





Bar Diagrams

Click the  button at any time to return to the Main Menu.


Add Parts


The workspace provides an automatic check system.

You can see how two values can be combined into a whole.

- You can input 2 values and combine them to create a whole. The parts can be equal or not equal to each other. An equation is shown to match the diagram.
- Make sure that the mode displays  Add To in the upper-left shell.
- You can click on the  to change the equation from addition to subtraction.

Practice Using Add To

- 1 Find the sum of two parts $247 + 18 = ?$.
- 2 Click the  toggle button in the bottom shell of the workspace to hide the whole. The equation should change from $10 + 10 = 20$ to $10 + 10 = ?$.
- 3 Click on the left part of the bar diagram in the workspace.
 - Enter 247 next to "Enter a value" or enter using the numeric keypad. Then click OK.
- 4 Click on the right part of the bar diagram.
 - Enter 18 next to "Enter a value" or enter using the numeric keypad. Then click OK.


The equation should now read: $247 + 18 = ?$.
- 5 Find the value of the missing whole, or the "?," to make the equation true.
 - Click the  toggle button to show the full equation with the whole, to see if your answer is correct.









Bar Diagrams

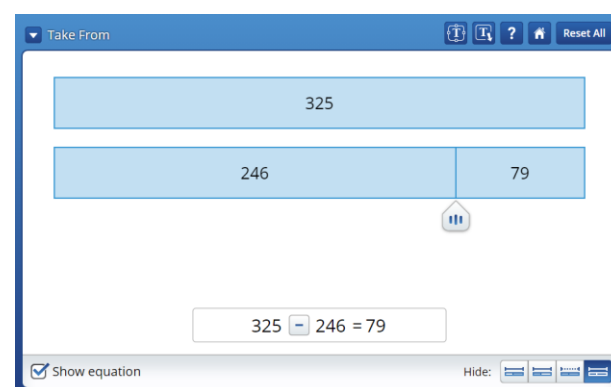
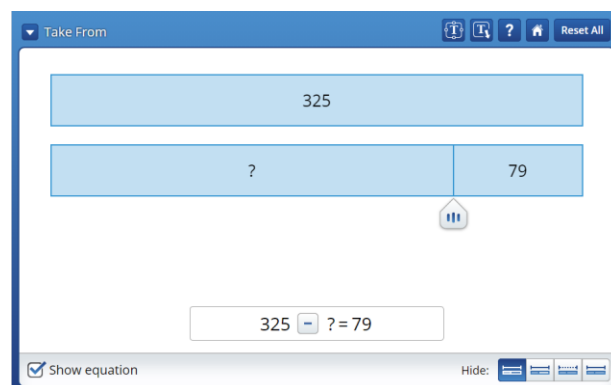
Subtract a Part from the Whole

To view the Take From mode, click  to see the drop-down menu and select **Take From**. You can subtract a part from a whole, so the sum of the parts equals the whole.

- You can input a number and divide it into 2 parts. The parts can be equal or not equal to each other. An equation is shown to match the diagram.
- You can click on the  to change the equation from subtraction to addition.


Practice Using Take From

- Find the missing part of the equation $325 - ? = 79$.
- Click on the box above the bar diagram in the workspace.
 - Enter 325 next to "Enter a value" or enter using the numeric keypad. Then click OK.
- Click the  toggle button in the bottom shell of the workspace to hide the left part. The equation should change from $325 - 162 = 163$ to $325 - ? = 163$.
- Drag the  so that the bar diagram shows 79 for the second part and "?" for the first part. The equation should now read $325 - ? = 79$.
- Find the value of the missing part, or the "?," to make the equation true.
 - Click the  toggle button to show the full equation with the missing part, to see if your answer is correct.




Bar Diagrams

Model Addition and Subtraction

To view the Put Together/Take Apart mode, click  to see the drop-down menu and select **Put Together/Take Apart**.

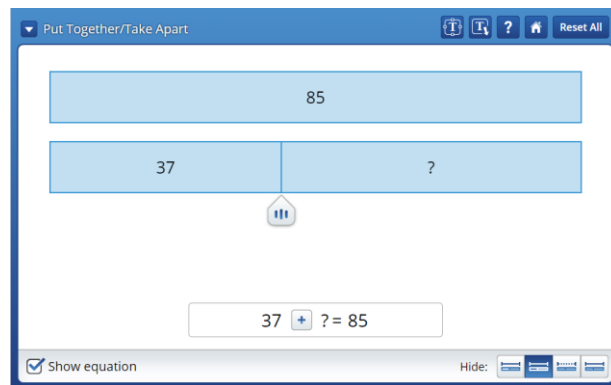
This workspace provides an automatic check system.



You can see how a value can be split into two parts, and compare the whole to each of the parts through addition or subtraction.

- You can input a number or its parts. The parts can be equal or not equal to each other. An equation is shown to match the diagram.
- You can click on  to change the equation between addition and subtraction.

Practice Using Put Together/Take Apart

- 1 Find a related subtraction equation to solve the equation $37 + ? = 85$.
- 2 Click on the box above the bar diagram in the workspace.
 - Enter 85 next to "Enter a value" or enter using the numeric keypad. Then click OK.




- 3 Click the  toggle button in the bottom shell of the workspace to hide the right part. The equation should change to $42 + ? = 85$.
- 4 Drag the  so that the bar diagram shows 37 for the first part and "?" for the second part.

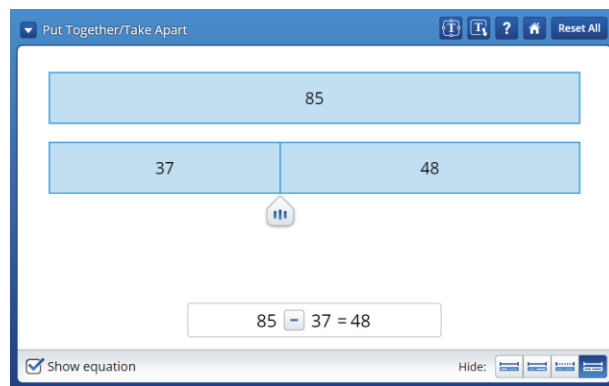
The equation should now read $37 + ? = 85$.

- 5 Click on  and select  to change the equation from addition to subtraction.

The equation should now read $85 - 37 = ?$.

- 6 Find the value of the missing part, or the "?," to make the equation true.

- Click the  toggle button to show the full equation with the difference, to see if your answer is correct.





Bar Diagrams




Comparing Parts By Addition and Subtraction

To view the Compare: Addition and Subtraction mode, click  to see the drop-down menu and select **Compare: Addition and Subtraction**.



This workspace provides an automatic check system.


You can see how a value can be split into two parts, and compare the whole to each of the parts through addition or subtraction.

- You can click on  to change the equation between addition and subtraction.

Practice Using Compare: Addition and Subtraction

- 1 Find a related addition equation to solve the equation $? - 42 = 84$.

- Click on  and select  to change the equation from addition to subtraction.

- 2 Click the  toggle button in the bottom shell of the workspace to hide the whole. The equation should change to $? - 10 = 10$.



- 3 Click on the left part of the bar diagram in the workspace.

- Enter 42 next to "Enter a value" or enter using the numeric keypad. Then click OK.

- 4 Click on the right part of the bar diagram.


- Enter 84 next to "Enter a value" or enter using the numeric keypad. Then click OK.

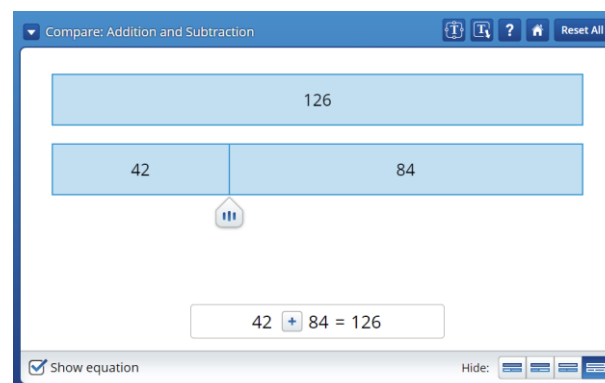
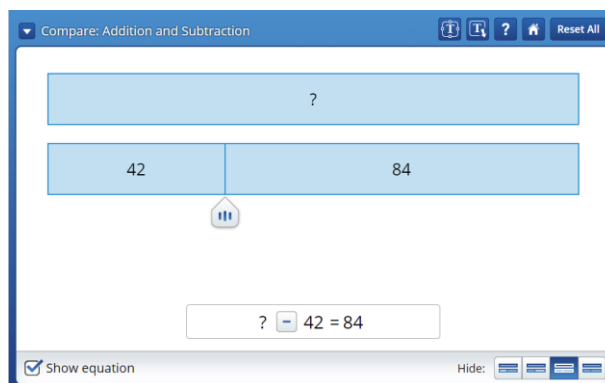
The equation should now read $? - 42 = 84$.

- 5 Click on  and select  to change the equation from subtraction to addition.

The equation should now read $42 + 84 = ?$.

- 6 Find the value of the missing whole, or the "?," to make the equation true.


- Click the  toggle button to show the full equation with the sum, to see if your answer is correct.





Bar Diagrams

Finding Equal Groups

To view the Equal Groups mode, click  to see the drop-down menu and select **Equal Groups: Multiplication and Division**.



The workspace provides an automatic check system.


You can see how a value can be split into various parts and how parts can be multiplied to make a value. These parts can be whole numbers or fractions.

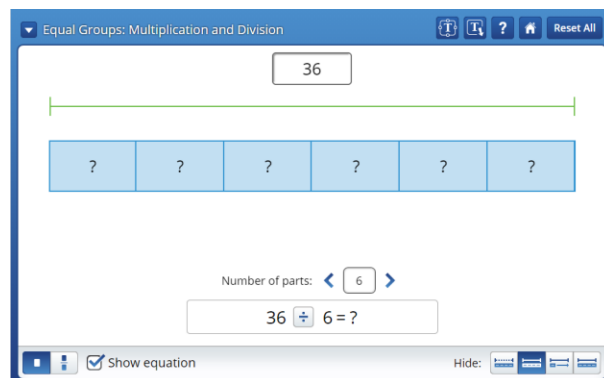
- You can click on  to change the equation from multiplication to division.

Practice Using Equal Groups




- 1 Divide 36 into 6 equal groups. Find the value of the groups.

- Click on the top box in the workspace.
- Enter 36 next to "Enter a value" or enter using the numeric keypad. Then click OK.
- Click on  and select .

- 2 Click the  toggle button in the bottom shell of the workspace. The equation should change from $36 \div 2 = 18$ to $36 \div 2 = ?$.




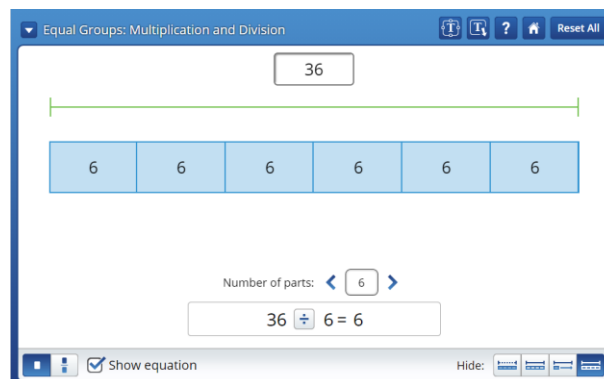
- 3 Make sure that the Whole Numbers button  is selected in the left part of the bottom shell.

- 4 Click on the right arrow located under the bar diagram until the box shows "6."   


The equation should now read: $36 \div 6 = ?$.

- 5 Find the value of the 6 equal groups, or the value of the "?," to make the equation true.

- Click the  toggle button to show the full equation with the missing part, to see if your answer is correct.









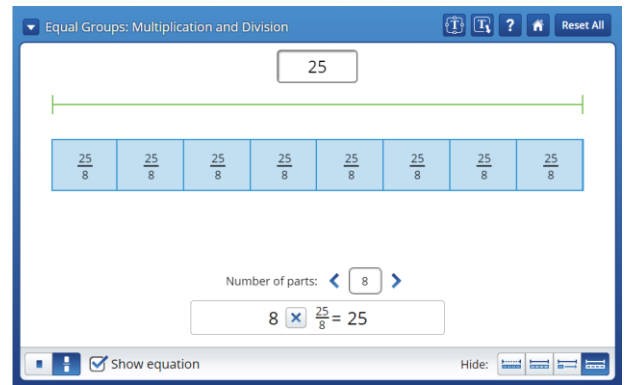
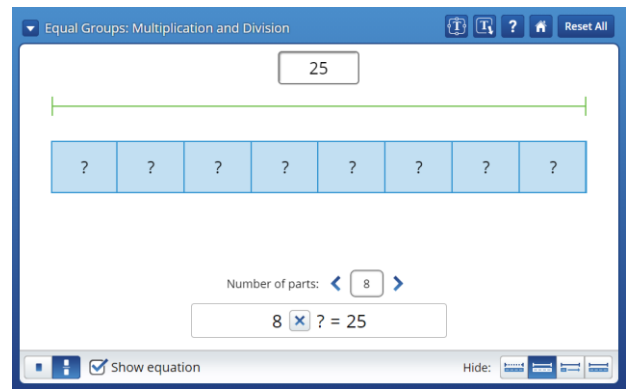
- 6 Divide 25 into 8 equal groups. Find the value of the groups.

- 7 Click the  button in the top shell above the workspace. Then click OK.

- 8 Click on the top box in the workspace.

- Enter 25 next to "Enter a value" or enter using the numeric keypad. Then click OK.

- 9 Click the  toggle button in the bottom shell of the workspace. The equation should change from $1 \times 25 = 25$ to $1 \times ? = 25$.
- 10 Make sure that the fractions button  is selected in the left part of the bottom shell.
- 11 Click on the right arrow after the "Number of parts," located under the bar diagram, until the box shows "8".   
The equation should now read $8 \times ? = 25$.
- 12 Find the value of the 8 equal groups, or the value of the "?," to make the equation true.
 - Click the  toggle button to show the full equation with the missing part, to see if your answer is correct.






Bar Diagrams

Comparing Factors

To view the Factor Comparison mode, click  to see the drop-down menu and select **Compare: Multiplication and Division**.



The workspace provides an automatic check system.


You can see how parts can be multiplied to make a value and compare the parts to the whole. These parts can be whole numbers or fractions.




- You can click on  to change the equation from multiplication to division.

Practice Using Compare: Division

1 Find the number that, when divided by 7, equals 9.


- Click on one part of the bar diagram in the workspace.
- Enter 9 next to "Enter a value" or enter using the numeric keypad. Then click OK.
- Click on  and select .

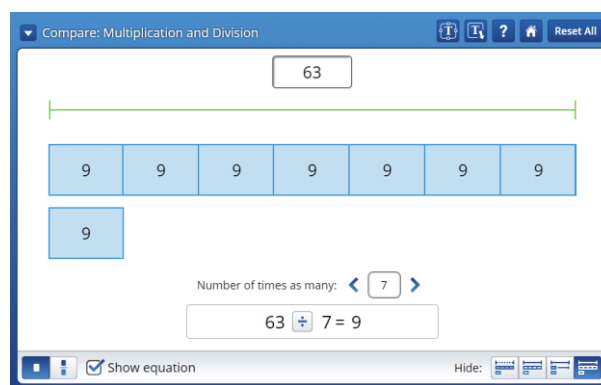
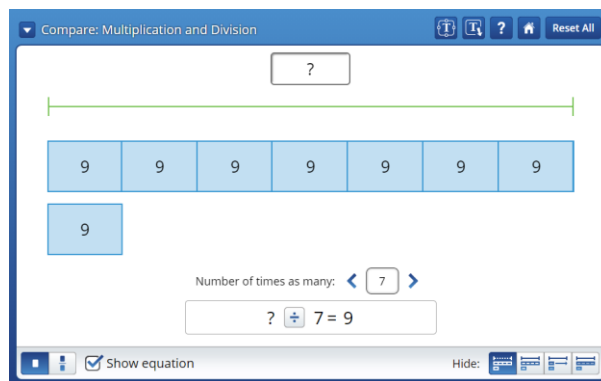
2 Click the  toggle button in the bottom shell of the workspace. The equation should change from $18 \div 2 = 9$ to $? \div 2 = 9$.

3 Click on the right arrow located under the bar diagram until the box shows "7."   

The equation should now read: $? \div 7 = 9$.

4 Find the value of the dividend, or the value of the "?," to make the equation true.

- Click the  toggle button to show the full equation with the missing whole, to see if your answer is correct.





Bar Diagrams





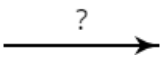

Creating Diagrams

To view the Create a Bar Diagram mode, click  to see the drop-down menu and select **Create a Bar Diagram**.

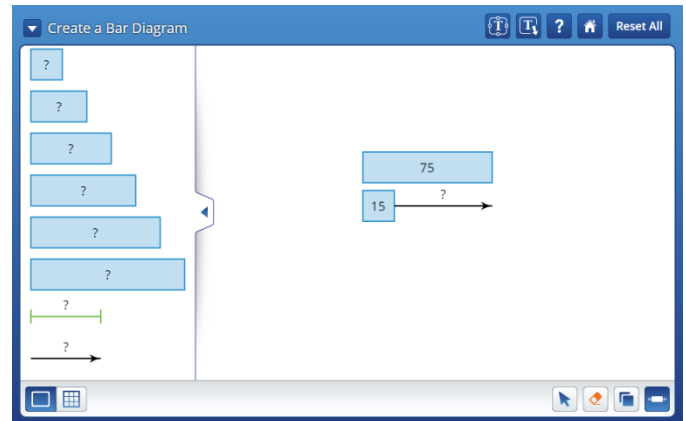
You can construct a bar diagram to model any situation.

Practice Creating a Bar Diagram







1 Model the problem $75 \div 15$.

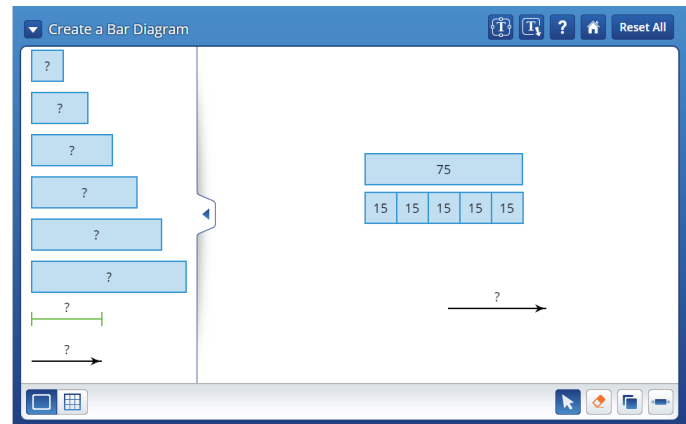
- Click on a medium-sized  bar from the palette and drag it into the workspace.
- Click on the bar and enter 75 next to "Enter a value" or enter using the numeric keypad. Then click OK.
- Click on the smallest  bar from the palette and drag it to line up with the left side of the first bar.
- Click on the bar and enter 15 next to "Enter a value". Then click OK.
- Click on the  icon and drag it into the workspace.
- Use the  to resize the arrow to match the large bar.

This bar diagram models $75 \div 15$.



2 Model the problem $75 \div 15 = 5$.

- Select  and click on the  bar to make 4 copies.
 - Use the  to drag the arrow out of the way, and then line up the  tiles below the  bar.
 - Use the  to resize the large bar to match the length of the 5 smaller bars.
- This bar diagram models the problem $75 \div 15$ and its solution, 5.



Additional Features



- Use  to erase an element from the workspace.






Click the  button at any time to return to the Main Menu.






Counting On and Back by 1 and 2




With Counters, you can act out the process of adding 1 or 2 more. You can also act out the process of subtracting 1 or 2.




- Use the container workspace: .
- Use  to move counters around the workspace.



Practice Using Counters


- 1 Above your container, click on  **Show Count**. 0 will be visible on your container.
- 2 Place counters in your container. Place 5  using .

- Click on . Drag the  to your  and release. Notice 0 is now 1 on the container.
- Continue to click and drag the  into the bag until the bag displays .




- 3 Place 2  in the workspace, but outside of the . Click  to display the Odometer at the bottom, which will show 7.

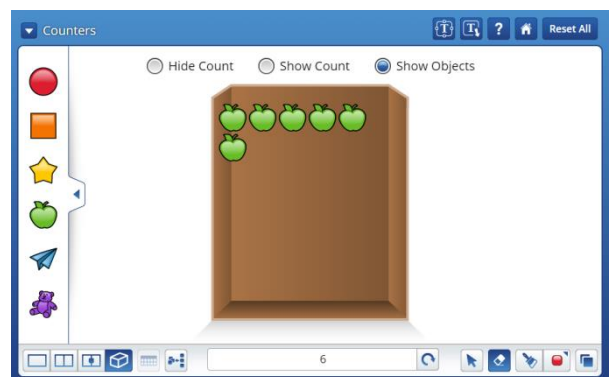
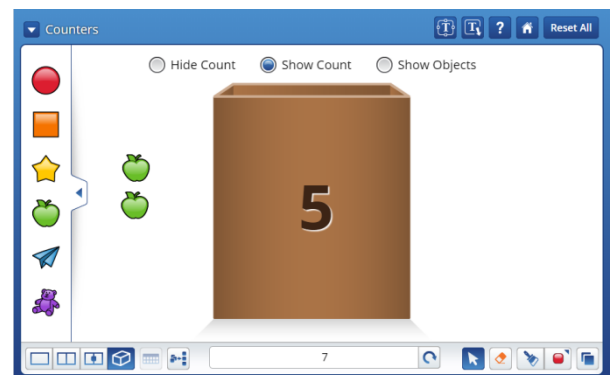
- 4 To count on, use  to move the  from the workspace into .

- Click on one  and drag it into the bag.
- Notice the count increases by 1. Repeat with the other .

- 5 Click on  **Show Objects**. Now the contents of the container show.

- 6 To count back, use  to take away one .

- Click on , then click one  inside the .
- Notice that the count decreases by 1 in the Odometer.



Math Tools



Counters

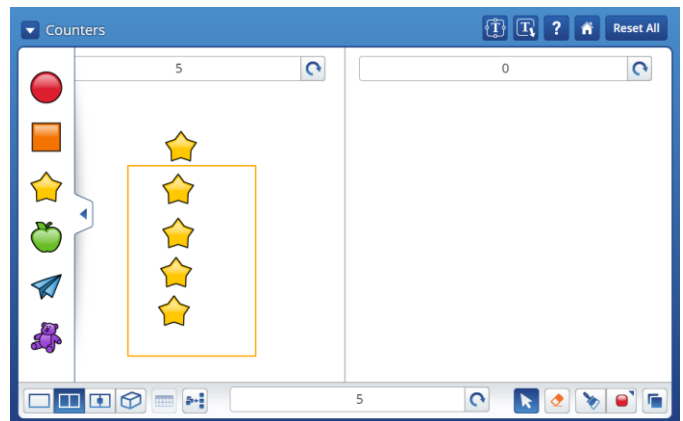
Using Different Workspaces in Counters

Use different workspaces to compare the amount of Counters and see the total.

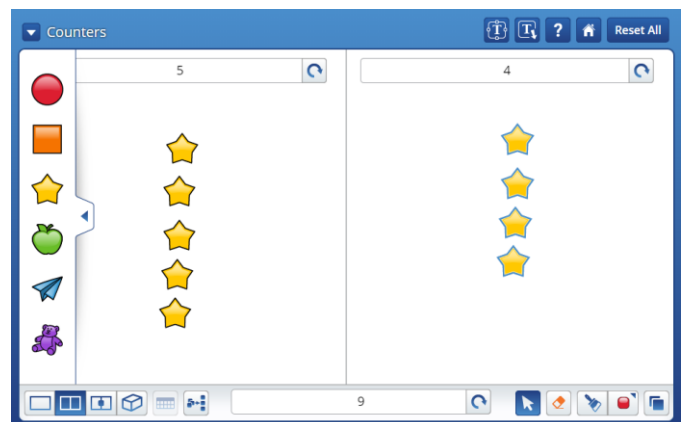
- Use the 2-part workspace:
- Use to move counters around the workspace.
- Use to copy or "clone" counters.

Practice Using Counters

- 1 In the 2-part workspace, you will see two additional Odometers at the top of each workspace. Click to show 0 on the two Odometers at the top and one Odometer at the bottom of the Tool.
- 2 Use to click and drag 5 onto the left workspace. Notice the Odometer will display 5.
- 3 In the workspace, click and drag a rectangle around 4 of the . You will see each star highlighted in blue.
- 4 Now click and click on the highlighted . You will see 4 more stars pop up on screen and the Odometer will display 9.




- 5 Use to click and drag the 4 blue highlighted stars into the right workspace. Notice the Odometers on the top of the Tool will read 5 and 4; the Odometer at the bottom of the Tool still reads 9.
- 6 Click to compare the two workspaces and see which has a greater number.
- 7 To change the color of the stars in the right workspace, use .









Counters

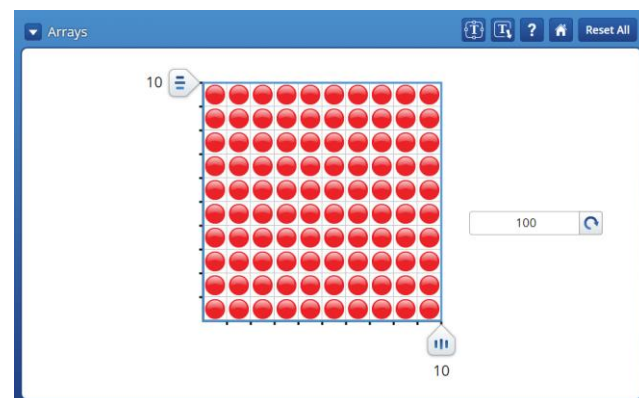
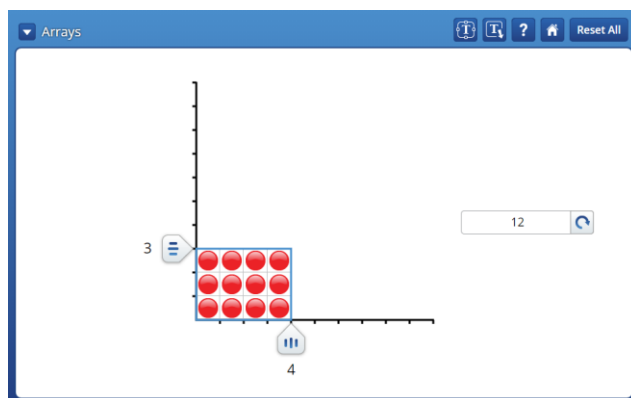
Multiplying Whole Numbers


You can use arrays to multiply two whole numbers. To get to the Arrays mode, click  to see the drop-down menu and select **Arrays**.

- Click on  and drag to resize the array.

Practice Using Arrays

- 1 Name your first factor. Use 3. Click on  and drag to adjust the number on the vertical axis to 3.
- 2 Name your second factor. Click on  and drag to adjust the number on the horizontal axis to 4.
- 3 Count the . The total number is the product.
- 4 Click  to see the product, 12, shown in the Odometer. Click again to see the product written as words, and again to see an expression, 3×4 .




The largest number the array can show is 10×10 , or 100 .





Counters: Integers

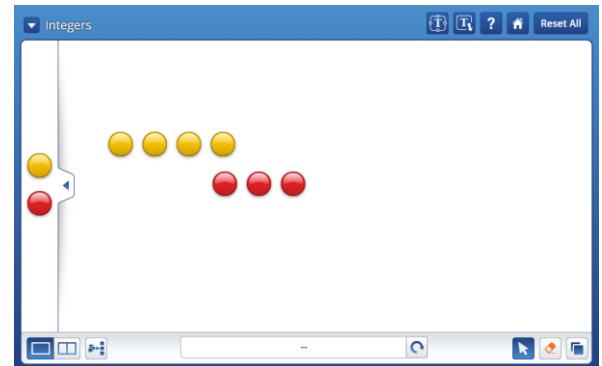
Counting Integers

You can use counters to subtract integers. To get to the Integers mode, click  to see the drop-down menu and select **Integers**.

- The one-part workspace provides a space to drag both red and yellow counters onto the mat, each representing an integer. The yellow counters are always the minuend or first number in the subtraction sentence. The red counters are always the subtrahend or the second number in the subtraction sentence.
- Drag counters on to the mat. Count them and use the other color counter to show subtraction of integers.


Practice Using Counters

- 1 Illustrate the subtraction of the integers $4 - 3$.
 - Drag 4 yellow counters onto the mat. Then drag 3 red counters onto the mat. Count the difference.
 $4 - 3 = 1$. Click  to show the equation.
- 2 To arrange the counters, click . This will arrange the counters in a line for easier viewing and counting.
- 3 Anytime you want to start a new set of counting integers, use **Reset All** to clear the mat and start over.



Counters



Finding the Difference

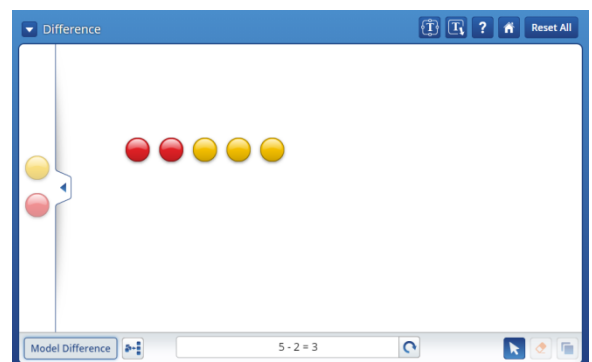
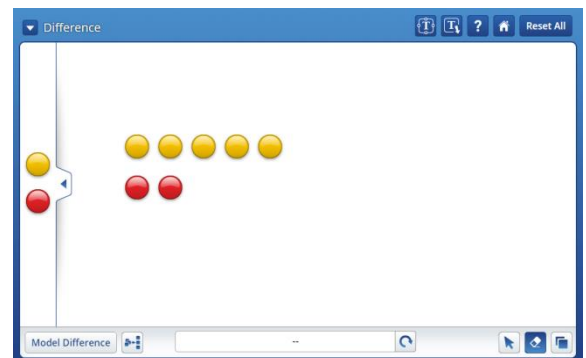
You can use counters to model subtraction. To get to the Difference mode, click  to see the drop-down menu and select **Difference**.

The Difference mode will always subtract the greater number of counters from the lesser number. For example, if there are more yellow counters, then the Tool will use the yellow counters as the first number in the subtraction sentence or “minuend”. If there are a greater number of red counters, the Tool will use the red counters as the first number in the subtraction sentence. This way, all problems result in a positive number.







- You can place counters on the workspace, then move them into different positions to compare them.
- Use [Model Difference](#) to show the subtraction.

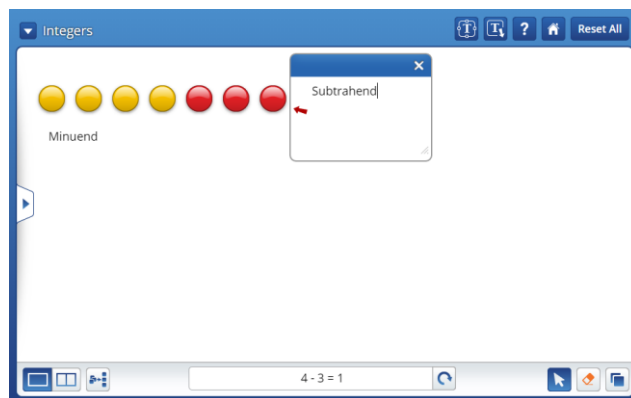
Practice Using Counters to Subtract

- 1 Model and solve the subtraction problem $5 - 2$. Drag 5  into the workspace and place in a row, as shown at right. This is the minuend.
- 2 Drag 2  for the subtrahend into the workspace and place in a row below.
 - You can compare the lengths of the lines of counters to find that there are 2 more yellow counters than red counters.
- 3 Click [Model Difference](#). The counters will move on top of each other to show the extras, or the difference. You can click it again to undo the action and separate the counters again, to show all of the counters.
- 4 By looking at the workspace and the Odometer, you can see that $5 - 2 = 3$.



Additional Features

- You can use the  to copy counters instead of dragging them onto the desktop. This is especially useful with larger numbers.
- You can use the  to erase counters on the workspace.
- The Text box  and Text box with arrow  buttons are along the top of the Tool. When you click on one of the Text box buttons, a dialog box will appear on the workspace. You can add any text into this box. You can also drag the box anywhere on the workspace. When you click outside the box, the outline of the box disappears and only the text and arrow are visible.
- In Counters mode in the Basic Workspace, you can put counters in a ten-frame. Click the ten-frame button  and then click on the workspace. Click on  and drag counters into the ten-frame.













Data and Graphs

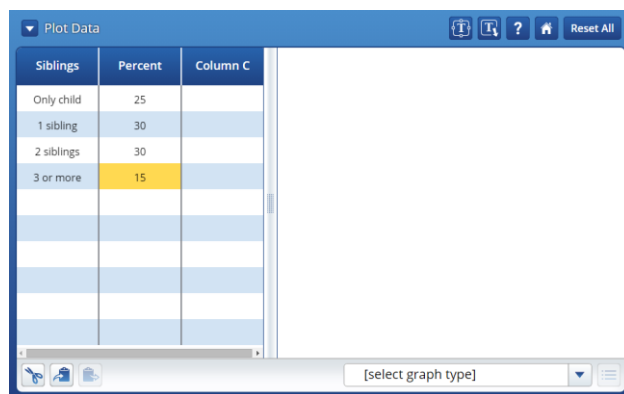
Click the  button at any time to return to the Main Menu.

Plot Data

You can format, copy, and sort data that you enter in a table. The data can be used to show differences among graph types.

Practice Plotting Data

- Enter data that contains percentages to be shown on a circle graph. First, change the header labels.
 - Click on the header labeled "Column A". In the window, click the  and select "New". Type the new header, "Siblings" and then click  to save.
 - Click on the header labeled "Column B". In the window, click the  and select "New". Type the new header, "Percent" and then click  to save.
- Enter data under the "Siblings" column.
 - Click on the first cell under the header "Siblings" and type "Only child".
 - Click on the second cell and type "1 sibling". Enter "2 siblings" for the third cell and "3 or more" for the fourth.
- Enter data under the "Percent" column.
 - Click on the first cell under the header "Percent" and type 25.
 - Click on the second cell and type 30.
 - Copy and paste data from the cell above by clicking on that cell and then clicking . Click on the third cell and click . You should see 30 in the third cell.
 - Click on the fourth cell and type 15.
- Order the data from lowest percent to highest.
 - Click on the column header "Percent". In the window under "Sort Rows", click . Click  to save.



Siblings	Percent	Column C
Only child	25	
1 sibling	30	
2 siblings	30	
3 or more	15	

5 Choose a circle graph to display the data.

- Display a circle graph by clicking the drop down menu on the bottom right and clicking on Circle Graph.
- In the window, make the circle graph settings as follows and press OK.

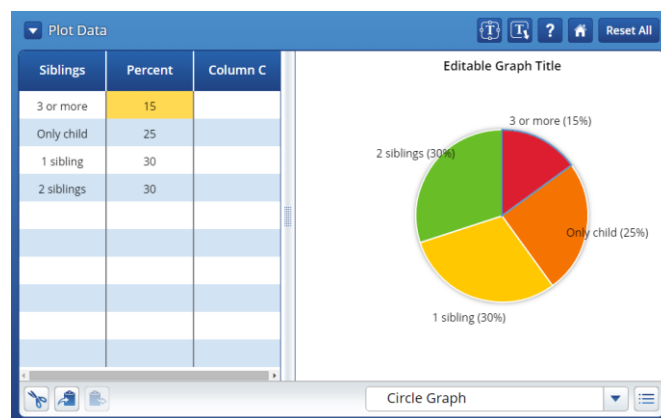
Circle Graph [X]

Labels: ☒ Siblings ☐ Percent ☐ Column C

Data: ☐ Siblings ☒ Percent ☐ Column C

☒ Label Percents

OK Cancel




- Edit the graph title by clicking on "Editable Graph Title". Delete the text and then enter "Number of Siblings of Class".



Data and Graphs



Creating Plots

You can create a graph or plot when you are working in the Primary workspace of the Create Plots mode. To get to the Create Plots mode, click  to see the drop-down menu and select **Create Plots**.



- To choose a graph type, click and then click the graph/plot of your choice.

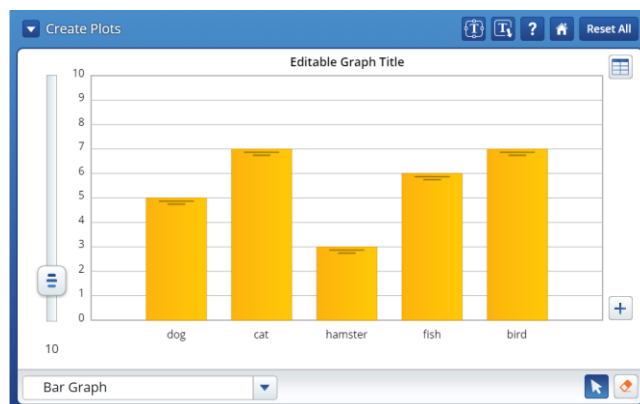
Practice Creating Plots: Bar Graph

1 Add labels along the bottom of the graph.

- Click on "Label 1" under . Delete the text, and enter "dog".
- Click  to add a label. Click on "Label 2" and enter "cat".
- Follow the same procedure as above to make new labels: "hamster", "fish", and "bird". There are now 5 labels for the bar graph.

2 Add vertical bars for each label.



- Click  above "dog" and drag up so that the bar reaches "5".
- Click  above "cat" and drag up so that the bar reaches "7".
- Follow the same procedure as above to add bars for the rest of the labels as follows:
hamster = 3, fish = 6, bird = 7.




3 Add a title to the graph.

- Click on "Editable Graph Title" at the top of the graph.
- Delete the text and then enter "Types of Pets for Students".

4 Make adjustments to the graph.

- Click  to the left of the graph, and slide it down so that the number "8" is the top number.
- To remove a bar from the graph, click  and then click the bar above "hamster".










5 View the data in the table.

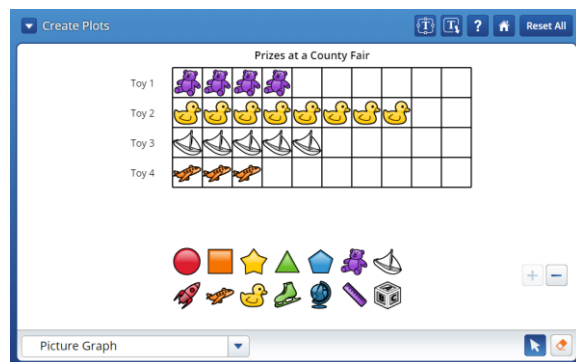
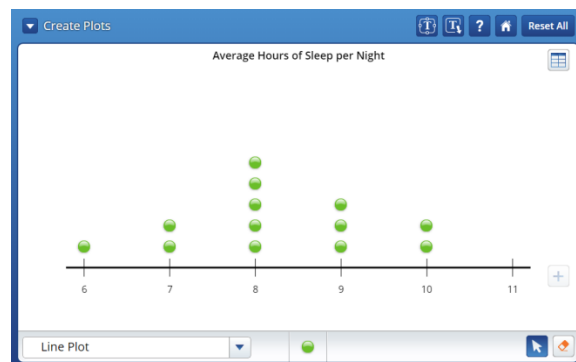
- Click . The data you see will be pulled from the bar graph.

Bar	Value
dog	5
cat	7
fish	6
bird	7

Additional Features

The other workspaces in this mode are Circle Graph, Line Graph, Scatter Plot, Line Plot, and Picture Graph.

- For the Circle Graph, click  to add a label.
Drag  around the circle to adjust the values.
Click  to see a table of values from the circle graph.
- For the Line Graph, add points by clicking .
Drag  to set the value.
- For the Scatter Plot, drag  onto the graph.
- For the Line Plot, add labels by clicking . Add points by clicking and dragging  above the labels.
- For the Picture Graph, you can have up to 4 rows with different pictures from the choices provided to represent data. To add a picture to a row, click and drag the picture to each box in which you want it to appear. Click  to erase a picture from the graph.








Data and Graphs

Graph Coordinates and Equations

In the coordinate grid workspace, the x -axis and y -axis intersect at the origin. Click  to see the drop-down menu and select **Graph Coordinates and Equations**.

- Use  when you only want to use the first quadrant of the coordinate grid.
- Use  when you want to use the four-quadrant coordinate grid.

Practice Graphing on a Coordinate Grid

1 Click the  button to open the Equation Grapher. The line graphed is $y = x + 0$. The equation $y = x + 0$ can also be written as $y = 1x + 0$. The line has a slope of 1 and it crosses the y -axis at 0.

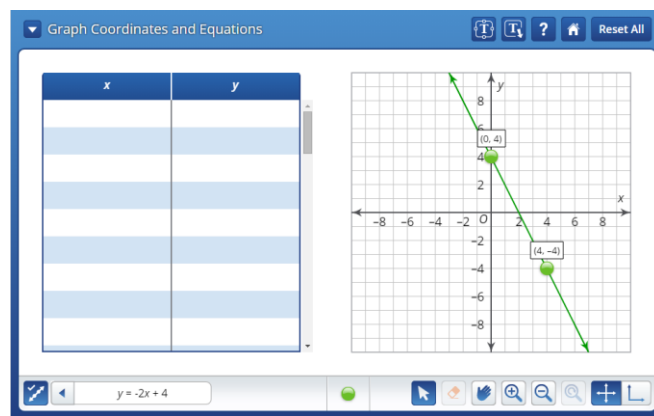
2 Change the line so that it crosses the y -axis at a different point.


- Click and drag the point at the origin up along the y -axis to $(0, 4)$.
- The line now crosses the y -axis at 4.

3 Move the point $(4, 4)$ so that the line crosses the x -axis at 2.

- Click and drag the point $(4, 4)$ straight down so that the coordinate point shown is $(4, -4)$.
- The line now crosses the x -axis at 2.
- The equation shown in the bottom left of the screen is $y = -2x + 4$.


4 Move the line to cross the y -axis at -30 .



- Notice the scale on the y -axis ranges from -10 to 10 . Click on the .
- Click and drag the point on the y -axis down until the line crosses the y -axis at -30 .


5 Change the line so that it has a positive slope of 0.5 , or $\frac{1}{2}$.

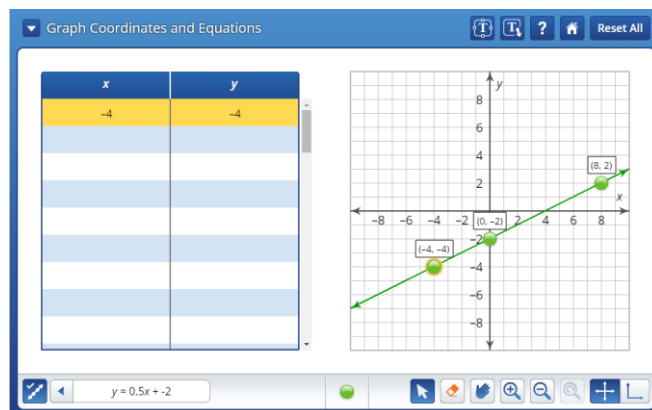
- Drag the point $(0, -30)$ back up to where the y -coordinate is within -10 and $+10$.

- Click on the  to zoom back in to the original scale.
- Click and drag the point on the y -axis to the point $(0, -2)$. Then click and drag the point $(4, -4)$ up and to the right to $(8, 2)$.





- The equation in the bottom-left of the screen reads $y = 0.5x - 2$. The slope is 0.5 and the line crosses the y -axis at -2 .

6 Add a coordinate point on the line.

- Click on the  in the bottom of the screen.
- Drag the point so that it reads $(-4, -4)$ on the graph.
- The values -4 and -4 are now highlighted in the first row of the table.



Additional Features


- Click  to toggle to  and make a scatter plot. Click  to get back to line graph mode.
- Use  to erase a point from the graph.





Data and Graphs

Math Tools


Plot Points and Write Coordinates

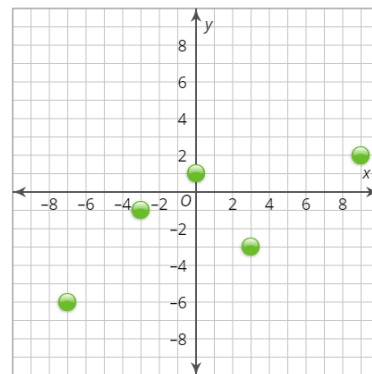
Plot points in the coordinate grid workspace, and then write their coordinates yourself to check your knowledge. Click  to see the drop-down menu and select **Plot Points and Write Coordinates**.

- Use  when you only want to use the first quadrant of the coordinate grid.
- Use  when you want to use the four-quadrant coordinate grid.

Practice Plotting Points and Writing Coordinates

1 Plot several random points.


- Drag  into the coordinate grid to plot points. Drag several points to different locations.
- The points shown are $(0, 1)$, $(-3, -1)$, $(9, 2)$, $(3, -3)$, and $(-7, -6)$.

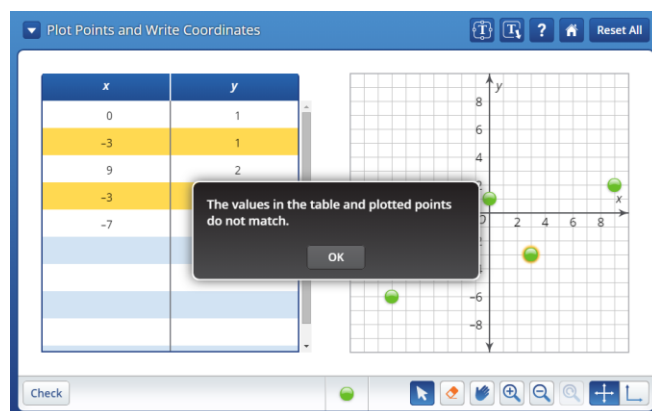


2 Write the coordinates for each point in the table.






- In the first row of the x column, type "0". In the first row of the y column, type "1". This represents the point $(0, 1)$.
- In the next row, type "-3" and "1".
- In the next rows, type "9" and "2", then "-3" and "-3", and then "-7" and "-6".

3 Check your answers.

- Click . The popup will tell you whether the coordinates are correct. The order is not important.
- The entries $(-3, 1)$ and $(-3, -3)$ are incorrect, so the table rows and their corresponding points are highlighted.
- Click OK and then change the highlighted rows to match the points.



Additional Features

- You can check the coordinates of only one point. Click on the point to show its label.
- Change the position and range of the coordinate grid using the     buttons.
- Use  to erase a point from the graph.

Math Tools





Fractions

Click the  button at any time to return to the Main Menu.






Fraction Sums and Mixed Numbers

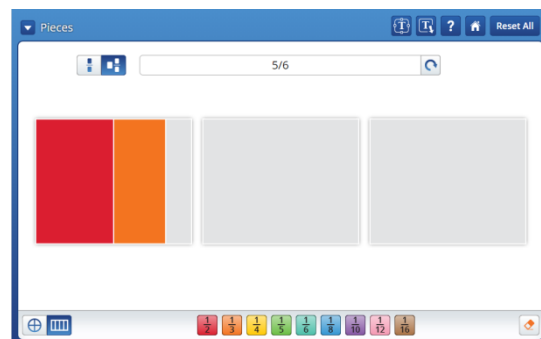
You can add fractions to make mixed numbers.

- You can add fractions that have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 16 (strips workspace used below).
- Make sure that the mode displays  Pieces in the upper-left shell.
- When an improper fraction is displayed in the Odometer, click  to show it as a mixed number.





Practice Using the Pieces Mode in the Strips Workspace

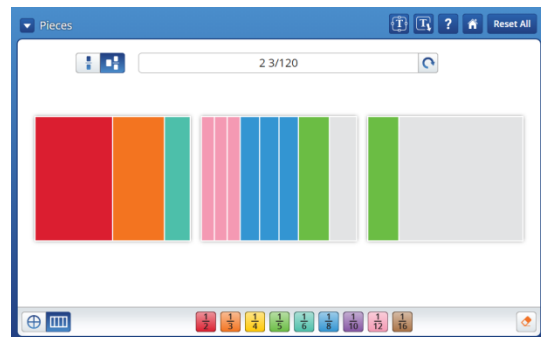
1 Place fraction pieces in the workspace.

- Click , then click .
- Click  to show "5/6." Notice that the MathTool finds the least common denominator and displays the sum in the Odometer.
- Click . Now you have made 6/6, or 1 whole.
- Click on  to switch back and forth between improper fraction and whole-number displays.



2 Continue to add fraction pieces to the workspace.

- Click  three times. Click  three times. Click  twice.
- Notice the Odometer. As you go along, click  to see improper fraction and mixed-number representations of the pieces.





Fractions

Modeling Equivalent Fractions

You can find equivalents of fractions less than 1. To get to the Equivalent Shapes mode, click



to see the drop-down menu and select **Equivalent Shapes**.

- The active workspace is marked by an orange highlight. Actions are applied to this workspace only.
- You can model fractions that have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 16 (wedges workspace used below).



Practice Using Equivalent Shapes Mode

1 Model a fraction in the left workspace. Use $\frac{1}{2}$.


- Click .



2 Find an equivalent fraction in the right workspace.

- Click inside the right workspace. Notice the orange box around the active workspace.
- Think of multiples of 2 to use for a denominator. Use $\frac{1}{4}$.

- Click  to place wedges in the circle until  appears between the two workspaces.

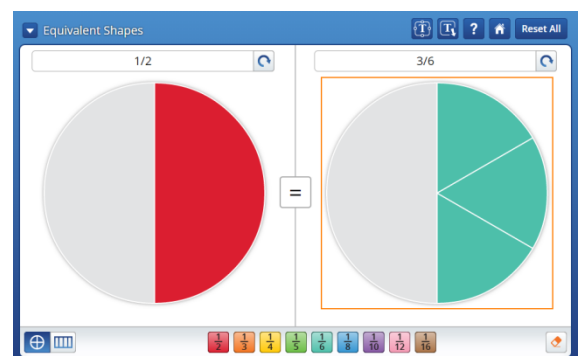
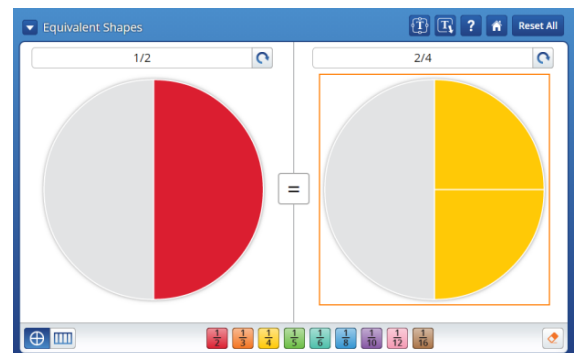
3 Find another fraction equivalent to $\frac{1}{2}$.

- Click  twice to erase the 2 wedges in the circle.


- Click  to place wedges in the circle until  appears between the two workspaces.

4 Find more fractions equivalent to $\frac{1}{2}$.

- Repeat Step 3 using , , , and .



Additional Features

You can click  to see each part expressed as a fraction, a decimal, words, or a percent.





Fractions

Constructing Fractions of Shapes

You can break shapes into fractional pieces. To get to the Modeling Fractions mode, click









to see the drop-down menu and select **Modeling Fractions**.




- The active shape is marked by   in the bottom left corner.
- You can break whole shapes apart to model fractions that have any denominator that evenly divides the shape, up to 12.

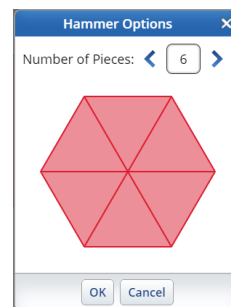
Practice Using Modeling Fractions Mode

1 Select the shape to model.




- Click the arrow in   and select the  from the menu.
- Click and drag 2 copies of the hexagon into the workspace.
- Click the right side of   and select  to change the selected color. Then click on a hexagon to paint it.

2 Break one shape into sixths.

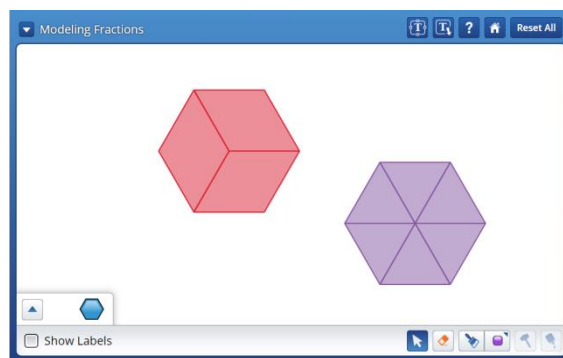
- Select the  and click on one of the hexagons.
- In the Hammer Options dialog, click   to select 6 parts. Click OK to close the dialog.



3 Break the other shape into thirds.



- Select the  and click on the other hexagon.
- In the Hammer Options dialog, click   to select 3 parts. Click OK to close the dialog.

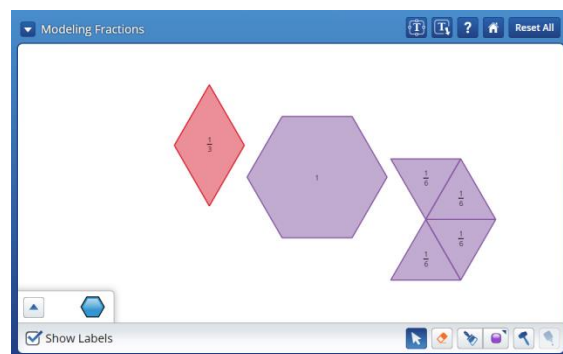
4 Drag the hexagon parts around to create new shapes. Compare the sizes of the parts.



5 Select ☒ Show Labels to show the sizes of all pieces.

6 Combine parts to make a whole again.

- Select two $\frac{1}{3}$ parts and two $\frac{1}{6}$ parts with the , to make 1 whole.
- Click  to combine the parts into a hexagon.








Fractions

Math Tools

Modeling Fractions Less Than 1

You can model a fraction using the Wedges workspace or the Strips workspace. To get to the Denominators mode, click  to see the drop-down menu and select **Denominators**.

- You can model fractions that have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 16.
- Use  to shade a wedge or strip and also to clear the shading from a wedge or strip.
- Click on  to switch between the Wedges and Strips workspaces.

Practice Using Fraction Wedges

1 Choose a denominator for the fraction that you want to model.


- Click in the denominator of the fraction.
- Select from the denominator menu.

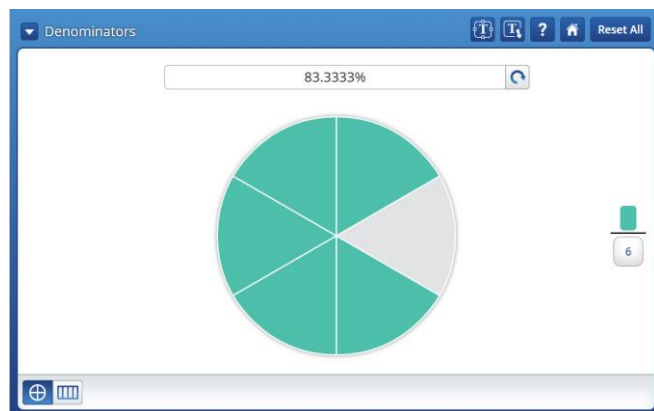
Select .

- Notice the circle is now separated into six equal wedges.

2 Shade wedges to represent the numerator for the fraction that you want to model.

- Choose a numerator. Use 5.
- Click inside 5 of the 6 wedges to represent the numerator.
- Notice the Odometer shows five sixths as "5/6."

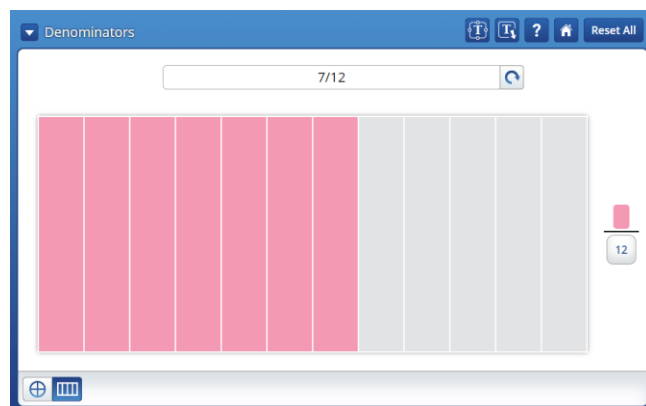
3 Click  to see the decimal form of 5/6 inside the Odometer. Click again to see it in word form, again to see it as a percent, and one more time to hide the label entirely.



Practice Using Fraction Strips

4 The process is the same as those used in Steps 1 – 3 when you use the Strips workspace.

- The fraction modeled at the right is 7/12.





Fractions

Math Tools


Building with Fraction Strips

You can combine and compare fractions. To get to the Fraction Strips mode, click  to see the drop-down menu and select **Fraction Strips**.

- You can model fractions that have a denominator of 1, 2, 3, 4, 5, 6, 8, 10, or 12.
- You can compare fraction strips to a number line.


Practice Using Fraction Strips Mode


1 Model the fraction $\frac{6}{8}$.

- In the palette, click on the sixth piece of the blue eighths bar , and drag it into the workspace. A fraction bar of length $\frac{6}{8}$ is created.



2 Use fraction strips to find an equivalent fraction with denominator 12.

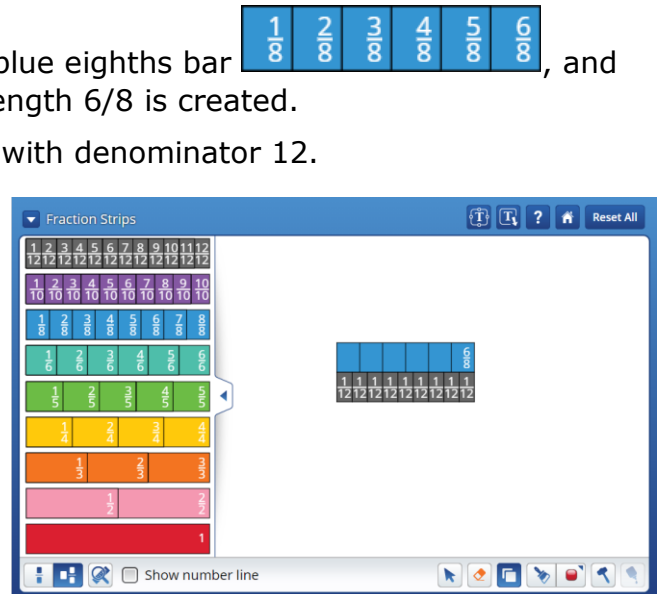
- In the palette, click on the first piece on the

black twelfths bar , and drag it into the workspace. Line it up below one end of the blue bar.


- Use the  to make copies of the $\frac{1}{12}$ bar, lining each one up below the blue bar, until the lengths are equal.

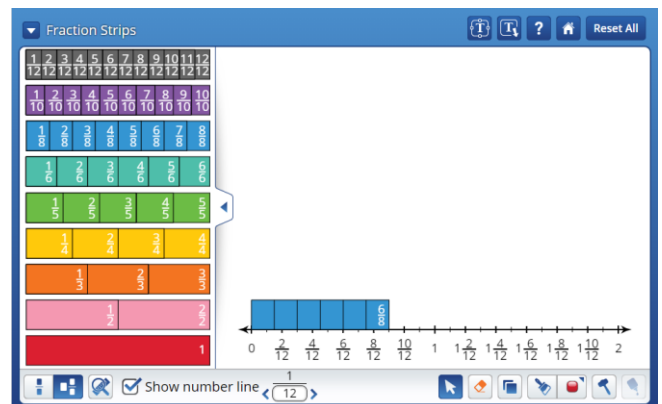
3 Or use the number line to find an equivalent fraction with denominator 12.

- Select ☒ Show number line to view a number line in the workspace.
- Drag the blue fraction bar to the left end of the number line, lining it up with 0.
- Click the   buttons to change the denominator modeled by the number line. Select .
- Read the label on the tick mark at the right end of the $\frac{6}{8}$ fraction bar to find the equivalent fraction.



Additional Features

You can use  to find the sum of fraction strips. Click on strips to add their lengths to the sum.



Multiplying Fractions

To get to the Array mode, click  to see the drop-down menu and select **Array**.


- You can multiply two fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, or 16.
- When you change the denominators in the fractions, you adjust the number of squares in 1 whole. You can also change the number of whole numbers that the array models.
- The purple shaded rectangle's width and length correspond to the numerators of the fractions.


Practice Using Arrays

1 Set the size of the array. Use 2.


- Click the Number of wholes button.
- Select from the menu .

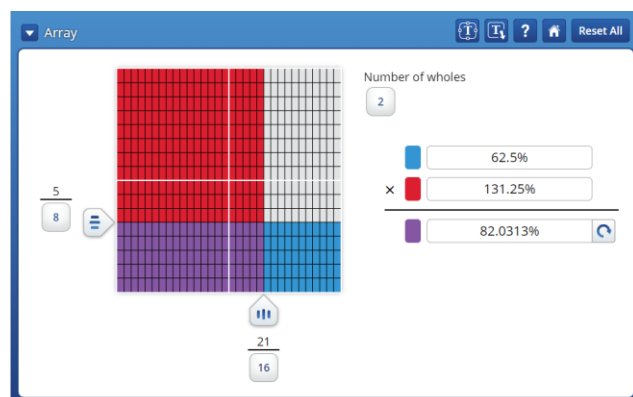
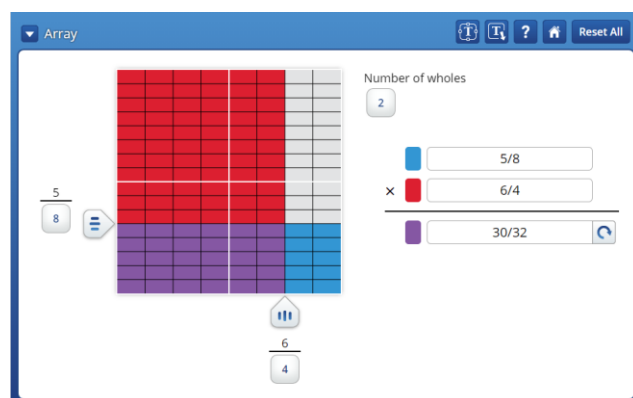
2 Name your first factor. Use 5/8.


- Click on the denominator of the fraction along the vertical scale.
- Select from the menu .
- Click on  and drag to adjust the numerator to 5.

- Click  and notice the first factor, 5/8, is shown as "5/8" in the top Odometer.

3 Name your second factor. Use 21/16.

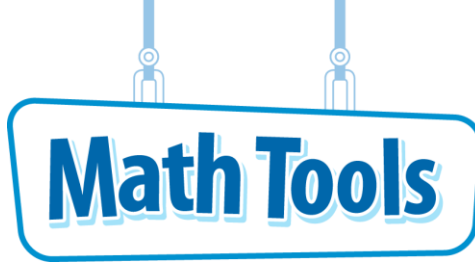
- Click in the denominator of the fraction along the horizontal scale.
- Select 16 from the menu .
- Click on  and drag to adjust the numerator to 21.
- Notice the second factor, 21/16, is shown as "21/16" in the middle Odometer.




4 The product, 105/128, is shown as "105/128" in the bottom Odometer. Click  to see the Odometer amounts as decimals, written as words, or as percents.



Fractions




Modeling on a Number Line

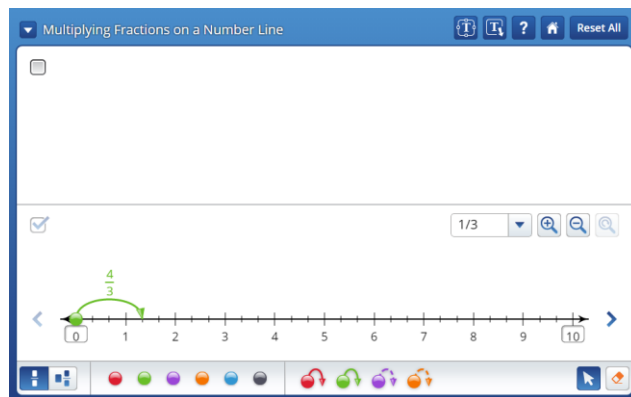
You can model fraction multiplication on a number line. To get to the Multiplying Fractions on a Number Line mode, click  to see the drop-down menu and select **Multiplying Fractions on a Number Line**.

- You can model fractions with a denominator of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, or 100.



Practice Multiplying Fractions on a Number Line

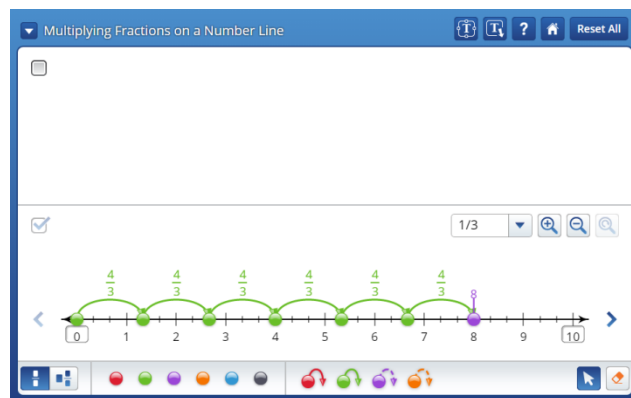
1 Model the fraction $\frac{4}{3}$ on the number line.

- Click and select $\frac{1}{3}$ from the menu.
- Drag  from the bottom shell onto the number line, with its left point at the 0 tick mark.
- Drag the arrow portion of the arc to the right, to $\frac{4}{3}$. The arc label is now " $\frac{4}{3}$ ".








2 Multiply $\frac{4}{3} \times 6$ on the number line.

- Drag another  from the bottom shell onto the number line, with its point at the arrow of the first arc. The new arc resizes to match the first one.
- Continue until you have 6 copies of the arc. The final arc lands on the product $\frac{4}{3} \times 6$.
- Drag  from the bottom shell to the end of the final arc to show the product.




Additional Features

- You can change the endpoints of the number line by dragging the line, by clicking the   arrows, or by clicking on an endpoint label and entering an endpoint value using the keyboard or the keypad.
- You can change the range of the number line by clicking the    buttons.



Geometry

Click the  button at any time to return to the Main Menu.


Shapes

Nine basic geometric shapes are included in the Shapes mode.

- After a shape is placed in the workspace, you can flip or rotate it. You can also change its color and relocate it in the workspace.

Practice Using Geometry Shapes


1 Place a shape in the workspace. Use a square.

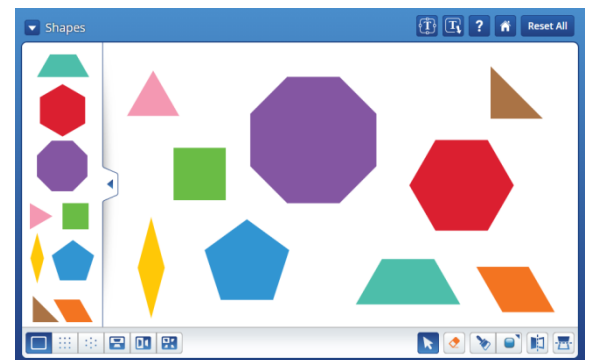
- Click and hold . Drag the shape onto the workspace.
- Move the cursor to the location in the workspace where you want to place the square and release.



2 Place one of all the other shapes in the workspace.

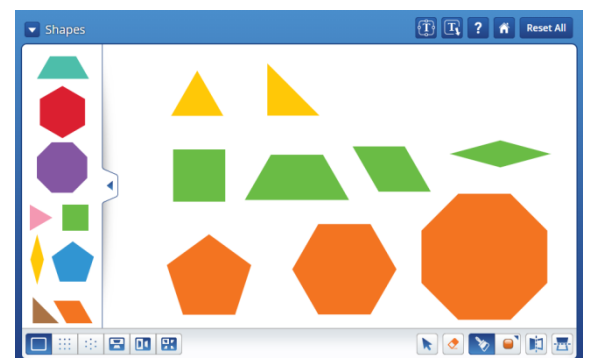
- Use the same procedure as you did for Step 1.

3 Classify and organize the shapes. Form groups of triangles, quadrilaterals, and other polygons.

- Use  to select and reposition the shapes in the workspace.
- Move both triangles to a row along the top of the workspace.
- Move the quadrilaterals to a row in the middle of the workspace.







- Rotate the  so that it looks like . To rotate a shape, drag any corner of the shape in a clockwise or counterclockwise direction.
- Move the other polygons to a row along the bottom of the workspace.





4 Change the colors of the shapes.

● Make all triangles yellow. Make all quadrilaterals green. Make all other polygons orange.

● Click  and select yellow . Move the cursor over the triangle and click. Its color will change to yellow. Click on the other triangle to change its color.


● Click  and select green . Move the cursor over the quadrilateral and click. Its color will change to green. Click on the other quadrilaterals to change their color.

● Click  and select orange . Move the cursor over the pentagon and click. Its color will change to orange. Click on the hexagon and octagon to change their color.



Tangrams

Five tangram pieces of different colors are included in the Tangrams mode, along with a large square piece that is made from the tangram pieces. To get to the Tangrams mode,


click  to see the drop-down menu and select **Tangrams**.


- You can drag the pieces onto the workspace multiple times as long as the new piece dragged does not overlap with an existing piece. Each tangram piece can be flipped.
- The pieces that make up the large square can be taken apart after the square is on the workspace.


Practice Filling an Outline Figure with Tangrams

1 Choose the outline that you want to fill with tangrams.

- Ten different outlines will appear from which you can choose.


- Click the  button in the bottom left of the screen.


- Click the  and drag it onto the workspace.

- Since the outline you chose appears to involve triangular tangrams, click on the  button to help you choose the right tangram for the outline and for easier placement.

2 Place the first tangram piece to fit in the bottom of the outline, where the bigger tangrams will be placed.

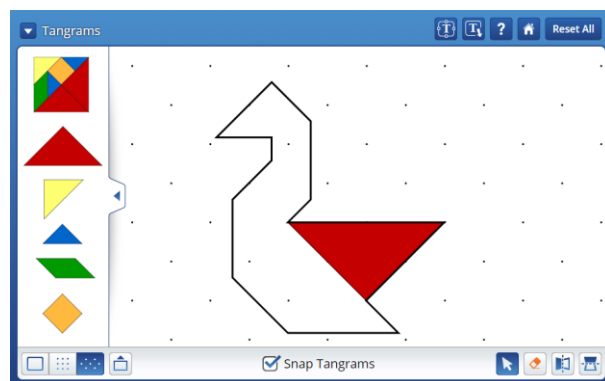
- Click and drag the  onto the workspace.

- Click the , and then click the tangram to flip it vertically.

- Click the  to activate the pointer again. You can now drag the tangram into the outline.

3 Rotate a tangram to position in the outline.

- Click and drag another  onto the workspace.




- Click on any corner of the triangle and drag it in a clockwise or counter-clockwise


direction so that it looks like .


- Drag the rotated tangram so that it snaps with the first piece into the bottom of the outline.

4 Flip and rotate a tangram to position in the outline.

- Click and drag  onto the workspace.

- Rotate the piece so that it looks like .

- Click the  and then click the tangram to flip it horizontally.

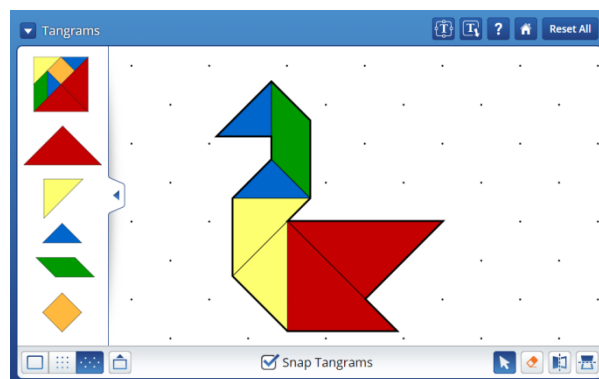
- Click the  to activate the pointer again. You can now drag the tangram into the outline.

5 Fill in the outline with other tangram pieces.

- Click and drag 2  and 2  tangrams onto the workspace.


- Rotate or flip certain tangrams so that the pieces can be positioned in the outline as seen to the right.

- Click and drag the tangrams into the outline to fill it completely.





Exploring Solids


Click  to see the drop-down menu and select **Exploring Solids**. Fifteen solids are available for you to explore their characteristics from different perspectives.

- After a solid is placed in the workspace, you can rotate it or unfold it to see its net.
- You can drag as many solids onto the workspace as will fit.


Practice Exploring Solids: Pentagonal Prism

1 Choose a solid to explore.




- Click the pentagonal prism , and then drag it onto the workspace


2 Rotate the solid.

- Click , and then click and hold on the solid (do not release it). Move the cursor left


and right to rotate it on the vertical axis. Unclick the solid so that it looks like .

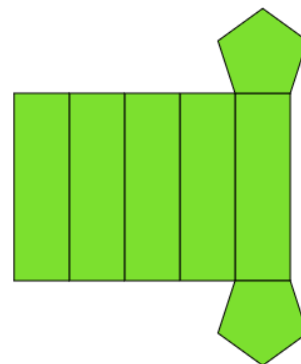
- Click , and then click and hold on the solid (do not release it). Move the cursor up and down to rotate it on the horizontal axis. Unclick the solid when done viewing the rotation.


3 View the net of the solid.

- Click , Click on the solid. It will unfold so that you can see all of its faces that form the net of the prism.

4 Fold the net together to view the solid.


- Click , Then click on the net.
- The net will fold up so you can see how to put it together to form a solid and how it looks in solid form.



5 You can click    in the left side solids menu to view other solids to explore.





Building Nets

Six prisms and six pyramids are available for which you can build nets that form the geometric solid. To get to the Building Nets mode, click  to see the drop-down menu and select **Building Nets**.

- You can rotate and relocate the shapes that make up the net.

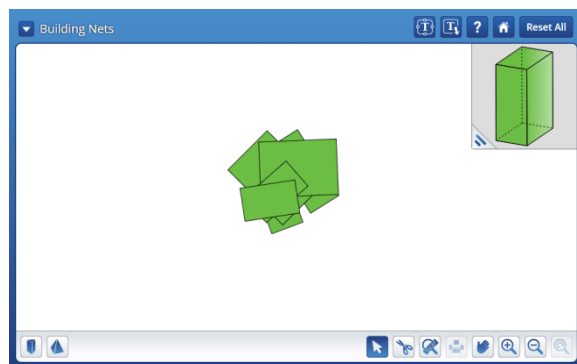
Practice Building Nets: Rectangular Prism


- Choose a geometric solid for which to build a net.

- Click . Move the cursor over the icon for rectangular prism  and click.
- The prism appears in the upper-right of the workspace, and the pieces that form the net are in a pile in the middle.


- Put similar pieces of the net together.

- Click and drag each piece from the center away from the pile.

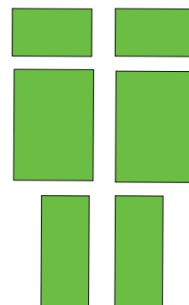


- On the left side of the workspace, place the 2  shapes together. Place the 2



shapes together. Place the 2  shapes together.



- Rotate each piece by dragging any corner of the shape in a clockwise or counterclockwise direction. Organize the pieces like this:





- Put the four side pieces together.

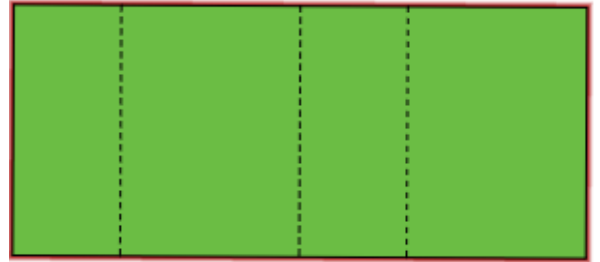


- Drag one  to the left-center of the workspace to start the net.


- Drag one  just to the right of the . They will snap together at a dotted line.


- Drag the other  to right of the last piece that you placed.



- Drag one  just to the right of the last piece that you placed. This will form a long rectangle with the four pieces.

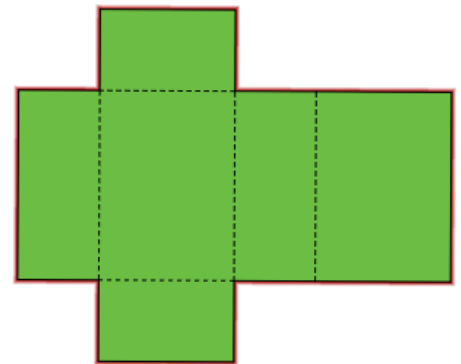


4 Put the top and bottom pieces of the prism onto the net.



- Drag one  so that it connects to the top of the second piece from the left of the net.

- Drag the other  so that it connects to the bottom of the same piece of the net. The net is now complete.

- To separate a piece from the net, click the . Then click on the dotted line that connects the piece to the net. Click on the  and drag the detached piece to connect at another location on the net.



Additional Features

- Click  to print the net.
- Use  to move the net in the workspace.



Explore Creating a Table of Input-Output Values

You can see results for the input and output of a particular rule.

- 

Practice Using the Input-Output Machine

- Explore

0

1

2

3

4

5

6

7

8

9

New Tile

Save Machine Here



Add Machine


Show Graph

Show Table

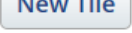
Input	Output



Clear Table

- 6 Drag the number tile  down to the  so that it passes through both machines.
The output should be 6, since $1 + 9 - 4 = 6$.
The input and output values will appear in the first row of the table.


- 7 Drag tiles numbered 2, 3, 4, and 5 down to the  so that they pass through both machines.

The input and output should appear in the table on the right. The last input tile that goes through the machine, 5, is the last one to appear in the table.

- 8 Click the  button. Enter "10" on the keypad and click "OK".

- Drag the number tile  down to the  so that it passes through both machines.





This will give you the sixth input/output value for the rules, which appears as the last row in the table.


- 9 You can see a graph that represents the values in the table with values by clicking the  button.

- Clicking on a point on the graph will show its ordered pair as (x, y) with x being the input and y being the output.




Additional Features



- Use the buttons     to the bottom right of the graph to view the data in different ways.

- You can print the table of input and output values by clicking  .

Input-Output Machine

Predict the Output

You can enter values for the "Output" column and check to see if you predicted the correct output values to match the input values and the rule. Click  to see the drop-down menu and select **Predict the Output**.







- You can set a rule by clicking on a machine  to change the operation and number for the rule.
- You can enter a value in the "Output" column of the table by clicking on the blank box . A keypad will pop up in which you can enter a number for the predicted outcome.

Practice Using the Input-Output Machine

- Find the output values when the input values are 0, 2, 4, 6, 8, 10, and 12 with a rule

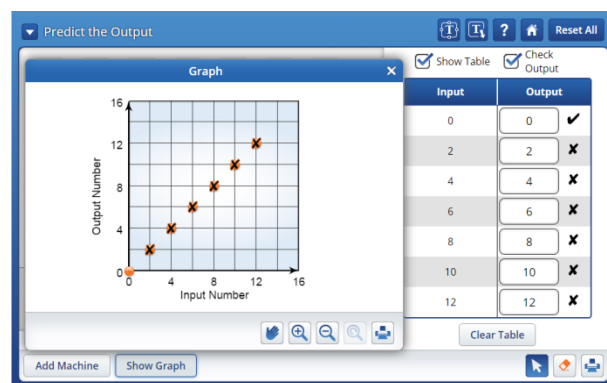


. Click on the machine to change the rule.

- Use the  to change the operation to \div .
 - Use the  and  to change the rule value to 2.
 - Click "OK" to save the rule.
- Make sure the "Show Table" box is checked and the "Check Output" box is NOT checked.
 - Click on the first blank box under the "Output" column to enter a value for the output. Click "Enter" to save the number you enter.
The correct output should be "0".
 - Click on the remaining blank boxes to enter the output values for each given input value.
 - All the number tiles above the machine should no longer be transparent.
 - Check to see if your output values are correct by checking  Check Output.
 - All Output values that are correct will have a  next to it.
 - All Output values that are not correct will have a  next to it.

Input	Output
0	0 ✓
2	2 ✗
4	4 ✗
6	6 ✗
8	8 ✗
10	10 ✗
12	12 ✗

- 6 You can see a graph that represents the table with Output values that you entered by clicking the **Show Graph** button in the bottom shell.
- Clicking a point on the chart will show its ordered pair as (x, y) with x being the input and y being the output.





Measuring Cylinders

Click the  button at any time to return to the Main Menu.

Reading and Comparing the Temperature on the Thermometer

You can show different temperatures on a thermometer in both degrees Fahrenheit and degrees Celsius.

- You can check and uncheck the boxes on the bottom of the workspace to show or hide degrees Fahrenheit or degrees Celsius.
- You can show the change or difference between two temperatures by toggling to


Difference mode  .

Practice Using the Thermometer

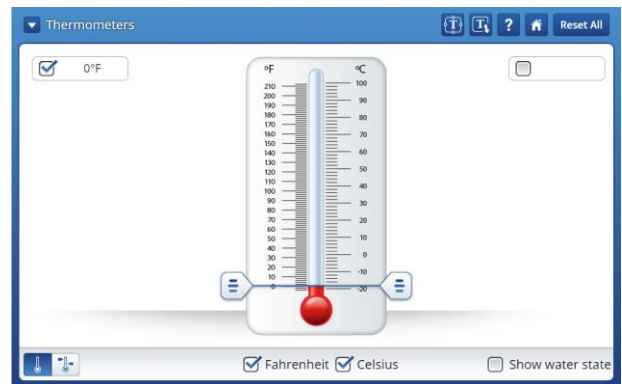
- 1 Find the temperature in degrees Celsius when it is 82° Fahrenheit.

Check and uncheck the boxes on the workspace.

- Make sure both the Fahrenheit and Celsius boxes are checked in the bottom shell.
- Uncheck the box that shows the Celsius temperature located in the upper-right corner of the workspace.

- 2 Drag the  up to 82° Fahrenheit.


- The upper-left corner of the workspace should display  82°F.



- 3 Estimate the temperature in degrees Celsius on the thermometer.

- Focus on the right side of the thermometer, which shows the degrees in Celsius. The temperature is where the line crosses the thermometer or the point where the thermometer is filled in red.

- 4 Check the box in the upper-right corner of the workspace so that the temperature in degrees Celsius displays to so you can check your estimate.


The temperature should read close to  28°C.



Measuring Cylinders




Exploring Different States of Water

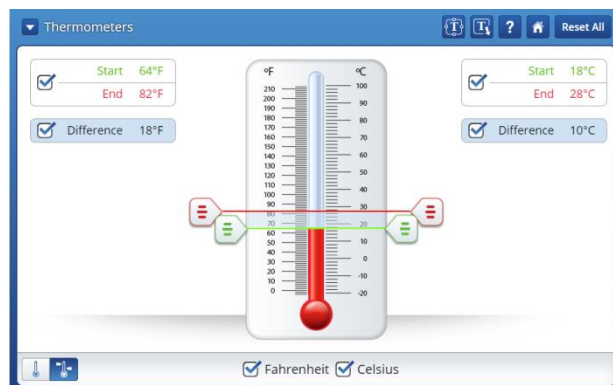
See how water changes at different temperatures.

- 1 Click the "Reset All" button in the top shell above the workspace. Then click OK.
- 2 Check the "Show water state" box.
- 3 Drag the  up and down to see at what temperature water freezes and boils.

Finding the Difference between Two Temperatures

If the temperature during the day rises from 64° Fahrenheit to 82° Fahrenheit, what is the change in temperature in both Fahrenheit and Celsius?

- 1 Find the difference between two temperatures.
 - Click the "Reset All" button in the top shell above the workspace. Then click OK.
- 2 On the bottom shell, toggle to Difference mode .
- 3 On the left side of the Thermometer, drag the  up to 64° Fahrenheit.
 - Then, drag the  up to 82° Fahrenheit.



- 4 The difference in temperature in degrees Fahrenheit and degrees Celsius from the start temperature to the end temperature is now displayed.

The change in degrees Fahrenheit is  Difference 18°F.

The change in degrees Celsius is  Difference 10°C.

Math Tools









Measuring Cylinders

Solving Capacity Number Stories and Word Problems

To view the containers mode, change **Thermometers** to **Containers** by clicking the down arrow from the top shell.

The workspace provides an automatic check system.




You can show the capacity of water in a container as water is added or taken away at different intervals.

- You can add water to the container by clicking .
- You can take away water from the container by clicking .
- You can change the capacity of the container by clicking  or  next to "Capacity".
- You can change the markings on the container by clicking  or  next to "Interval".

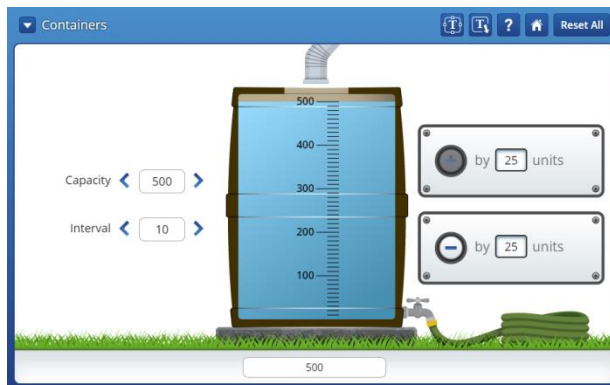
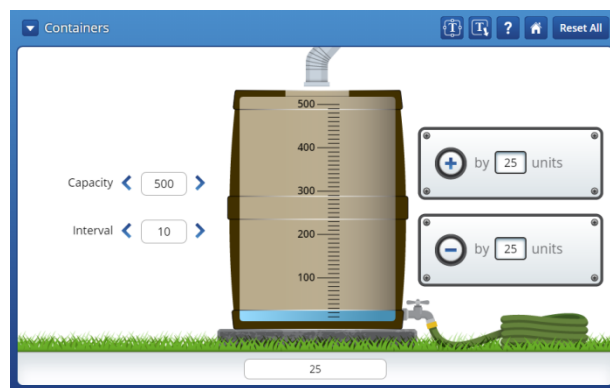
Practice Using the Container




For a 500-unit container, how many hours will it take to fill the container if water is pumped in at a rate of 25 units per hour?

1 Adjust the settings to best fit the situation.





- Click on  next to "Capacity" to change the capacity from 100 to 500.
- You can also change the interval of the marks shown on the container. The choices are 5, 10, or 50. An interval of 10 will have a mark at every 10 units going up to 500 units.
- Change the number in the box that has the  button by clicking inside the units box. Using the keypad, insert the number 25, then click the Enter button.
- You may want to also enter the same number (25) in the units box of the  button to double-check your answer later.

2 Fill the container with water until you reach 500 units.



- Click  as many times as needed to reach the top of the container (500 units). When the water reaches the maximum capacity, the  button will be disabled.
- Keep track of how many times you click the  button. This will give the number of hours it takes to fill the container.

3 Drain the container of water until the container is empty.

- Click  as many times as needed to reach the bottom of the container (with no water shown).
- A good way to check your answer from Part 2 when you filled up the container with water is to keep track of how many times you click the  button. The number of  clicks and  clicks should match if each is set to the same number of units (25).







Money

Click the  button at any time to return to the Main Menu.



Equivalent Money Amounts


You can find different combinations of bills and coins that equal the same amounts.






- Use  and  to exchange money.
- Use  when you want to arrange the displayed money from greatest to least.
- Use  to view different formats for writing the amount.

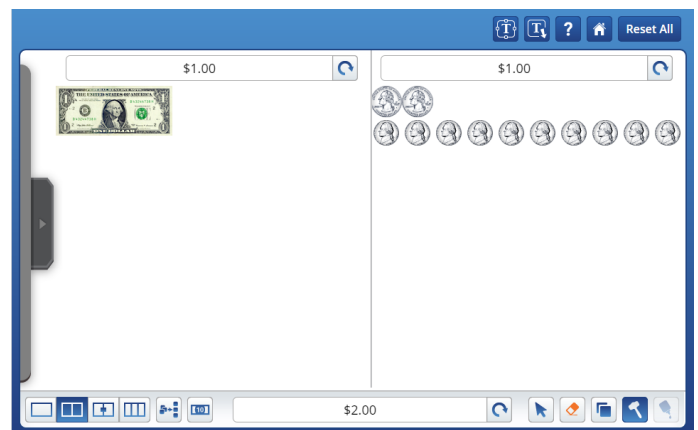
Practice Using Money


- 1 Show the same amount of bills and/or coins in both workspaces.

- Click  to view the two-part workspace.
- Click . Place \$1 in each part of the workspace. Notice the Odometers show \$1.00.





- 2 In the right workspace, use  to exchange money.

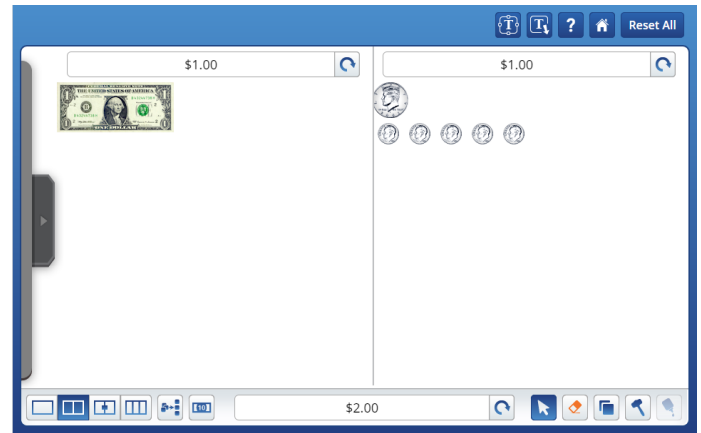
- Click the  on the \$1 bill. Notice the exchange to 2 half dollars.
- Click the  on the 2 half dollars. Notice the exchange to 4 quarters. Use  to move the coins as needed for better viewing.
- Click the  on 2 quarters. Click the  on 4 dimes.
- Notice the Odometer still shows \$1.00. So, \$1 is the same as 2 quarters and 10 nickels.







- 3 In the right workspace, use  to exchange money.

- Click the  to highlight 2 quarters. Click the  to exchange to a half-dollar.

- Click the  to highlight 2 nickels. Click the  to exchange into a dime. Repeat until all nickels are exchanged.
- 4 The amount shown in each Odometer is still \$1.00. So, \$1 is the same as one half-dollar and 5 dimes.
- 5 Click  to see the amount written as cents. Click  again for the amount in words.



Additional Features

- Use the  to make copies of money within the workspace.
- Click the  to work with denominations of money that are multiples of 10.
- You can use  to compare two amounts of money. Click  to view the multi-part workspace.




Number Charts










Click the  button at any time to return to the Main Menu.

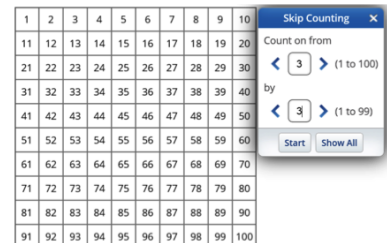
Skip Counting by Threes

You can skip count using the hundred chart.

- This workspace provides a chart with 100 spaces that can be set to start at any number.
- Use  to change the number that the chart begins with.

Practice using the Hundred Chart

- On the bottom shell, click on . You will see a dialog box where you can enter a number to start from and a number to count by.
 - Use the  button to change the Count on from number to 4.
 - Use the  button to change the Count by number to 4.
 - Click on  to highlight the first number. Then click on  to highlight each subsequent number.
- Use  to show all the numbers in the skip counting pattern at once.
 - Use  to clear the chart and start a new pattern.
 - Change the number in the "Count on from" box to change the starting number of the skip counting.
- The number you are skip counting by can be changed to any number by changing the number in the "by" box. Anytime you want to count by a different pattern, use  to clear the chart and start over.
- In the bottom shell, click the Circle Primes box . You will see all the prime numbers circled in the Hundred Chart.






Number Charts



Finding Sums

You can find sums using the Addition Chart. To get to the Addition Chart mode, click  to see the drop-down menu and select **Addition Chart**.




- This workspace provides a chart that can be used to find any sum between 0 and 998.
- Use  to change the number that the rows and columns start at. The rows and columns can start with any number between 0 and 491.

Practice Using the Addition Chart

1 Find the sum $8 + 9$.

- To add $8 + 9$, click on  in the top row. Then, click on  in the left-most column. The sum is the number where the green strips intersect. So, the sum is $9 + 8 = 17$.

+	1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18

2 Now, find the sum $246 + 84$. Use  to start the row to include 246 and the column to include 84. You may use your keyboard or the arrows,  and , to insert numbers in the Set Chart box. Then click OK.

- Click on 246 in the left-most column 246 and 84 in the top row. The intersection is at 330. So, $246 + 84 = 330$.

Anytime you want to find a different sum, use  to clear the chart and start over.



Number Charts

Finding Products

You can find products using the Multiplication Chart. To get to the Multiplication Chart mode, click to see the drop-down menu and select **Multiplication Chart**.

- The workspace provides a chart that can be used to find any product between 0 and 961.
- Use to change the number that the rows and columns start at. The rows and columns can start with any number between 0 and 23.

Practice Using the Multiplication Chart

1 Find the product 6×8 .

- To multiply 6×8 , click on in the left-most column. Then, click on in the top row. The product is the number where the green strips intersect. So, the product is $6 \times 8 = 48$.

×	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

2 Now, find the product 18×21 . Use to start the rows to include 18 and the columns to include 21. Then click OK.

- Click on 18 in the left-most column and 21 in the top row. The intersection is at 378. So, $18 \times 21 = 378$.

Anytime you want to find a different product, use to clear the chart and start over.

×	20	21	22	23	24	25	26	27	28
10	200	210	220	230	240	250	260	270	280
11	220	231	242	253	264	275	286	297	308
12	240	252	264	276	288	300	312	324	336
13	260	273	286	299	312	325	338	351	364
14	280	294	308	322	336	350	364	378	392
15	300	315	330	345	360	375	390	405	420
16	320	336	352	368	384	400	416	432	448
17	340	357	374	391	408	425	442	459	476
18	360	378	396	414	432	450	468	486	504

Additional Features

You can change the highlighted color of the rows and columns.

- It is especially helpful when you highlight 2 or more rows or columns at the same time.
- The color choices are at the bottom of the workmat. You



can click the Paint Brush and Select Color buttons to choose different colors and highlight any product on the Number Chart.

- The Hide Cells button lets you hide any numbers that are not part of your equation.





Number Line

Click the  button at any time to return to the Main Menu.



Adding Whole Numbers, Fractions, and Decimals


You can add whole numbers, fractions, and decimals using a number line.


- The two-part workspace  provides a number line that can be set for whole numbers, fractions, or decimals.
- Use  to set the number line to whole numbers, fractions, or decimals as needed.

Practice Using a Number Line


- 1 The number line is set for whole numbers from 0 to 10 by default.


- Drag a  onto the 3 and a  onto the 7. Use the number line to determine what must be added to 3 to equal 7.

Drag 4  onto each whole number between 3 and 7. So, $3 + 4 = 7$.

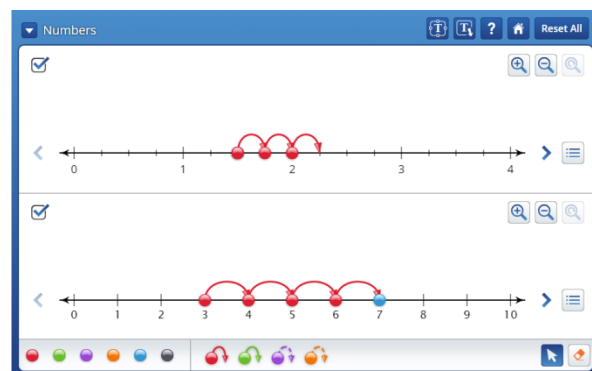
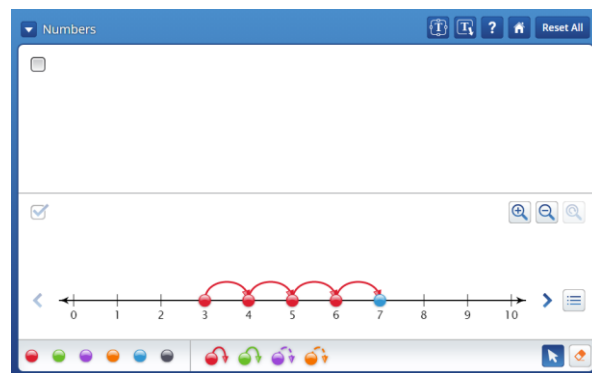
- 2 Select the top number line by checking the checkbox. Use  to set the number line to fractions. Set the minimum to 0/1, the maximum to 4/1, and the interval to 1/4.

- Drag a  onto $1 \frac{1}{2}$.

- You can add $\frac{3}{4}$ to $1 \frac{1}{2}$ by dragging 3  onto to each fractional part to demonstrate that $1 \frac{1}{2} + \frac{3}{4} = 2 \frac{1}{4}$.

- Use  to set the number line to change to decimal form. You can set it up similarly to the fraction mode to demonstrate the addition of decimals.


- Use  to clear the number line and start over with the default number line.











Number Line

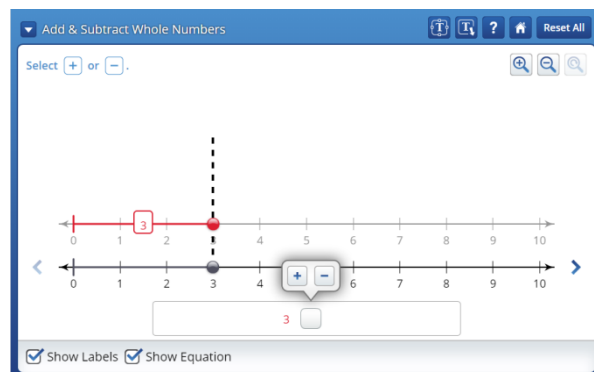
Adding and Subtracting Whole Numbers



You can add and subtract whole numbers using a number line. To get to the Add & Subtract Whole Numbers mode, click  to see the drop-down menu and select **Add & Subtract Whole Numbers**.


Practice Adding/Subtracting Using a Number Line

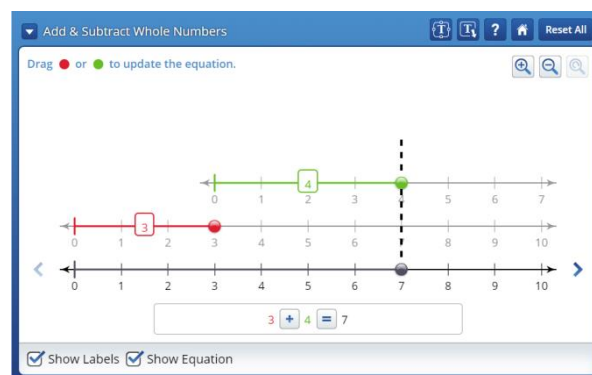
1 Use number lines to create the addition equation $3 + 4$.

- Under , drag the red dot to the first number in the equation, 3. Click on the "Set Value."
- In the , click on the .
- Under , drag the green dot to the second number in the equation, 4. Click on the "Set Value."
- In the , click on the . So, $3 + 4 = 7$.



2 You can set up a subtraction equation by following the same steps except click  instead of .


- You can add or subtract up to 3 numbers in the equation using the number lines.
- Use  to clear the number line and start over with a new equation.





Number Line

Adding and Subtracting Decimals










You can add and subtract decimals using a number line. Click  to see the drop-down menu and select **Add & Subtract Decimals**.

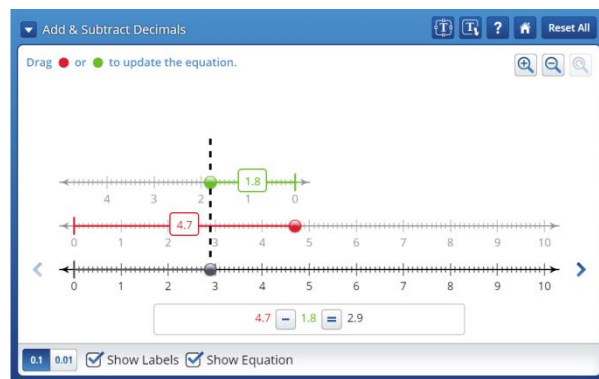
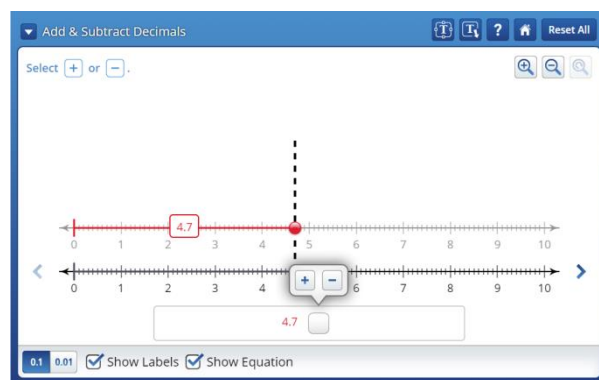
- The workspace provides a number line that can be used to demonstrate the addition and subtraction of decimals.
- The number line can be set to add/subtract tenths or hundredths by clicking on



Practice Adding/Subtracting Decimals Using a Number Line

- 1 Use number lines to create the subtraction equation $4.7 - 1.8$.


- Under , drag the red dot to the first number in the equation, 4.7. Click on the "Set Value."
- In the , click on the .
- Under , drag the green dot to the second number in the equation, 1.8. Click on the "Set Value."
- In the , click on the . So, $4.7 - 1.8 = 2.9$.
- You can set up an addition equation by following the same steps except click  instead of .
- You can add or subtract up to 3 decimal numbers in the equation using the number lines.
- Use  to clear the number line and start over with a new equation.







Number Line


Adding and Subtracting Fractions

You can add and subtract fractions using a number line. Click  to see the drop-down menu and select **Add & Subtract Fractions**.

- The workspace provides a number line that can be used to demonstrate the addition and subtraction of fractions.
- The number line can be set to add/subtract fractions or mixed numbers by clicking on  .

Practice Adding/Subtracting Fractions Using a Number Line

1 Use number lines to create an addition equation. Find the sum of $\frac{1}{6} + \frac{3}{4}$.



- Since the first fraction is $\frac{1}{6}$, choose 6 for the denominator. Under , drag the red dot to $\frac{1}{6}$. Click on the "Set Value."


- In the , click on the .

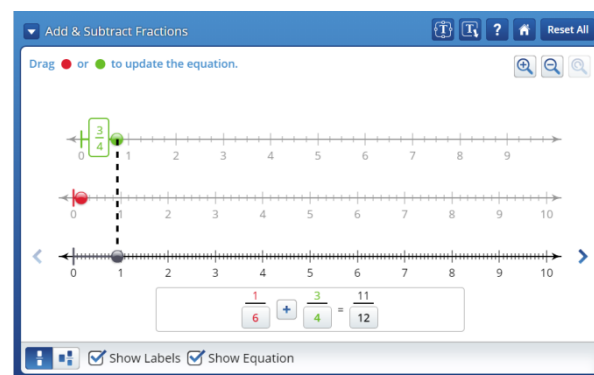
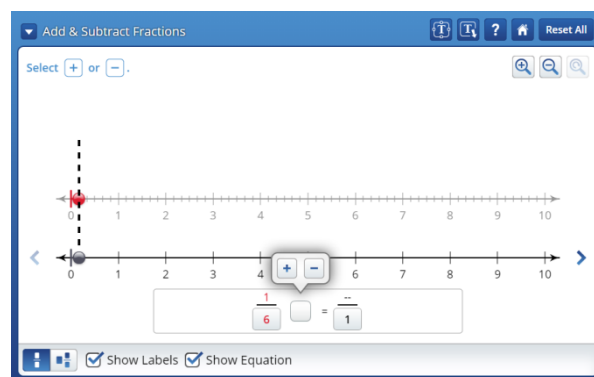
2 To show the fraction $\frac{3}{4}$, choose 4 for the

- denominator. Under , drag the green dot to $\frac{3}{4}$. Click on the "Set Value."

- To add the fractions, you must have a common denominator. Select 12 as the denominator. So, $\frac{1}{6} + \frac{3}{4} = \frac{11}{12}$.
- If you select the incorrect denominator, it will leave the numerator blank. Then, you know you need to select a different number for the denominator.

3 You can set up a subtraction equation by following the same steps except click  instead of .


- Use  to clear the number line and start over with a new equation.

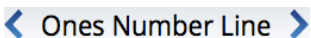




Number Line


Using Number Lines to Compare Intervals of Different Place Values

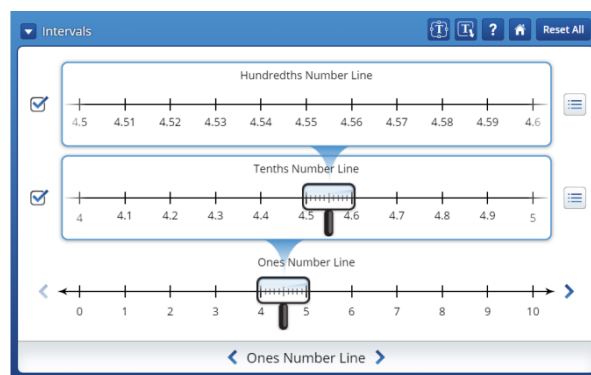
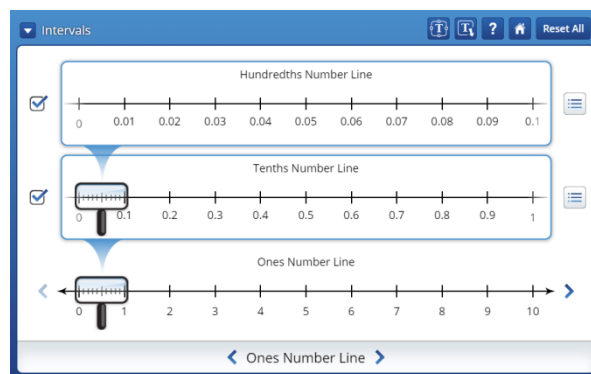
You can use a number line to compare intervals of various place values. Click  to see the drop-down menu and select **Intervals**.

- The workspace provides 3 number lines that represent 3 different place values.
- Click on either arrow of  to set the bottom number line to show ones, tens, or hundreds place value.
- The number line above each number line is like looking through the magnifying glass on the number line below it to see the smaller units of place value.

Practice Comparing Intervals on a Number Line

1 Use the number lines to show the place on a number line for the number 4.57.

- Since 4.57 is between 4 and 5, drag the magnifying glass on the ones to show the interval 4 to 5.
- 4.57 is between 4.5 and 4.6 on the tenths number line. Move up to the tenths line and drag the magnifying glass to show the interval of 4.5 to 4.6.
- You can change the bottom number line to ones, tens, or hundreds to examine the place values of different numbers.
- Use  to clear the number lines and start over with for a new number.





Pan Balance

Click the  button at any time to return to the Main Menu.

Comparing Numbers


You can compare values on a balance scale.

- The workspace provides a pan balance that can be used to compare two or more numbers.
- Drag numbers onto each side of the balance to see how they compare. The x-block can be used to introduce a balanced equation.

Practice Using a Pan Balance to Compare Numbers

- 1 Click and drag numbers onto each side of the scale to make an equation. Drag 1 and 3 into the left pan and drag 3 and 5 into the right pan.


- The odometer shows the inequality statement.

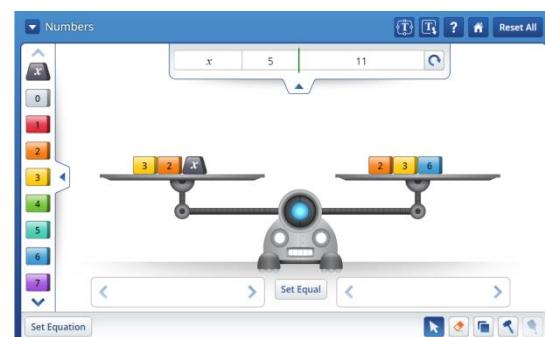
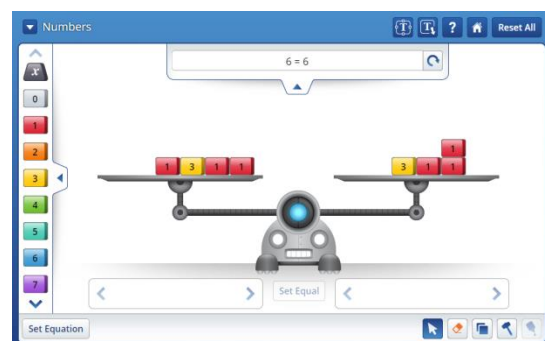
- 2 Use  to break apart the 5 in the right pan into 5 ones. Move cubes between pans to make the sides equal. Notice this turns the inequality into an equation.

- Use **Reset All** to clear the balance and start over.

- 3 Introduce a variable by using the x-block from the menu on the left.

- Drag x onto the left side of the balance and 6 as a value for x onto the other side. Use **Set Equal** to set the variable equal to that value.

- Now, drag equal or unequal values to both sides of the scale to demonstrate balanced and unbalanced equations. Click the  odometer to see the equation as a bar model.




Math Tools



Pan Balance

Comparing Symbols



You can compare shapes that have been randomly assigned different values. To get to the Symbols mode, click  to see the drop-down menu and select **Symbols**.






- The one-part workspace provides a balance that can be used to compare two or more shapes of unknown weight.
- Drag symbols/shapes onto each side of the balance to see how they compare.

Practice Comparing Numbers

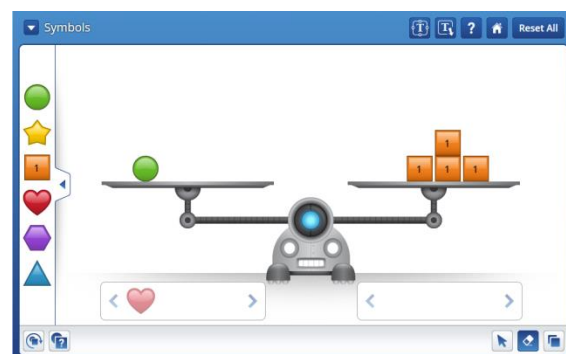
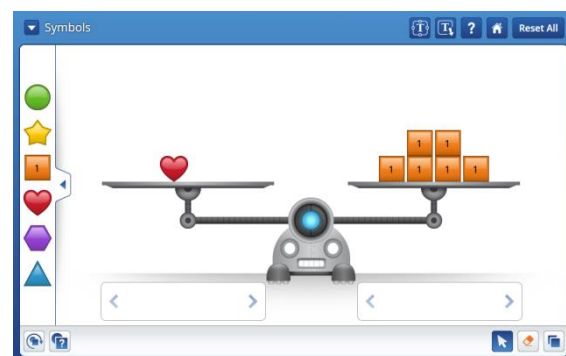
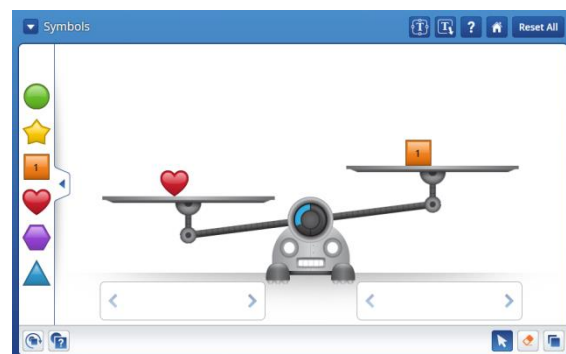
- 1 Drag a heart onto one side of the balance and a square onto the other.
 - Compare the weights of each shape.
- 2 Drag more squares onto the pan balance until the sides are equivalent.
- 3 Next, find how many squares would be equivalent to one circle.

- 4 You can use the balance to order the weights of each shape from least to greatest.

- 5 Click  to type the values of the shapes as you find them. If you are correct, you will see a  next to the shape.

Guess Values			
	=	<input type="text"/>	x
	=	1	✓
	=	<input type="text"/>	x
	=	<input type="text"/>	x
	=	<input type="text"/>	x
	=	<input type="text"/>	x

- Anytime you want to compare symbols using different values, use **Reset All** to clear the balance and start over.





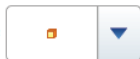


Place-Value Blocks

Math Tools

Click the  button at any time to return to the Main Menu.













Modeling Numbers

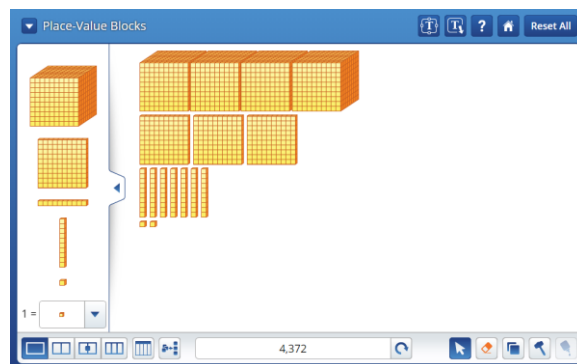
You can model whole numbers using place-value blocks.

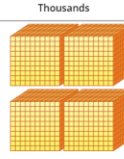
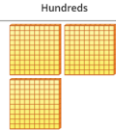


- The $1 =$  menu allows you to choose which block will be the unit block. When Small is selected,  equals 1. The values of the other blocks are set as 10, 100, and 1000.
- Use  to move blocks.


Practice Using Place-Value Blocks

Model the number 4,372.

- 1 Click . Place one Large cube in the workspace for each thousand in the number being modeled. Use 4 .
 - 2 Click . Place one Flat in the workspace for each hundred in the number. Use 3 .
 - 3 Click  or . Place one Long (either horizontal or vertical) in the workspace for each ten in the number being modeled. Use 7 .
 - 4 Click . Place one Small cube in the workspace for each one in the number being modeled. Use 2 .
 - 5 Click  to arrange the blocks in an organized way.
 - 6 Click  to display different ways of naming that number. Click one time for the Odometer to show the number in words. Click again for the Odometer to show the standard form of the number: 4,372.
- Click  to show the place-value chart. Notice that the blocks in the workspace are positioned in



Place-Value Chart			
Thousands	Hundreds	Tens	Ones
			
4	3	7	2
4,372			


the proper columns and the Odometer shows the number: 4,372. Click  to close the place-value chart.




Place Value Blocks

Math Tools


Multiplying Numbers

You can find the product of two numbers using an array. To get to the Arrays mode, click  to see the drop-down menu and select **Arrays**.






- Click on the  in the upper right corner of the array box and drag to resize the array.

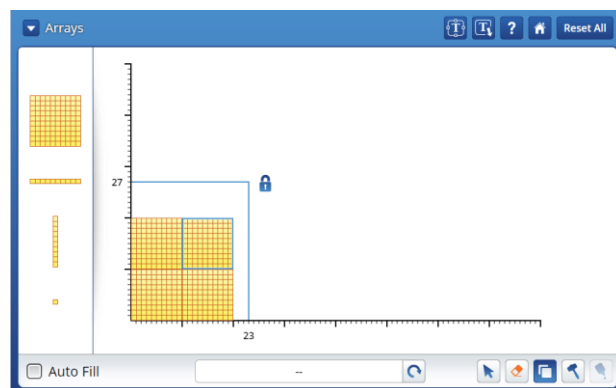
Practice Using the Array Workspace

Model the multiplication problem $27 \times 23 = 621$.







- 1 Click  and drag to set the factors of a multiplication problem. Use 27 along the vertical scale and 23 along the horizontal scale.

- 2 Begin to fill the rectangle with  blocks.

- Click . Place the block in the lower left corner inside the rectangle.
- Click the  on the block in the rectangle to copy a  in the rectangle.
- Continue to click the  on a  in the rectangle until it appears that no more can fit inside the rectangle. (Click 3 times.)





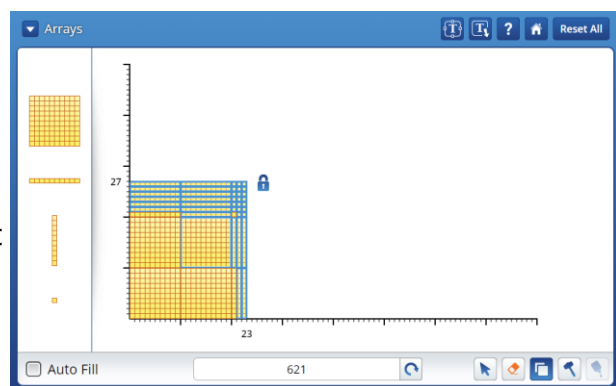
- 3 Continue placing blocks in the rectangle until it is filled.

- Click . Place a  above the upper left .
- Click the  on the  to copy another  inside the array.

- 4 Continue to click the  on a  until it appears that no more can fit inside the rectangle. (Click 13 times.)



- Place 6  inside the rectangle.
- Place  to fill the rectangle. Place 21 Small cubes.
The multiplication problem solved is $27 \times 23 = 621$.
- Check "Auto Fill" to automatically fill the array.








Place-Value Blocks

Math Tools






Comparing Numbers

You can compare numbers using place-value chips. Click  to see the drop-down menu and select **Place-Value Chips**.


- Use the  workspace. Actions are applied in this workspace only.
- Use  to copy selected chips.

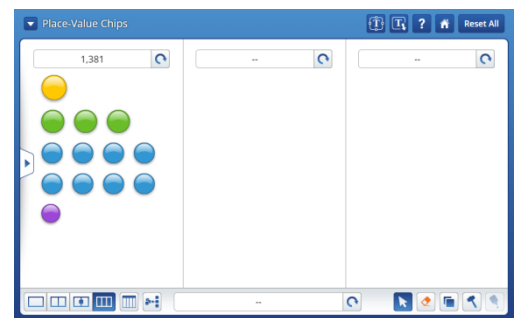
Practice Using Place-Value Chips



- Place chips in the left workspace to represent a number having digits in the thousands, hundreds, tens, and ones places. Use 1,381.

- Place 1 . Place 3 . Place 8 . Place 1 .
- Click  once to show the word form of the number in the Odometer. Notice that the Odometer may not display the complete number word in the window. Click on the Odometer window to display the complete text.





Click  again to check that the left Odometer shows 1,381 in standard form.











- Click  to arrange the blocks in an organized way.




- Click  to show the place-value chart. Notice the number in each place-value column. Click  to close the place-value chart.

- In the middle workspace show a number that is 100 more than 1,381.

- Use  and drag a rectangle around all the chips in the left workspace.
- Click  and click on any selected (blue highlighted) chip.
- Click . Click and hold on one of the blue highlighted chips and drag the group into the middle workspace.
- Place one more  in the middle workspace to add 100 to 1,381.




Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
			  	    	
0	0	1	3	8	1

1,381


- Click  two times and check that the middle Odometer shows 1,481.

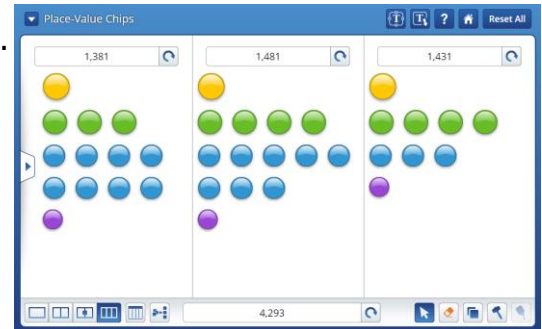
4 In the right workspace show a number that is 50 less than 1,481.

- Select and copy the chips in the middle workspace. Move the copied chips into the right workspace.




- Use  to take away 50. Click the  on 5 .

- Check that the right Odometer shows 1,431.

- Click  on the lower odometer two times to show the numbers in standard form. This will show the total of all three workspaces. Check that the lower odometer reads 4,293.



Additional Features

- Click the  to break the place-value chips or place-value blocks into smaller units.
- You can use  to combine smaller units into a larger unit. Select a group of ten chips or blocks of the same value, such as ones chips, and click .