## 4.

## Solution

To find the vertex, we look at the coefficients in the function $f(k) = ak^2 + bk + c$
in this equation, $a = 2$ and $b = 4$
The first coordinate of the vertex has the formula: $\frac{-b}{2a}$ now, plugging into formula to get:

$\frac{-b}{2a} = -\frac{4}{2(2)} = -1$

The second coordinate of the vertex is $f(-1) = 2(-1)^2 + 4(-1) - 3$
$= -5$
Therefore, the vertex of the graph of f is $(-1, -5)$