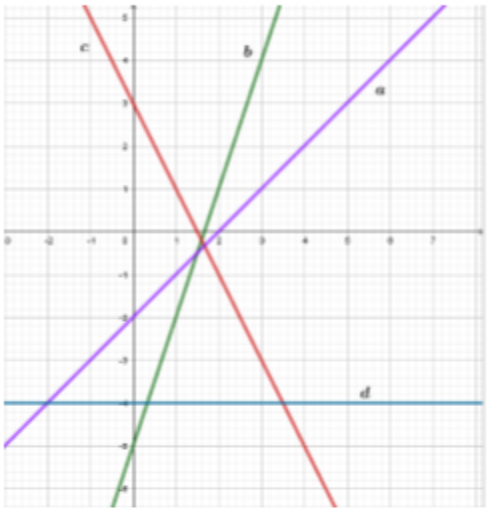
# UNIT 11: LINEAR, QUADRATIC AND PIECEWISE FUNCTIONS

**Exercise 1:** Write the explicit equation of these straight lines:




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

a) That goes through the point $A(5,-1)$ and has a slope $m=-3$

b) That goes through the point $B(4,-3)$ and has a slope $m=-2$

c) The general equation of the straight line that goes through the point $P(-5,4)$ and has a slope $m=5$

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

a) That goes through the points $A(1,3)$ and $B(3,-1)$

b) That goes through the points $A(-1,1)$ and $B(2,10)$

c) That goes through the points $A(1,7)$ and $B(5,19)$

**Exercise 4:** Indicate the value of the slope of the straight line $5x-7y-9=0$, and the point where it crosses the y-axis

**Exercise 5:** Indicate the value of the slope of the straight line $7x+3y-2=0$, and the point where it crosses the y-axis

**Exercise 6:** Work out the general equation of the straight line that is parallel to $y=4x-5$ and goes through the point $P(-2,5)$

**Exercise 7:** Find the equation of the straight line that is parallel to $2x-5y+4=0$ and goes through the point $A(6,1)$

**Exercise 8:** Work out the equation of the straight line that is parallel to $6x+2y-7=0$ and goes through the point $P(2,-5)$

**Exercise 9:**

a) Work out the equation of the straight line that goes through the points $A(5,-2)$ and $B(7,-9)$

b) Work out the explicit equation of the straight line that is parallel to $7x-4y-9=0$ and goes through the point $Q(5,7)$. Indicate also the slope and the y-intercept.

**Exercise 10:** Work out the equations of the straight lines:

a) It goes through the points $A(-1,4)$ and $B(1,8)$

b) It is parallel to $2x-5y+13=0$ and goes through the point $P(2,3)$

**Exercise 11:** Work out the general equation of the straight line that goes through the points $A(2,-1)$ and $B(6,5)$

**Exercise 12:** Work out the equation of the straight line that goes through the points $A(-4,2)$ and $B(8,6)$ and indicate the slope and the y-intercept.

**Exercise 13:** Work out the general equation of the straight line that goes through the points $A(-4,5)$ and $B(4,5)$

**Exercise 14:**

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

b) Work out the general equation of the straight line that goes through the points $A(-5,3)$ and $B(5,6)$

**Exercise 15:** 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.

**Exercise 16:** Plot the graph of the function $f(x)=x^2-4x+3$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex.

**Exercise 17:** Plot the graph of the function $f(x)=-x^2+2x+8$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex.

**Exercise 18:** Plot the graph of the function $f(x)=-x^2+2x+8$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex.

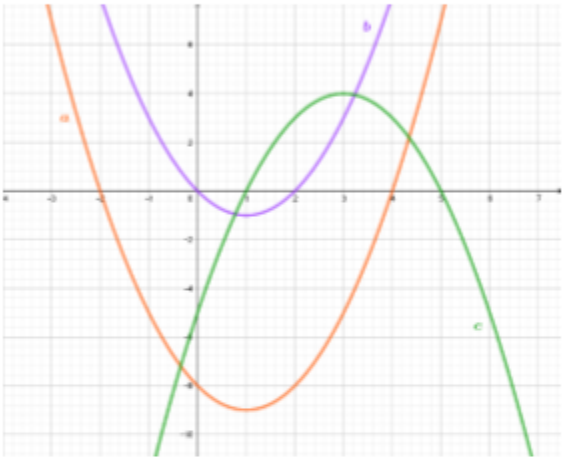
**Exercise 19:** Plot the graph of the function $f(x)=-x^2+7x-12$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex.

**Exercise 20:** Plot the graph of the function $f(x)=9-x^2$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex.

**Exercise 21:** Draw the graph of the function $f(x)=x^2-3x-10$, indicating its direction, studying the points where it crosses the axes and finding the coordinates of the vertex.

**Exercise 22:** 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?

**Exercise 23:** Find the equation of the following parabolas:



**Exercise 24:** Sketch the graph of the function:

$$f(x)=\begin{cases}4-2x & x<1\\ x^2-4x+5 & 1<x\le 5\\ 8 & 5<x\le 9\end{cases}$$

**Exercise 25:** Sketch the graph of the piecewise function given below

$$f(x)=\begin{cases}4 & x<-2\\ 5-2x & -2\le x\le 1\\ x^2-6x+8 & 1<x<6\end{cases}$$

**Exercise 26:** Sketch the graph of the piecewise function given below

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

**Exercise 27:** Sketch the graph of the piecewise function given below

$$f(x)=\begin{cases}4 & x\le -1\\ 2x+6 & -1<x<3\\ x^2-9x+18 & 3<x\le 6\end{cases}$$

**Exercise 28:** Sketch the graph of the piecewise function given below

$$f(x)=\begin{cases}2x+3 & -3<x<1\\ x^2-6x+8 & 1\le x<5\\ x-2 & x\ge 5\end{cases}$$

**Exercise 29:** Sketch the graph of the piecewise function given below

$$f(x)=\begin{cases}x+3 & x<-2\\ 5+2x & -2\le x<1\\ x^2-6x+8 & 1\le x<6\end{cases}$$

**Exercise 30:** Sketch the graph of this piecewise function:

$$f(x)=\begin{cases}x^2+2x+1 & -5<x\le -1\\ 2x & -1<x\le 4\\ 8 & x>4\end{cases}$$

**Exercise 31:** Sketch the graph of the piecewise function given below

$$f(x)=\begin{cases}3-x & 0\le x<3\\ x^2-6x+5 & 3\le x<6\\ 5 & x>6\end{cases}$$