain number of points for each 2nd choice vote.

Your teacher decides to use these rules for her point system:

- Points need to be positive whole numbers.
- Points for a 1st choice vote have to be greater than or equal to the points for a 2nd choice vote.

Determine point values for the 1st and 2nd choice that would result in the **turtle winning**. Use words and numbers to explain how this point system results in the turtle winning.

4

Your classmate claims that there is **no** point system that could result in the goldfish winning. Do you agree or disagree with your classmate?

Use words and numbers to explain your reasoning.

5

Your principal surprises you by buying your class a turtle. He brings the turtle to your class along with a sheet from the pet store titled “Turtle Tank Rules.”

The rules state:

- Tank walls must be at least 1 foot tall so the turtle can’t climb out.
- There must be at least 400 square inches of floor space for the turtle to walk around on.

Your teacher says the volume of the tank must be smaller than 5000 cubic inches so it doesn’t take up too much room in the classroom.

Give the dimensions of a tank that would work for your new turtle. Use words and numbers to explain how your tank satisfies the “Turtle Tank Rules” and your teacher’s requirement.

Volume of a rectangular prism = length x width x height
--

1

Using the class data shown in **Table 1**, complete the following frequency table.

Pet	Total 1st Choice Votes	Total 2nd Choice Votes
Goldfish		
Hamster		
Turtle		

#1. Fill in table/numeric entry only - 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#1	2	SP, OA	2A	1	6.SP.B.5, 2.OA.A.1	1	See exemplar

Rubric (1 point): The student enters **all** correct values into the frequency table as shown below.

Pet	Total 1st Choice Votes	Total 2nd Choice Votes
Goldfish	7	8
Hamster	4	7
Turtle	9	5

Commentary:

The purpose of this question is primarily to assess whether the student understands the context and the representation (a table).

The context is reasonably authentic. Many schools have class pets. Keeping track of how many votes each pet earned is a reasonable expectation for 6th grade students.

Rationale for Content:

The content (addition and subtraction within 100) is securely held, as it is a 2nd grade standard. Although the primary standard (6.SP.B.5) is at grade level, students are essentially reading data from a table and summarizing the numerical data set in a context, which builds on standards addressed in previous grades.

6.SP.B.5: Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.

Rationale for Claim:

The fact that the student must extract the quantities from a well-posed problem is what makes this item align to Target 2D.

Claim 2, Target D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).

Rationale for DOK:

This item is a straightforward DOK 1. From the *Cognitive Rigor Matrix/Depth of Knowledge* chart:

- Retrieve information from a table or graph to answer a question.

2

Create your own method for using the votes to decide a winner. Explain your method using the information from **Table 1** to determine the winning pet.

#2. Short answer – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#2	4	SP	4E, 4D	3	4.OA.C.5, 6.SP.B	2, 3, 4	See sample responses

Rubric:

2 points: Student clearly describes his/her selected method for using votes to decide a winner AND explains which pet is the winner based on this method.

1 point: Student describes which pet won, but does not support his/her answer with a method, OR student clearly describes a method for using the given information to determine the winning pet, but then does not use his/her method to determine which pet won.

0 points: Student just states a winning pet without explanation.

Note: As long as students use their calculations correctly from Item 1 to answer Item 2, full credit should be granted.

Commentary:

The purpose of this question is for students to communicate their understanding of the context using the data provided in an authentic way: to determine the winning pet. Students are given some flexibility to utilize and assign values to the data in a way that makes sense to them. Students are asked to assign point values to the data and then communicate how those points determine the winning pet.

Rationale for Content:

The content of this item is securely held, as the standards comes from 4th grade.

4.OA.C.5: Generate a number pattern that follows a given rule.
Identify apparent features of the pattern that were not explicit in the rule itself.

This aligns to the item because students are asked to create their own method for how the data are used and then use that rule to connect the data to the context.

Rationale for Claim:

This item is a “design under constraints” type of problem, which allows students to develop their own mathematical model and then interpret the results in the context. This is why this item falls under Claim 4, Targets E and D.

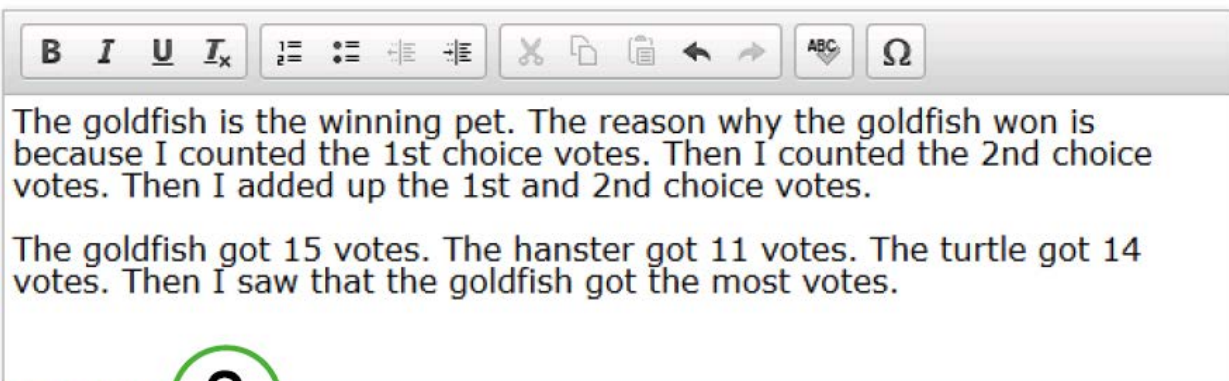
Target E: Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.

Target D: Interpret results in the context of a situation.

Rationale for DOK:

Because students are asked to develop a solution strategy and the item has more than one possible answer, this item is DOK 3.

What follows are sample responses and scoring annotations for Item 2.

Sample Response 2a

The goldfish is the winning pet. The reason why the goldfish won is because I counted the 1st choice votes. Then I counted the 2nd choice votes. Then I added up the 1st and 2nd choice votes.

The goldfish got 15 votes. The hanster got 11 votes. The turtle got 14 votes. Then I saw that the goldfish got the most votes.

SCORE POINT**2**

The student clearly states his/her method of counting and adding the 1st and 2nd votes together to determine the winner. The response contains evidence of the student's competence in problem solving and modeling to the full extent that these processes apply to this item.

Sample Response 2b

I would add the 1st choice and the 2nd choice and which ever is the highest would be the winner. I would do that because it would be fair.

Goldfish $7 + 8 = 15$ winner
 Hamster $4 + 7 = 11$
 Turtle $9 + 5 = 14$

SCORE POINT

2

The student shows his/her method of adding the 1st and 2nd votes together and states “which ever is the highest would be the winner.” The response contains enough evidence of the student’s competence in problem solving and modeling to receive full credit.

Sample Response 2c

The pet that won is the turtle because it got more votes in the first time that is why its the winner.

SCORE POINT

1

Although it is true that the turtle got the most votes in the first round, the student did not clearly state that the method he/she used was to consider just the 1st place votes. The student has demonstrated only a **partial** understanding of the mathematical content and practices essential to this item.

Sample Response 2d

The Goldfish won becuse it got the todle of 15 votes. first i counted the first vote and it was 7. Then i counted 2 votes and it was 8. Finaly I added $8 + 7$ to get the todle.

SCORE POINT

1

The student states that he/she added the 1st and 2nd choice votes, but fails to compare this total with the other pets. The student has demonstrated only a **partial** understanding of the mathematical content and practices essential to this item.

Sample Response 2e

	first choice	second choice	
Goldfish	7	8	=15
Hamster	4	7	=11
Turtle	9	5	=14

SCORE POINT

0

Although correct information and calculations are shown, the student did not explain which pet won and did not describe a method for determining the winner. No evidence is present that demonstrates the student's understanding of the mathematical content and practices essential to this item.

3

Your teacher wants to use a point system to select the winning pet. She wants each pet to get a certain number of points for each 1st choice vote and a certain number of points for each 2nd choice vote.

Your teacher decides to use these rules for her point system:

- Points need to be positive whole numbers.
- Points for a 1st choice vote have to be greater than or equal to the points for a 2nd choice vote.

Determine point values for the 1st and 2nd choice that would result in the **turtle winning**. Use words and numbers to explain how this point system results in the turtle winning.

#3. Short answer – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#3	4	SP	4D, 4B	3	4.OA.A	2, 3, 4	See sample responses

Rubric:

2 points: The student describes a method that meets the two criteria (assigns positive whole number of points to each first choice and second choice, and 1st choice is greater or equal to the 2nd choice values) AND gives a valid explanation for why the turtle wins using this method.

1 point: The student describes a method that meets the two criteria (assigns positive whole number of points to each first choice and second choice, and 1st choice is greater or equal to the 2nd choice values), but does not give a valid explanation for why the turtle wins using this method.

OR

The student gives a valid explanation for why the turtle wins using this method, but does not describe the method.

0 points: No viable method or viable explanation is provided.

Commentary:

The purpose of this question is to allow students to design a point structure that has a predetermined outcome. There is no one correct solution, so students are given the freedom to design a point system and then defend why their system results in the turtle becoming the class pet.

Rationale for Content:

This is securely held content in that it is primarily adding, multiplying, and comparing whole numbers.

4.OA.A: Use the four operations with whole numbers to solve problems.

Rationale for Claim:

This question is intended to be a “design under constraints” modeling task. The students have data (the class voting data) and are asked to describe a method of assigning values that meet two criteria. Additionally, they need to explain how their method, when applied to the data, results in the desired outcome.

Target D: Interpret results in the context of a situation.

Target B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.

Rationale for DOK:

This is a straightforward DOK 3 problem. From the *Depth of Thinking* chart:

DOK 3, Understand:

- Use concepts to solve non-routine problems
- Explain reasoning when more than one response is possible

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

Sample Response 3a

B I U T_x **1 2 3 4** **5 6 7 8** **9 10 11 12** **ABC** **Ω**

	1st choice	2nd choice
Goldfish	7×10	$8 \times 5 = 70 + 40 = 110$
Hamster	4×10	$7 \times 5 = 40 + 35 = 75$
Turtle	9×10	$5 \times 5 = 90 + 25 = 115$

So what I did was make every 1st place vote times 10 and every 2nd place vote times 5. The turtle wins because it has 115 and the hamster has 75 and the goldfish has 110.

SCORE POINT

2

The student correctly describes a method that meets the criteria and provides a valid explanation for why the turtle wins using this method. The response contains evidence of the student's competence in problem solving and modeling to the full extent that these processes apply to this item.

Sample Response 3b

B I U T_x **1 2 3 4** **5 6 7 8** **9 10 11 12** **ABC** **Ω**

I can make the turtle win by making all the first choice votes being 2 points and all the second choice votes being 1 point.

This way the goldfish has 7 times 2 and 8 points, so 22 points.
 The hamster has 5 times 2 and 7 points, so 17 points.
 And the turtle has 9 time 2 and 5 points, so 23 points.

SCORE POINT

2

The student clearly states his/her method of assigning 2 points to each 1st choice vote and 1 point to each 2nd choice vote and declares the turtle the winner with this method. Although, the hamster only had 4 1st choice votes, it is consistent with the student's tallies in question 1, therefore it receives full credit for the response.

Sample Response 3c

Goldfish	21	16
Hamster	15	14
Turtle	27	10

Each 1st choice vote times 3 and each 2nd choice vote times 2.
The turtle wins because it has 37 points.

SCORE POINT

1

The student correctly described a method that meets the criteria of positive whole numbers and 1st choice points greater than or equal to 2nd choice points. However, the student didn't recognize that these point values create a tie between the goldfish and turtle. This error prevents the response from receiving full credit.

Sample Response 3d

If the turtle wants to win in the first choice it would have 27 votes and for the second choice it would have 15 votes, which is 42 votes. That way the turtle would win over the goldfish and hamster. Each vote counts 3 points.

SCORE POINT

1

The student describes a method “each vote counts 3 points” implying that both 1st and 2nd choice votes receives 3 points and even correctly indicates the number of votes the turtle would have using the stated method. However, the student doesn’t recognize that these point values would actually mean the goldfish would win and the explanation is incomplete. The student has demonstrated only a **partial** understanding of the mathematical content and practices essential to this item.

Sample Response 3e

B
I
U
I_x

$\frac{1}{2}$
 $\frac{3}{4}$
 $\frac{5}{8}$
 $\frac{7}{8}$

Goldfish 7
Hamster 4
Turtle 9

The turtle has more because it has 9 points and the rest have less.

SCORE POINT

0

The student gives a potentially valid explanation, but the method is not described. Additionally, the inferred method (1 point for first choice votes and 0 points for second choice votes) does not meet the criteria (positive whole number values). There are significant omissions that indicate a lack of comprehension in regard to the mathematical content and practices essential to this task.

4

Your classmate claims that there is **no** point system that could result in the goldfish winning. Do you agree or disagree with your classmate?

Use words and numbers to explain your reasoning.

#4. Short answer – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#4	3	SP	3G, 3F	3	4.OA.A	3	Varies (see rubric)

Rubric:

2 points: The student disagrees with his/her classmate's claim and explains his/her reasoning by providing a point system for 1st and 2nd choice which meets the criteria from Item 3 and results in the Goldfish winning the contest. For example: Equal values for 1st and 2nd choice, 4 pts for 1st and 3 pts for 2nd, etc.

Picking a Pet Performance Task

1 point: The student disagrees with his/her classmate's claim and provides a point system for 1st and 2nd choice which may be flawed or lack sufficient detail, OR the student agrees with his/her classmate's claim and provides a point system that supports his/her position.

0 points: No scoring method or incorrect scoring method given.

Commentary:

The purpose of this question is to allow students an opportunity to challenge the claim of a classmate and design a point system to achieve the outcome of a Goldfish victory to support their reasoning. There are multiple correct solutions, so students are given the freedom to design any point system and defend how their system results in the Goldfish winning the contest.

Rationale for Content:

This is securely held content in that it is primarily adding, multiplying, and comparing whole numbers.

4.OA.A: Use the four operations with whole numbers to solve problems.

Rationale for Claim:

This question is intended to be an opportunity for students to communicate reasoning by challenging a claim of a classmate. While the classmate's claim is true for some point systems, the student can argue that there are a number of alternative point systems that can result in the Goldfish winning and can provide an example of such to support his/her proposition.

Target G: At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)

Target F: Base arguments on concrete referents such as objects, drawings, diagrams, and actions.

Rationale for DOK:

This is a straightforward DOK 3 problem. From the *Depth of Thinking* chart: DOK 3, Understand:

- Use concepts to solve non-routine problems
- Explain reasoning when more than one response is possible

5

Your principal surprises you by buying your class a turtle. He brings the turtle to your class along with a sheet from the pet store titled “Turtle Tank Rules.”

The rules state:

- Tank walls must be at least 1-foot tall so the turtle can’t climb out.
- There must be at least 400 square inches of floor space for the turtle to walk around on.

Your teacher says the volume of the tank must be smaller than 5000 cubic inches so it doesn’t take up too much room in the classroom.

Give the dimensions of a tank that would work for your new turtle. Use words and numbers to explain how your tank satisfies the “Turtle Tank Rules” and your teacher’s requirement.

Volume of a rectangular prism = length x width x height

#5. Short answer – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#5	4	MD	4D, 4B	3	5.MD.C.5	2,3,4	Varies

Rubric:

2 points: The student gives dimensions that satisfy all three constraints (height, base area, and volume) and provides an explanation as to why the chosen dimensions meet all requirements.

1 point: The student gives dimensions that satisfy all three constraints (height, base area, and volume), but does not provide an explanation as to why the chosen dimensions meet all requirements, OR the student gives

dimensions that satisfy two of the three constraints and provides an explanation that supports those dimensions.

0 points: Student only gives dimensions to satisfy one of the constraints and does not provide any valid explanation.

Commentary:

This item is intended to give students flexibility in their approach and dimension choice. Given the three parameters (height, base area, and volume), students need to manipulate numbers within the context to satisfy all restrictions. This is a design under constraints item whose purpose is to allow students to think flexibly within a mathematical context.

Rationale for Content:

The content is securely held, as it comes from 5th grade Measurement and Data domain. Students are asked to use and calculate volume in a real-world context and interpret their selected measurements to determine whether the three parameters were met.

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:

As a “design under constraints” problem, students are required to select values for the dimensions of the tank, interpret those values as they relate to volume, and determine whether those dimensions satisfy all three constraints. Because of this, this item is Claim 4, Target D and Target B.

Target D: Interpret results in the context of a situation.

Target B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.

Rationale for DOK:

Because students are asked to develop a solution strategy and the item has more than one possible answer, this item is DOK 3.

The hand-scored 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 hand-scoring 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.