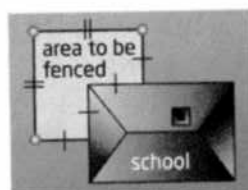


8. The cost, C , in dollars, of fuel per month for Sanjay to operate his truck is given by $C(v) = 0.0029v^2 - 0.48v + 142$, where v represents his average driving speed, in kilometres per hour. Find the most efficient speed at which Sanjay should drive his truck.

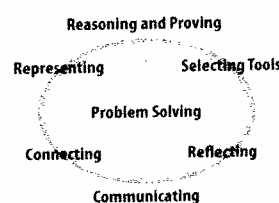
9. Arnold has 24 m of fencing to surround a garden, bounded on one side by the wall of his house. What are the dimensions of the largest rectangular garden that he can enclose?

10. The area shown is to be enclosed by 30 m of fencing. Find the dimensions that will maximize the enclosed area.



11. The sum of two numbers is 10. What is the maximum product of these numbers?

12. A function models the effectiveness of a TV commercial. After n viewings, the effectiveness, e , is $e = -\frac{1}{90}n^2 + \frac{2}{3}n$.



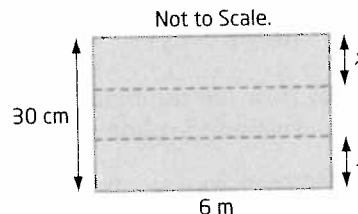
- a) Determine the range for the effectiveness and the domain of the number of viewings. Explain your answers for the domain and range.
- b) Use either completing the square or partial factoring to find the vertex. Is it a minimum or a maximum? Explain.
- c) What conclusions can you make from this function?
- d) Graph the function on a graphing calculator to verify your conclusions from part c).

13. All quadratic functions of the form $y = 2x^2 + bx$ have some similar properties.

- a) Choose five different values of b and graph each function.
- b) What are the similar properties?
- c) Determine the vertex of each parabola.
- d) Find the relationship between the vertices of these parabolas.

Extend

14. A sheet of metal that is 30 cm wide and 6 m long is to be used to make a rectangular eavestrough by bending the sheet along the dotted lines.



What value of x maximizes the capacity of the eavestrough?

15. A ball is thrown vertically upward with an initial velocity of v metres per second and is affected by gravity, g . The height, h , in metres, of the ball after t seconds is given by $h(t) = -\frac{1}{2}gt^2 + vt$.

- a) Show that the ball will reach its maximum height at $t = \frac{v}{g}$.
- b) Show that the maximum height of the ball will be $\frac{v^2}{2g}$.

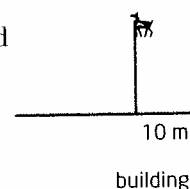
16. **Math Contest** Given that $x^2 = y^3 = z$, where x , y , and z are integers, how many different values of z are there for $z < 1001$?

A 0 B 3 C 4 D 10

17. **Math Contest** A function of two variables is defined as $f(x, y) = x^2 + y^2 + 4x - 6y + 7$. What is the minimum value of this function?

A 7 B -13 C -6 D 0

18. **Math Contest** A dog's 15-m-long leash is attached to a building. The leash is attached 10 m from one corner of the building. Assume that the sides of the building are long enough that the dog cannot go around any of the other corners. The greatest area that the dog can cover, in square metres, is



A 250π B $\frac{475\pi}{4}$ C 112.5π D 125π

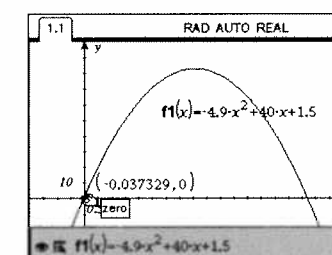
Use a TI-Nspire™ CAS Graphing Calculator to Find the Maximum or Minimum and the Zeros of a Quadratic Function

Jamie throws a ball that will move through the air in a parabolic path due to gravity. The height, h , in metres, of the ball above the ground after t seconds can be modelled by the function $h(t) = -4.9t^2 + 40t + 1.5$.

- a) Find the zeros of the function and interpret their meaning.
- b) Determine the time needed for the ball to reach its maximum height.
- c) What is the maximum height of the ball?

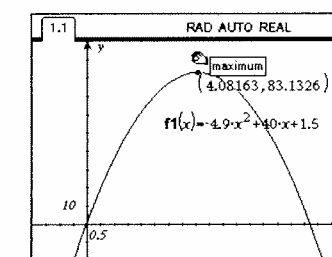
Solution

- a) Turn on the TI-Nspire™ CAS graphing calculator.
- Press 2ND and select **6:New Document**.
 - Select **2:Add Graphs & Geometry**.
 - Type $-4.9x^2 + 40x + 1.5$ for function $f1$ and press ENTER .
 - Press MENU . Select **4:Window**.
 - Select **1:Window Settings**. Set **XMin** to -2 , **XMax** to 10 , **Ymin** to -40 , and **YMax** to 100 . Tab down to **OK** and press ENTER .
 - Press MENU and select **6:Points & Lines**.
 - Select **2:Point On**. Move the cursor to the graph and press ENTER .
 - Press ESC .
 - Press CTR and then ENTER to grab the point. Use the cursor keys (the arrows on the NavPad) to move the point along the graph toward the left zero. When you reach the zero, "zero" will appear in a box. Read the coordinates of the zero. It occurs at a time of approximately -0.037 s.



Similarly, you can find the right zero at a time of about 8.20 s.

- b) To find the maximum height of the ball, move the point toward the maximum on the graph. When you reach the maximum, "maximum" will appear inside a box. Read the coordinates of the maximum. It occurs at a time of approximately 4.08 s.



- c) The maximum height of the ball is approximately 83.13 m.

Tools

- TI-Nspire™ CAS graphing calculator

Connecti

Example 4 of 29 is used to find the maximum and minimum of a quadratic using a TI-Nspire CAS graphing calculator.