

FOUNDATIONS 20 – QUADRATIC WORD PROBLEMS DAILY WARMUP

Answer the following questions using the method indicated – only graphing calculator, only algebra or using both methods. Show answers to the nearest thousandth.

1. GRAPHING CALCULATOR

The profits of Mr. Unlucky's company can be represented by the equation $y = -3x^2 + 18x - 4$, where y is the amount of profit in hundreds of thousands of dollars and x is the number of years of operation. He realizes his company is on the downturn and wishes to sell before he ends up in debt.

- When will Unlucky's business show the maximum profit? (After 3 years)
- What is the maximum profit? (23 hundred thousand dollars)
- At what time will it be too late to sell his business? (When will he start losing money?) (At the end of 5 years)

2. GRAPHING CALCULATOR

Jocelyns and Kelly built rockets from assembly kits and are going to launch them at the same time to see whose rocket flies higher. If Jocelyn's rocket's height, in feet can be described by the equation $J(x) = -16x^2 + 180x$ while Kelly's is represented by $K(x) = -16x^2 + 240x$.

- Who won the contest? Kelly
- How long does it take for Jocelyns rocket to land? How long does it take for Kelly's rocket to land? 15 secs and 11.25 secs
- To the nearest tenth of a second, what was the difference in time for the two different rockets to reach their respective max heights? 1.9 secs

3. GRAPHING CALCULATOR & ALGEBRAICALLY

A ball rolls down a slope and travels a distance $d = 6t + \frac{t^2}{2}$ feet in t seconds. Find when the distance is 17 feet.

(2.367 seconds)

4. GRAPHING CALCULATOR (12.819 Horsepower is needed to overcome a wind drag on the car if it is travelling 50 miles per hour) (199.317 miles per hour the car uses 200 horsepower)

The number of horsepower needed to overcome a wind drag on a certain automobile is given by $N(s) = 0.005s^2 + 0.007s - 0.031$, where s is the speed of the car in miles per hour. How much horsepower is needed to overcome the wind drag on this car if it is traveling 50 miles per hour? At what speed will the car need to use 200 horsepower to overcome the wind drag?

5. GRAPHING CALCULATOR & ALGEBRAICALLY

The number of board feet in a 16 foot long tree is approximated by the model

$F(d) = 0.77d^2 - 1.32d - 9.31$ where F is the number of feet and d is the diameter of the log. How many board feet are in a log with diameter 12 inches? What is the diameter that will produce the minimum number of board feet?

85.73 board feet are in a log with a diameter of 12 inches

A diameter of 4.438 inches will produce 0 board feet

6. GRAPHING CALCULATOR

For the years of 1983 to 1990, the number of mountain bike owners m (millions) in the US can be approximated by the model $m = 0.337t^2 - 2.265t + 3.962, 3 \leq t \leq 10$ where $t=3$ represents 1983 and $t=10$ represents 1990.

- In which year did 2.5 million people own mountain bikes?
- IN what year was the number of mountain bike owners at a minimum?

1986 2.5 million people own mountain bikes. In 1983 number of mountain bikers were at a minimum

7. GRAPHING CALCULATOR

The path of a high diver is given by $y = -\frac{4}{9}x^2 + \frac{24}{9}x + 10$ where y is the height in feet

above the water and x is the horizontal distance from the end of the diving board in feet. What is the maximum height of the diver and how far out from the end of the diving board is the diver when he hits the water?

Maximum height is 14 feet .

8.612 feet away from the diving board when he hits the water