



Sample Mathematics Item: Grade 6

“Fraction Model”

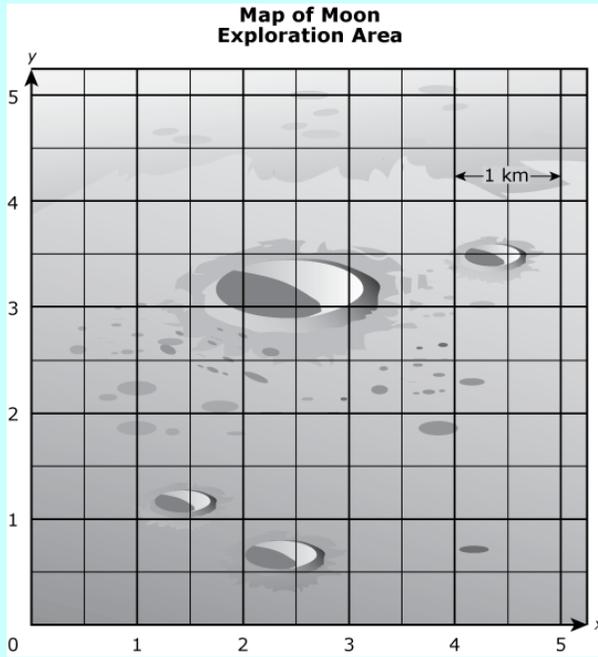
November 2013

Scientists are sending a rover to the moon. Their plan is to study a rectangular area of the moon using the map shown. On the grid, 1 unit represents 1 kilometer (km).

Part A

The rover will land at $(3.5, 1)$, explore up to $(3.5, 4)$, and then over to $(2, 4)$.

Plot these three points on the map.



Part B

What are the coordinates of the fourth vertex of the rectangle that the scientists plan to explore?

(,)

Part C

What is the horizontal length of the rectangle? kilometers

What is the vertical length of the rectangle? kilometers

Part D

Find the area of the moon exploration area in square **meters**. Show your work.

Grade 6	Fraction model
Type	Type III 6 Points
Evidence Statement	<p>6.D.2: Solve multi-step contextual problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in 5.NBT.B, 5.NF, 5.MD and 5.G.A.</p> <p>Clarification: Tasks may have scaffolding if necessary in order to yield a degree of difficulty appropriate to Grade 6.</p>
Most Relevant Standards for Mathematical Content	<p>5.NF.4b: Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. (Major)</p> <p>5.MD.1: Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (Supporting)</p> <p>5.G.1: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (Additional)</p>
Most Relevant Standards for Mathematical Practice	Students must use the technology-enabled answer space in order to begin to create a model of the moon exploration area (MP.4). This model requires significant interpretation both in explanation and computation requiring students to reason abstractly and quantitatively (MP.2). Some of these explanations will require precise use of language to differentiate the meaning of the sections in the model.
Item Description and Assessment Qualities	<p>This six-point task asks student to model a situation using a technology-enhanced response mechanism. Students use the technology to begin to create a model of the moon exploration area. Then, they interpret the model by identifying the fourth point of the rectangle and describing the length of the sides. Students must thoroughly understand this model in order to calculate the area either by converting the two lengths or finding the area in square kilometers and converting that measurement to square meters.</p> <p>Although this item is based on securely held content from grade 5, plotting points like (3.5, 1) represent the rigor expected at grade 6. In addition, the calculations resulting in an area of millions of square meters reflect the fluency with numbers that are appropriate for grade 6 students.</p> <p>The response for Part A is technology-enhanced so that it can be electronically scored. Unlike traditional multiple choice, it is difficult to guess the correct answer or use a choice elimination strategy.</p>
Scoring Information	<p>Scoring Rubric</p> <p>Task is worth 6 points. Task can be scored as 0, 1, 2, 3, 4, 5, or 6. Scoring consists of 4 points for modeling and 2 points for computation.</p> <p>Part A, machine-scored</p>

- 1 modeling point for creating a model with three correctly plotted points.
- 1 modeling point for writing the point of the fourth coordinate point.

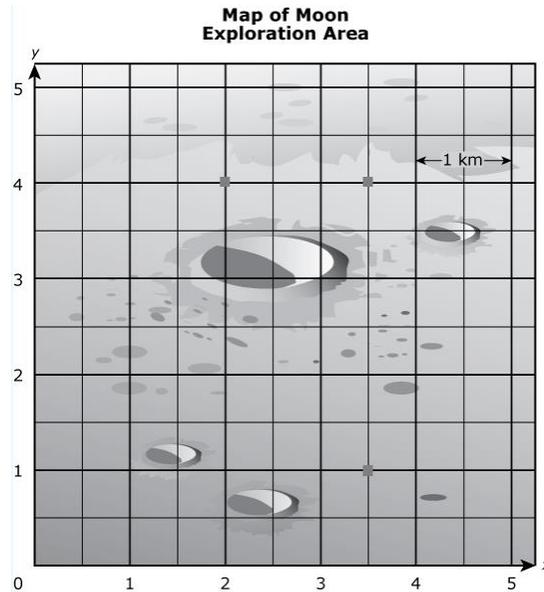
Part B, machine scored

- 1 computational point for finding that the horizontal length is 1.5 kilometers.
- 1 computational point for finding that the vertical length is 3 kilometers.

Part C, hand scored

- 1 modeling point for creating a solution path that addresses unit conversion.
- 1 modeling point for creating a solution path to determine the area in square meters.

For example,
Part A.



Part B. (2, 1)

Part C. 3 kilometers and 1.5 kilometers

Part D.

I converted 3 kilometers to 3,000 meters and 1.5 kilometers to 1,500 meters. Then, I multiplied 3,000 by 1,500 to find that the moon exploration area is 4,500,000 square meters.

OR students may solve Part C in this manner:

I multiplied 3 kilometers by 1.5 kilometers to get 4.5 square kilometers. One square kilometer is 1,000 meters multiplied by 1,000 meters, which is 1,000,000 square meters. That means that 4.5 square kilometers is 4,500,000 square meters.