

6.G Painting a Barn

Task

Alexis needs to paint the four exterior walls of a large rectangular barn. The length of the barn is 80 feet, the width is 50 feet, and the height is 30 feet. The paint costs \$28 per gallon, and each gallon covers 420 square feet. How much will it cost Alexis to paint the barn? Explain your work.

IM Commentary

The purpose of this task is to provide students an opportunity to use mathematics addressed in different standards in the same problem.

The Standards for Mathematical Practice focus on the nature of the learning experiences by attending to the thinking processes and habits of mind that students need to develop in order to attain a deep and flexible understanding of mathematics. Certain tasks lend themselves to the demonstration of specific practices by students. The practices that are observable during exploration of a task depend on how instruction unfolds in the classroom. While it is possible that tasks may be connected to several practices, the commentary will spotlight one practice connection in depth. Possible secondary practice connections may be discussed but not in the same degree of detail.

This task helps illustrate Mathematical Practice Standard 4 and engages students in grappling with aspects of the problem to determine how to use mathematics to solve it. Students must apply multiple mathematics standards in this real life problem situation and discuss what needs to be painted, how the area should be calculated, and how many cans of paint are necessary. Also, this problem connects very nicely to work on area, surface area, and volume (6.G.A.1). Students discuss assumptions and approximations used to solve the problem (MP.4). They share how they were able to

model the situation and their subsequent results. Through the sharing of models and results, incorrect and correct assumptions will be uncovered. Questions that students may ask each other include: “How many cans of paint are really needed?” “Will there be left over paint, how do you know?” “How did you decide which measurements to use to figure out what need to be painted?”

This problem can be seen as a stepping stone problem towards more complex or abstract modeling problems students might tackle in the future. While the student is given everything they need to solve the problem within the stem of the task, and also they do not have to sort through additional material that is not necessary for solving the problem in the task, they do have to apply skills from different standards that they may have learned at different times to a real life situation. So while the task is more straight forward than some modeling tasks, it is still along the continuum of modeling with mathematics and can help our student get ready for less well defined tasks in the future.

Solution

First Alexis needs to find the area she needs to paint. Alexis will need to paint two 30 foot - by - 50 foot walls and two 30 foot - by - 80 foot walls.

$$2 \times 30 \text{ feet} \times 50 \text{ feet} = 3000 \text{ square feet}$$

$$2 \times 30 \text{ feet} \times 80 \text{ feet} = 4800 \text{ square feet}$$

Alexis will need to paint $3000 + 4800 = 7800$ square feet.

Next, the table below shows how many square feet she can cover with different quantities of paint.

Number of gallons of paint	Area covered
1	420
5	2100
10	4200
15	6300

20	8400
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20 gallons is a little more than she needs, so she can check 19 gallons and 18 gallons:

Number of gallons of paint	Area covered
1	420
5	2100
10	4200
15	6300
20	8400
19	7980
18	7560

18 gallons isn't quite enough and 19 gallons is a bit more than she needs. Since paint is usually sold in whole gallons, it makes sense for Alexis to buy 19 gallons of paint.

Finally, since paint costs \$28 per gallon, the total cost will be

$$19 \text{ gallons} \times \$28 \text{ per gallon} = \$532$$

It will cost Alexis \$532 to paint the barn.

