5.

Solution

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

$x(q) = aq^2 + bq + c$ where a, b, and c are real numbers and $a \neq 0$

we have $x(q) = q^2 + 5q + 8$, note: $q^2 + 5q + 8$ is in qx-plane

Here, we know that $a=1$, $b=5$, $c=8$

Since $a > 0$,we know that the x-coordinate of the vertex is a minimum. However,to find the x-coordinate of our vertex we first need to find the q-coordinate of the vertex by using $q = -\frac{b}{2a} = -\frac{5}{2} = -\frac{5}{2}$ Now that we have the q-coordinate, we can find the x-coordinate of the vertex by finding $x(-\frac{5}{2}) = 1(-\frac{5}{2})^2 + 5(-\frac{5}{2}) + 8 = \frac{25}{4} - \frac{25}{2} + 8 = \frac{7}{4}$ Minimum $= \frac{7}{4}$