

STRAIGHT LINE GRAPHS

Student Notes

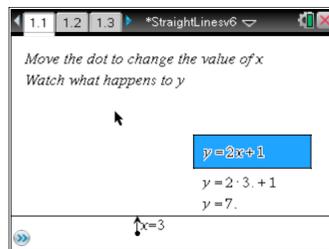
This TI-Nspire activity will help you to:

- understand the connection between equations such as $y=2x+1$ and the graphs of straight lines.

1.1 Moving x and calculating y

On your TI-Nspire handheld open the document ***StraightLines.tns***.

On page 1.1 as you change the x value, y is calculated using the equation $y=2x+1$.



Grab the big black dot and move the little arrow left and right along the line.

Watch the y values change.

Try to make

$$y = 9$$

$$y = 13$$

$$y = 1$$

$$y = -1$$

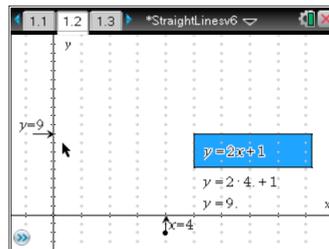
As you increase x by 1, y increases by 2.

Why does y go up in twos?

1.2 Using some axes

Press **ctrl** to move to page 1.2. Here you can see both x and y marked on the axes.

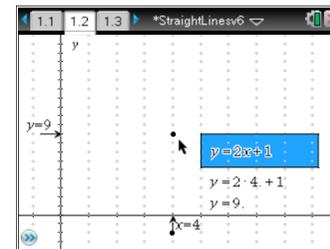
Make the value of x = 4.



Press **menu** **7** **2** to choose the Point On tool.

Move to where the two arrows are pointing and press **enter**.

You have plotted the point (4, 9) because $x=4$ and $y=9$. Press **esc**.



Make the value of x = 3.

Plot the point (3,7).

Repeat for $x=2$, $x=1$, $x=0$, $x=5$ etc.

What do you notice about the points?

1.3 Change the equation

Press **ctrl** to move to page 1.3.

Here there is a different equation.

Plot the point (4,10) for this equation.

Change the value of x and plot more points.

What do you notice about these points?

How is it different from page 1.2?

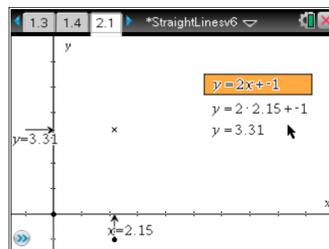
Move to page 1.4 and plot some points for this equation.

How is this one different from the others?

2.1 Sliding along the axis

Move to page 2.1, where the equation $y=2x+1$ is used.

At first sight this page looks like the previous ones but in fact it is quite different.



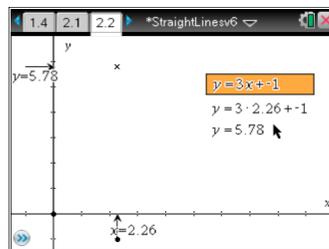
With your neighbour or your teacher discuss the differences you can see as you change the x-value on this page.

As you change the x-value, watch carefully the way the point marked with a cross moves.

Try to imagine the line that the point with the cross moves along,

2.2 Imagining more lines

On pages 2.2 up to 2.10 look carefully at each equation. Before you change the x-value, can you guess how the point with a cross will move?

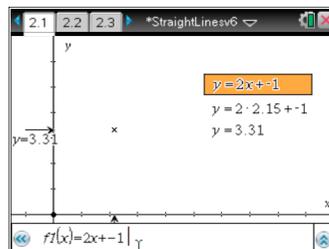


Change the x-values and see if your guess was right.

2.3 Drawing the lines

On each of the pages 2.1 to 2.10 you can draw the line along which cross moves.

To do this click on the double arrow in the bottom left corner of the screen.



Alongside $f1(x)$ type the right-hand part of the equation – so on page 2.1 you type:

$$2x+1$$

Press **enter** and you should see the straight line drawn.

Change the x-value and watch the point marked with a cross as it moves along the line.

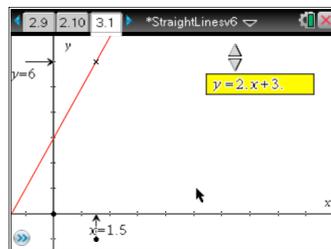
This straight line is the graph of the function.

It joins all the points whose x- and y-coordinates fit the equation.

3.1 The gradient of the graph

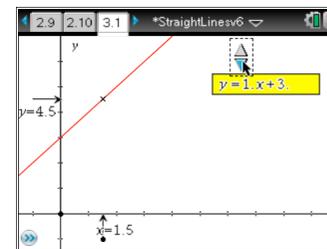
Move to page 3.1 to see the equation $y=2x+3$ and the graph of its function.

If you wish you can change the x-value to check that the point really does move along the dotted line.



Notice that above the 2 in the shaded rectangle is a double arrow. Click once (press $\left[\frac{\Delta}{\Delta} \right]$) on the down pointing arrow.

Notice the change to the function and its graph.



Click the down arrow again several times. Then try the up arrow.

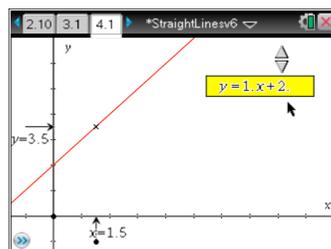
What does changing this number in the function do to the graph?

Discuss why this is.

4.1 The intercept on the y-axis

Move to page 4.1 to see the equation $y=1x+2$ and its graph.

This time there are arrows above the 2 that allow you to increase and decrease that number.



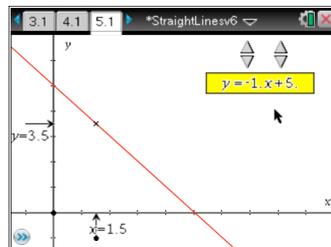
What is the effect on the graph of changing this number in the function?

Once again, discuss why this is.

5.1 From function to graph

Move to page 5.1 and there are arrows above both numbers in the function.

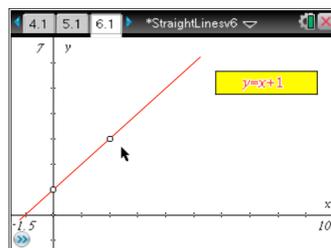
Now you can try changing both of them.



6.1 From graph to function

Up to now you have changed the equation and seen how the graph changed.

On page 6.1 you can change the graph and see how the function changes.



Here you can grab and drag either of the two white-centred dots and so change the graph.

Watch how the function changes.

See if you can make graphs whose functions are:

$$\begin{aligned} y &= 2x - 1 \\ y &= 0.25x + 4 \\ y &= -3x + 2 \\ y &= -0.5x + 4 \end{aligned}$$