

Sample Mathematics Item: Grade 6

"Proportion of Instruments"

November 2013



Mr. Ruiz is starting a marching band at his school. He first does research and finds the following data about other local marching bands.

	Band 1	Band 2	Band 3
Number of Brass Instrument Players	123	42	150
Number of Percussion Instrument Players	41	14	50

Part A

Type your answer in the box. Backspace to erase.

Mr. Ruiz realizes that there are brass instrument player(s) per percussion player.

Part B

Mr. Ruiz has 210 students who are interested in joining the marching band. He decides to have 80% of the band be made up of percussion and brass instruments. Use the unit rate you found in Part A to determine how many students should play brass instruments.

Show or explain all your steps.

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Grade 6	Proportions of Instruments
Туре	Type II 4 Points
Evidence Statement	 6.C.8.1: Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in 6.RP.A
Most Relevant Standards for Mathematical Content	 6.RP.A: Understand ratio concepts and use ratio reasoning to solve problems. 1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." 2. Understand the concept of a unit rate a/b associated with a ratio a:b with b < 0, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger." 3. 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. a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. 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? c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
Most Relevant Standards for Mathematical Practice	Students must engage in problem solving as a form of argument and directly targets (MP.3). To successfully do this, students will need to look for and make use of structure (MP.7) in order to persevere in solving this application problem (MP.1). The ratios between the number of people playing brass instruments and the number of people playing percussion instruments is information that students must use in thoughtful ways to construct the table of equivalent ratios as well as solve for the number of people playing each instrument. During the solution process, it may be necessary for students to contextualize the numbers and proportional relationships that they generate in order to self-regulate their thinking.

Item Description and Assessment Qualities	This item requires students to create a chain of reasoning to address a problem solving situation. Students gain access to the problem by completing a carefully-designed table of equivalent ratio which checks for student understanding. Then, students build a chain of reasoning that connects the ratio of people playing brass and percussion instruments and the total number of people in the band to the number of people playing brass and percussion instruments.
	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.
Scoring Information	Task is worth 4 points. Task can be scored as 0, 1, 2, 3, or 4.
	Part A
	 1 computation point for stating 3
	Part B: 3 points.
	 1 point reasoning, explains or shows how to use the 80%
	 1 point reasoning, explains or shows how to use the 3:1 ratio
	 1 point computation, provides answer of 126