5.

Solution

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

$r(x)=ax^2+bx+c$ where a, b, and c are real numbers and $a\neq 0$

we have $r(x)=-x^2-7x+10$, note: $-x^2-7x+10$ is in xr-plane

Here, we know that $a=-1$, $b=-7$, $c=10$

Since $a<0$,we know that the r-coordinate of the vertex is a maximum.However,to find the r-coordinate of our vertex we first need to find the x-coordinate of the vertex by using $x=-\frac{b}{2a}=-\frac{-7}{-2}=-\frac{7}{2}$ Now that we have the x-coordinate, we can find the r-coordinate of the vertex by finding $r\left(-\frac{7}{2}\right)=-1\left(-\frac{7}{2}\right)^2-7\left(-\frac{7}{2}\right)+10=-\frac{49}{4}+\frac{49}{2}+10=\frac{89}{4}$ Maximum$=\frac{89}{4}$