

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 trash can icon and a 'Reset' button. On the left, there are controls for 'Show background grid' (a checked checkbox) and 'Show dimensions' (a grid icon with a 3x3 shape and numbers 2, 3, 2). On the right, there are controls for 'Toggle between one and two boards' (two grid icons) and 'Reset the screen back to its original state' (a circular arrow icon). A callout 'Minimize information panel' points to a minus sign icon. The bottom of the screen has a navigation bar with 'Area Builder', 'Explore', 'Game', a home icon, and the PhET logo.

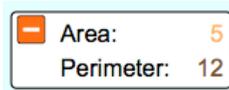
Game Screen

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

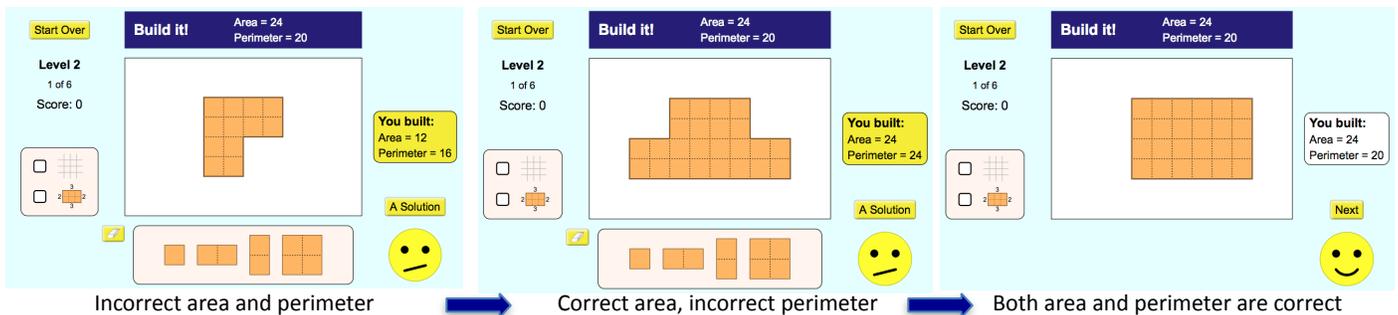
The screenshot shows the 'Choose Your Level!' screen. It features six level cards numbered 1 through 6, each with a grid and a star rating. Callouts describe the challenges for each level: Level 1: 'Build a shape given area; Find the area of basic shapes'; Level 2: 'Find the area using limited tools'; 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'. A callout for Level 3 also includes a screenshot of the 'Find the area' challenge interface, which shows a grid with a shape and a numerical keypad. The bottom of the screen has a navigation bar with 'Area Builder', 'Explore', 'Game', a home icon, and the PhET logo.

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.

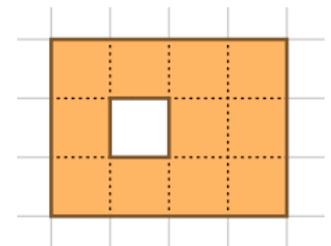


Suggestions for Sim Use

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?