

**MoveOver : Part One - How To Use MoveOver**

LiveMath is designed for you to do math...not watch math. You have already tried your hand at moving expressions around to perform operations such as substitution.

This same type of interaction is also possible within expressions and equations to manipulate the objects algebraically.



Consider this equation:

$$\square 3x + 5 = \square x + 4$$



If you were solving this equation for x you might decide to isolate x on the left hand side of the equal sign. A first step might be to move the $-x$ from the right side over to the left side. This is what you do in LiveMath also.

To perform this action within the notebook, you are going to **MoveOver** the $-x$.

Step 1) Double click on the x on the right hand side of the equation. This will highlight the x .

$$\square 3x + 5 = -x + 4$$

Step 2) Macintosh: Press and hold down the COMMAND key.
Windows: Press and hold down the CONTROL key.

The cursor will change from an arrow to a pointing hand.

$$\square 3x + 5 = -x + 4$$

Step 3) Keep pressing on that key. Press down on the (left) mouse button and hold the mouse button down. You have grabbed a hold of the x .

Step 4) Move the cursor to the left side of the equal sign. When you get the cursor over to the left side LiveMath will indicate that it has found a permissible place to move the x by highlighting and drawing a line from where the x was to where it is going.

$$\square 3x + 5 = -x + 4$$

Step 5) Release the mouse button. Release the keyboard key.

LiveMath will perform the algebra that you have initiated and produce a result statement.

$$\square 3x + 5 = -x + 4$$

$$\triangle 4x + 5 = 4 \quad \text{Move Over}$$

Click anywhere on the notebook to unhighlight the equation.

$$\square 3x + 5 = -x + 4$$

$$\triangle 4x + 5 = 4 \quad \text{Move Over}$$

- LiveMath moved the x over. Since it was being subtracted on the right hand side, it will be added on the left hand side resulting in a total of 4x. In effect you have added x to both sides. The 4 and 5 remains where they were. They were unaffected by the x.

The 5 can be moved over as well.

$$\square 3x + 5 = \square x + 4$$

$$\triangle 4x + 5 = 4 \quad \text{Move Over}$$

$$\triangle 4x = \square 1 \quad \text{Move Over}$$

- The resulting equation is $4x = -1$. To isolate x we would need to move over the 4. In effect divide both sides by 4.

Divide both sides


- Of course we can do just that. Divide both sides by 4.

- First we want to place in the notation to divide both sides by 4 and then we want to ask LiveMath to go ahead and do the division.


- First step is to put in the division notation. Here we will use fraction notation for division.

Method 1

Highlight the lefthand side, $4x$, with the cursor and mouse. Press the  key or

choose the fraction template  from the palette. Type in a 4 into the denominator. Now do the same to the right hand side of the equal sign.

Method 2

With the cursor highlight $4x$ on the left hand side of the equal sign. Hold down the SHIFT key. Highlight the -1 on the right hand side. Both sides are now highlighted and the equal sign is not highlighted. Press the  key or choose the fraction

template  from the palette. Each side becomes a fraction. Both denominators are highlighted. Type 4. Both denominators get a 4.

$$\triangle 4x = -1 \quad \text{Move Over}$$

$$\square \frac{4x}{?} = \frac{-1}{?}$$

$$\square \frac{4x}{4} = \frac{-1}{4}$$

 Click on the equal sign to highlight the whole equation. Now click on the simplify

button  in the palette.

$$\triangle x = -\frac{1}{4} \quad \text{Simplify}$$

$$\square 3x + 5 = \square x + 4$$

$$\triangle 4x + 5 = 4 \quad \text{Move Over}$$

$$\triangle 4x = \square 1 \quad \text{Move Over}$$

$$\square \frac{4x}{4} = \frac{\square 1}{4}$$

$$\triangle x = \square \frac{1}{4} \quad \text{Simplify}$$



Notice that our original equation has a square as its statement icon. The next line has a triangle as its statement icon. This lets us know that LiveMath created this statement as a result of the MoveOver action. Another MoveOver action produces the third line with a triangle icon indicating a result. Both of these results were indented to further signal that they resulted from the previous line by some operation or action.

The fourth line is back to the square icon. This line was not created by LiveMath as a result of some action. Instead we stepped in and performed some manual actions on the previous expression. LiveMath indicates this with the square icon.

A triangle icon indicates a result. A result statement is a statement that is created by LiveMath as a result of some action probably initiated by you the user.

A square icon indicates the you, the user, have broken LiveMath's concentration and stepped in yourself and did something.



Instead of stepping we could have asked LiveMath to highlight both sides for us by

clicking on the Apply button  in the palette. The Apply button allows you to perform the same action or operation to both sides.

This would have been an action by LiveMath and the result icons and indenting would have continued.

$$\square 3x + 5 = \square x + 4$$

$$\triangle 4x + 5 = 4 \quad \text{Move Over}$$

$$\triangle 4x = \square 1 \quad \text{Move Over}$$

$$\triangle \frac{4x}{4} = \frac{\square 1}{4} \quad \text{Apply}$$

$$\triangle x = \square \frac{1}{4} \quad \text{Simplify}$$

 All result statements.



Now It's Your Turn... Follow the directions below to get hands on experience.



1.

Isolate x on the left hand side in the equation

$$6x - 4 = 3x + 2$$