PARCC

Sample Mathematics Item: Grade 3

"Art Teacher's Rectangular Array"

November 2013

An art teacher will tile a section of the wall with painted tiles made by students in three art classes.

- Class A made 18 tiles.
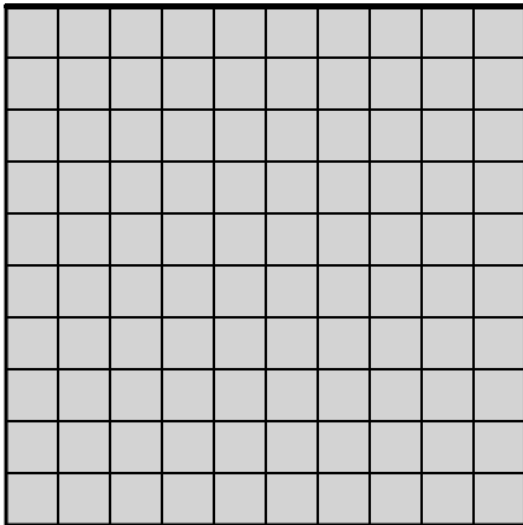- Class B made 14 tiles.
- Class C made 16 tiles.

Part A

What is the total number of tiles that are to be used?

| | tiles

Part B

The grid shows how much wall space the art teacher can use. Use the grid to create a rectangular array showing how the art teacher might arrange the tiles on the wall.

Select the boxes to shade them. Each tile should be shown by one shaded box.

Part C

Andy created a rectangular array showing how he would place 56 small tiles on the wall. He placed 7 tiles in each row. He wrote a multiplication equation using _R_ to stand for the number of rows he used.

Write an equation using _R_ that Andy could have written.

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| Grade 3	The art teacher's rectangular array
Type	Type III - 3 points
Evidence Statement	**3.D.1:** Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 3, requiring application of knowledge and skills articulated in the Evidence Statements on the PBA (excludes Reasoning Evidence Statements). **Clarification:** i) Tasks may have scaffolding if necessary in order to yield a degree of difficulty appropriate to Grade 3.
Most Relevant Standards for Mathematical Content	**3.OA.8:** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. This standard is major content in the grade based on the PARCC Model Content Frameworks.
Most Relevant Standards for Mathematical Practice	Students must create a model of the situation using equations as well as the technology-enabled response space (MP.4). Note that there are multiple possible solutions, an increasingly important component of modeling across the grades. In order to create these models, students will need to reason abstractly and quantitatively with that context (MP.2).
Item Description and Assessment Qualities	This application task requires students to use their understanding of the four operations to solve a real-world problem. This is a two-step problem because students must add to determine the total number of tiles, and then determine how those tiles can be displayed in a rectangular array within a 10 x 10 grid. Students then write an equation with a letter to represent an unknown quantity to represent a similar situation using different numbers. This item allows for a variety of rectangular arrays and emphasizes that there are multiple representations by requiring students to write an equation. The rectangular array can be placed on the grid in a wide variety of ways but each correct representation will represent $6 \times 8 = 48$ or $8 \times 6 = 48$. Similarly the student should recognize that if 56 tiles are used with 7 tiles placed on each of R rows, then an equation such as $7 \times R = 56$ is another representation of the situation. The requirement of the use of a multiplication equation reinforces the relationship between multiplication and division. The response boxes are technology-enhanced so they can be electronically scored. Unlike traditional multiple choice, it is difficult to guess the correct answer or use a choice elimination strategy.
Scoring Information	**Scoring Rubric** Task is worth 3 points. Task can be scored as 0, 1, 2, or 3. Scoring consists of 2 points for modeling and 1 point for computation.

Part A

- 1 computation point is earned for determining that the total number of tiles is 48 tiles.

Part B

- 1 modeling point is earned for stating the number of rows needed AND creating a rectangular array using the provided model that is 6 boxes wide and 8 boxes tall (or 8 boxes wide 6 boxes tall). For example, here are two of the many possible solutions:
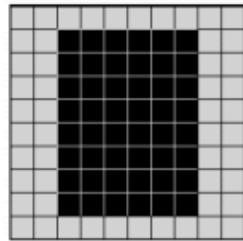
OR
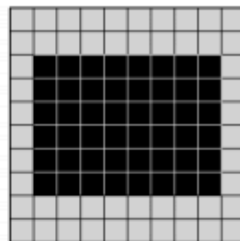
Part C

- 1 modeling point is earned for writing a correct equation using R.
  7 x R = 56 or R x 7 = 56 or 56 = R x 7 or 56 = 7 x R

Note: An incorrect computation in Part A may be carried through Part B to receive the modeling credit of 1 point for Part B.