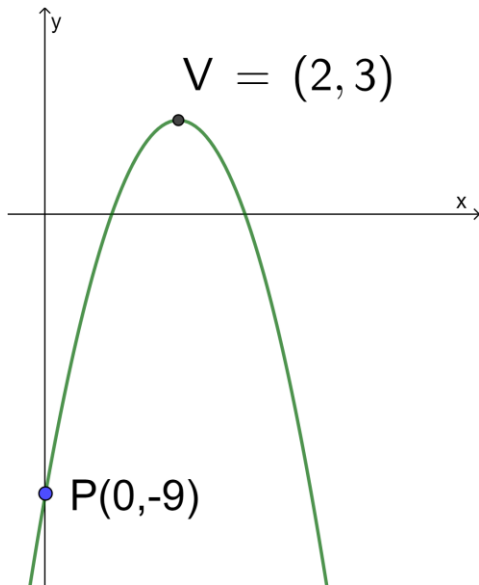The graph below is the function $f(x) = a(x - h)^2 + k$

The graph pass through the point $P(0, -9)$ and has vertex (2,3)

a) Write down the value of a, h and k

b) Find $f(x)$ giving your answer in the form $f(x) = Ax^2 + Bx + C$

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a) Since $f(x) = a(x - h)^2 + k$ gives us the vertex (h, k)
   and the vertex is (2,3)
   then $f(x) = a(x - 2)^2 + 3$

   The graph passes through the point $P(0, -9)$
   $x = 0 , y = -9$
   $-9 = a(0 - 2)^2 + 3$
   $-9 = 4a + 3$
   $-12 = 4a$
   $-3 = a$

b) $f(x) = -3(x - 2)^2 + 3$
   $f(x) = -3(x - 2)(x - 2) + 3$
   $f(x) = -3(x^2 - 4x + 4) + 3$
   $f(x) = -3x^2 + 12x - 12 + 3$
   $f(x) = -3x^2 + 12x - 9$