8. [10 points] A cannon fires a cannonball. Let p be a positive constant and

$$f(t) = -5t^2 + pt + 30$$

be the height of the cannonball (in meters) above the ground t seconds after the cannon was fired.

a. [3 points] Find the value and a practical interpretation of the vertical intercept of the function $f(t)$.

Vertical intercept: _____

Practical interpretation:

b. [5 points] Complete the square to put the formula of f in vertex form. *Carefully show your algebraic work step by step.* Your answer may include the constant p.

$f(t)=$_____

c. [2 points] What should be the value of p if the maximum height of the cannonball is 200 meters above the ground? Find your answer algebraically. Show all your work.

$p=$_____