

Applications on Max/Min problems of Quadratic Functions

(solve by graphing with DESMOS)

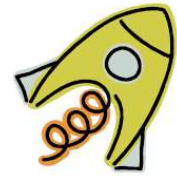
- 1) Suppose you are tossing an apple up to a friend on a third-story balcony. After t seconds, the height of the apple in feet is given by $h = -16t^2 + 38.4t + 0.96$. Your friend catches the apple just as it reaches its highest point. How long does the apple take to reach your friend, and at what height above the ground does your friend catch it?

- 2) The barber's profit p each week depends on his charge c per haircut. It is modeled by the equation $p = -200c^2 + 2400c - 4700$. Sketch the graph of the equation. What price should he charge for the largest profit?

- 3) A skating rink manager finds that revenue R based on an hourly fee F for skating is represented by the function $R = -480F^2 + 3120F$. What hourly fee will produce maximum revenues?

(Solve by completing the square)

- 4) A model rocket is launched from the roof of a building. Its flight path is modeled by $h = -5t^2 + 30t + 10$ where h is the height of the rocket above the ground in metres and t is the time after the launch in seconds.



What is the rocket's maximum height?

- 5) A fireworks rocket is launched from a hill above a lake. The rocket will fall into the lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $g(x) = -16x^2 + 64x + 80$. What is the maximum height of the rocket?

(Dealing with numbers)

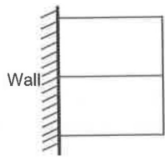
6) Two numbers have a sum of 20. The sum of their squares is a minimum. Determine the two numbers.

7) Two numbers have a difference of 18 and their product is a minimum. Find the two numbers.

(Dealing with fields)

- 8) A rectangular field is to be enclosed by 400 m of fence. What is the maximum area? What dimensions will give the maximum area?

- 9) A farmer has 120 m of fencing and he wants to make two rectangular pens – one for sheep and the other for cattle. If he uses the wall of his house as one side of the pens, what dimensions will give the maximum area?



(Dealing with maximum revenue)

10) Last year, talent show tickets were sold for \$11 each and 400 people attended. It has been determined that an increase of \$1 in ticket price would cause a decrease in attendance of 20 people. What ticket price would maximize revenue?

11) Tickets to a school dance cost \$4 and the projected attendance is 300 people. For every \$0.10 increase in ticket price, the dance committee projects that attendance will decrease by 5.

- a) Determine the dance committee's greatest possible revenue.
- b) What ticket price will produce the greatest revenue?