

1.

## Solution

To find the vertex, we look at the coefficients in the function  $r(d) = ad^2 + bd + c$  in this equation,  $a = 3$  and  $b = 9$

The first coordinate of the vertex has the formula:  $\frac{-b}{2a}$  now, plugging into formula to get:

$$\frac{-b}{2a} = -\frac{9}{2(3)} = -\frac{3}{2}$$

$$\begin{aligned}\text{The second coordinate of the vertex is } r\left(-\frac{3}{2}\right) &= 3\left(-\frac{3}{2}\right)^2 + 9\left(-\frac{3}{2}\right) - 7 \\ &= -\frac{55}{4}\end{aligned}$$

Therefore, the vertex of the graph of  $f$  is  $\left(-\frac{3}{2}, -\frac{55}{4}\right)$