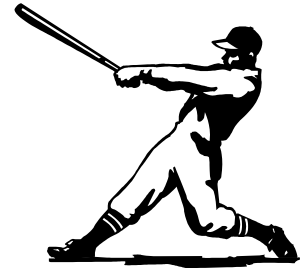


Station # 1: The Baseball Player

The height of a baseball after it is hit can be modeled by the function

$$y = -4.9x^2 + 35x + 1$$

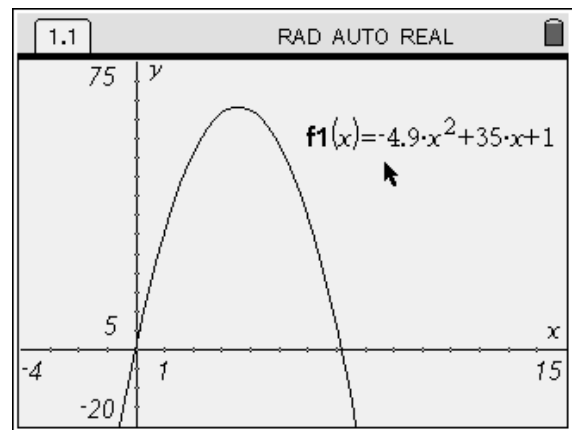
In this equation x is the time, in seconds, since the ball was hit and y is the height, in metres, of the ball above the ground.



a) Graph the equation on your TI-Nspire using the window settings shown on the grid provided.

Sketch your graph on the grid provided.

b) Trace your graph to find the following ordered pairs: y -intercept, x -intercept, vertex. Record the ordered pairs on your sketch. Draw a dotted line on your sketch to represent the axis of symmetry.



c) Is your vertex a maximum or minimum point?

Maximum

d) What is the maximum height of the ball?

63.5 m

e) What is the height of the ball when it is hit?

1 m

f) How long does it take for the ball to hit the ground?

7.2 seconds

You will need to trace to find other ordered pairs to answer the following questions:

g) What is the height of the ball 2 seconds after it is hit?

51.4 m

h) Over what time interval is the height of the ball greater than 30 metres?

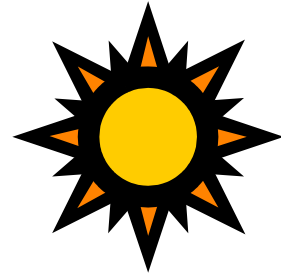
About 5.2 seconds

Station # 2: The UV Index

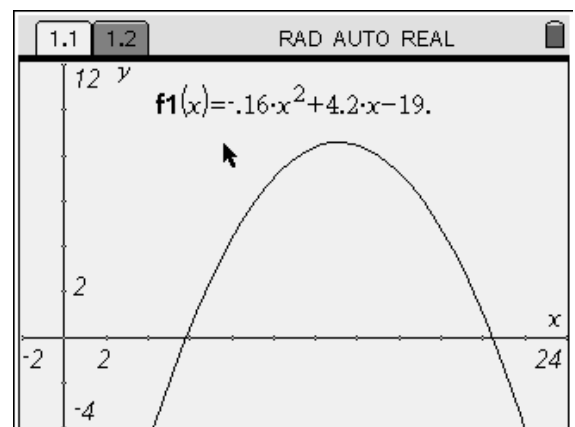
The UV index was created to measure the strength of the sun's rays. The scale goes from 0 to 12 where the higher the value, the faster unexposed skin burns. The UV index on a hot day during the summer in Ontario can be modeled by the function

$$y = -0.16x^2 + 4.192x - 19.2576.$$

In this equation, x is the time of day (24 hour clock) and y is the UV index.



a) Graph the equation on your TI-Nspire using the window settings shown on the grid provided. Sketch your graph on the grid provided.



b) Trace your graph to find the following ordered pairs: x-intercepts, vertex. Record the ordered pairs on your sketch. Draw a dotted line on your sketch to represent the axis of symmetry.

c) What is the maximum value of the UV index?

8.3

d) At what time does the maximum occur?

A little after 13:00 hours
or 1:00 pm

e) What are the x-intercepts of the function?
What do they represent in this context?

(5.8,0) (20.4,0)
When UV index is 0

You will need to trace to find other ordered pairs to answer the following questions:

f) What is the UV index at noon? (12:00)

8.4

g) When the UV index is greater than 7, it is considered to be high and exposed skin can burn in 15 minutes or less. For how long is the UV index high on this day?

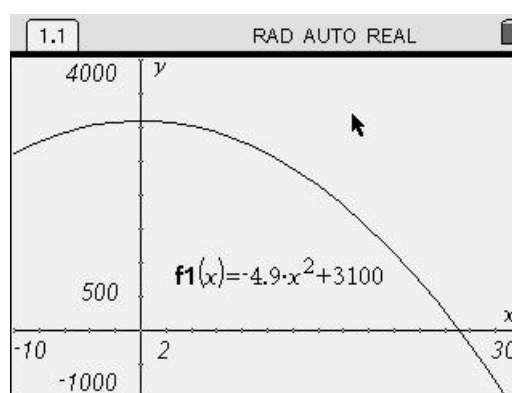
About 6.3 hours

Station # 3: Skydiving

A skydiver jumps from a plane at an altitude of 3100 metres. Her height above the ground during free fall is given by the equation $y = -4.9x^2 + 3100$. In this equation, x is the time in seconds since she leaves the plane and y is the height above the ground in metres.



a) Graph the equation on your TI-Nspire using the window settings shown on the grid provided. Sketch your graph on the grid provided.



b) Trace your graph to find the following ordered pairs: y -intercept, x -intercept(s), vertex. Record the ordered pairs on your sketch.

c) In this example the vertex and the y -intercept are the same point. What does the y -value of this point represent in this context? Height of plane, 3100m

d) If her parachute didn't open, how long would it be until the skydiver reaches the ground? 25.2 seconds

You will need to trace to find other ordered pairs to answer the following questions:

e) What is her height above the ground 5 seconds after she leaves the plane? 2977.5 m

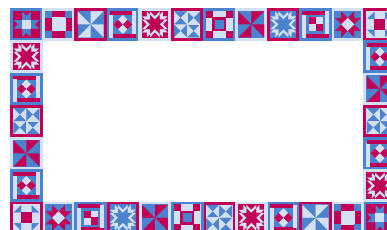
f) If the skydiver plans to open her parachute at an altitude of 2000 metres, how many seconds of free fall will she have? 15 seconds

Station # 4: Area of a Rectangle

A rectangular enclosure has an area in square metres given by the equation

$$y = -2x^2 + 36x.$$

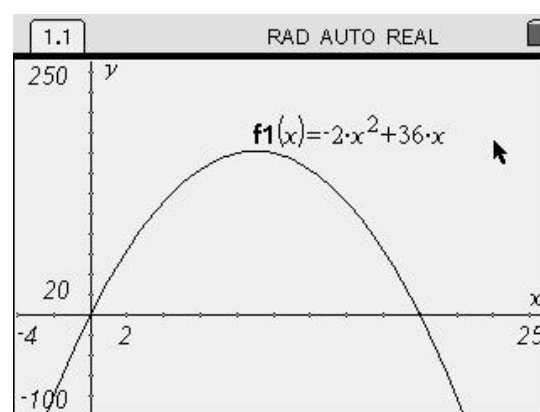
In this equation, x is the width of the rectangle in metres, and y is the area of the rectangle.



a) Graph the equation on your TI-Nspire using the window settings shown on the grid provided.

Sketch your graph on the grid provided.

b) Trace your graph to find the following ordered pairs: y -intercept, x -intercepts, vertex. Record the ordered pairs on your sketch. Draw a dotted line on your sketch to represent the axis of symmetry.



c) One of the x -intercepts is the same as the y -intercept.

What does this point represent in this context? No width means no area

d) What is the maximum area of the rectangle?

162 square metres

e) What is the width of the rectangle that would produce this maximum area?

9 metres

You will need to trace to find other ordered pairs to answer the following questions:

f) Find the area when the width is 4.

112 square metres

g) Find the width that would produce an area of 90 square metres.

3 m