

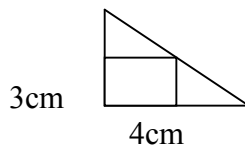
Quadratic Functions Word Problems

- 1) The John Deere company has found that the revenue from sales of heavy-duty tractors is a function of the unit price p that it charges. The revenue R is

$$R = -\frac{1}{2}p^2 + 1900p$$

What unit price p should be charged to maximize revenue? What is the maximum revenue?

- 2) Among all pairs of numbers whose sum is 100, find a pair whose product is as large as possible. (Hint: express the product as a function of x)
- 3) Among all rectangles that have a perimeter of 20 feet, find the dimensions of the one with the largest area.
- 4) Find the area of the largest rectangle that can be inscribed in a right triangle with legs of lengths 3 cm and 4 cm if two sides of the rectangle lie along the legs as shown in the figure. (Hint: set the triangle with the right angle at the origin of a graph and write the equation of the line containing the hypotenuse)



- 5) A farmer has 3000 feet of fence available to enclose a rectangular field. Assuming that he uses all of his fence material, find the length of each of the sides of the rectangle which will maximize the area. What is the maximum area he can enclose?

- 6) A farmer with 4000 meters of fencing material wants to enclose a rectangular plot that borders on a river. If the farmer does not fence the side along the river, what is the largest area that he can enclose? What will the dimensions be?
- 7) A projectile is fired from a cliff 200 feet above the water at an inclination of 45° to the horizontal, with a muzzle velocity of 50 feet per second. The height h of the projectile above the water is given by $h(x) = -\frac{32x^2}{50^2} + x + 200$ where x is the horizontal distance of the projectile from the face of the cliff.
- At what horizontal distance from the face of the cliff is the height of the projectile a maximum?
 - Find the maximum height of the projectile.
 - At what horizontal distance from the face of the cliff will the projectile strike the water?
 - When the height of the projectile is 100 feet above the water, how far is it from the cliff?

Answers:

- \$1900.00; \$1,805,000.00
- 50, 50
- 5ft by 5ft
- 3 cm^2
- \$1.00
- $2,000,000 \text{ m}^2$; 1000 m by 2000 m
- a) about 39 feet b) about 219.5 feet c) about 170 feet d) about 135.7 feet