Investigating Transformations of Non-Linear Graphs

Use Desmos Graphing Calculator with a y-axis scale that goes from -4 to $+4$ and an x-axis scale in degrees that goes from -150 to $+450$.

Task 1

Plot the following graphs on the same axes.

(a) $y = \sin(x)$ (b) $y = 2\sin(x)$ (c) $y = 4\sin(x)$

Print a picture of these graphs and stick it in your book. Describe how the graphs differ from each other.

Take the point $(90, 1)$ on the graph of $y = \sin(x)$. Where does this point map to on the graphs of $y = 2\sin(x)$ and $y = 4\sin(x)$? Can you describe how the coordinates of this point change in general terms?

Task 2

Plot the following graphs on the same axes.

(a) $y = \sin(x)$ (b) $y = \sin(x) + 1$ (c) $y = \sin(x) + 2$

Print a picture of these graphs and stick it in your book. Describe how the graphs differ from each other and how they are similar.

Take the point $(90, 1)$ on the graph of $y = \sin(x)$. Where does this point map to on the graphs of $y = \sin(x) + 1$ and $y = \sin(x) + 2$. Can you describe how the coordinates of this point change in general terms?

Task 3

Plot the following graphs on the same axes.

(a) $y = \sin(x)$ (b) $y = \sin(2x)$ (c) $y = \sin(3x)$

Print a picture of these graphs and stick it in your book. Describe how the graphs differ from each other.

Take the point $(90, 1)$ on the graph of $y = \sin(x)$. Where does this point map to on the graphs of $y = \sin(2x)$ and $y = \sin(3x)$? Can you describe how the coordinates of this point change in general terms?

Task 4

Plot the following graphs on the same axes.

(a) $y = \sin(x)$ (b) $y = \sin(x + 30)$ (c) $y = \sin(x + 60)$

Print a picture of these graphs and stick it in your book. Describe how the graphs differ from each other.

Take the point $(90, 1)$ on the graph of $y = \sin(x)$. Where does this point map to on the graphs of $y = \sin(x + 30)$ and $y = \sin(x + 60)$? Can you describe how the coordinates of this point change in general terms?

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Change your scale so it now has y-axis scale that goes from -10 to $+10$ and an x-axis scale that goes from -10 to $+10$.

Task 5

Plot the following graphs on the same axes.

(a) $y = x^3 + 2x^2 - 5$ (b) $y = -(x^3 + 2x^2 - 5)$

Print a picture of these graphs and stick it in your book. Describe how the graphs differ from each other.

Take the point $(1, -2)$ on the graph of $y = x^3 + 2x^2 - 5$. Where does this point map to on the graph of $y = -(x^3 + 2x^2 - 5)$? Can you describe how the coordinates of this point change in general terms?

Task 6

Plot the following graphs on the same axes.

(a) $y = x^2 - 4x + 3$ (b) $y = (-x)^2 - 4(-x) + 3$

Print a picture of these graphs and stick it in your book. Describe how the graphs differ from each other.

Take the point $(4, 3)$ on the graph of $y = x^2 - 4x + 3$. Where does this point map to on the graph of $y = (-x)^2 - 4(-x) + 3$? Can you describe how the coordinates of this point change in general terms?

Challenge

Using what you have learned, **sketch** the following graphs, then use Desmos to check your answers. You will need to go back to the original scale for this challenge.

(a) $y = \cos(x)$ (b) $y = \cos(x) - 2$ (c) $y = 4\cos(x)$

(d) $y = \cos(2x)$ (e) $y = \cos(x + 90)$ (f) $y = -\cos(x)$

(g) $y = \cos(-x)$ (h) $y = 4\cos(x) + 2$