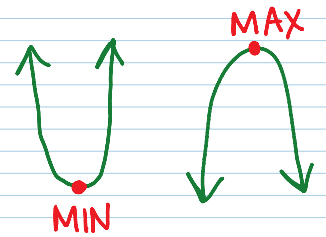


State whether there is a maximum or minimum. Then, find the value.

*The max or min is always @ the vertex!



① $a=-5$ $b=0$ $c=7$
 $y = -5x^2 + 7$

MAX @ $y = 7$

$$x = \frac{-b}{2a} = \frac{-0}{2(-5)} = 0$$

$$y = -5(0)^2 + 7$$

$$y = 7 \quad (0, 7)$$

② $a=1$ $b=7$ $c=8$
 $x^2 + 7x + 8$

MIN @ $y = -\frac{17}{4}$

$$x = \frac{-b}{2a} = \frac{-7}{2(1)} = -\frac{7}{2}$$

$$y = \left(-\frac{7}{2}\right)^2 + 7\left(-\frac{7}{2}\right) + 8$$

$$y = \frac{49}{4} - \frac{49 \cdot 2}{2 \cdot 2} + \frac{8 \cdot 4}{4}$$

$$= \frac{49}{4} - \frac{98}{4} + \frac{32}{4} = -\frac{17}{4}$$

③ $-2x^2 - x + 10$

MAX @ $y = \frac{81}{8}$

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

$$y = -2\left(-\frac{1}{4}\right)^2 - \left(-\frac{1}{4}\right) + 10$$

$$y = -2\left(\frac{1}{16}\right) + \frac{1}{4} + 10$$

$$y = -\frac{2}{16} + \frac{1}{4} + 10 \cdot \frac{16}{16}$$

$$y = -\frac{2}{16} + \frac{4}{16} + \frac{160}{16} \Rightarrow y = \frac{162}{16} = \frac{81}{8}$$

Fishing spiders can propel themselves across water and leap vertically from the surface of the water. During a vertical jump, the height of the body of the spider can be modeled by the function $y = -4500x^2 + 820x + 43$ where x is the duration (in seconds) of the jump and y is the height (in millimeters) of the spider above the surface of the water. After how many seconds does the spider's body reach its maximum height? What is the maximum height?

$$x = \frac{-820}{2(-4500)} = .0911 \text{ sec}$$

$$y = -4500(.0911)^2 + 820(.0911) + 43 = 80.36 \text{ mm}$$