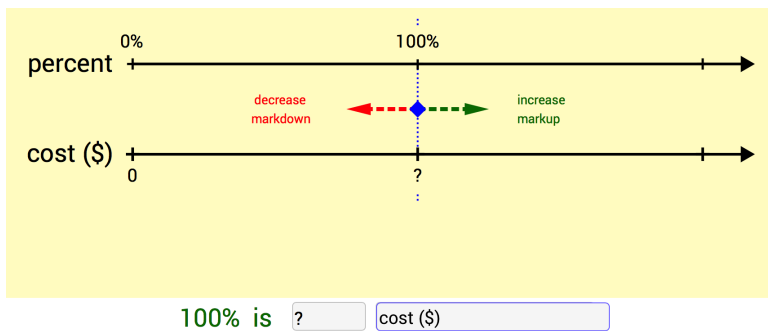


## Introducing Percent Change on the Double Number Line

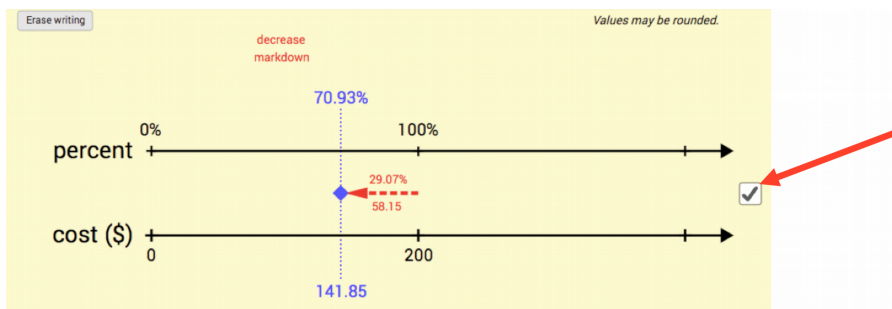
One of the key ideas embedded in a *percent change* problem is that the whole, or original value, in the problem is equivalent to 100%. Review the representations below and notice the whole in the problem.

A bicycle has an original cost of \$200. It is on sale for 25% off. What is the sale price?

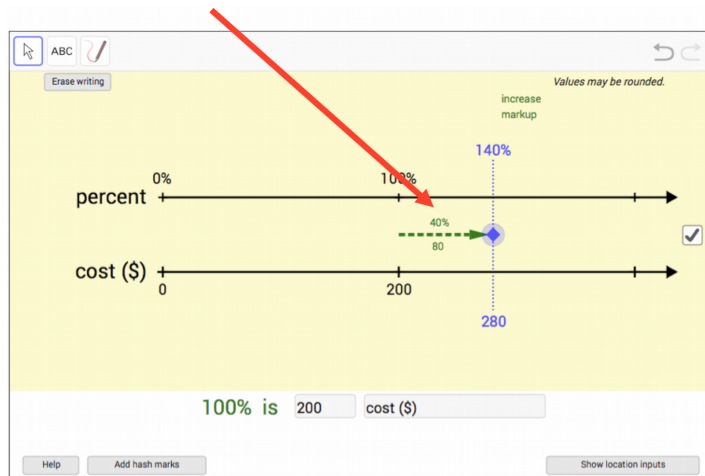
1. Review the **Double Number Line – Percent Change** applet screen below.



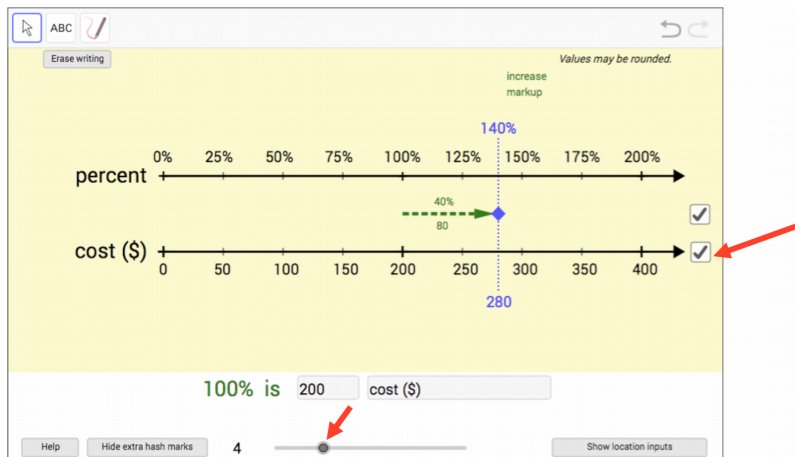
2. Go to the **Double Number Line – Percent Change** applet online.
3. Delete the question mark and enter the original cost of 200 where the “?” is in the applet.  
**Note** – Do not include the “\$” in the box where you enter the number for the original cost. Add the label “**cost (\$)**”.
4. You will notice that the value of 200 appears on the bottom number line and there is also a blue 200 associated with the diamond-shaped blue point that is between the number lines.
5. Drag the blue point to the left of 100% moving in the direction of 0%. Notice the **percent value** and the **cost value** changing. Also notice the red text showing **decrease** and **markdown**.
6. Click on the white check box to the right of the double number line to show the **percent decrease** and the amount the **value decreased** above and below the arrow.



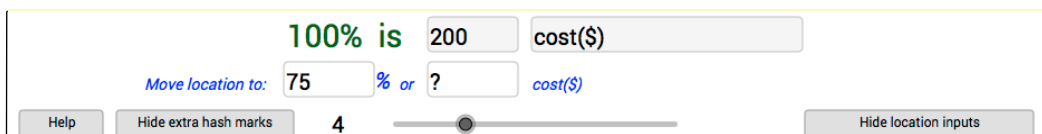
7. Drag the blue point to the right of 100% and you will see the **percent increase** and amount the **value increased** in green above and below the arrow.



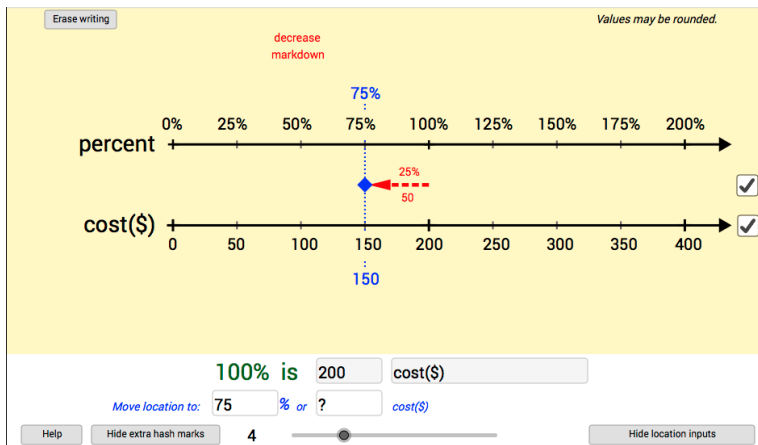
8. To add hash marks and additional reference values to your Double Number Line, click on the **Add hash marks** button. A slider will appear. Drag it to the right to see 4 hash marks for 100%. Click on the second white check box to display the cost values.



9. Use the applet to answer example markup questions:
- If the \$200 bicycle is marked up an additional 40%, how much is the new cost?
  - What is the retail cost of a bicycle with a \$200 wholesale cost and a 50% markup?
10. Use a location input box: click on the **Show location inputs** button. Enter 75 in the *Move location to:* box.



11. Review the double number line to answer the original question, "A bicycle has an original cost of \$200. It is on sale for 25% off. What is the sale price?"



You can use the **Double Number Line– Percent Change applet** to demonstrate markup and markdown scenarios on a double number line. The applet reinforces the whole or original value and its association with 100%.

Because you can add hash marks without labeling them at first, students can use the hash marks to help visualize the problem and predict the solution. This is a helpful skill because it reinforces the ratio, or relationship, and supports students as they think about common divisors or common multiples between the numbers.

Once students make predictions they can then check their prediction using the **Show location inputs** button or by moving the blue point.