Grade 7 Mathematics Performance Task Scoring Guide

Skate Park Performance Task

September 2019

Stimulus

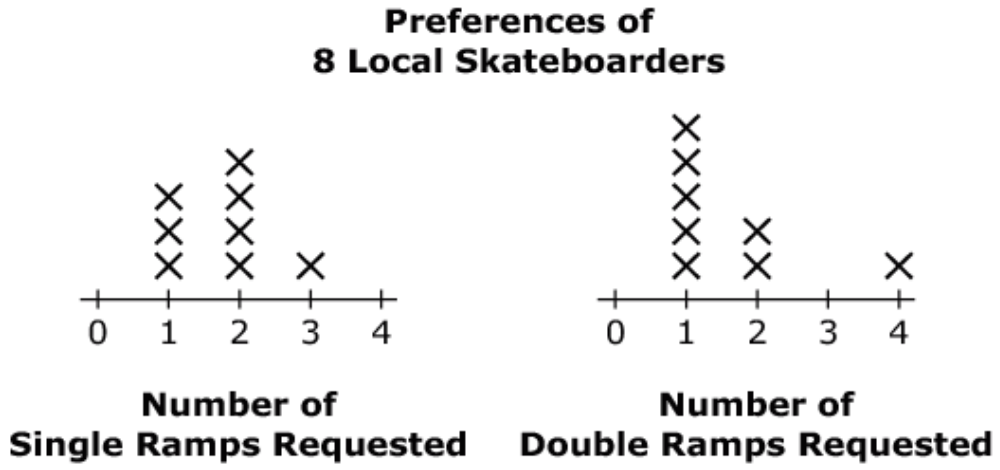
Skate Park

A local skate park is being planned by the Community Recreation Committee.

In this task, you will make recommendations for a skate park design that most of the local skateboarders like. You will use your recommended design to create a safety code for the park.

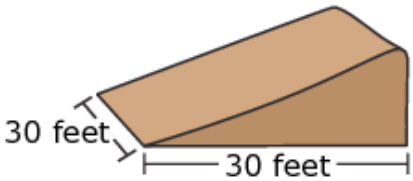
The area of the planned skate park is 10,000 square feet.

The committee asks you to gather data about skate ramps. You survey 8 local skateboarders on their preferences for the number of single ramps and number of double ramps for the skate park. The survey results are shown in the line plots.

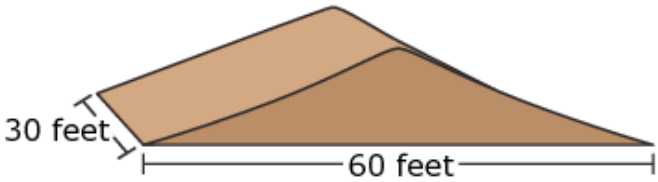


The single and double ramps are shown. Each ramp has a rectangular base.

Single Ramp



Double Ramp

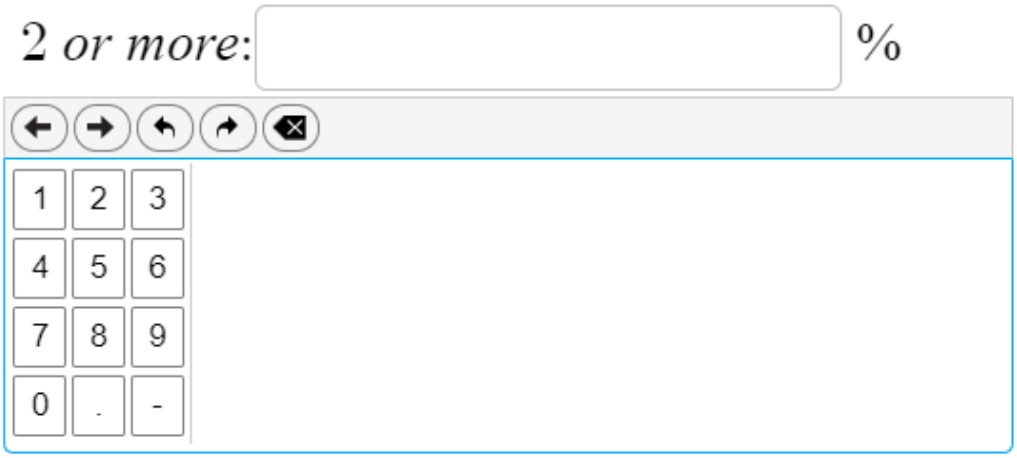


not drawn to scale

Performance Task Items

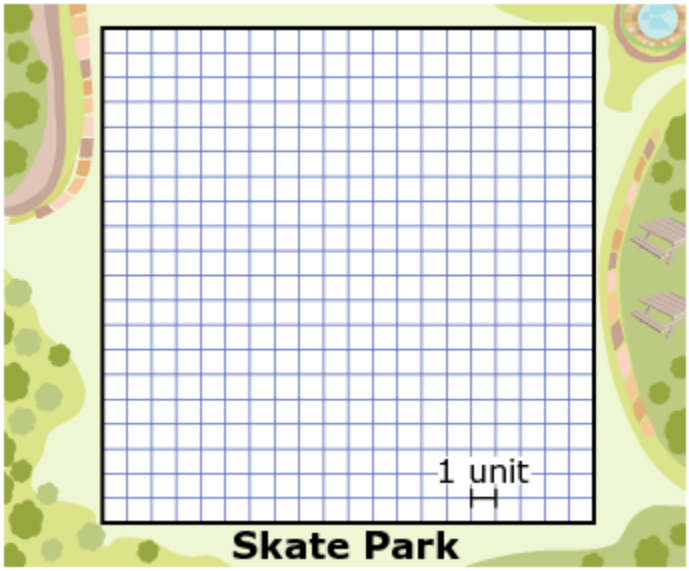
ITEM 1

Based on the survey data, what percent of skateboarders requested 2 or more single ramps?



ITEM 2

The skate park will be in the shape of a square. It will have an area of 10,000 square feet. A scale drawing of the skate park is shown.



Choose the correct scale for the scale drawing.

A: 1 unit = 5 feet
B: 1 unit = 10 feet

C: 1 unit = 15 feet
D: 1 unit = 20 feet

ITEM 3

The base of the single ramp is a rectangle 30 feet by 30 feet.
The base of the double ramp is a rectangle 30 feet by 60 feet.

Enter the area, in square feet, of the base of a single ramp.
Enter the area, in square feet, of the base of a double ramp.

Single ramp:

Double ramp:

ITEM 4

Based on the survey data, you will recommend a number of single ramps and double ramps the park should have.

- Use the information from the Preferences of 8 Local Skateboarders line plots.
- At least 50% of the skateboarders must have requested the number of ramps you recommend.

What is the number of single ramps you recommend?

What is the number of double ramps you recommend?

Single ramps:

Double ramps:

ITEM 5

The town safety code requires 10 square feet of empty floor space per person. Empty floor space is defined as space where no ramps will be built.

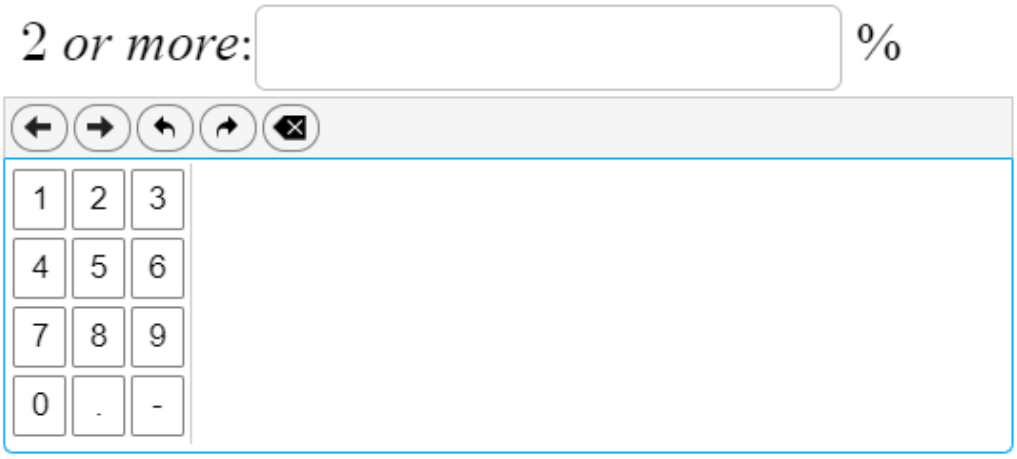
Based on the number of ramps you've chosen, what is the maximum number of people that can be in the skate park at any given time?

Use information from previous questions to fully explain your answer.

Scoring Guide

ITEM 1

Based on the survey data, what percent of skateboarders requested 2 or more single ramps?



#1 Equation numeric – 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#1	2	SP	2A	2	6.SP.B.5	3	62.5

Rubric:
1 point: The student enters a value from 62 to 63.

Commentary: The purpose of this question is to draw from securely held grade 6 content. The question will assess the student's ability to use information from the line plots and transfer that information to a well-posed percent problem, with a higher level of complexity of calculating the part from a whole.

Rationale for Content:
The primary standard (6.SP.B.5) is familiar content from a previous grade. Students are tasked with reading data from a table and computing a percent of a quantity.

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 student must extract and translate the quantity from the line plot. That is what makes this a Claim 2, Target A.

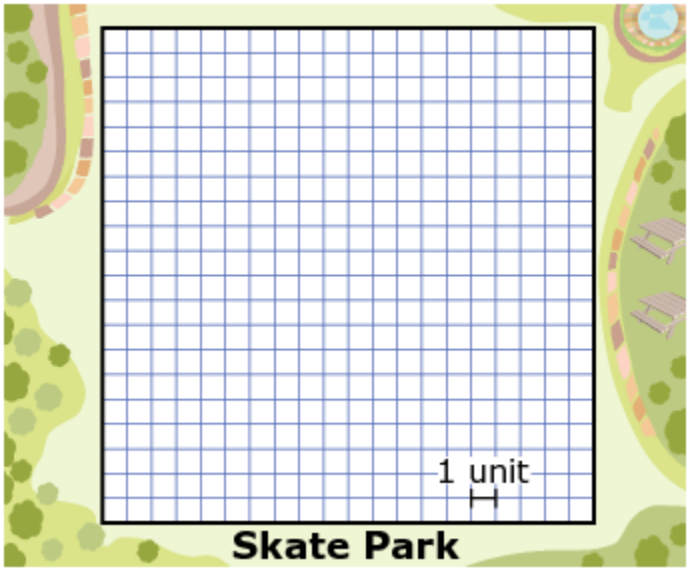
Claim 2, Target A: Apply mathematics to solve well-posed problems in pure mathematics and those arising in everyday life, society, and the workplace.

Rationale for DOK:
This DOK 2 question asks students to retrieve information from a data display to solve a problem.

Analyze (DOK 2): Interpret data from a simple graph.
Apply (DOK 2): Select a procedure and perform it.

ITEM 2

The skate park will be in the shape of a square. It will have an area of 10,000 square feet. A scale drawing of the skate park is shown.



Choose the correct scale for the scale drawing.

A: 1 unit = 5 feet
B: 1 unit = 10 feet
C: 1 unit = 15 feet
D: 1 unit = 20 feet

#2 Multiple choice – 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#2	4	G	4A	2	7.G.A.1	4, 7	A

Rubric:
1 point: The student selects option A—1 unit = 5 feet.

Commentary: This question is designed to allow the student to determine the important information necessary to solve the problem when the required information is not immediately obvious. Students will have multiple access points to the problem and after applying their knowledge of scale drawings they will have the opportunity to assess the reasonableness of their solution.

Rationale for Content:
Students are required to make sense of measurement quantities in context. Students must translate between square units and units of length to compute an actual length from a scale drawing.

7.G.A.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Rationale for Claim:
The student is asked to solve a multi-step problem where they must identify relevant information. They need to interpret the context to build a chain of reasoning that will lead to a solution.

Claim 4, Target A: Apply mathematics to solve problems arising in everyday life, society, and the workplace.

Rationale for DOK:
This DOK 2 question asks students to solve a routine problem by applying multiple concepts or decision points.

Understand (DOK 2): Use models/diagrams to explain concepts.
Apply (DOK 2): Translate between representations.

ITEM 3

The base of the single ramp is a rectangle 30 feet by 30 feet.
The base of the double ramp is a rectangle 30 feet by 60 feet.

Enter the area, in square feet, of the base of a single ramp.
Enter the area, in square feet, of the base of a double ramp.

Single ramp:

Double ramp:

#3 Equation numeric – 1 point

Item	Claim	Domain	Target	DOK	Content	MP	Key
#3	2	G	2A	2	6.G.A	5	900, 1800

Rubric:
1 point: The student enters 900 square feet in the first response box and 1800 square feet in the second response box.

0 points: All other responses.

Commentary: This question requires the student to find the area of the bases of the ramps when given the dimensions. This is a well-posed problem and the results will be used in future questions. Students can use spatial reasoning and decomposition of figures as a strategy to solve and make sense of the problem.

Rationale for Content:
Finding the area of a rectangle is securely held content from Grade 6.

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

Rationale for Claim:
The student is given a context and asked to solve a well-posed problem, but they are not told what procedure they must use to solve the problem.

> Claim 2, Target A: Apply mathematics to solve well-posed problems in pure mathematics and those arising in everyday life, society, and the workplace. The student solves a multi-step problem with the four operations in a context involving measurement quantities.

Rationale for DOK:
This DOK 2 question requires the student to retrieve information and select a procedure to solve a problem.

Apply (DOK 2): Solve routine problems applying multiple concepts or decision points.

ITEM 4

Based on the survey data, you will recommend a number of single ramps and double ramps the park should have.

- Use the information from the Preferences of 8 Local Skateboarders line plots.
- At least 50% of the skateboarders must have requested the number of ramps you recommend.

What is the number of single ramps you recommend?

What is the number of double ramps you recommend?

Single ramps: ☐

Double ramps: ☐

#4 Equation numeric – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#4	3	SP	3A	2	6.SP.B.5, 6.RP.A	1, 2	2, 1

Rubric:
2 points: The student provides both correct answers: 2 single ramps and 1 double ramp.

1 point: The student provides one correct answer either: 2 single ramps OR 1 double ramp.

0 points: All other responses.

Commentary: The student is required to develop a response based on several pieces of information. The student cannot simply make calculations. They must first understand the survey information and then base their recommendations on their interpretation of the survey results.

Rationale for Content:
This content is securely held from previous grades and Grade 6. Students begin representing data graphically in Grade 2, eventually leading up to summarizing distributions in Grade 6. Students are asked to employ ratio reasoning to make a recommendation.

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

Rationale for Claim:
This question addresses Claim 3. Students must put together several pieces of information to support a claim with specific examples.

Claim 3, Target A: Tasks used to assess this target should ask students to develop a chain of reasoning to justify or refute a conjecture.

Rationale for DOK:
This question has multiple parts that classify it as DOK 2. The student must interpret data from a simple graph and use that retrieved information to solve a problem.

Analyze (DOK 2): Interpret data from a simple graph.
Apply (DOK 2): Retrieve information to solve a problem.

ITEM 5

The town safety code requires 10 square feet of empty floor space per person. Empty floor space is defined as space where no ramps will be built.

Based on the number of ramps you've chosen, what is the maximum number of people that can be in the skate park at any given time?

Use information from previous questions to fully explain your answer.

#5 Short answer – 2 points

Item	Claim	Domain	Target	DOK	Content	MP	Key
#5	4	G	4A	3	7.G.A.1	1, 4	See exemplar

Rubric:

2 points: Student correctly subtracts the number of square feet taken up by the number of ramps, based upon the number of ramps from question 4 and the area of the bases of the ramps from question 3, from 10,000 square feet AND then the student divides the result by 10 to find the maximum number of people.

1 point: Student correctly subtracts the number of square feet taken up by the number of ramps, based upon the number of ramps from question 4 and the area of the bases of the ramps from question 3, from 10,000 square feet OR the student has a calculation error in determining the number of square feet not taken up by ramps but correctly divides by 10 to find the maximum number of people.

0 points: The response does not meet minimum requirements to score 1 point.

Note: This question is dependent on the responses to Item 3 and Item 4. Students should be awarded full credit if they find the max number of people based on the incorrect square feet required or an incorrect number of recommended ramps.

Commentary: The purpose of this culminating question is to allow the student to draw upon the pieces of information that they have gathered in preceding questions. The student must now make a determination of the total number of and type of ramps to safely recommend to the committee. Students will solve this question with no given arithmetic or geometric structure or guidelines. The student may use solution strategies that draw upon knowledge from different domains.

Rationale for Content:
The primary standard (7.G.A.1) is at grade level. Students are solving a problem that involves a scale drawing of geometric figures. The underlying mathematics required to solve the problem in context is securely held from previous grades. The student must perform the four arithmetic operations as well as understand ratio concepts to determine the maximum number of people that can be in the skate park.

Rationale for Claim:
The student must solve a multi-step problem using the four operations by identifying the needed information. The questions used to assess this Claim 4 target are well-posed and not completely formulated as they are in Claim 2 questions. That is what makes this Claim 4: Apply mathematics to solve problems arising in everyday life, society, and the workplace.

Rationale for DOK:
The student must select a procedure and perform it as well as interpret results in the context of a situation. The student must understand how the quantities are related to solve the problem.

Understand (DOK 3): Use concepts to solve non-routine problems.
Evaluate (DOK 3): Cite evidence and develop a logical argument.

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

Sample Response 5a

Firstly, you will have to know all information such as area of skate park, areas of the single ramp and double ramp, and how much free space each person needs. Next, with this information, formulate the following expression.

(10000-((2*900)+30)))/10

The first number, 10000 is the total area of the skate park as a whole. It is then subtracted by (2*900) and (60*30). These are the areas of the single ramps and double ramp respectively. After multiplying you get a product (1800+1800). After adding you get a sum 3600. You subtract the total area of the skate park from the combined area of the two single ramps and one double ramp to calculate the amount of free space left. The difference is 6400. Now that you have calculated the amount of free space you divide that number my 10. This is because according to town safety law, each person the park needs 10 square feet of empty space. After you divide this, the quotient, and solution is 640.

In conclusion, the number of people in the skate park must be less than or equal to 640.

Item 3 responses: Single ramp 900 square feet, Double ramp 1800 square feet

Item 4 responses: 2 Single ramps, 1 Double ramp

Score point 2:
The student correctly subtracts the number of square feet taken up by the number of ramps and area of the bases of the ramps by indicating that "10000 is the total area…It is then subtracted by (2*900) and (60*30)…" The student then divides the given difference of 6400 sq ft by 10 feet per

person to find that a maximum of 640 people can be in the skate park at any given time.

Sample Response 5b

Based on the number of ramps, 460 people can be in the park at any given time this is because the total space is 10,000 sq ft. So 2 single ramps (18,000 sq ft) plus a double ramp (3600 sq ft). So now the total area covered by ramps is 5,400 sq ft. 10,000-5,400 = 4600 divided by 10 equals 460. Therefore, with 2 single ramps and one double ramp, 460 people can be at the park at any given time.
Item 3 responses: Single ramp 900 square feet, Double ramp 3600 square feet
Item 4 responses: 2 Single ramps, 1 Double ramp

Score point 2:
The student correctly subtracts the number of square feet taken up by the number of ramps and area of the bases of the ramps based on the answer provided in item 3, in which the area of the double ramp was calculated to be 3600 sq ft. The student then divides the given difference of 4600 sq ft by 10 feet per person to find that a maximum of 460 people can be in the skate park at any given time.

Sample Response 5c

???????The maximum amount of people that can be there at any given time is, 64 people because taken that the area of the skate park is 10,000 ft^2, if you add the areas of the two single ramps and the one double ramp it would take up 3,600 ft. If you subtract the areas from 10,000, the original area, you would get 6,400 square feet left over, dividing that by ten, the town safety code of empty floor space, it would leave you with 64, the maximum number of skaters allowed in the park.
Item 3 responses: Single ramp 900 square feet, Double ramp 3600 square feet
Item 4 responses: 2 Single ramps, 1 Double ramp

Score point 1:
The student correctly subtracts the number of square feet taken up by the number of ramps and area of the bases of the ramps, “if you add the areas of the two single ramps and the one double ramp…subtract the areas from

10,000." However, when dividing the given difference of 6,400 sq ft by 10, the student makes an error resulting in a maximum of 64 people.

Sample Response 5d

My recommendation will have to be 3 single and 2 double ramps and 28 people can be at the park at once. The 3 single ramps will take up 360 feet of the park. The double ramps will take up 360 feet aswell. There will be 280 feet left so i divided it by 10 because that is how much people space will be and i got 28, and 28 represents the number of people that can be at the park all at once.
Item 3 responses: Single ramp 120 square feet, Double ramp 180 square feet
Item 4 responses: 3 Single ramps, 2 Double ramp

Score point 1:
The student incorrectly subtracts the number of square feet taken up by the number of ramps and area of the bases of the ramps from 1,000 rather than 10,000 and additionally makes errors in computing the bases of ramps based on the answers provided in item 3 and item 4. However, the student then correctly divides the given difference of 280 by 10 to find that a maximum of 28 people can be in the skate park at any given time.

Sample Response 5e

Based on the number of ramps I've chosen, maximum number of people that can be in the skate park at any given time would be like around 5 people because there would be the single ramp that is 900 square feet and since it requires 10 square feet of empty floor space per person it would end up being 890 square feet. Also, for the double ramp since it is 1800 square feet and you have to have 10 square feet of empty floor per person it would be 1790 square feet. I subtracted 10 frome each square feet and that's how I got my answers.
Item 3 responses: Single ramp 900 square feet, Double ramp 1800 square feet
Item 4 responses: 1 Single ramps, 1 Double ramp

Score point 0:
The student demonstrates merely an acquaintance with the topic by subtracting 10 from the area of the bases of the single and double ramps. The student states that "around 5 people" would be in the skate park without providing supporting work or explanation.

Smarter Balanced Mathematics General Rubrics

The handscored item in this guide is a 2-point short-text item. 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 handscoring 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.