

## Explore Screen

In this screen students can build any shape and explore the relationship between area and perimeter.

The screenshot shows the 'Area Builder' interface. At the top, it displays 'Area: 0' and 'Perimeter: 0'. The main area is a large grid. Below the grid is a toolbar with a 'Minimize information panel' button, a 'Show background grid' button, and a 'Show dimensions' button. A callout box points to the 'Show dimensions' button, showing a 3x2 rectangle with dimensions 3 and 2. Another callout box points to the 'Toggle between one and two boards' button, showing two grids side-by-side. A third callout box points to the 'Reset the screen back to its original state' button, which is a circular arrow icon. The bottom of the screen has a navigation bar with 'Area Builder', 'Explore', 'Game', and 'Home' icons, and the PhET logo.

## Game Screen

There are two kinds of challenges: Build a Shape and Find the Area. Each level contains challenges of increasing difficulty.

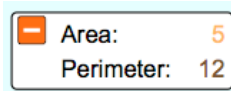
The screenshot shows the 'Choose Your Level!' screen. It features six level cards numbered 1 through 6, each with a grid and a star rating. Callout boxes describe the challenges for each level:
 

- Level 1: Build a shape given area; Find the area of basic shapes
- Level 2: Find the area using limited tools
- Level 3: Build a shape given area and perimeter
- Level 4: Find the area of more difficult shapes
- Level 5: Build a 2-color shape given fractional areas
- Level 6: Build a 2-color shape given fractional area, perimeter

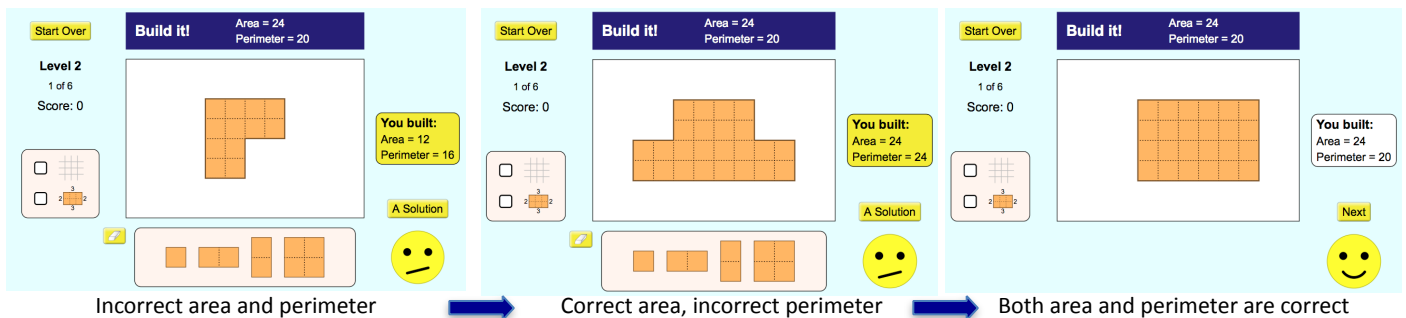
 The bottom of the screen shows a navigation bar with 'Area Builder', 'Explore', 'Game', and 'Home' icons, and the PhET logo. A callout box for Level 5 shows a screenshot of the 'Build It!' challenge interface, displaying 'Level 5', '1 of 6', 'Score: 0', and 'Your goal: Area = 42, 1/2, 1/3'.

## Insights Into Student Use / Thinking

- The information panel may go unnoticed by students until they are prompted to use it in a task (see below for a sample task).



- In the game screen, after two incorrect answers on Build It! challenges, a “You built” panel appears to help students compare their solution to the goal (still stated in the prompt). Students can *continue working* to achieve the correct solution and watch the banner update.

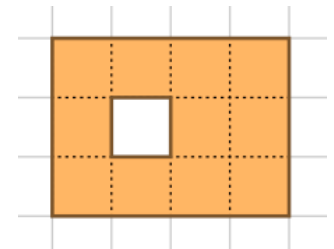


## Suggestions for Sim Use

Area Builder is ideal for guided exploration in an elementary or middle school classroom. Students can work individually with a sim, in pairs, or with it projected in front of the class.

### Activity Ideas

- Individual exploration:** Have students explore the sim for 5 minutes. They will notice the game screen quickly, so providing a [guided inquiry activity](#) for the Explore Screen that prompts students to compare the area and perimeter of a shape they build will allow for richer use of the sim. Use the dual board mode to create two shapes with the same area and different perimeter.
- In pairs:** Using the Explore Screen, have students build a shape and minimize the information panel at the top. Then have their partner calculate the area and perimeter; they can check their answers by expanding the panel.
- Class demo:** Minimize the information panel and create an irregular shape. Elicit different methods for finding the area of the shape (ex: breaking into smaller shapes, finding the area and subtracting the “missing” area, etc.). Similarly, facilitate a discussion about the perimeter of the shape (ex: Does the internal border count? What is the most efficient way of calculating it?).



### Sample Challenge Prompts

- What is area? How is it calculated?
- What is perimeter? How is it calculated?
- How might you use the dimensions tool to calculate area and/or perimeter?
- Without adding/removing blocks, can you rearrange the blocks in a shape to form a different area? Can you form a different perimeter? What kind of shapes have a bigger perimeter? What kind of shapes have a smaller perimeter?