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Mathematics Tasks for the Thinking Classroom, Grades
K-5.

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TASK 37: GARDEN FENCES

TASK

This task moves students through finding the length of wood around a planter box (perimeter), to what size felt is needed to block the weeds (base area), to how much dirt in units³ can fit into it (volume).

Content: perimeter, area, volume

Competencies: perseverance, mobilizing knowledge

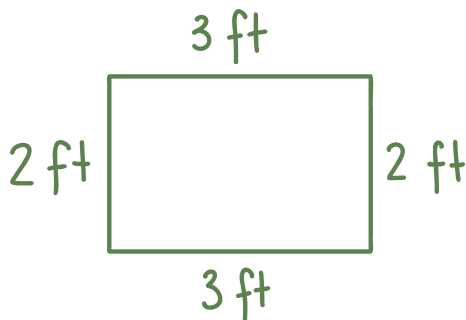
Seen Before: addition, multiplication

Before You Launch: This task will require you to shift the narrative of the story as the task type changes. You can gather two to three groups together at a time to do this. For Type 2 tasks, it would be handy if the students had access to a nonpermanent grid at their VNPSs. This task works well with the banner.

LAUNCH SCRIPT

Teacher: Hello my superb mathematicians! I've decided to build a raised garden bed. I have all these ideas but I'm not sure of the amount of materials I need. I know I want it to be a rectangular shape, but can you help me figure out how much all my materials would be?

Teacher: I want to start by building the walls of the garden [teacher draws a rectangle] and I need to know how many feet of wood I need to go around my garden bed. How many feet of wood should I buy to go all the way around if it is 2 feet by 3 feet [teacher labels each side of the rectangle]?



Students: 10 feet of wood.

Teacher: OK. What if my garden bed was 3 feet long and 4 feet wide? [teacher draws out a rectangle]



TASK SEQUENCE

Type 1: Perimeter

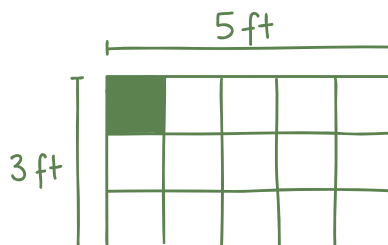
How many feet of wood do I need to go around the garden if it is

1. 3 ft long and 4 ft wide?
2. 6 ft long and 8 ft wide?
3. 5 ft long and 8 ft wide?
4. 10 ft long and 8 ft wide?
5. 10 ft long and 7 ft wide?
6. 9 feet by 7 feet?
7. 9 feet by 11 feet?
8. 14 feet \times 11 feet?
9. 17 feet \times 24 feet?

Type 2: Area

Hint: [Draw a 2 by 3 grid and have the students count the squares inside.]

10. **Teacher:** Now that I figured out how many feet of wood I need, I bought this black felt that covers the ground inside the garden bed to stop weeds from growing in the garden. It comes in square feet like this [teacher draws a rectangle with grid lines inside and colors in one square]. How many square feet of felt do I need if my garden is 3 feet long and 5 feet wide?



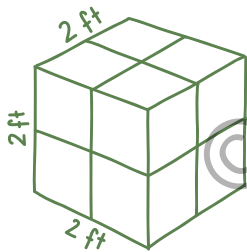
How many square feet of felt do I need if the garden is

11. 6 ft long and 8 ft wide?
12. 5 ft long and 8 ft wide?
13. 10 ft long and 8 ft wide?
14. 10 ft long and 7 ft wide?
15. 9 ft by 7 ft?
16. 9 ft by 11 ft?
17. 14 ft \times 11 ft?
18. 17 ft \times 24 ft?
19. 17 ft \times 24 ft?

Type 3: Volume

Hint: [Show students a $1 \times 3 \times 4$ prism built out of linking cubes and have them count how many linking cubes there are.]

20. This is great! I've got the wood (perimeter) figured out and the felt (area) figured out. Now I just need to figure out how much dirt to put in. We measure the dirt in cubic (cubed) feet. For example, if my garden is 2 feet long, 2 feet wide, and 2 feet high [teacher builds with linking cubes]. I will need [teacher counts each cube] 8 cubic feet of dirt.



How many cubic feet of dirt will I need if my garden is

21. 4 ft long and 3 ft wide and 1 ft high?
22. 3 ft long and 2 ft wide and 2 ft high?
23. 4 ft long and 2 ft wide and 1 ft high?
24. 6 ft long and 2 ft wide and 3 ft high?
25. 7 ft by 5 ft by 2 ft?
26. 8 ft by 6 ft by 4 ft?
27. 9 ft \times 11 ft \times 6 ft?
28. 11 ft \times 14 ft \times 8 ft?
29. 12 ft \times 20 ft \times 7 ft?

CONSOLIDATION TASKS

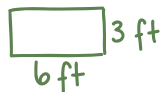
Teacher: I have written on the board three questions like the ones you just did in your group, but I may have put them in the wrong order. Turn to your neighbor and discuss what the order should be and why.

- A How much dirt in cubic feet (volume) is needed if the garden is 9 ft × 11 ft × 6 ft? (Type 3)
- B How many feet of wood (perimeter) is needed to go around a 4 ft wide and 6 ft long garden? (Type 1)
- C How many square feet of felt (area) is needed to cover the inside of an 8 ft by 12 ft garden? (Type 2)

STUDENT NOTES TO THEIR FUTURE FORGETFUL SELVES

Example 1:

What is the perimeter of a 3 feet × 6 feet rectangle?



$$3 \text{ ft} + 6 \text{ ft} + \square \text{ ft} + \square \text{ ft} = \square \text{ ft}$$

Things to Remember:

Example 2:

What is the area of an 8 ft × 5 ft rectangle?

Example 3:

(HE(K-YOUR-UNDERSTANDING QUESTIONS

MILD

How many feet of wood (perimeter) is needed if my garden is

- A. 4 ft wide by 6 ft long?
- B. 3 ft wide by 9 ft long?
- C. 10 ft wide by 7 ft long?

MEDIUM

How many square feet of felt (area) is needed if my garden is

- A. 5 ft by 7 ft?
- B. 4 ft by 8 ft?
- C. 11 ft by 6 ft?

