

Suzhou Skyscraper Shadow Problem

The "Gate to the East" is a prominent skyscraper in Suzhou, standing at a height of 991 ft. On a particular day, as the sun moves across the sky, the length of the shadow of the building can be modeled by the quadratic function: $s(t) = -t^2 + 12t + 10$ where $s(t)$ is the length of the shadow in feet and t is the time in hours since sunrise.



- a) At what times t is the shadow length at its maximum?
- b) Determine the maximum length of the shadow.
- c) Calculate the length of the shadow 3 hours after sunrise.
- d) Using the quadratic formula, determine the times when the shadow is 40 ft long.

Suzhou Garden Visitor Problem

One of Suzhou's classical gardens, the "Lingering Garden," has seen a fluctuation in the number of visitors over the past few months. The garden's management has modeled the number of visitors, v , as a function of the month, m , using the quadratic equation:

$v(m) = -30m^2 + 540m + 1000$ where $m=1$ represents January, $m=2$ represents February, and so on.



1. In which month does the garden expect the maximum number of visitors?
2. Determine the maximum number of visitors the garden expects in a month.
3. Calculate the expected number of visitors in June (i.e., $m=6$).
4. Using the quadratic formula, determine in which months the garden expects exactly 2000 visitors.

Suzhou Cultural Festival Revenue Problem

Every year, Suzhou hosts a grand cultural festival celebrating its rich history and traditions. The revenue, R , generated from ticket sales for the festival as a function of the ticket price, p , is modeled by the equation: $R(p) = -50p^2 + 1000p$

The city council wants to determine the optimal ticket price to maximize revenue.



1. Express the revenue function, $R(p)$, in the form $R(p) = a(p-h)^2 + k$ by completing the square.
2. Using the completed square form, determine the ticket price, p , that will maximize the revenue.
3. Calculate the maximum possible revenue.
4. Interpret the results in the context of the cultural festival.