

QEQFII L6 Max/Min Number & Area Problems

Thursday, October 13, 2022 8:39 AM



QEQFII L6 MaxMin Number & Area Problems

Lesson 6 Max/Min Problems (Number & Area)

vertex

vertex formula

$$x = \frac{-b}{2a}$$

1.) Two numbers differ by 20. Their product is a minimum. Determine the numbers.

$$\begin{aligned} x \\ x - 20 \\ 10 - 20 \\ -10 \end{aligned}$$

$$\begin{aligned} P &= x(x - 20) \\ &= 1x^2 - 20x \end{aligned}$$

$$\begin{aligned} x &= \frac{-b}{2a} \\ &= \frac{-(-20)}{2(1)} \\ &= 10 \end{aligned}$$

x-coord of vertex

∴ the numbers are 10 and -10
min product -100

2.) The sum of two numbers is 20. The sum of their squares is a minimum. Determine the numbers.

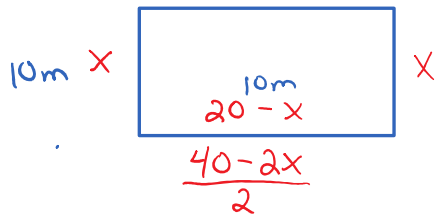
$$\begin{aligned} x \quad x^2 \quad + \\ 20 - x \quad (20 - x)^2 \\ S &= x^2 + (20 - x)^2 \\ &= x^2 + 400 - 40x + x^2 \\ &= 2x^2 - 40x + 400 \end{aligned}$$

$$\begin{aligned} x &= \frac{-b}{2a} \\ x &= \frac{-(-40)}{2(2)} \\ x &= 10 \end{aligned}$$

$$\begin{aligned} 20 - x \\ 20 - 10 \\ 10 \end{aligned}$$

∴ numbers are 10 and 10

3.) Determine the dimensions of a rectangular lot with a maximum area using 40 m of fencing.

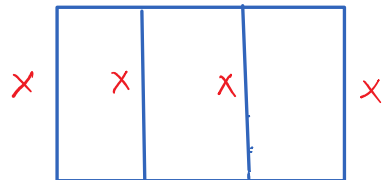


$$\begin{aligned} A &= l \cdot w \\ &= x(20 - x) \\ &= 20x - x^2 \\ \text{or} \\ A &= -x^2 + 20x \end{aligned}$$

$$\begin{aligned} x &= \frac{-20}{2(-1)} \\ &= 10 \end{aligned}$$

∴ dimensions are 10m x 10m

4.) A rectangular lot is fenced in and divided into 3 sections using 800 m of fencing. Determine the dimensions that will create a lot of maximum area.



$$\begin{aligned} A &= l \cdot w \\ &= x(400 - 2x) \\ &= 400x - 2x^2 \\ \text{or} \\ A &= -2x^2 + 400x \end{aligned}$$

$$\begin{aligned} x &= \frac{-b}{2a} \\ &= \frac{-400}{2(-2)} \\ &= 100 \end{aligned}$$

∴ dimensions are 100m x 200m

Assign
pg 256
2, 3, 4
9, 11