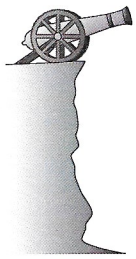
NAME _____ DATE _____ PERIOD HW #3

~~4-1~~ Word Problem Practice

LT 3.1-3.3 ## Graphing Quadratic Functions

1. **TRAJECTORIES** A cannonball is launched from a cannon on the wall of Fort Chambly, Quebec. If the path of the cannonball is traced on a piece of graph paper aligned so that the cannon is situated on the y-axis, the equation that describes the path is



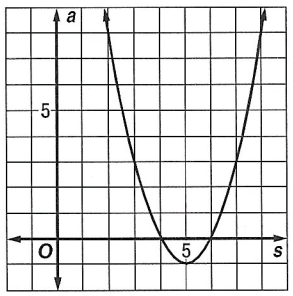
$$y = -\frac{1}{1600}x^2 + \frac{1}{2}x + 20,$$

where x is the horizontal distance from the cliff and y is the vertical distance above the ground in feet. How high above the ground is the cannon? **20 ft**

2. **TICKETING** The manager of a symphony computes that the symphony will earn $-40P^2 + 1100P$ dollars per concert if they charge P dollars for tickets. What ticket price should the symphony charge in order to maximize its profits? **$13.75**

3. **ARCHES** An architect decides to use a parabolic arch for the main entrance of a science museum. In one of his plans, the top edge of the arch is described by the graph of $y = -\frac{1}{4}x^2 + \frac{5}{2}x + 15$. What are the coordinates of the vertex of this parabola? **(5, 21.25)**

4. **FRAMING** A frame company offers a line of square frames. If the side length of the frame is s, then the area of the opening in the frame is given by the function $a(s) = s^2 - 10s + 24$. Graph $a(s)$.



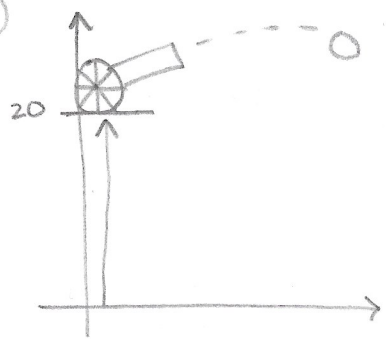
5. **WALKING** Canal Street and Walker Street are perpendicular to each other. Evita is driving south on Canal Street and is currently 5 miles north of the intersection with Walker Street. Jack is at the intersection of Canal and Walker Streets and heading east on Walker. Jack and Evita are both driving 30 miles per hour.

   a. When Jack is x miles east of the intersection, where is Evita?
   5 − x mi north of the intersection

   b. The distance between Jack and Evita is given by the formula $\sqrt{x^2 + (5 - x)^2}$. For what value of x are Jack and Evita at their closest? (Hint: Minimize the square of the distance.)
   x = 2.5

   c. What is the distance of closest approach?
   $\frac{5\sqrt{2}}{2}$ mi

Lesson 4-1

① 

$y = -\frac{1}{1600}x^2 + \frac{1}{2}x + 20$

20 ft.

② $-40p^2 + 1100p$

$x = p = \frac{-b}{2a} = \frac{-1100}{2(-40)} = \frac{-1100}{-80}$

$p = \$13.75$

③ $y = -\frac{1}{4}x^2 + \frac{5}{2}x + 15$

$x = \frac{-b}{2a} = \frac{-5/2}{2(-1/4)}$

$x = \frac{-5/2}{-2/4} = \frac{5}{2} \times \frac{4}{2} = \frac{20}{4} = 5$

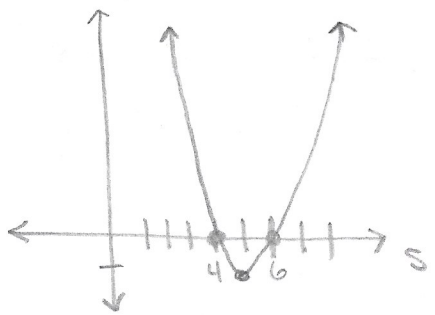
$f(5) = -\frac{1}{4}(5)^2 + \frac{5}{2}(5) + 15$

$= -\frac{1}{4}(25) + \frac{25}{2} + 15$

$= -\frac{25}{4} + \frac{50}{4} + \frac{60}{4}$

$= \frac{25+60}{4} = \frac{85}{4} = 21.25$

④ $a(s) = s^2 - 10s + 24$



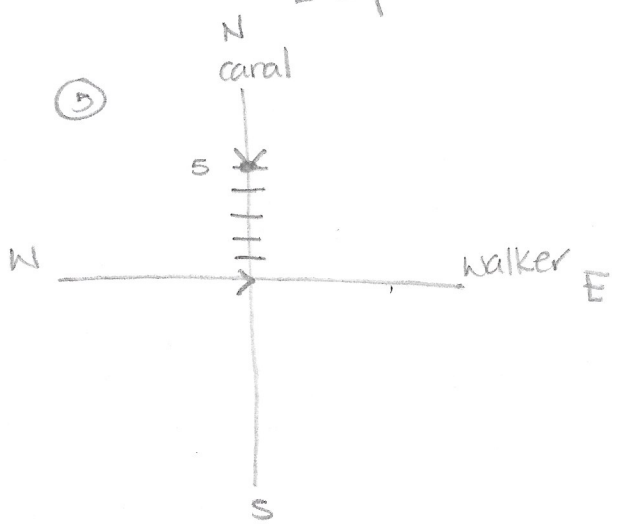
$x = 6 \quad x = 4$

$x = \frac{-(-10)}{2(1)} = 5$

$a(5) = 5^2 - 10(5) + 24$

$= 25 - 50 + 24$

$= -1$

⑤ 

a) $5 - x$ miles north of the intersection

b) $\sqrt{x^2 + (5-x)^2} = \sqrt{x^2 + 25 - 10x + x^2}$

$\sqrt{2x^2 - 10x + 25}$