Day 8: The Hidden Hufflepuff Greenhouse

Your Mission

Professor Sprout has discovered a hidden greenhouse beneath the Hufflepuff common room. Inside is the Golden Watering Can, which can make plants grow ten times faster when used to water them. But five geometric locks keep the greenhouse sealed. Each lock asks about perimeter, area, or shape measurement. Solve all five, and you may enter and take the Golden Watering Can to water all plants at Hogwarts!



Warm-Up: Geometry Tools

Today's tools are about measuring shapes:

- **Perimeter**: the distance around a shape. Add all the sides.
- **Area**: the space inside a flat shape.
- **Units**: always write cm, dm, m, etc. next to each measurement for shapes.
- **Diagram**: if no picture is given, draw one and label the sides.

Quick Check: A green square has side length 6 cm.



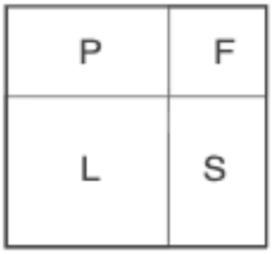
Perimeter = _____ cm Area = _____ cm^2

Challenge 1: The Square Garden Lock

A square garden inside the greenhouse is divided into four parts: a pool (P), a flowerbed (F), a lawn (L), and a sandbox (S). The lawn and the flowerbed are squares. The perimeter of the lawn is 20 m. The perimeter of the flowerbed is 12 m. What is the perimeter of the pool?

(A) 10 m (B) 12 m (C) 14 m (D) 16 m (E) 18 m

Hint: Find the side length of each small square first. The pool is a rectangle made from those two side lengths.

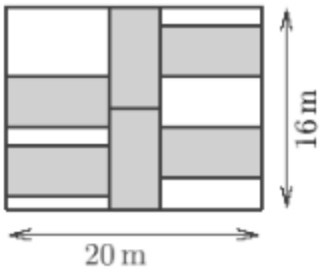


Challenge 2: The Flowerbed Path Lock

A rectangular garden inside the greenhouse measures 16 m by 20 m. It contains six identical rectangular flowerbeds, as shown in the diagram. The 16 m side is exactly two flowerbed lengths. The 20 m side is two flowerbed lengths plus a 4 m path. What is the perimeter of one flowerbed?

(A) 20 m (B) 22 m (C) 24 m (D) 26 m (E) 28 m

Hint: Each flowerbed has length $16 \div 2 = 8$ m. Use the 20 m side to find its width.

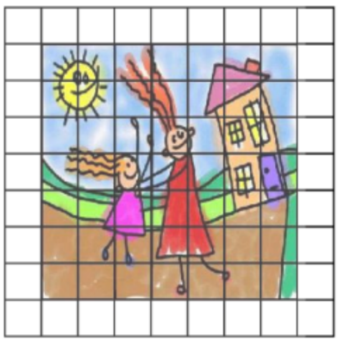


Challenge 3: The Photo Frame Lock

A Hufflepuff student, Anna, used 32 small white squares to frame a 7 by 7 picture. How many small white squares does she need to frame a 10 by 10 picture?

(A) 36 (B) 40 (C) 44 (D) 48 (E) 52

Hint: A frame around an $n \times n$ picture uses $4n + 4$ small squares. $4n$ surrounds the four sides, 4 covers the four corners.

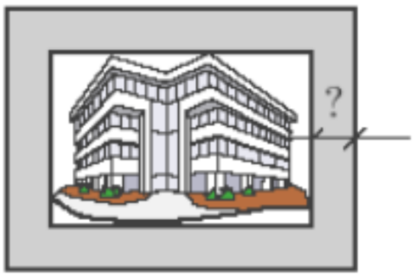


Challenge 4: The Wooden Frame Lock

A rectangular picture frame in the greenhouse is made from four wooden pieces of the same width. The inside perimeter of the frame is 8 dm less than the outside perimeter. What is the width of the frame?

(A) 1 dm (B) 2 dm (C) 4 dm (D) 8 dm (E) It depends on the picture size.

Hint: The difference between the outside and inside perimeters comes from 8 strip-widths on the corners of the outside frame, two at each corner.



Challenge 5: The Square Plaza Lock

A Hufflepuff student needs 12 minutes to walk around a square plaza inside the greenhouse. How much time will the same person need to walk at the same pace around a square plaza whose area is four times greater?

(A) 48 mins (B) 24 mins (C) 30 mins (D) 20 mins (E) 36 mins

Hint: If the area is 4 times greater, the side length is 2 times greater. What happens to the perimeter?



The Master Code

You have solved all five geometric locks! Fill in the secret code to open the Hufflepuff Greenhouse and get the Golden Watering Can.

Word Bank: AREA, DIAGRAM, PERIMETER, SIDES, UNITS

1. The distance around the outside of a shape is its _____.
2. The amount of space inside a flat shape is its _____.
3. In a square, all four _____ are the same length.
4. Always write the _____ (cm, m, dm) with each measurement.
5. When a diagram is not given, draw a _____ to help you see the shape.

Mission Complete!

The greenhouse door swings open. Professor Sprout hands you the Golden Watering Can, and a proud badger gives a little bow. You have mastered the art of geometry in Hufflepuff. Now the flowers and trees at Hogwarts will grow ten times faster!

