

5.5

Text page 170

Exploring the Area and Perimeter of a Trapezoid

► **GOAL** Explore the relationship between the area and perimeter of a trapezoid.

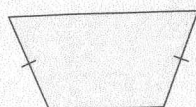
You will need

- a 24 cm piece of string
- tape
- a ruler
- a calculator



MATH TERM

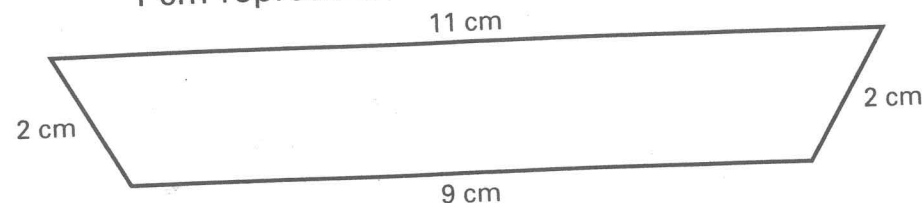
isosceles trapezoid
a trapezoid where the non-parallel sides have equal lengths



Brooke is planning a flower garden in the shape of an **isosceles trapezoid**. It will have a perimeter of 24 m.

Use these steps to determine what dimensions will give the garden the greatest area.

Step 1: Here is a drawing of one possible garden. 1 cm represents 1 m.

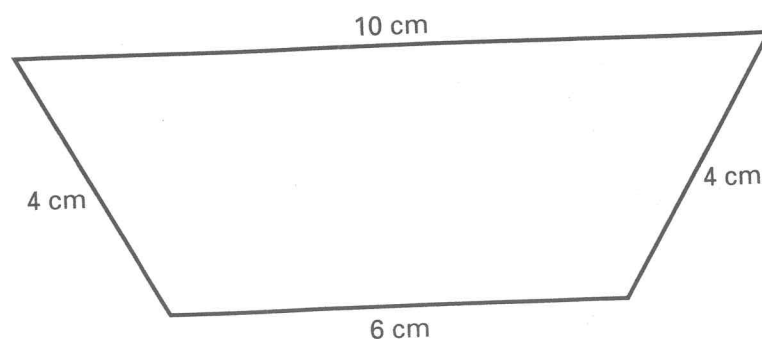


Put your 24 cm string around the outside of the trapezoid to check that the perimeter is 24 cm. You may want to tape down the corners. Measure the height and calculate the area.

height = _____ cm

$$\begin{aligned} \text{Area} &= (11 \text{ cm} + \text{_____ cm}) \times \text{_____ cm} \div \text{_____} \\ &= \text{_____ cm}^2 \end{aligned}$$

Step 2: Here is a second possible garden. Put your string around the outside of this trapezoid to check that the perimeter is 24 cm.



Step 3: Complete the table for the two possible gardens.

Perimeter (cm)	Sketch of possible trapezoid	Side length (cm)	Side length (cm)	Base a (cm)	Base b (cm)	Height (cm)	Area (cm ²)
24		2	2	11	9	1.7	
24		4	4	10			
24							
24							
24							

Hint

Make sure the non-parallel sides of your trapezoid are the same length.

Step 4: Use tape to help arrange your string into three more isosceles trapezoids. Record each trapezoid's measurements in the table. Find their areas.

Step 5: Circle the row of the table for the trapezoid with the greatest area.

Reflecting

► What happens to the area of the trapezoid as the sides and height get closer to the same measurement?
