

6.

## Solution

Quadratic function: is a function that can be written in the form:

$q(w) = aw^2 + bw + c$  where  $a$ ,  $b$ , and  $c$  are real numbers and  $a \neq 0$

we have  $q(w) = -w^2 - 15w + 4$ , note:  $-w^2 - 15w + 4$  is in  $wq$ -plane

Here, we know that  $a = -1$ ,  $b = -15$ ,  $c = 4$

Since  $a < 0$ , we know that the  $q$ -coordinate of the vertex is a maximum. However, to find the  $q$ -coordinate of our vertex we first need to find the  $w$ -coordinate of the vertex by using  $w = -\frac{b}{2a} = -\frac{-15}{-2} = -\frac{15}{2}$ . Now that we have the  $w$ -coordinate, we can find the  $q$ -coordinate

of the vertex by finding  $q\left(-\frac{15}{2}\right) = -1\left(-\frac{15}{2}\right)^2 - 15\left(-\frac{15}{2}\right) + 4 = -\frac{225}{4} + \frac{225}{2} + 4 = \frac{241}{4}$  Maximum =  $\frac{241}{4}$