

Given $y=x^2+6x-7$, find the coordinates of the Vertex.

Completing the Square	$h = \frac{-b}{2a}$ $k = f\left(\frac{-b}{2a}\right)$

1. The sum of two integers is 48. Find the values of these two integers so that their product is a maximum, and find the maximum value of the product.

2. You have 480 feet of fencing to enclose a rectangular plot of land. Find the dimensions of the rectangular plot that would maximize the area.

3. You have 1200 feet of fencing to enclose a rectangular plot of land with one side along a river. No fencing is to be used on the side of the field containing the river. Find the dimensions of the field that will maximize the area of the field.

4. A rectangular field is to be fenced off, and then divided in two by a fence running parallel to one of the sides. If 918 meters of fencing can be used, find the dimensions of the field that will maximize the total area, and then find the maximum area.

5. A car rental company has 448 cars on their lot. They can rent all 448 cars at a rate of \$40 per day. They determine that for every \$1 increase in the rental cost, they will rent 4 fewer cars. Find the car rental rate that will maximize revenue for the company.

6. A company can produce a toy bear at a cost of \$5 per bear. When the company sells the bears at a price of \$34, they can sell 280 bears each week. It is estimated that for every \$0.50 decrease in the price, they can sell 20 more bears. Find the price that will maximize the profit for the company.

7. The height of a ball thrown from the top of a building can be modeled by the equation, where h is the height in feet and t is time in seconds.

$$h(t) = -16t^2 + 75t + 200$$

- (a) The height of the building:
- (b) The time it takes for the ball to reach its max height:
- (c) The maximum height of the ball:
- (d) The time it takes for the ball to reach the ground:

8. The velocity of a subatomic particle moving through space can be modeled by: $v(t) = 0.2t^2 - 5t + 0.8$
for $t \geq 0$ where t is in seconds and v is velocity in m/s .

(a) The time(s) t at which the particle is not moving:

(b) The intervals over which it is moving forward:

(c) The intervals over which it is moving backwards:

9. On a citrus farm, the average annual yield of oranges is 104 pounds per tree when the number of trees is 20 per acre. For each additional tree over 20, the annual yield per tree decreases by 2 pounds per tree. How many orange trees should be planted per acre to maximize the number of pounds of oranges per acre?