

Worksheet Quadratic Applications

- A cliff diver dives from 17m above the water. The diver's height above the water, $h(t)$ in metres after t seconds is modelled by $h(t) = -4.9t^2 + 1.5t + 17$. Determine when the diver was 5 m above the water.
- The function $P(x) = -30x^2 + 360x + 785$ models the profit, $P(x)$, earned by a theatre owner on the basis of a ticket price, x . Both the profit and ticket price are in dollars. What is the maximum profit and how much should the tickets cost?
- The population of a town is modelled by the function $P(t) = 6t^2 + 110t + 4000$, where $P(t)$ is the population and t is the time in years since 2000.
 - What will the population be in 2020?
 - When will the population be 6000?
 - Will the population ever be 0? Explain your answer.
- The profit of a shoe company is modelled by the function $P(x) = -5(x - 4)^2 + 45$, where x is the number of pairs of shoes produced in thousands, and $P(x)$ is the profit, in thousands of dollars. How many thousands of pairs of shoes will the company need to sell to earn a profit?
- Beth wants to plant a garden at the back of her house. She has 32m of fencing. The area that can be enclosed is modelled by the function $A(x) = -2x^2 + 32x$, where x is the width of the garden in metres and $A(x)$ is the area in square metres. What is the maximum area that can be enclosed?
- A rectangle is 7 cm longer than it is wide. The diagonal is 13cm. What are the rectangle's dimensions?
- A photo framer wants to place a mat of uniform width all around a photo. The area of the mat should be equal to the area of the photo. The photo measures 40 cm by 60cm. How wide should the mat be?
- The stopping distance for a boat in calm water is modelled by the function $d(v) = 0.004v^2 + 0.2v + 6$, where $d(v)$ is in metres and v is in kilometres per hour.
 - What is the stopping distance if the speed is 10km/h?
 - What is the initial speed of the boat if it takes 11.6m to stop?
- Mario wants to install a wooden deck around his rectangular swimming pool. The cost is modelled by the function $C(w) = 120w^2 + 1800w$, where $C(w)$ is the cost in dollars and w is the width in metres. How wide will the deck be if he has \$4080 to spend?
- The population of a rural town can be modelled by the function $P(x) = 3x^2 - 102x + 25000$, where x is the number of years since 2000. According to the model in what year will the population be lowest?
- A bowling alley has a \$5 cover charge on Friday nights. The manager is considering increasing the cover charge in 50¢ increments. The revenue modelled by the function $R(x) = -12.5x^2 + 75x + 2000$, where revenue $R(x)$ is in dollars and x is the number of 50¢ increments.
 - What cover charge will maximize revenue?
 - What will the cover charge be if revenue is \$2000?
- The height of a soccer ball kicked in the air is given by the equation $h(t) = -4.9(t - 2.1)^2 + 23$, where t , is the time in seconds and $h(t)$ is the height in metres
 - What is the height of the ball when it was kicked?
 - What is the maximum height of the ball?
 - Is the ball still in the air after 6 seconds? Explain
 - For how long was the ball at least 10m high?

Answers

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| 1. 1.73 s | 2. \$1865 & \$6 | 3. a.)8600 | b)2011 | c)no | 4. between 1000 & 7000 |
| 5. 128m ² | 6. 5 cm X 12 cm | 7. 10 cm | 8. a)8.4km | b) 20km/h | |
| 9. 2 m | 10. 2017 | 11. a)\$6.50 | b) \$5 or \$8 | | |
| 12. a)1.39m | b)23m | c)no hits ground at 4.3s | d) 3.26s | | |