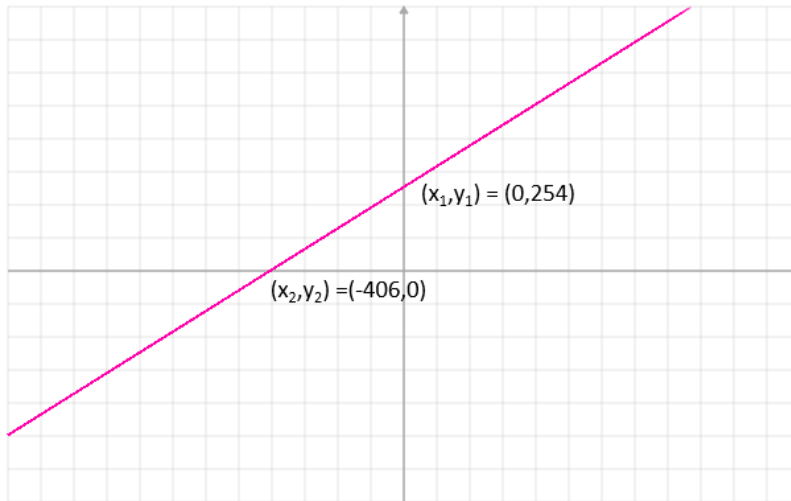


Mathematics – Function - Exercises - Solutions

Click on the exercise number to start a video.

- 01** Determine the equation of the straight line having a Y-axis (vertical) intercept of 254 units positive, and an X-axis (horizontal) intercept of 406 units negative.

Solution:



Every straight line that is not vertical will be of the form $y = ax + b$ where a is the slope and b is the interception of the y -axis.

$$y = ax + b$$

$$b = \underline{254}$$

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 254}{-406 - 0} = \frac{-254}{-406} = \frac{254}{406} = \underline{0.626}$$

$$\underline{\underline{y = 0.626x + 245}}$$

or:

$$y = ax + b$$

$$x = 0 \wedge y = 254 \Rightarrow 254 = a \cdot 0 + b \Rightarrow \underline{b = 254}$$

$$x = -406 \wedge y = 0 \Rightarrow 0 = a \cdot (-406) + 254 \Rightarrow a = \frac{254}{406} = \underline{0.626}$$

$$\underline{\underline{y = 0.626x + 245}}$$

02 For the function:

$$\frac{(x-3)^2}{25} + \frac{(y-4)^2}{25} = 1$$

- Sketch the function.
- Determine any axis intercepts.

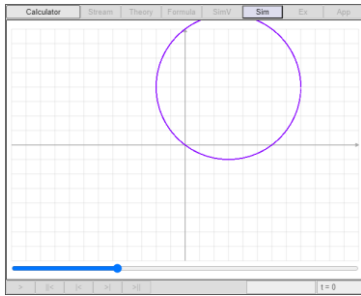
Solution:

$$\frac{(x-3)^2}{25} + \frac{(y-4)^2}{25} = 1$$

$$(x-3)^2 + (y-4)^2 = 25$$

$$\underline{(x-3)^2 + (y-4)^2 = 5^2}$$

This is a circle with center in $(x,y) = (3,4)$ and radius 5



Intercepts with the y -axis ($x = 0$):

$$(x-3)^2 + (y-4)^2 = 5^2$$

$$(0-3)^2 + (y-4)^2 = 5^2$$

$$9 + y^2 - 8y + 16 = 25$$

$$y^2 - 8y = 0$$

$$y(y-8) = 0$$

$$\underline{y=0} \quad \vee \quad \underline{y=8} \quad \underline{\underline{\text{Intercepts } y\text{-axis: } (0,0), (0,8)}}$$

Intercepts with the x -axis ($y = 0$):

$$(x-3)^2 + (y-4)^2 = 5^2$$

$$(x-3)^2 + (0-4)^2 = 5^2$$

$$9 + y^2 - 8y + 16 = 25$$

$$x^2 - 6x = 0$$

$$x(x-6) = 0$$

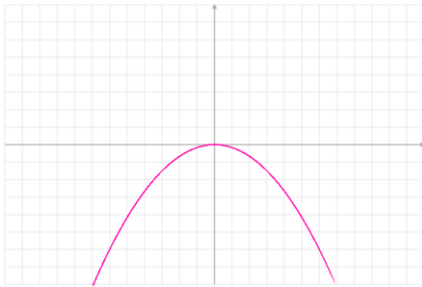
$$\underline{x=0} \quad \vee \quad \underline{x=6} \quad \underline{\underline{\text{Intercepts } x\text{-axis: } (0,0), (6,0)}}$$

- 03 a) Sketch the function: $x^2 = -6x$
and indicate any axis intercepts.

Solution:

$$x^2 = -6y \Rightarrow \underline{y = -\frac{1}{6}x^2}$$

This is a parabola with maximum point in origin (0,0).
Only one intercept with axis: Origin (0,0).
Use the [SimReal calculator](#) to draw the graph.



- b) Sketch the function $(x - 2)(y + 2) = 15$
and indicate any axis intercepts.

Solution:

$$(x-2)(y+2) = 15 \Rightarrow y+2 = \frac{15}{x-2} \Rightarrow \underline{y = \frac{15}{x-2} - 2}$$

$$(x-2)(y+2) = 15 \wedge x=0 \Rightarrow -2 \cdot (y+2) = 15 \Rightarrow -2y = 19 \Rightarrow \underline{y = -9.5}$$

$$(x-2)(y+2) = 15 \wedge y=0 \Rightarrow (x-2) \cdot 2 = 15 \Rightarrow 2x = 19 \Rightarrow \underline{x = 9.5}$$

Intercepts: x-axis: (0, -9.5) y-axis: (9.5, 0)

This is a hyperbola with asymptotes $x = 2$ (vertical) and $y = -2$ (horizontal).

