PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí
POST PRIMARY MATHS

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Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

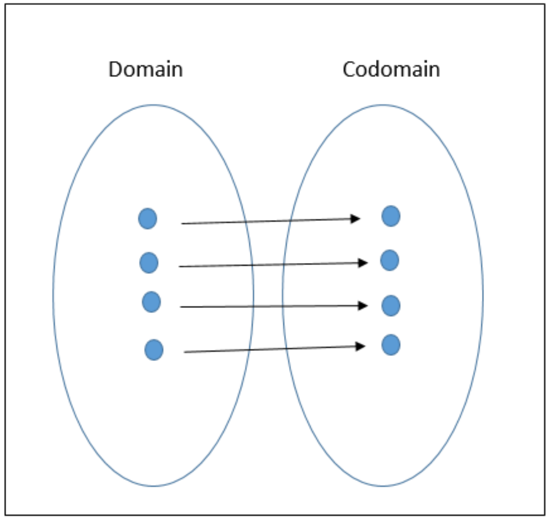
Algebra & Functions

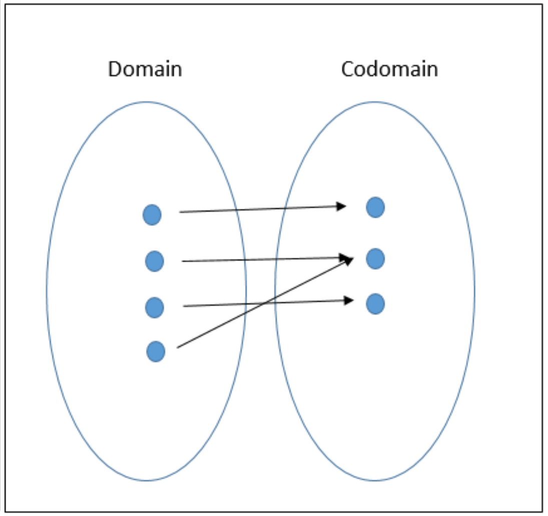
Teaching for understanding

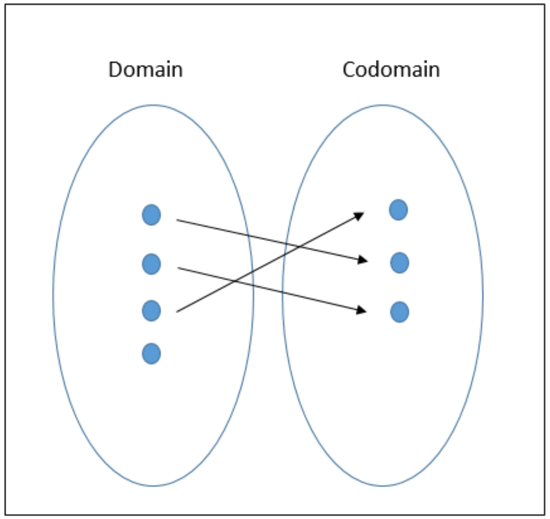
Workshop 5 Booklet

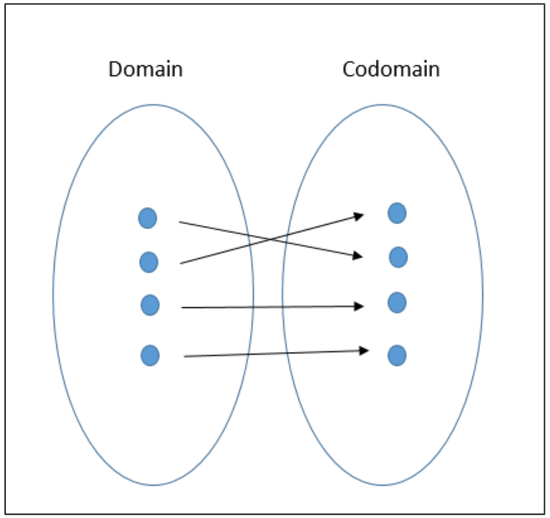
Name: _____

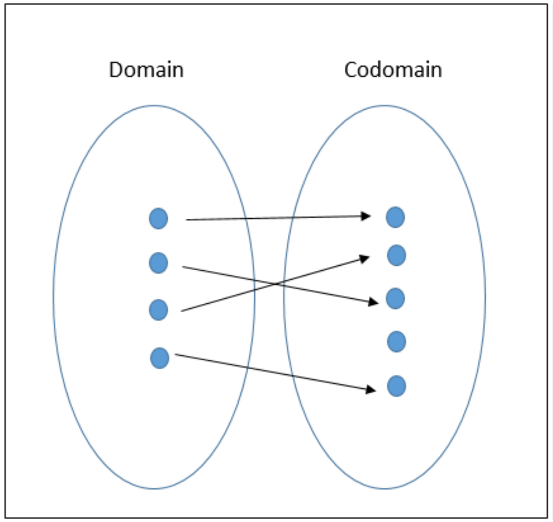
Task 1.1 – Mapping Representations

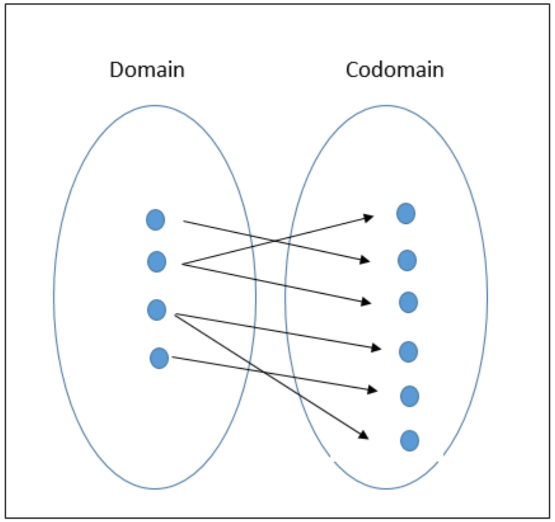


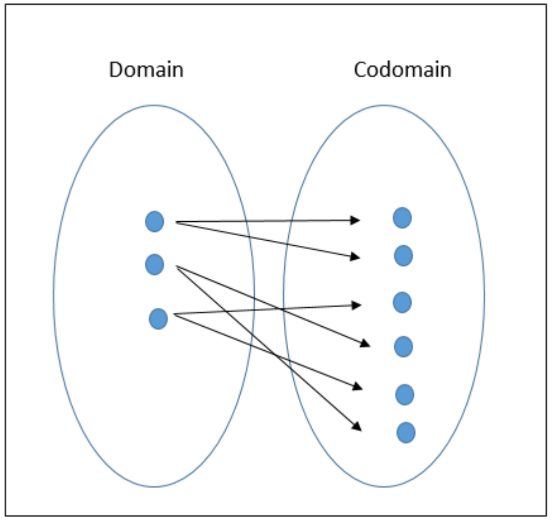


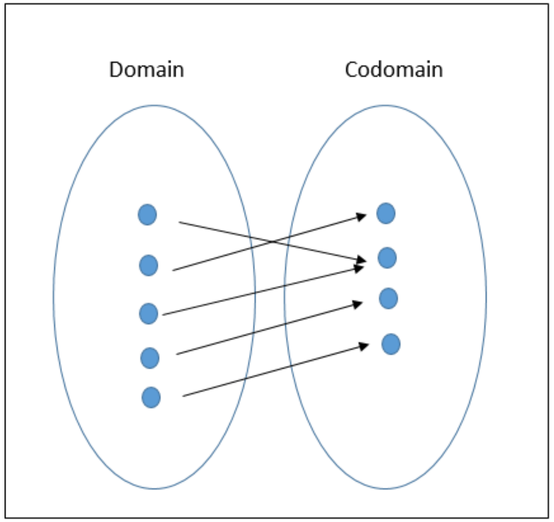




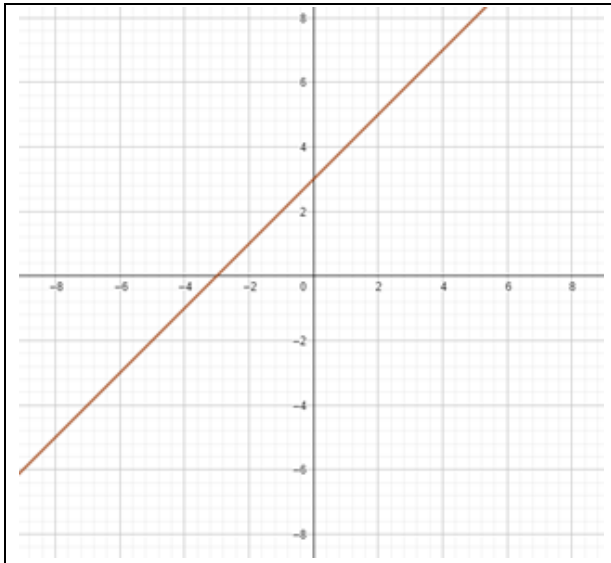






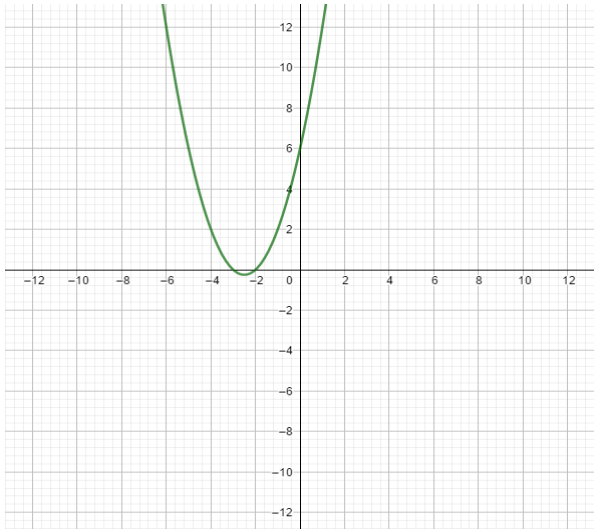


Task 1.2 – Matching graphs, couples and algebraic notation.



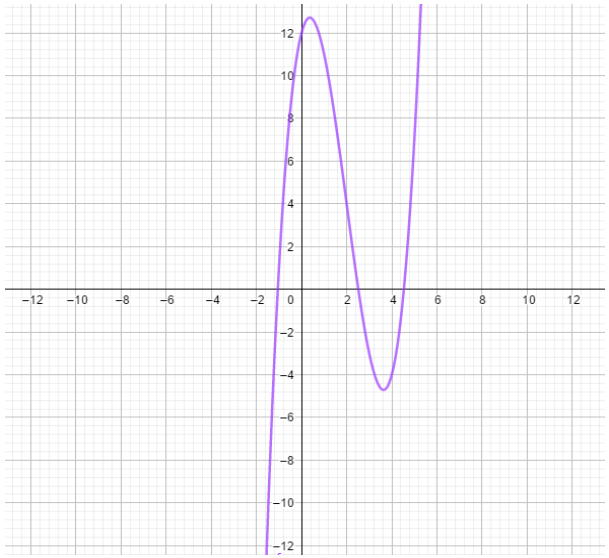
(-4, -1)
(-3, 0)
(-2, 1)
(-1, 2)
(0, 3)
(1, 4)

$y = x + 3,\ x \in \mathbb{R}$



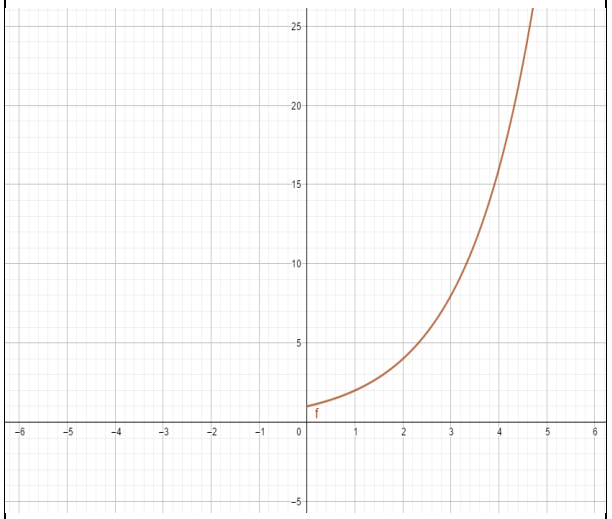
(-4, 2)
(-3, 0)
(-2, 0)
(-1, 2)
(0, 6)

$y = x^2 + 5x + 6, x \in \mathbb{R}$



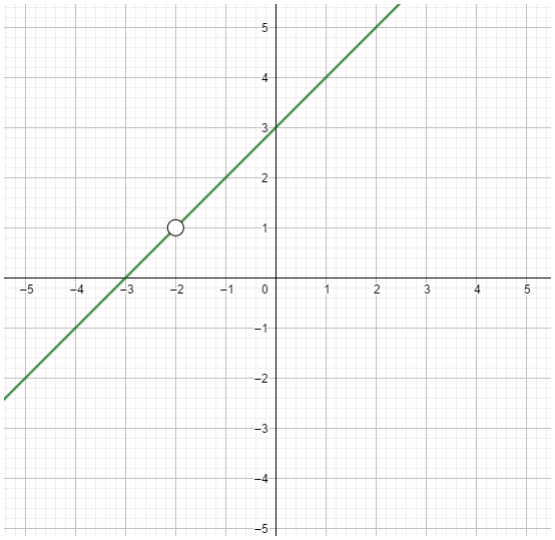
(-1.15, -2)
(-1, 1)
(0, 12)
(1, 11)
(2, 4)
(3, -3)
(4, -4)
(5, 7)

$y = x^3 - 6x^2 + 4x + 12, x \in \mathbb{R}$



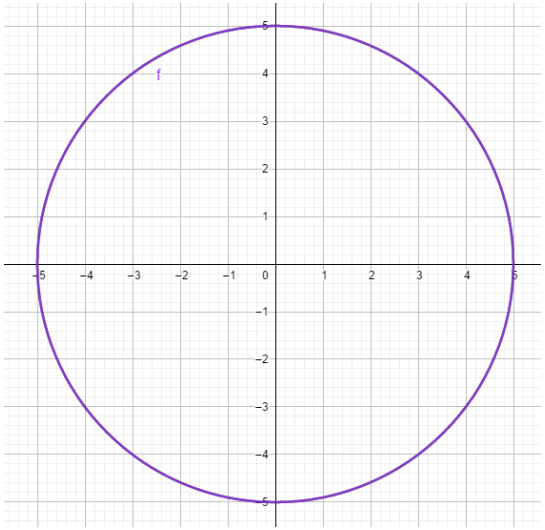
(0, 1)
(1, 2)
(2, 4)
(3, 8)
(4, 16)
(5, 32)

$y = 2^x, x \in \mathbb{R}^+$



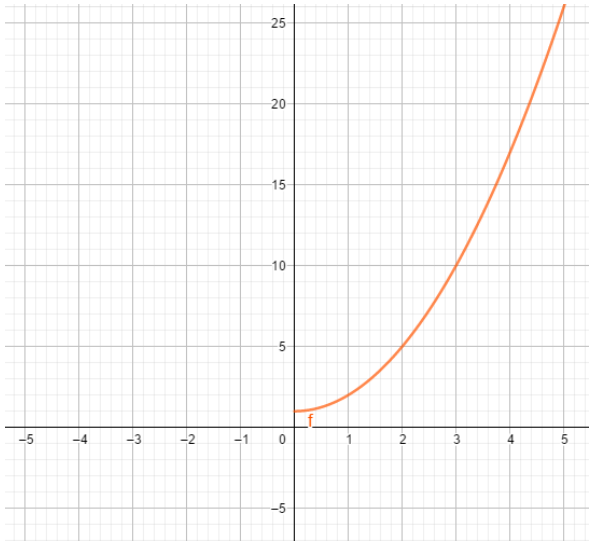
(-4, -1)
(-3, 0)
(-1, 2)
(0, 3)
(1, 4)

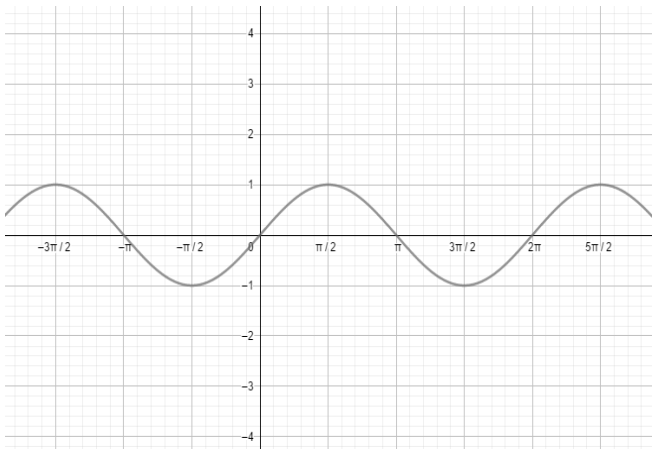
$y = \frac{x^2 + 5x + 6}{x + 2}, x \in \mathbb{R}$

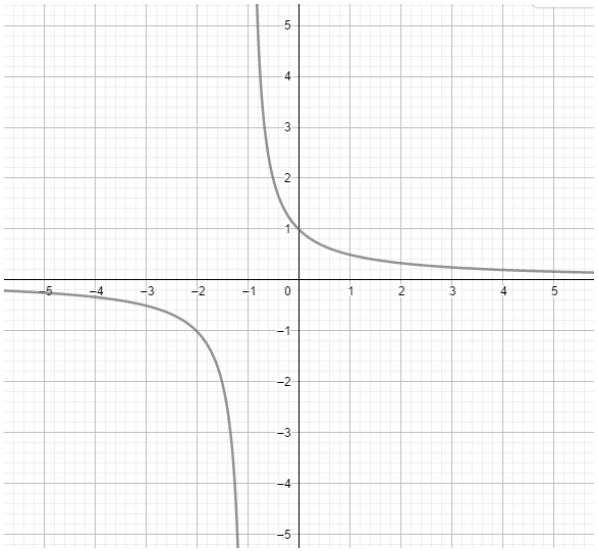


(-5, 0)
(-4, -3)
(-4, 3)
(-3, -4)
(-3, 4)

$x^2 + y^2 = 25$







$(0, 1)$

$(1, 2)$

$(2, 5)$

$(3, 10)$

$(4, 17)$

$(5, 26)$

$(-\frac{\pi}{2}, -1)$

$(0, 0)$

$(\frac{\pi}{2}, 1)$

$(\pi, 0)$

$(\frac{3\pi}{2}, -1)$

$(2\pi, 0)$

$(-4, -0.\dot{3})$

$(-3, -0.5)$

$(-2, -1)$

$(0, 1)$

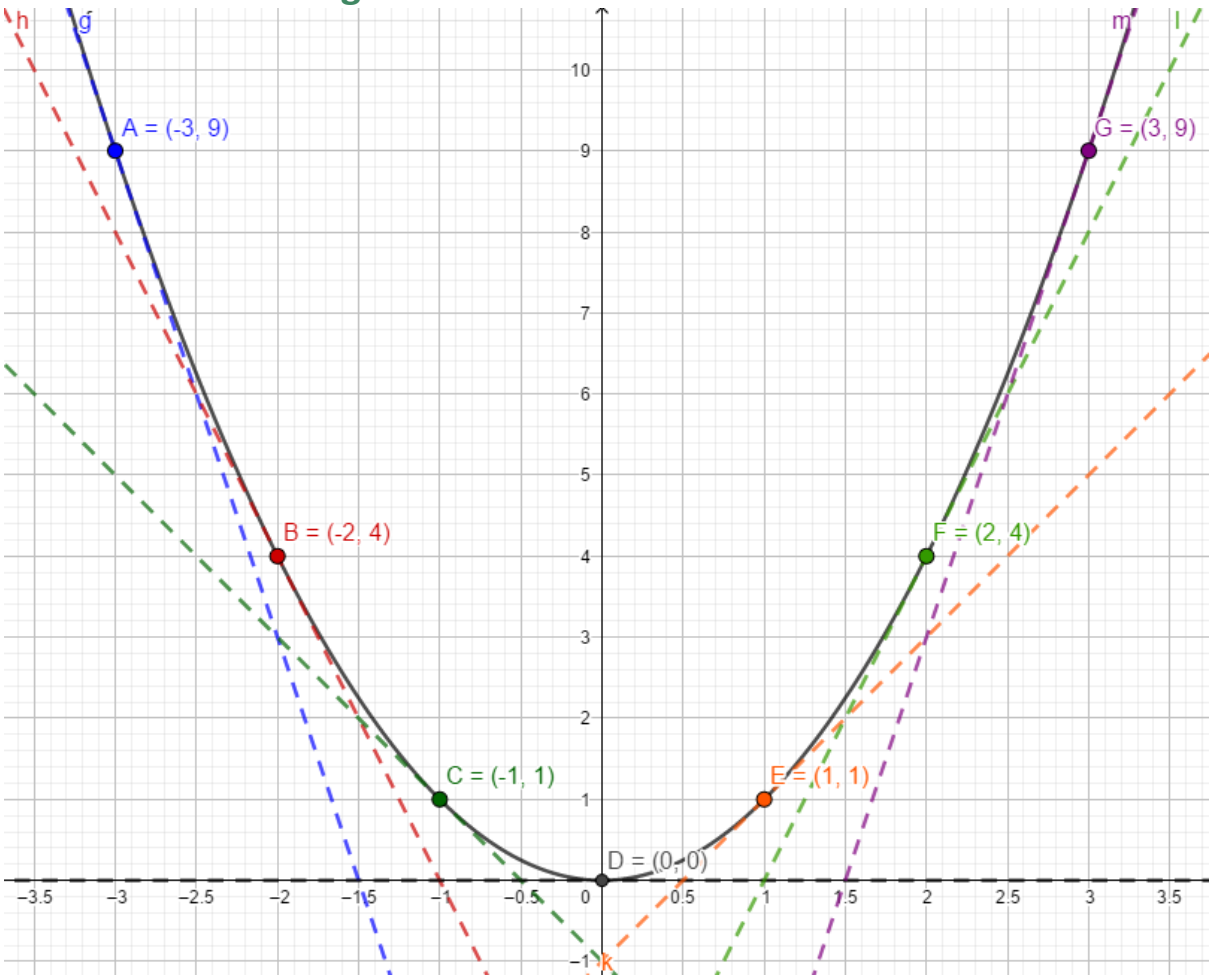
$(1, 0.5)$

$y = x^2 + 1, x \epsilon \mathbb{R}^+$

$y = \sin(x), x \epsilon \mathbb{R}$

$y = \frac{1}{x+1}, x \epsilon \mathbb{R}$

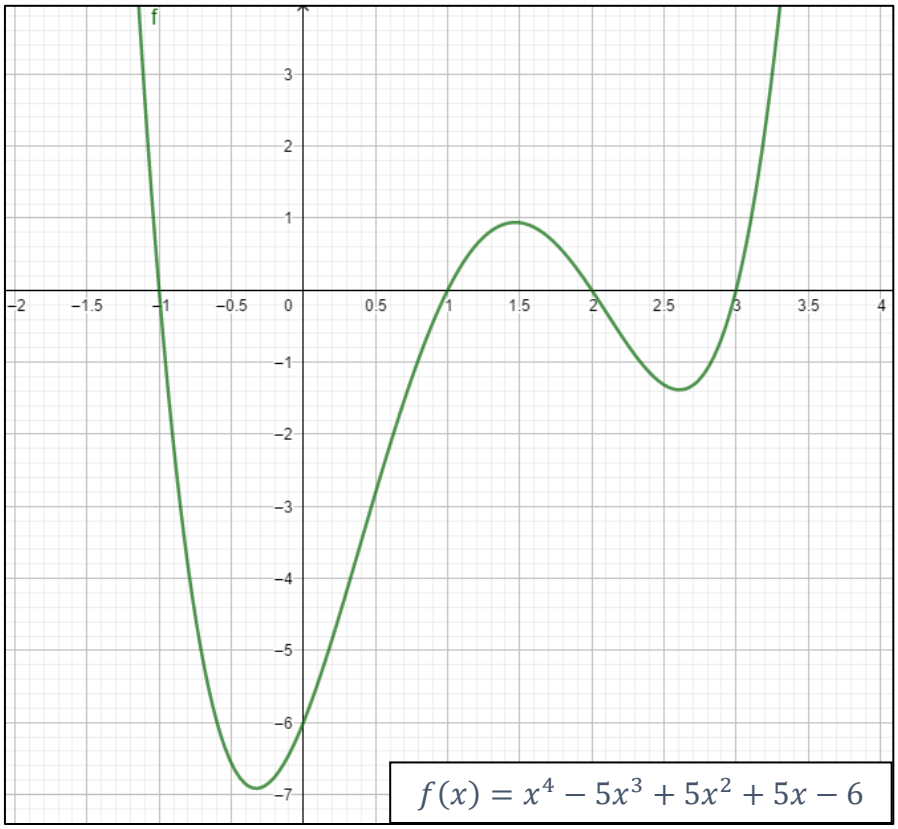
Task 3: Constructing a Lesson



https://www.geogebra.org/classic/f8fgbcz5

Discussion/Notes:

Describe the shape of this curve and the slope of the tangent as it moves along the function



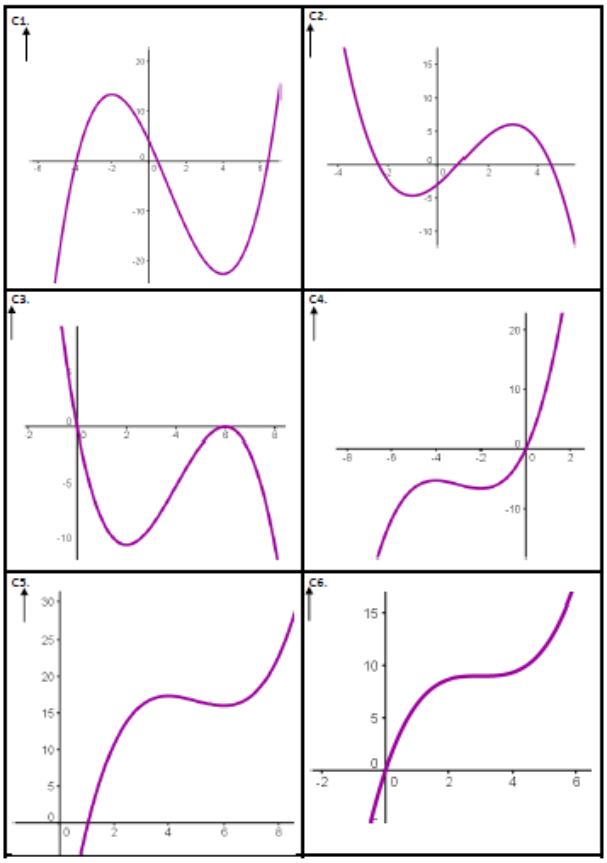
Suggestion:

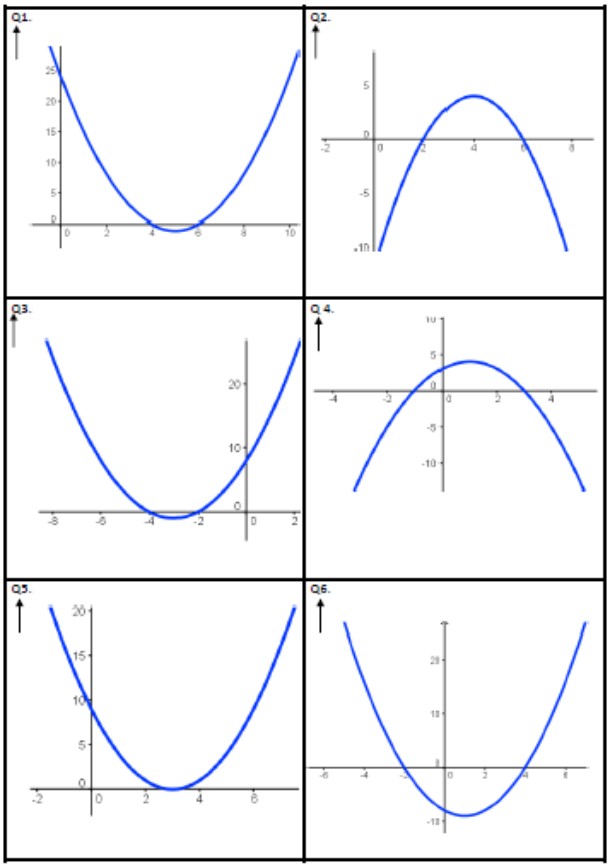
Use a ruler as the tangent to the curve. Move this ruler along the curve to see how the curve changes at each point.

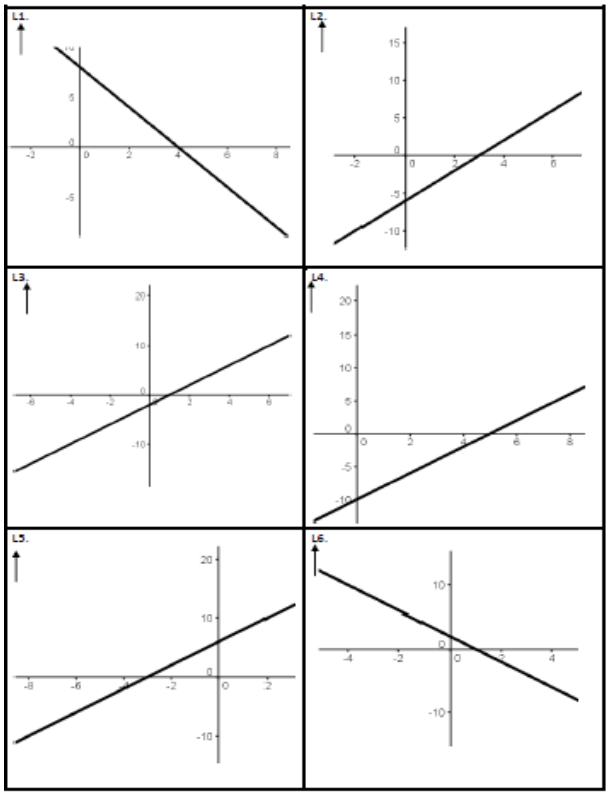
Notes/Observations/Reflections:

Take Home Task: Visualising Derivatives

Match these graphs of functions to their derivatives and justify your answers





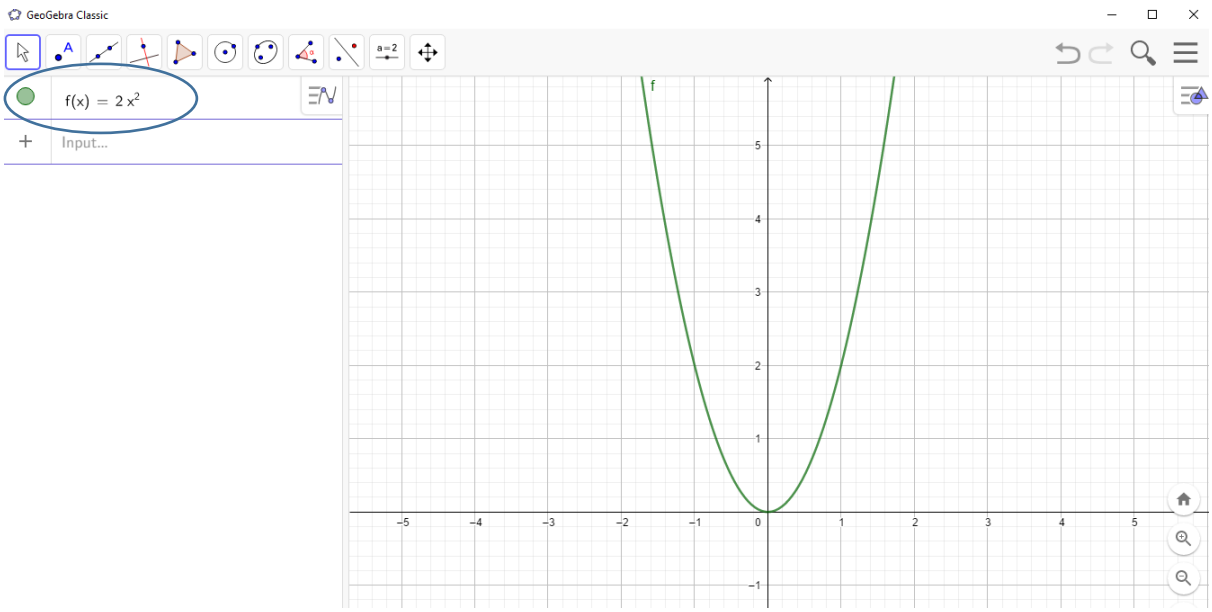


Solutions

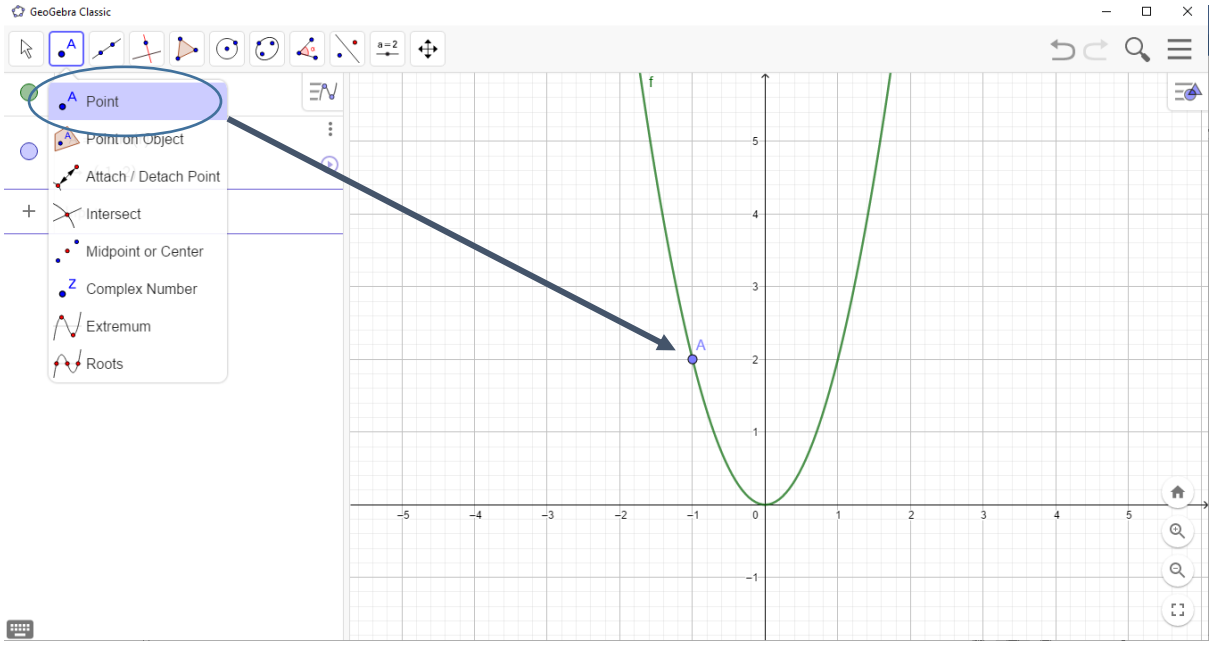
$f(x)$ $y =$	$f'(x)$ $\frac{dy}{dx} =$	$f''(x)$ $\frac{d^2y}{dx^2} =$

Cheat sheet to measure the slopes of tangents to a curve on GeoGebra

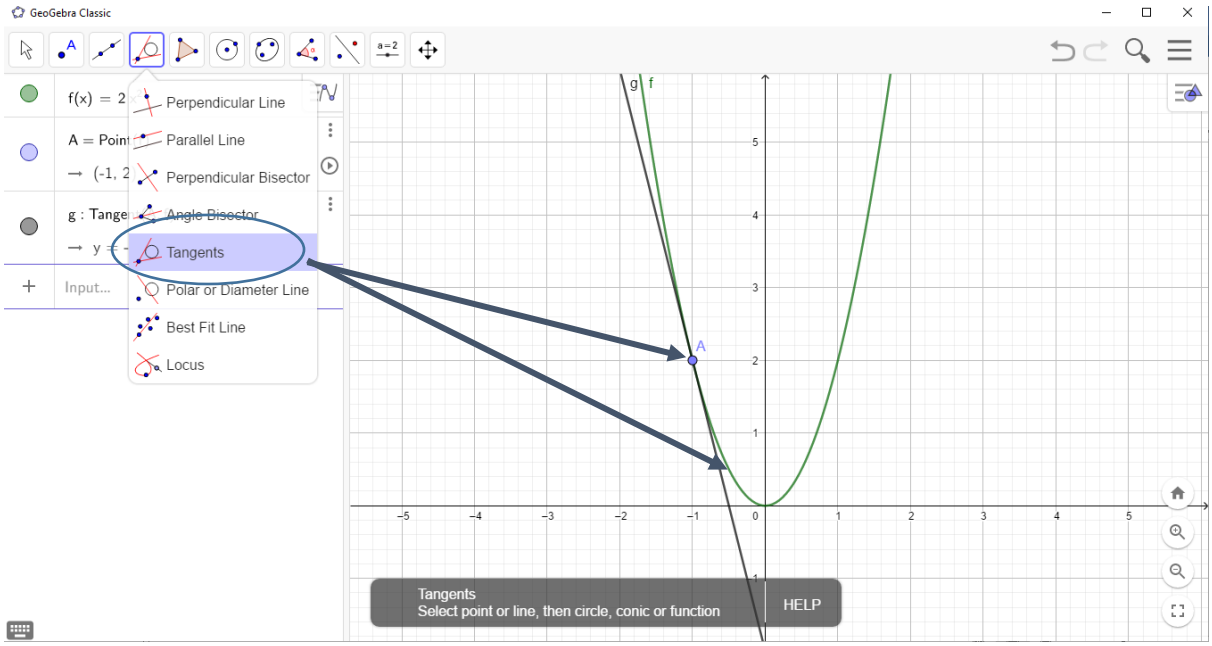
Input your function into the input bar:



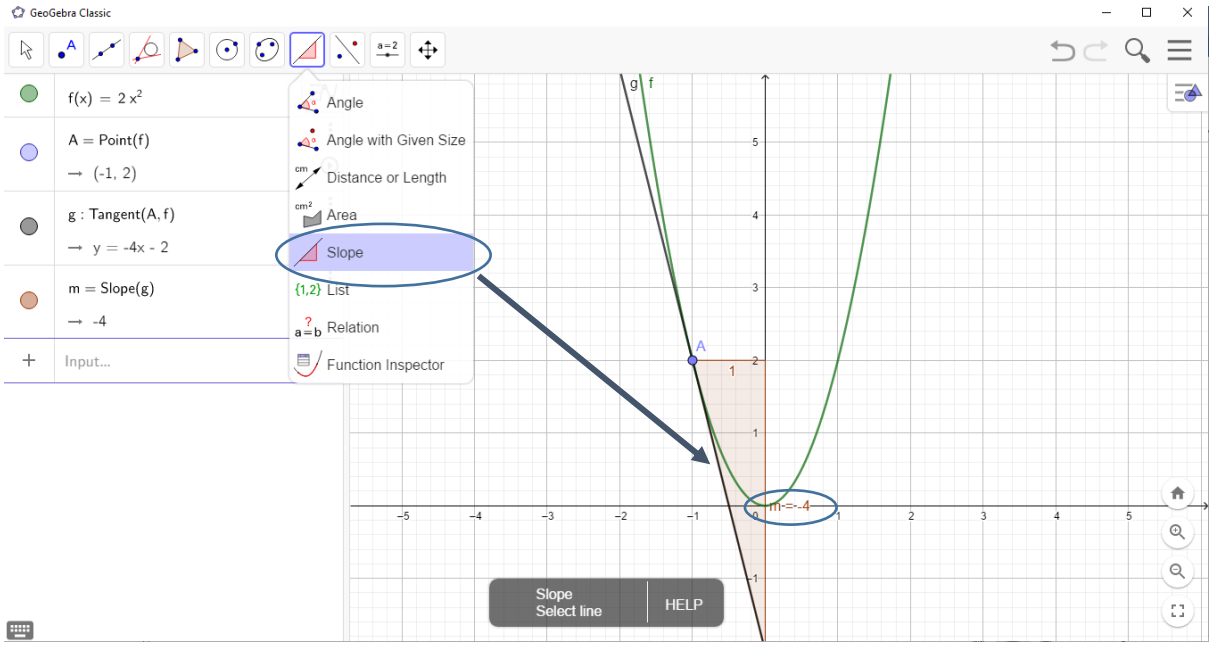
Place a point on the curve:



Use the tangent button, and select the point and the curve to create a tangent at that point:



Finally, by clicking on the slope button, select the tangent and this will give the slope of the tangent at that point:



By moving this point along the curve, we can see the slope change. The algebra for the selected point and the slope of the tangent can be seen on the left of the screen. The values for the table are taken from the *x* value of the point and the slope of the tangent at that point.

Useful resources and GeoGebra Files:

Usain Bolt GeoGebra File

https://www.geogebra.org/classic/tsysejjh

Task 3: Constructing a Lesson:

https://www.geogebra.org/classic/f8fgbcz5

Creating the derivative of a trigonometric function:
https://www.geogebra.org/classic/xecjkwps

Describing the shape of a function in relation to its derivative (this function can be changed in the input bar of the GeoGebra file):

https://www.geogebra.org/classic/tq8845sk

Resource on Sketching Derivatives:
https://www.projectmaths.ie/workshops/workshop8/SketchingDerivatives.pptx

Resource on Relating The Derivative to Slope:
https://www.projectmaths.ie/workshops/workshop8/RelatingTheDerivativeToSlope.pptx

Graph matching activity (PDF):
https://www.projectmaths.ie/workshops/workshop8/GraphMatchingDerivatives.pdf

Solutions to graph matching activity and other resources:

https://www.projectmaths.ie/for-teachers/workshops/workshop-8-functions-calculus-and-problem-solving/