MAT.06.PT.4.DGRDN.A.167 Claim 4

Sample Item ID:	MAT.06.PT.4.DGRDN.A.167
Title:	Design a Garden (DGRDN)
Grade:	06
Primary Claim:	**Claim 4: Modeling and Data Analysis** Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.
Secondary Claim(s):	Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.
Primary Content Domain	Equations and Expressions
Secondary Content Domain(s):	Geometry, Operations and Algebraic Thinking, Measurement and Data
Assessment Target(s):	4 A: Apply mathematics to solve problems arising in everyday life, society, and the workplace. 4 B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. 4 D: Interpret results in the context of a situation. 1 G (Gr 6): Represent and analyze quantitative relationships between dependent and independent variables 1 H (Gr 6): Solve real-world and mathematical problems involving area, surface area, and volume. 1 I (Gr 5): Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. 1 A (Gr 5): Write and interpret numerical expressions. 1 I (Gr 4): Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
Standard(s):	6.EE.9, 6.G.1, 6.G.2, 5MD.3, 5.MD.5, 5.OA.2, 4.MD.3
Mathematical Practice(s):	1, 3, 4, 5
DOK:	3
Item Type:	PT
Score Points:	12
Difficulty:	M
How This Task Addresses The “Sufficient Evidence” For This Claim:	The student uses measurement skills such as finding the area of polygons, finding the volume to determine the amount of soil or mulch that must be purchased to fill the gardens for planting, and finding the perimeter to and surface area of each garden area. The student determines the cost of each garden by using variables to represent two quantities that change in relationship to one another; writes equations to express one

	quantity, thought of as the independent variable; and analyzes the relationship between the dependent and independent variable using tables.
Target-Specific Attributes (e.g., accessibility issues):	Accommodations may be necessary for students with fine motor-skill challenges and language-processing challenges.
Stimulus/Source:	www.homedepot.com www.lowes.com Custom-Created Flyer or Newspaper Advertisements
Notes:	Multi-part task
Task Overview:	Students must work through various calculations in order to find the best deal, area, perimeter, and volume of each garden.
Teacher Preparation/ Resource Requirements:	Calculators are available to students, either online or physically.
Teacher Responsibilities During Administration:	Monitor individual student work; provide resources as necessary.
Time Requirements:	Two sessions totaling no more than 120 minutes. Parts A and B should be completed in Session 1. Parts C, D, and the conclusion should be completed in Session 2.

Prework: none

Design a Garden

You are volunteering at a community center. The director of the center has asked you to design a garden and to determine the amount and cost of materials to build the garden, including wood, soil, and plants.

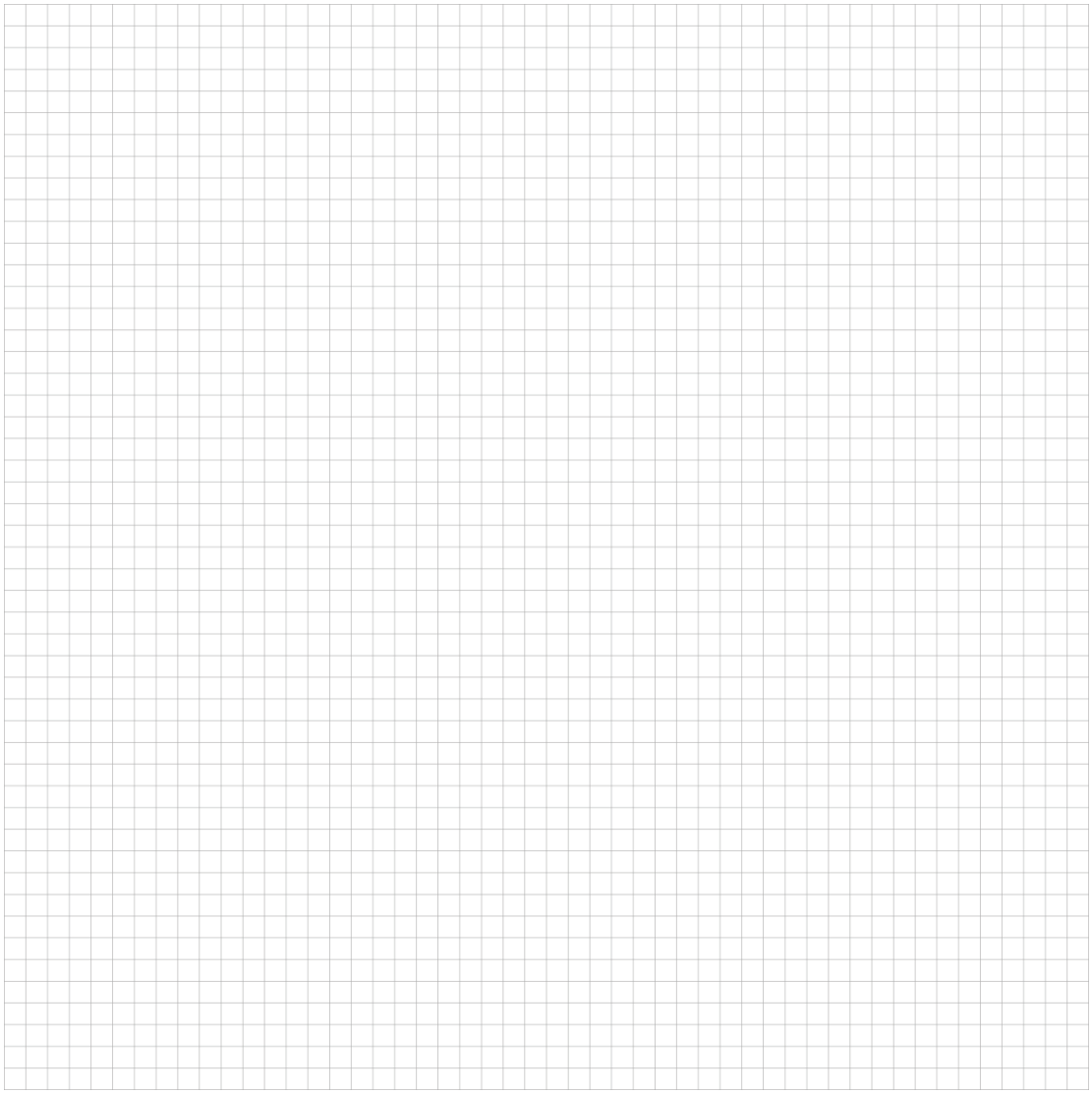
Part A

The director has asked you to design different sections of the garden that meet the following conditions:

- Section 1 must be shaped like a square.
- Section 1 must have an area between 26 square feet and 50 square feet.
- Section 2 must be shaped like a rectangle but must **not** be a square.
- Section 2 must be exactly twice the area of Section 1.

On the grid below, draw your design for Section 1 and Section 2.

Be sure to label each section (1 or 2) and include the dimensions. Each box in the grid represents 1 square foot.



Based on your design, complete the following table:

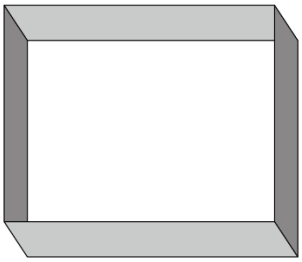
Section	Area (square feet)	Perimeter (feet)
1		
2		

Part B

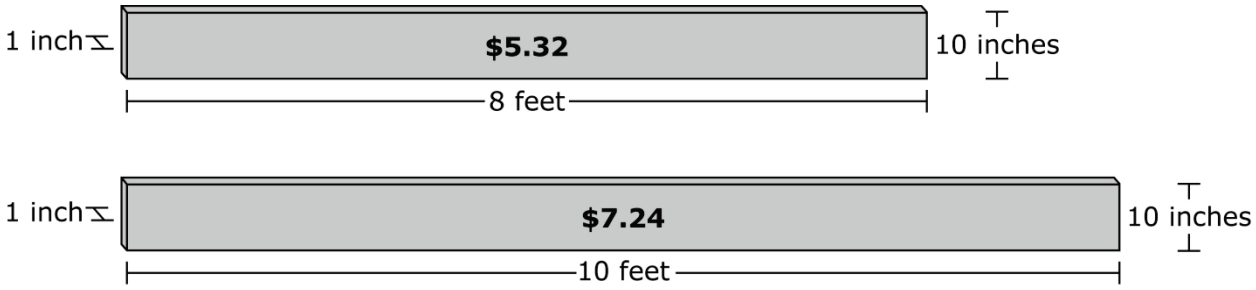
Building Planter Boxes

The director would like the sections to be contained in planter boxes that are 20 inches deep. You must buy the wood to construct the planter boxes for Section 1 and Section 2.

As seen in the picture below, a planter box is a rectangular prism that is filled with soil. It has no top or base.



Morris Hardware Store offers pressure-treated wood in two different lengths.



What is the minimum amount of wood that needs to be purchased to construct a planter box for both Sections 1 and 2? Explain your answer using diagrams, pictures, mathematical expressions, and/or words.

You plan to buy the wood to make the planter boxes from Morris Hardware Store. Using the information above, what is the **minimum** cost to buy the amount of wood needed for both boxes? Use mathematics to justify your answer.

This is the end of Session 1.

Part C

Buying Plants

The director would like you to buy and plant carrots and tomatoes in the garden.

You will plant carrots in Section 1 and tomatoes in Section 2. Each plant must be 1 foot away from the sides of the planter box and 1 foot away from each other. How many carrot plants and tomato plants do you need to buy? Provide mathematical justification for your answer.

Number of carrot plants _____

Number of tomato plants _____

You have a choice of two stores to buy the carrot plants and tomato plants, as shown below.

	Greenthumb Garden Mart	**Lawn & Garden Depot**
Carrots	$1.29 each	$7.92 for 6
Tomatoes	$1.89 each	$8.70 for 6

Based on the unit rate, write an equation to represent the total cost to purchase any number of tomato plants at the Lawn & Garden Depot. In the equation, let C represent the total cost of the tomato plants in dollars and n represent the number of tomato plants bought.

What is the minimum amount you will need to pay to buy the carrot and tomato plants? Provide justification for your answer.

Part D

Buying Soil

It is recommended that planter boxes be filled with 6 or 9 inches of soil, depending on the type of plant. The carrot plants will be planted in 9 inches of soil and the tomato plants will be planted in 6 inches of soil.

Complete the table below to convert inches into feet.

Depth (in inches)	Depth (in feet)
3 inches	0.25 foot
6 inches	
9 inches	
12 inches	1 foot

Determine the depth, in feet, of the soil in each planter box.

Planter Boxes

Section	Depth (in feet)
1	
2	

Determine the minimum volume, in cubic feet, of soil that will be needed for the carrot plants and the tomato plants. Use mathematics to justify your answer.

Carrot plants need ☐ cubic feet of soil.

Tomato plants need ☐ cubic feet of soil.

The Greenthumb Garden Mart offers two different prices for soil, as shown below.

At this store, a cubic foot of soil weighs 80 pounds. Which type of soil will be the least expensive for you to buy? Use mathematics to justify your answer.

What is the total cost for purchasing soil from Greenthumb Garden Mart to fill both planter boxes? Explain your answer using diagrams, pictures, mathematical expressions, and/or words.

Conclusion

You have been given a budget of $450 to build the garden you designed. Based on your work in *Part C* and *Part D*, do you have enough money to build the garden you designed? If so, justify your answer using mathematics or words. If not, what could you change so that you do not go over budget?

End of Session 2