DOINGWHATWORKS

VIDEO
5:48 min

Full Details and Transcript

Non-Routine Problem in Geometry

Papillion Junior High School, Nebraska
November 2011

Topic IMPROVING MATHEMATICAL PROBLEM SOLVING IN GRADES 4 THROUGH 8

Practice PROBLEM-SOLVING INSTRUCTION

Highlights

- Seventh-grade teacher Kathy Huggins presents students with the Fencing Task, a non-routine problem about maximizing area when a given amount of fencing is available.
- The task was chosen to give students problem-solving experience and an opportunity to apply area and perimeter concepts in an open-ended task.
- Students work in groups to solve the problem, with each group finding its own approach and ideas about the shape of the rabbit pen.
- Ms. Huggins describes how students share different strategies, noting her plan for student presentation and especially an unexpected approach.
- She describes next steps she will take to generalize with this problem and other ideas about area and perimeter relationships with different shapes.
- She comments on the value of problem solving for students.

About the Site

Papillion Junior High School
Papillion, Nebraska

Demographics

- 83% White
- 6% Hispanic
- 6% Black
- 2% Asian
- 19% Free or Reduced-Price Lunch
- 1% English Language Learners

Papillion Junior High School in the Papillion-La Vista School District strives to meet all students' needs through a rigorous district math curriculum focusing on:

- Problem solving;
- Using math in everyday situations;
- Communicating mathematical solutions and explaining the reasoning behind these solutions;
- Hands-on experiences using a variety of manipulatives to build math understanding; and
- Asking questions and investigating solutions so students explore and discover in problem situations.

Full Transcript

00:04 Kathy Huggins: My name is Kathy Huggins, and I teach seventh-grade math at the Papillion Junior High, part of the Papillion-La Vista School District.

Huggins (to class) **00:11** Yesterday, we talked about how you can have a rectangle with one set perimeter and different areas, right, and vice versa—a rectangle with one area with different perimeters, so we are going to build on that task today with something called the Fencing Task.

Huggins 00:33 I chose the task because we have been studying area and perimeter lately, and I wanted them to be able to apply those skills. Another major goal is just for them to have experience with problem solving, struggling with the problem a little bit, and exploring a variety of different ways to approach it.

Huggins (to class) 00:54 The 24 feet of fence makes up all but one side of the pen because one side of the pen is…

Student The school.

Huggins (to class) The school, okay, and it's a normal flat wall of the school, but you don't have to put fence up against that wall because rabbits can't get over the school, so they're fenced in on that one side by the building and they need fencing elsewhere, however you decide to do that.

Huggins 01:26 The goal for the lesson was twofold: one, a general process goal of an opportunity to do some problem solving, which we seem to never have enough of; the other was the content goal of looking at area and perimeter and the relationship between the two, where one of those, in this case, the perimeter or the amount of fence, is fixed.

Student 1 01:48 Ten, ten, and then four. Ten, ten...

Student 2 Five, five, and 14. You know I had the right idea.

Huggins 02:05 The importance of a task of this type is that it gives context to some of the things that we have been learning about—area and perimeter. Geometry in and of itself is rich contextually, but they really need a situation to be able to latch on to, and I think that this particular situation was something that the students understood and were able to relate to.

Student 3 02:31 I'm going to write 24 in all of these. We never did 11. What did you get for 11?

Student 4 71.5.

Student 3 What was two?

Student 4 Oh, it was 6.5.

Student 3 Wait, because 11 plus 11 is 22.

Student 5 Unless you did 6.5 plus 6.5.

Student 4 That's what I did. 6.5 plus 6.5.

Student 5 He does 6.5 plus 6.5, and then he adds the 11.

Huggins **03:04** Within an individual problem, what I will do when we process the problem is I will have students who have done it different ways share those different methods. To share their strategies, I definitely want to take the time to explore what the different kids are coming up with and then plan what order I want them to present them in. What we will often do when we're sharing out strategies is I will try to get a student to demonstrate what seems to be the most common response. This time, the 8x8 pen was definitely the one I saw in almost every group within the first three minutes of the task. And so we started with that one when we shared out as well. And then what you want to do is go in the directions that different students had proceeded in and make sure that you get all of the possible responses and strategies.

04:07 They always come up with something that I had not expected. In this task today the triangle, trying the triangle solution, having the same area as the rectangle—that was one possible direction that I had not predicted but was very excited to see that the kids came up with on their own.

04:26 The next step is to try to build on that generalizing idea. That is, they were able to come up with several different strategies of solving this problem and maximizing that area for the pen of a given fence link. But now we want to try to get them to generalize how they could do that for any number of feet of fencing.

04:52 What I also want them to be able to do is realize that while the fence length is fixed, the perimeter itself is not because the amount of feet along the side of the school building that they are using does vary depending on the shape they use.

05:10 I think problem-solving skills are super important for students to develop because the kinds of problems that they are going to face haven't even been invented yet. If they can develop the skills that they need to be able to approach, tackle, persevere, and look back and check and verify their solutions to their problems, then no matter what gets invented in the future they'll have a better chance of succeeding.

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