

3.3 Notes - Explore Quadratic Function Applications
Find max/min/roots using the calculator

Problem 1

The daily high temperature in Death Valley, California, in 2003 can be modeled by the function

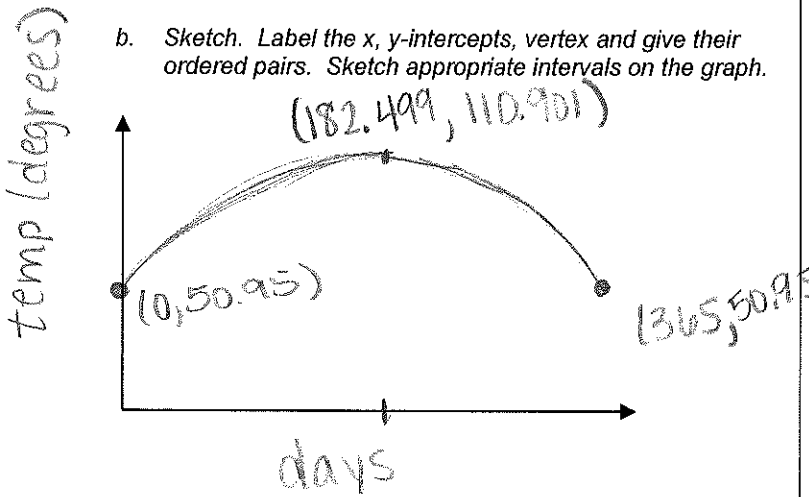
$T(d) = -0.0018d^2 + 0.657d + 50.95$, where T is temperature in degrees and d is the day of the year.

a. Graph $T(d)$ in your calculator. Adjust the window settings.

x-axis represents: days Settings: [0, 365, 10]

y-axis represents: temp Settings: [0, 150, 10]

b. Sketch. Label the x, y-intercepts, vertex and give their ordered pairs. Sketch appropriate intervals on the graph.



c. What are the units of the ordered pairs. (Use words.)

(DAYS , TEMP)

d. What is the maximum temperature in 2003 to the nearest degree?

111°

e. Why are there no x-intercepts for this situation?

365 is the last day of the year.

f. What is the domain and range for this function in the context of this situation?

Domain: DAYS : [0, 365]
Range: Temp : [50.95, 110.901]

Problem 2

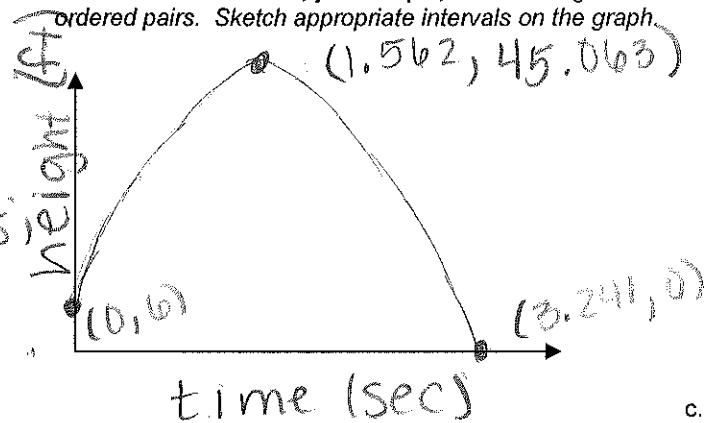
A baseball is thrown with a vertical velocity of 50 ft/s from an initial height of 6 ft. The height h in feet of the baseball can be modeled by the function $h(t) = -16t^2 + 50t + 6$, where t is the time in seconds since the ball was thrown.

a) Graph $T(t)$ in your calculator. Adjust the window settings.

x-axis represents: time Settings: [0, 5, 1]

y-axis represents: height Settings: [0, 50, 10]

b. Sketch. Label the x, y-intercepts, vertex and give their ordered pairs. Sketch appropriate intervals on the graph.



c. What are the units of the ordered pairs. (Use words.)

(time , height)

e. Approximately how tall is the person who threw the ball?

6 ft

f. Approximately how many seconds does it take the ball to reach its maximum height?

1.562 sec.

g. How long is the ball in the air?

3.241 sec.

h. What is the domain and range for this function in the context of this situation?

Domain: time [0, 3.241]

Range: ht [0, 45.063]

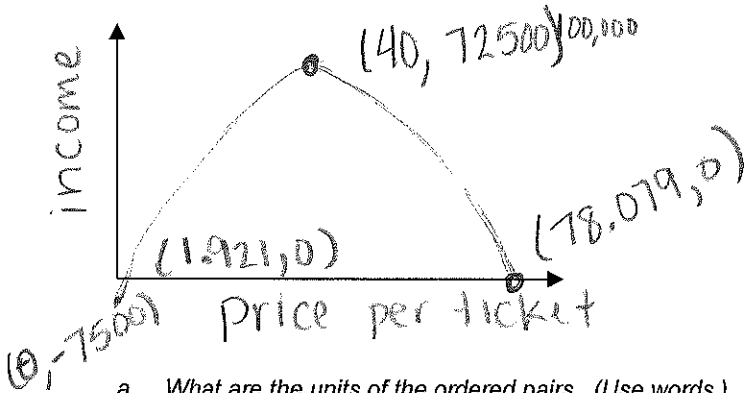
Problem 3

Rock music managers handle publicity and other business issues for the artists they manage. One group's manager has found that based on past concerts, the predicted income for a performance is modeled by the function $P(x) = -50x^2 + 4000x - 7500$, where x is the price per ticket in dollars.

a. Graph $P(x)$ in your calculator. Adjust the window settings.

x-axis represents: price Settings: [0 , 100 , 10]

y-axis represents: income Settings: [-7500 , ↑ , ↵ 15000]



a. What are the units of the ordered pairs. (Use words.)

(price of ticket , income)

b. What is the ticket price that will give the most profit?

\$ 40

c. What is the maximum profit they can earn?

\$ 72500

d. What is the meaning of the more positive x-intercept in the context of this problem? The y-intercept?

X-int \rightarrow where they just break even

Y-int \rightarrow cost for production

e. What is the domain and range for this function in the context of this situation?

Domain: Price : [0 , 78.08]

Range: Income [-7500 , 72500]

Problem 4

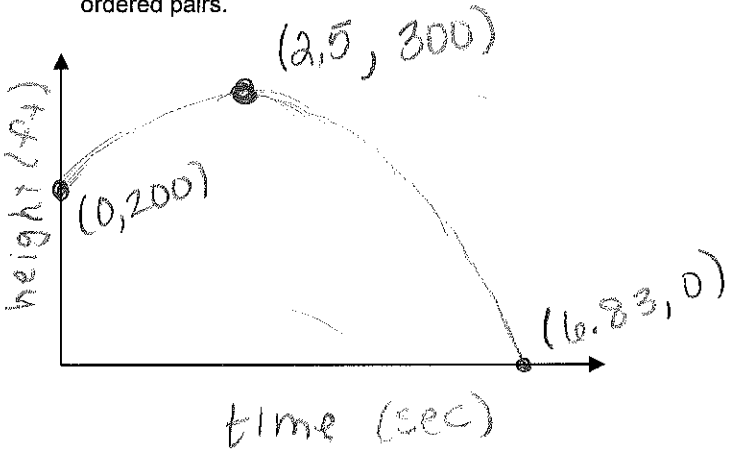
An object is fired straight up from the top of a 200-foot tower at a velocity of 80 feet per second. The height $h(t)$ of the object t seconds after firing is modeled by the function $h(t) = -16t^2 + 80t + 200$.

Graph $h(t)$ in your calculator. Adjust the window settings.

x-axis represents: time Settings: [0 , 10 , 1]

y-axis represents: ht Settings: [0 , 400 , 10]

a. Sketch. Label the y-int, x-int, and the vertex and give their ordered pairs.



b. What are the units of the ordered pairs. (Use words.)

(time , height)

c. What is the maximum height the object will reach?

300 ft

d. How long will it take to reach the maximum height?

2.5 ft

e. What is the meaning of the y-intercept in this problem? X-intercept?

Y-int: the ht the object is launched from.

X-int: time it takes to hit the ground.

f. What is the domain and range for this function in the context of this situation?

Domain: time [0 , 6.83]

Range: height [0 , 300]