

Maximum /Minimum Problems (Second Long answer Q on Public)

Maximum/minimum problems are problems that involve finding the vertex of a quadratic function and interpreting what the vertex is saying

IE) for $y = -2(x-7)^2 + 18$

vertex = (7,18) Y has a maximum value of 18 at $x = 7$

IE) for $\frac{1}{2}(y - 3) = (x + 7)^2$

Vertex = (-7,3) y has a minimum value of $y = 3$ and it occurs at $x = -7$

Max and Mins (Given the function)

Ex) A ball is thrown into the air and its path can be described by the function

$H(t) = -4.9t^2 + 29.4t + 1$ where t is time in seconds and H(t) is height in meters.

- A) Determine the initial height of the ball?
- B) Determine algebraically the maximum height reached by the ball. (Note: this is a max/min problem because it used the term maximum...must find vertex)

C) Algebraically determine when will the ball hit the ground. (Note this is a quadratic equation problem ...therefore you must find the zeroes of the function by using the quadratic formula)

D) Algebraically determine what times will the ball be at a height of 40.2 m? 25.5 m?

Ex) An arrow is shot into the air and its path can be described by the function $H(t) = -5t^2 + 30t$ where t is time in feet and H(t) is height of the arrow in meters.

- A) How do you know the arrow was fired from ground level? (initial height)

- B) Determine algebraically the maximum height reached by the arrow. (Note: this is a max/min problem because it used the term maximum...must find vertex)
- C) Algebraically determine when will the arrow hit the ground. (Note this is a quadratic equation problem ...therefore you must find the zeroes of the function by using the quadratic formula)
- D) Algebraically determine what times will the arrow will be at a height of 33.75 m?

Type two Max and Mins. Not Given The Function (Usually type that is asked in LA)

- Ex) Two numbers have a sum of 84. Set up a quadratic function and identify these numbers if their product is a maximum,
- Ex) Two numbers differ by 30. Set up a quadratic function and determine the two numbers if their product is a minimum.
- Ex) You have 150 m of fencing with which to fence a rectangular region. Set up a quadratic function to determine the dimension that will yield the largest possible area.
- Ex) A farmer has 400 m of fencing to fence a rectangular pasture that has a river bordering on one side of the pasture. Set up a quadratic function and determine that largest possible area he can enclose under these conditions. What are the dimensions that give this area?

Max and Mins Continued

Ex) A farmer wishes to enclose a rectangular region bordering a river using 900m of fencing . If she wishes to divide the region into two equal sections, what are the dimensions that will produce the maximum area?

Ex) A sheet of bristle board measure 2m by 3 m. A box is constructed by folding each corner by cutting equal sized squares from each corner of the bristle board. What will be the largest possible surface area that can be made?

Quadratic Equation Problems DOP LA Q 52 or 53 LA 4%

These are often characterized by "...set up a quadratic equation and algebraically determine"... maximum and minimum are never mentioned.

Ex) A cannon ball is shot into the air as shown below. The height of the ball above ground, in meters, t seconds after being shot is approximated by $h(t) = -5t^2 + 15t + 12$. Algebraically determine the times when the ball is at a height of 22m. (Give diagram)

Note: not a max/min problem now...quadratic eq problems therefore set up equation and find roots by quadratic formula

Ex) The length of a rectangular driveway is 8m longer than its width. If the area of the driveway is 240 m^2 , Set up a quadratic equation and use it to determine the dimensions of the driveway.

Ex) A deck of uniform width is to be built around the swimming pool as shown. The pool has dimensions 10 m by 20 m. Set up a quadratic equation to determine what is the width of the deck if the new combined area is 336 m^2 . (Give diagram)