***The Graph of y = (-2)x***

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***by Philip Lloyd***

If we just choose **INTEGER** values of *x* we get the following points:
eg **(0, 1), (1, *–*2), (2, 4), (3, *–*8), (4, –16) ... and (*–*1, *–* ½ ), (*–*2, ¼ ), (*–*3, *–*⅛)...**



**However, the graph does not just exist as a set of these isolated points.**

If we choose ***x = 0.25*** *we get* ***y = 0.84+ 0.84i***

***x = 0.5 we get y = 0 + 1.41i***

***x = 0.75 we get y = –1.19 + 1.19i***

 ***x = 1.25*** *we get* ***y = –1.68 – 1.68i***

***x = 1.5 we get y = 0 – 2.83i***

***x = 1.75 we get y = 2.38 – 1.38i***

 ***x = –0.25 then y = 0.59 – 0.59i***

 ***x = –0.5 then y = 0 – 0.71i***

 ***x = –0.75 then y = –0.59 – 0.59i***

 ***x = –1.25 then y = –0.3 + 0.3i***

 ***x = –1.5 then y = 0 + 0.35i***

 ***x = –1.75 then y = 0.2 + 0,2i***

 ***etc***

These points have a **REAL PART** and an **IMAGINARY PART**. In order to make sense of this, we need to be able to plot these ***complex y values*** so we need **another axis** besides the ***normal x and y axes***.

I will use only ***REAL x VALUES*** on the *x axis* and in order to plot points such as
***y = 0.2 + 0,2i*** I will put the **real part** on the normal ***y axis***
and the **imaginary part** on the ***z axis (imaginary y axis)***, using **Autograph**.

The DOMAIN of this graph is all the real numbers (ie on the real *x* axis).
But instead of a simple ***y AXIS*** we now have a ***complex*** ***y PLANE*.**
**I plotted the POINTS listed above and several more *and produced this spiral.***



I then found the **equation** of the curve and the shape becomes clearer.



Here is another version without the extra “points” ***y = ( –2)x***



An interesting variation is to change the base of the equation to ***y = ( –1.25)x***



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