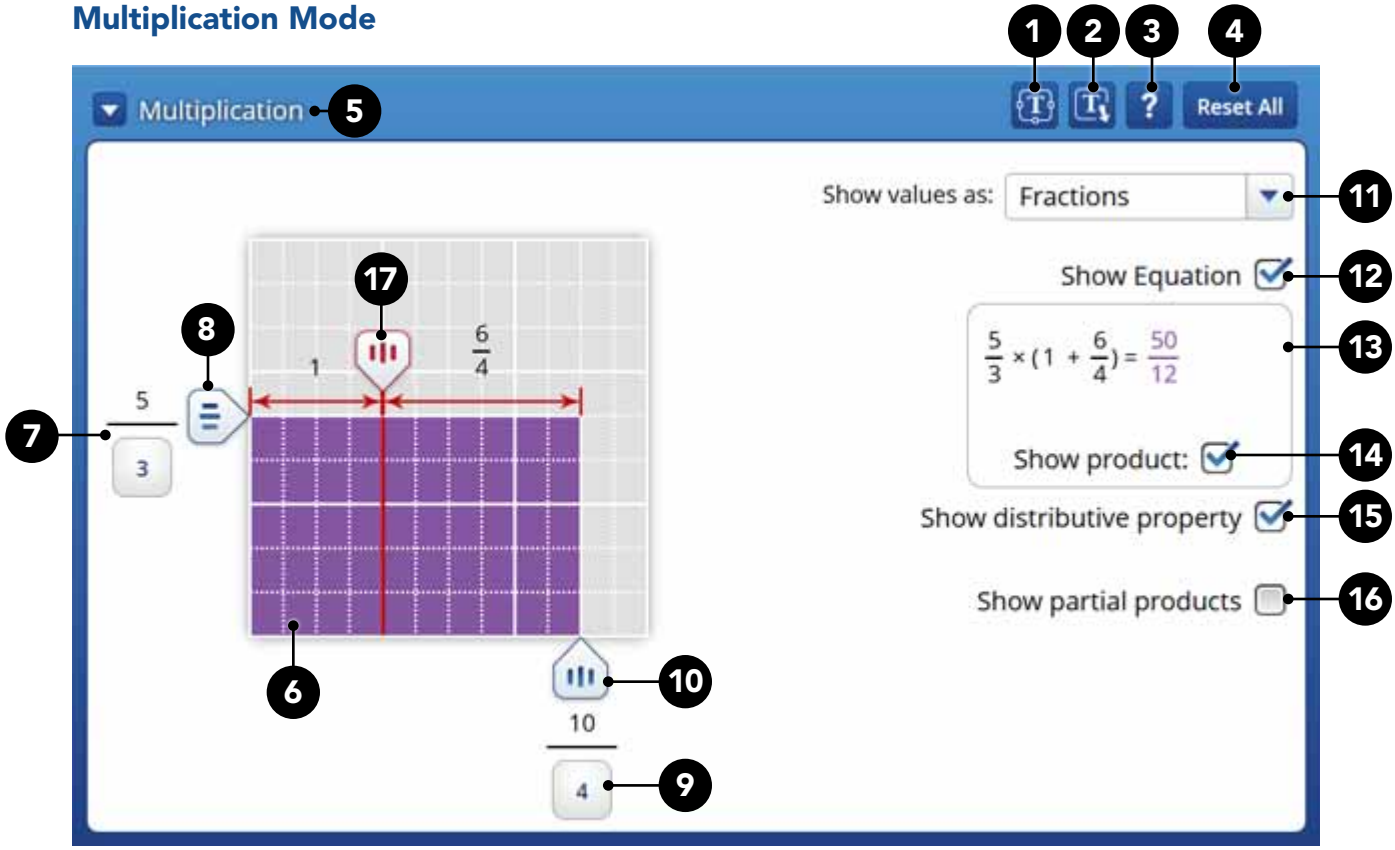
# Area Models

**In this tool,** you can explore the multiplication of fractions and mixed numbers, the relationship between squares and square roots, and the relationship between cubes and cube roots using a grid array.

## Multiplication Mode




1. **Textbox** Add comments to the activity area.
2. **Textbox with Arrow** Add comments to the activity area, using the arrow to focus attention on a particular area.
3. **Help** Launch a help file PDF for the tool.
4. **Reset All** Reset all current work in the activity area for the tool back to the default settings.
5. **Mode Drop-down** Shows all the available modes of the Area Models tool. Selecting a mode will open the tool in that mode and save any current work in the mode you were previously working in. There are three modes in the Area Models tool: Multiplication, Square Numbers & Square Roots, and Cube Numbers & Cube Roots.
6. **Grid Array** Where you can model two fractions or mixed numbers to find their product. Each side of the grid area allows you to model fractions or mixed numbers up to 3. The product of the two fractions or mixed numbers is represented by the part of the grid colored in purple.

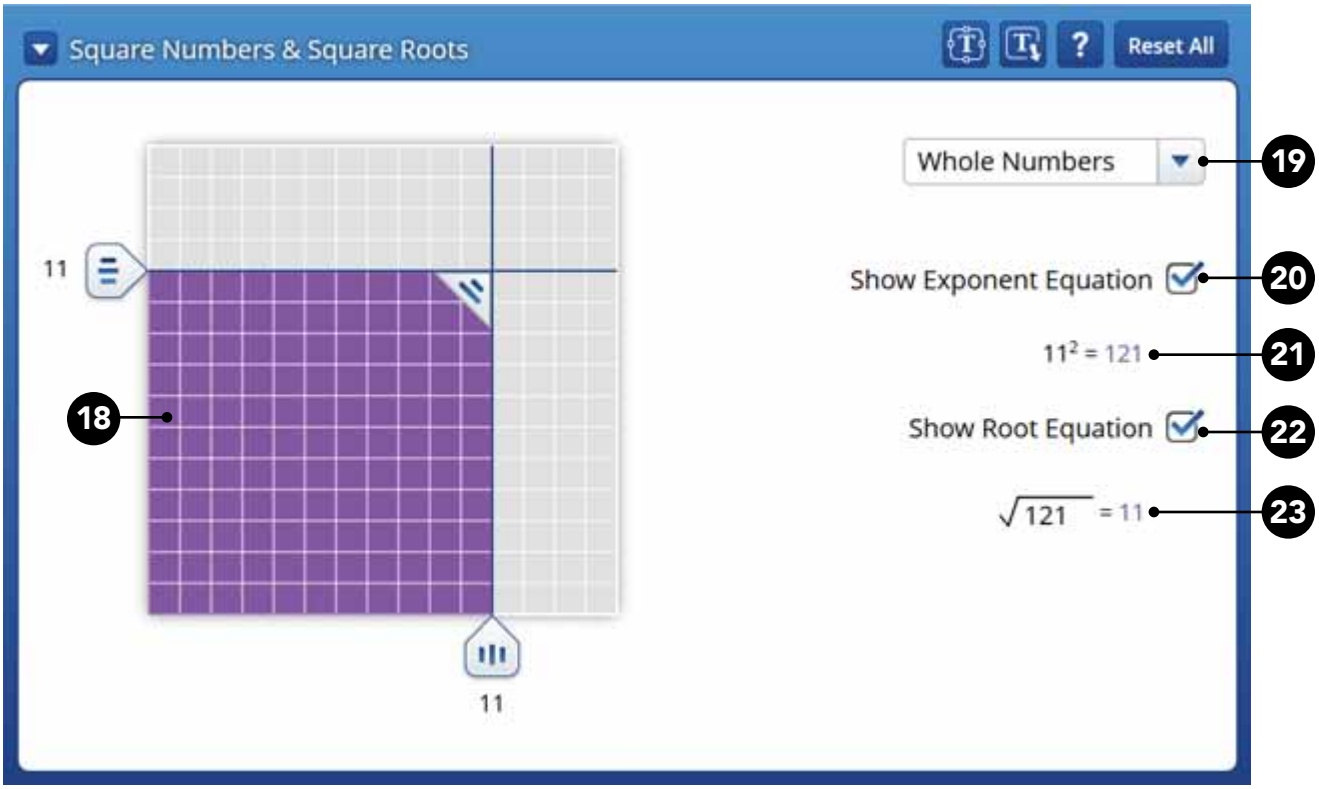
*(continued on the next page)*

7. **Fraction 1** Shows you the value of the fraction or mixed number that you have created using the fraction 1 slider. You can press the denominator of fraction 1 to change the value of the denominator.
8. **Fraction 1 Slider** Using the slider, you can model the value of fraction 1 along the left side of the array. You can move the slider along the left side of the array and snap to any of the available grid lines. The number of grid lines between each unit is determined by the denominator you chose for fraction 1.
9. **Fraction 2** Shows you the value of the fraction or mixed number that you have created using the fraction 2 slider. You can press the denominator of fraction 2 to change the value of the denominator.
10. **Fraction 2 Slider** Using the slider, you can model the value of fraction 2 along the bottom of the array. You can move the slider along the bottom of the array and snap to any of the available grid lines. The number of grid lines between each unit is determined by the denominator you chose for fraction 2.
11. **Show Values As Drop-down** You can change the style of the numbers shown in the equation area between fractions and mixed numbers. The values along the array will always remain as fractions.
12. **Show Equation Checkbox** Allows you to show or hide the equation area.
13. **Equation Area** Shows an equation of the product of the two fractions on the array. You can change the values between fractions and mixed numbers using the drop-down.
14. **Show Product Checkbox** Allows you to show or hide the product of the two fractions or mixed numbers in the equation area.
15. **Show Distributive Property Checkbox** Allows you to show or hide a divider bar on the array. The divider bar allows you show the total value of fraction 2 in two parts to help understand the distributive property.
16. **Partial Fractions Checkbox** When you select the partial fractions checkbox, the grid array will be split into up to four parts. The grid will split the whole number parts from the fraction parts for each part of the array. If you press on each colored section of the array, you can see an expression of the value of that portion of the array below the checkbox.
17. **Divider Bar** Once you have selected the show distributive property checkbox, the divider bar will appear in the array. You can drag the divider bar from left to right in the array. As you drag the divider bar, the total value of the fraction 2 will be split into two values which appear on either side of the divider bar. The values will update to reflect the position of the divider bar.

*(continued on the next page)*

# Area Models

## Square Numbers & Square Roots Mode




**18. Square Grid Array** Where you can model square numbers or help find square roots. You can model values up to 15 for whole numbers and up to 1.5 for decimals along each part of the array. You can drag any of the three handles to help model your number. The value along the left and bottom of the array will always have the same value as you adjust the array.

**19. Show Values As Drop-down** You can change number type shown in the grid array between whole numbers and decimals. Any equations will show the number type you selected.

**20. Show Exponent Equation Checkbox** Allows you to show or hide the exponent equation area.

**21. Exponent Equation Area** Shows an equation of the product of the two values along the array in exponential form.

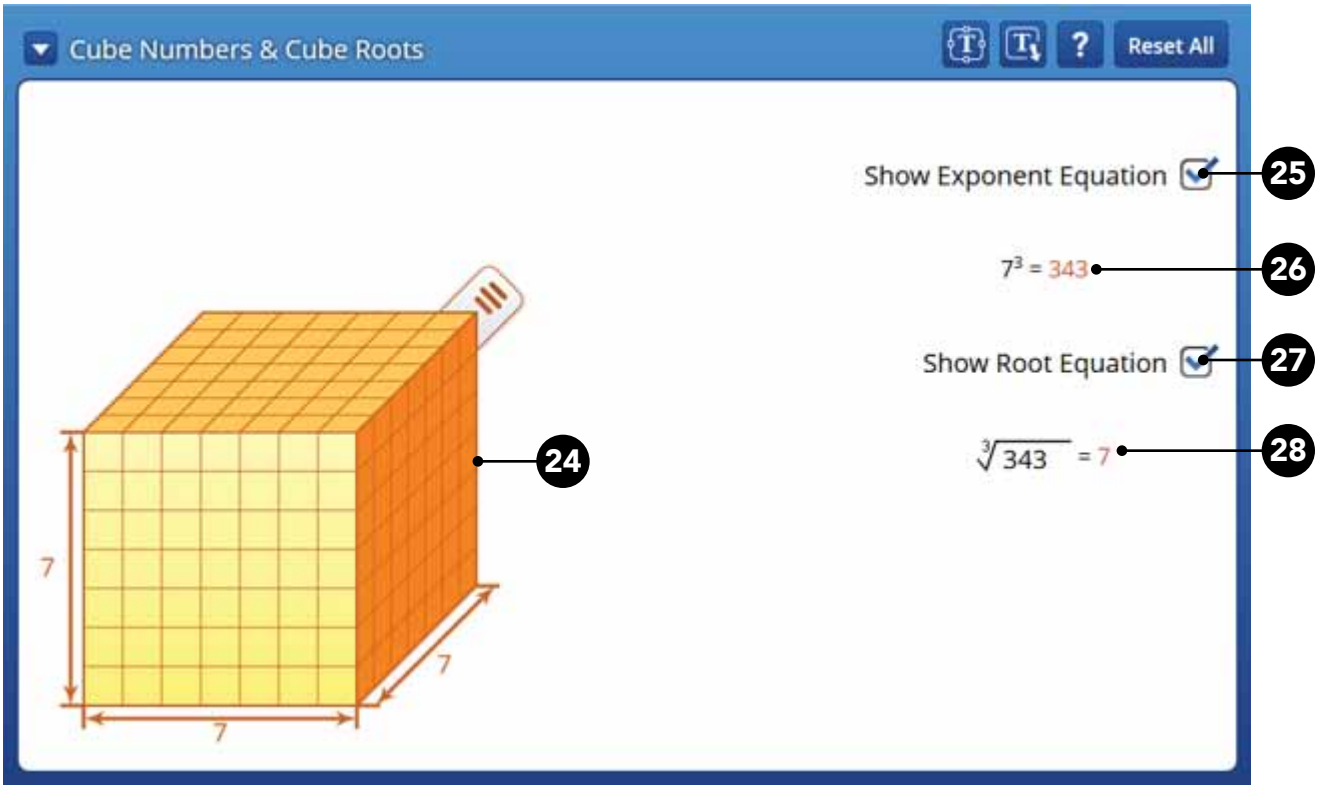
**22. Show Root Equation Checkbox** Allows you to show or hide the root equation area.

**23. Root Equation Area** Shows an equation of the product of the two values along the array in square root form.

*(continued on the next page)*

# Area Models

## Cube Numbers & Cube Roots Mode




**24. Cube Array** You can model a cube array from 1 unit on each side up to ten units along each side. To change the size of the cube array, you can drag the pull tab at the upper right of the cube array up and to the right to increase its size, or down and to the left to decrease its size.

**25. Show Exponent Equation Checkbox** Using the checkbox, you can show or hide an exponential equation represented by the cube array.

**26. Show Exponent Equation Area** Shows an equation of the product of the values in the cube array in exponential form.

**27. Show Root Equation Checkbox** Allows you to show or hide the root equation area.

**28. Root Equation Area** Shows an equation of the product of the values in the cube array in cube root form.