

Kate's Flower Garden

Kate asked her dad if they could plant a flower garden in their backyard. Her dad thought that was a great idea. He gave Kate some rules to follow. The garden has to have 4 sides and a perimeter of exactly 24 feet. A plastic border should go around the garden. They have 14 sections of this plastic border. Each section is 2-feet long. Each section cannot be cut or bent. Kate's dad asked for a design of the garden. What could Kate's design look like?

Kate's Flower Garden

Suggested Grade Span

Grades 3–5

Grade(s) in Which the Task Was Piloted

Grade 4

Task

Kate asked her dad if they could plant a flower garden in their backyard. Her dad thought that was a great idea. He gave Kate some rules to follow. The garden has to have 4 sides and a perimeter of exactly 24 feet. A plastic border should go around the garden. They have 14 sections of this plastic border. Each section is 2–feet long. Each section cannot be cut or bent. Kate's dad asked for a design of the garden. What could Kate's design look like?

Alternative Versions of the Task

More Accessible Version:

Kate asked her dad if they could plant a flower garden in their backyard. Her dad thought that was a great idea. He gave Kate some rules to follow. The garden has to have 4 sides and a perimeter of exactly 16 feet. A plastic border should go around the garden. The border comes in 1–foot sections that cannot be cut or bent. Kate's dad asked for a design of the garden. What could Kate's design look like?

More Challenging Version:

Kate asked her dad if they could plant a flower garden in their backyard. Her dad thought that was a great idea. He gave Kate some rules to follow. The garden has to have 4 sides and a perimeter of exactly 24 feet. A plastic border should go around the garden. They have 14 sections of this plastic border. Each section is 2–feet long. Each section cannot be cut or bent. Kate's dad asked for a design of the garden. What are all of the possible dimensions of her garden?

NCTM Content Standards and Evidence

Number and Operation Standard for Grades 3–5

Instructional programs from Pre–Kindergarten through grade 12 should enable students to...

- Understand numbers, ways of representing numbers, relationships among numbers and number systems.
 - *NCTM Evidence:* Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.
 - *Exemplars Task Specific Evidence:* This task requires students to find sums of 12 using two addends, and eliminate those that contain an odd numbered addend.

Time/Context/Qualifiers/Tip(s) from Piloting Teacher

This is a short to medium length task.

Links

This task could link to a unit on gardening.

Common Strategies Used to Solve This Task

Most students will use a chart to solve this task.

Possible Solutions

Original Version:

Possible dimensions for the garden are: 2' x 10', 4' x 8', or 6' x 6'. No matter the design, 12 pieces of plastic border will be used.

More Accessible Version:

1' x 7', 2' x 6', 3' x 5', or 4' x 4'

More Challenging Version:

Possible dimensions for the garden are: 2' x 10', 4' x 8', and 6' x 6'. No matter the design, 12 pieces of plastic border will be used. In this version, all 3 solutions must be shown.

Task Specific Assessment Notes

General Notes: This task lends itself well to using math language and representations.

Novice: The Novice will have no workable approach to solving the task. Some numbers presented in the task may be randomly manipulated, but the solution will show no mathematical reasoning. Little or no math language will be used to communicate the solution.

Apprentice: The Apprentice will have a partially correct solution. The Apprentice may neglect to consider that only even numbered dimensions will work since the plastic pieces come in 2-foot sections. Some math language and representations will be used to communicate.

Practitioner: The Practitioner will have a correct solution with supporting work. Relevant observations will be made along the way. Math language and representation will be used to communicate with the audience.

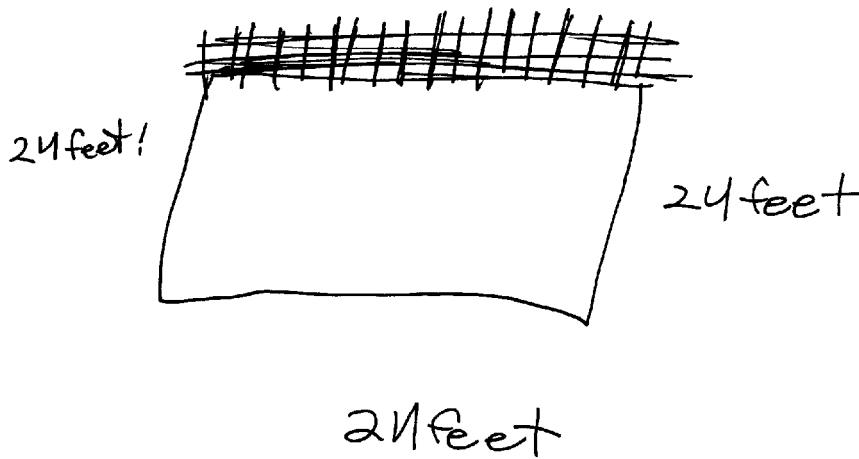
Expert: The Expert will find all three correct solutions. Mathematically relevant observations will be made throughout the solution. The observations will be used to explain the approach and reasoning used and to extend the solution. Math language and representations will be relied on to communicate.

Author

Deb Armitage, Pre-K–8 Mathematics Assessment Consultant at the Vermont Department of Education, wrote this task. Teachers and students in Vermont piloted the task.

The student is unable to correctly interpret data presented in the task to proceed toward a solution. Even the restatement of the task is flawed.

I will make a picture.
I need to find out how much fence.



Apprentice

A chart is used to communicate the solution.

I need to find out how many fence designs.

L	w
11	1
10	2
9	3
8	4
7	5
6	6

6 designs

The student has some understanding of the task, but neglects to consider that the sections must be two feet long so odd dimensions will not work.

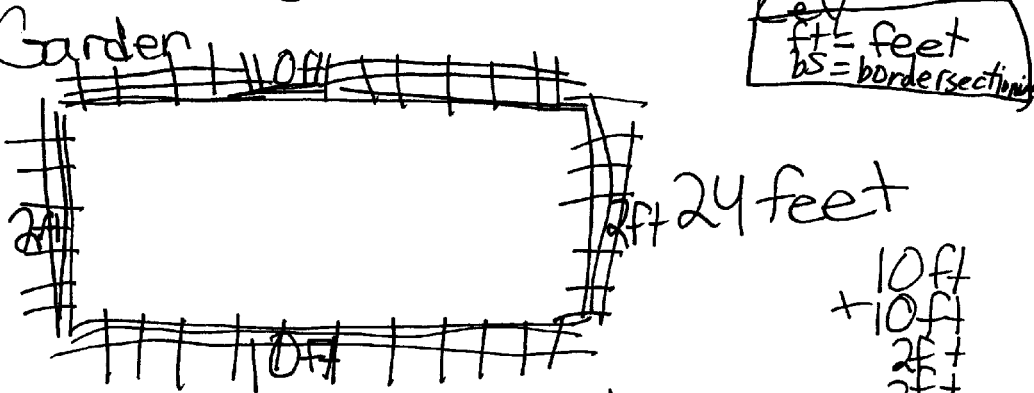
Practitioner

A correct solution is achieved with supporting work.

Diagrams and math language are used to communicate the solution.

I need to find out what Kate's design would look like. I will make a diagram

Kate's design of her Garden



$$\frac{+1}{2}$$

$$\begin{array}{r} + 10bs \\ + 2bs \\ \hline 12bs \end{array}$$

$$\frac{+5}{10}$$

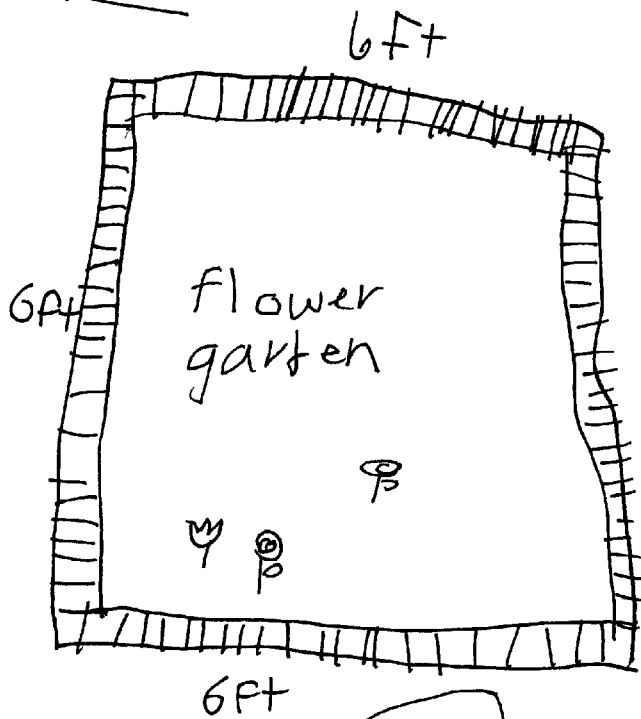
must be even
2, 4, 6, 8, 10
5 fences

she has 24ft
More fences left

Relevant observations are made.

Mathematically relevant observations are made throughout the solution.

I will need to find out how many plastic fences we need
 plastic



14

I used 12 plastic I had 2 fences left over
 6ft there are always 2 fences left over.
 $12 \times 2 = 24$ ok
 $14 \times 2 = 28$ too much

The student achieves the three correct solutions with supporting evidence.

Expert cont.

A correct alternative shaped garden is achieved.

Diagrams and math language are used throughout to communicate.

