Miss Guy's Puppy Problem

Miss Guy has a very energetic puppy. The puppy loves to play outdoors, so Miss Guy decided to build a pen to allow her pet to be outside while she is at school. She just happens to have 50 feet of fencing in her basement that she can use for the pen.

What are some of the ways she can set up the pen that uses all the fencing?

What are the dimensions of the rectangular pen with the most space available for the puppy to play?

Write a letter to Miss Guy explaining her choices and which pen you would recommend she build. Be sure to show how you made your decisions and include a mathematical representation to support your solution. Grade Levels 3 - 5

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Context

This task was given to students after a unit on measurement. Two of the major concepts addressed in this unit were those of area and perimeter. The two fourth grade classes were given a menu of problems to choose from. This was the most popular problem, perhaps because Miss Guy actually has a new puppy.

What This Task Accomplishes

This problem directly addresses the concepts of area and perimeter and is a good assessment of student mastery and understanding of these concepts. There is the opportunity for students to discover the relationship between area and perimeter. This task also provides students with a real-world application of the skills they have been developing in class.

What the Student Will Do

Students were given a choice to work independently or in groups. Most students began by sketching rectangles and figuring dimensions that would total 50 feet. Few students were able to discover the size for a square pen, 12 1/2 feet per side, but many were able to find the 12 x 13 foot pen. Calculators were used to compute the areas of the pens. A group of students used the side of the house as one side of the pen, which resulted in an alternative solution to the problem, with a larger area.

Time Required for Task

Two, 45-minute periods

Interdisciplinary Links

Students could research the recommended pen sizes for dogs, horses, sheep or any other animal and compare the fencing types. It might be interesting to discuss grazing requirements of farm animals and plans for rotating pastures with area farmers.

Teaching Tips

Most students needed to make a lot of sketches of rectangles. Having a puppy they knew about starring in the problem helped motivate students to find the largest possible area.

Suggested Materials

- Graph paper
- Calculators
- Rulers
- Tiles

Possible Solutions

The pen with the most area is $12 \frac{1}{2}$ feet x $12 \frac{1}{2}$ feet. 12 feet x 13 feet is the largest pen possible when using whole numbers. If the student uses the side of the house as one side of the pen, answers will vary.

Benchmark Descriptors

Novice

A solution that shows an incomplete understanding or inability to solve the problem. A solution that does not use 50 feet of fencing or address the areas of potential pens. Reasoning is lacking or inaccurate. It is not clear what the student did to solve the task.

Apprentice

A solution that attempts to address the area of the pens using 50 feet of fencing, but is incomplete or incorrect in the final result. A solution which shows some understanding of the problem, but has a weak or random explanation or strategy. The student lacks communication about what was done to solve the task.

Practitioner

A solution that shows understanding of the perimeter and area aspects of the problem. A solution in which the student is able to apply fundamentals of multiplication and addition to calculate the area and perimeter of the pens. The student finds the largest possible pen either in whole numbers or using fractions and supports the answer. The student is able to communicate with some clarity what was done to solve the problem and why.

Expert

A solution that shows understanding of the perimeter and area aspects of the problem. A solution in which the student is able to apply fundamentals of multiplication and addition to calculate the area and perimeter of the pens. The student finds the largest possible pen either in whole numbers or using fractions and supports the answer. The student is able to communicate with some clarity what was done to solve the problem and why.

Novice



Novice



Apprentice



Apprentice



Apprentice

I think you shold use the bigest one because it would be better to have more 60 m for your puppy to play in. your puppy can run Jump and a lot of other things he could do I found out that one was the bigest by timeing it and so it added up to 154 seft. That is how I got my answer. I times 11×11×14×14=154.

Student chooses the largest area of the solutions s/he finds, but does not find the rectangle with the largest possible area.

Student's equation does not match the area. "Added up to" and "timing" are not mathematically accurate terms.

Practitioner



Expert

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