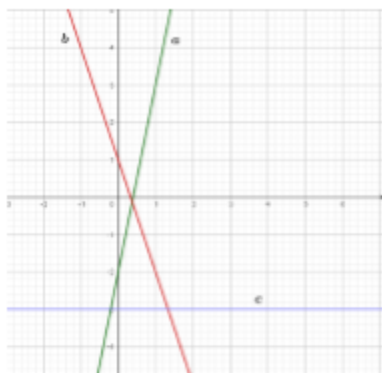


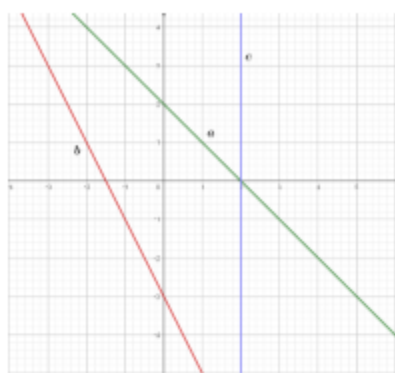
UNIT 5: ELEMENTARY FUNCTIONS

Exercise 1: Find the equations of the lines represented on these graphs:

a)



b)



Exercise 2: Work out the equation of the straight lines:

- That goes through the point $A(-1, 5)$ and has a slope $m = 3$
- That goes through the point $B(3, -4)$ and has a slope $m = -2$
- The general equation of the straight line that goes through the point $P(4, -5)$ and has a slope $m = 5$

Exercise 3: Work out the equation of the straight line:

- That goes through the points $A(1, -5)$ and $B(3, 5)$
- That goes through the points $A(-3, 5)$ and $B(2, 15)$
- That goes through the points $A(1, 7)$ and $B(5, -3)$
- That goes through the points $A(5, -3)$ and $B(5, 1)$

Exercise 4: Indicate the value of the slope of the straight line $7x - 5y + 3 = 0$, and the point where it crosses the y-axis

Exercise 5: Work out the equation of the straight line that is parallel to $y = 7x + 5$ and goes through the point $P(-3, 1)$

Exercise 6: Find the equation of the straight line that is parallel to $x + 5y - 10 = 0$ and goes through the point $A(1, -3)$

Exercise 7:

- Work out the equation of the straight line that goes through the points $A(-5, 2)$ and $B(-9, 7)$
- Work out the explicit equation of the straight line that is parallel to $2x - 7y + 1 = 0$ and goes through the point $Q(5, 7)$. Indicate the slope and the y-intercept

Exercise 8:

- Work out the general equation of the straight line that goes through the point $A(3, -4)$ and has a slope $m = -7$
- Work out the general equation of the straight line that goes through the points $A(-5, 3)$ and $B(5, 6)$

Exercise 9: Plot the graph of the function $f(x) = x^2 - 6x + 9$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex. Create also a table with at least a couple of values.

Exercise 10: Plot the graph of the function $f(x) = x^2 - 7x + 6$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex. Create also a table with at least a couple of values.

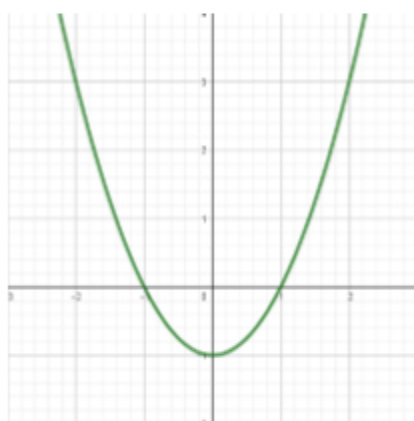
Exercise 11: Plot the graph of the function $f(x) = -x^2 + 8x - 12$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex. Create also a table with at least a couple of values.

Exercise 12: Plot the graph of the function $f(x) = 1 - x^2$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex. Create also a table with at least a couple of values.

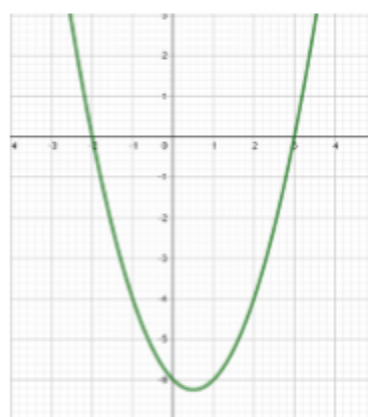
Exercise 13: Write the equation of a convex parabola that crosses the x-axis at $x = -1$ and $x = 5$. What's the x-coordinate of the vertex? And the y-intercept?

Exercise 14: Find the equation of these parabolas:

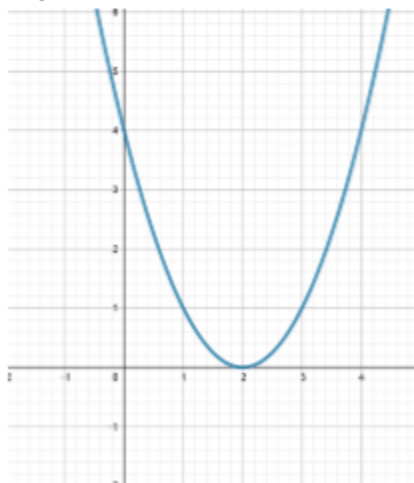
a)



b)



c)



d)



Exercise 15: Sketch the graph of the function:

$$f(x) = \begin{cases} 3-x & x < 1 \\ 2 & 1 \leq x < 2 \\ x & 2 \leq x < 5 \end{cases}$$

Exercise 16: Sketch the graph of the function:

$$f(x) = \begin{cases} x-1 & x \leq -1 \\ x^2-4 & -1 < x < 3 \\ 5 & x \geq 3 \end{cases}$$

Exercise 17: Sketch the graph of the function:

$$f(x) = \begin{cases} 2x+4 & -3 \leq x \leq -1 \\ 2 & -1 < x \leq 1 \\ x^2-4x+4 & x > 1 \end{cases}$$

Exercise 18: Work out:

a) $\log_3 9 =$

c) $\log_3 1 =$

e) $\log 0.001 =$

g) $\log_2 128 =$

b) $\log_9 3 =$

d) $\log 100 =$

f) $\log_3 \frac{1}{9} =$

h) $\log_2 0.25 =$

Exercise 19: Work out:

a) $\log_5 \sqrt{5} =$

c) $\log_7 \frac{1}{49} =$

e) $\log 0.00001 =$

g) $\log_4 \sqrt{2} =$

b) $\log_8 2 =$

d) $\log_5 -125 =$

f) $\log_5 0.2 =$

h) $\log_2 \frac{1}{32} =$

Exercise 20: Work out, if possible, or leave indicated:

a) $\log_6 12 + \log_6 18 =$

c) $\log_3 100 - \log_3 4 =$

e) $\log_2 \frac{8}{\sqrt{128}} =$

g) $\log_7 \frac{\sqrt[4]{7^5}}{\sqrt[9]{7^2}} =$

i) $\frac{\log 1024}{\log 256} =$

b) $\log 500 - \log 50 =$

d) $\log \sqrt{x^3} =$

f) $\log_3 \frac{\sqrt[5]{3^7}}{\sqrt{243}} =$

h) $\frac{\log_5 243}{\log_5 729} =$

Exercise 21: Work out:

$$\text{a) } \frac{\log_7 98 - \log_7 2}{\log_7 84 - \log_7 12} =$$

$$\text{b) } \frac{\log_7 1029 - \log_7 3}{\log_7 245 - \log_7 5} =$$

$$\text{c) } \frac{\log_5 32 - \log_5 8}{\log_5 2 + \log_5 4} =$$

$$\text{d) } \frac{\log_2 5 + \log_2 25}{\log_2 625 - \log_2 25} =$$

$$\text{e) } \frac{\log_3 5^7}{\log_3 75 - \log_3 5} =$$

$$\text{f) } \frac{\log 6 + \log 2}{\log 9 + \log 8 - \log 6} =$$

$$\text{g) } \frac{\log 6 + \log 3 - \log 2}{\log 9 - \log 3} =$$

Exercise 22: Sketch the graph of the following piecewise function:

$$f(x) = \begin{cases} x+2 & -5 \leq x < -1 \\ 3^x & -1 \leq x < 2 \\ 13-2x & x \geq 2 \end{cases}$$

Exercise 23: Sketch the graph of the following piecewise function:

$$f(x) = \begin{cases} -x & x < 1 \\ \log_3 x & 1 \leq x \leq 9 \end{cases}$$

Exercise 24: Sketch the graph of the piecewise function:

$$f(x) = \begin{cases} x+1 & x < 0 \\ \sqrt{x+1} & x > 0 \end{cases}$$

Exercise 25: Sketch the graph of the piecewise function:

$$f(x) = \begin{cases} x^2 - 1 & x < 1 \\ \frac{1}{x-1} & x > 1 \end{cases}$$

Exercise 26: Identify the graphs of the following functions:

a) $f(x) = e^x + 1$ b) $f(x) = \frac{x}{x-1}$ c) $f(x) = \log_3(x+2)$

d) $f(x) = \frac{x}{x^2-9}$

e) $f(x) = \sqrt{x-2}$ f) $f(x) = 3^{x-1}$ g) $f(x) = 2 + \log_5 x$

h) $f(x) = \left(\frac{1}{2}\right)^{x+3}$

