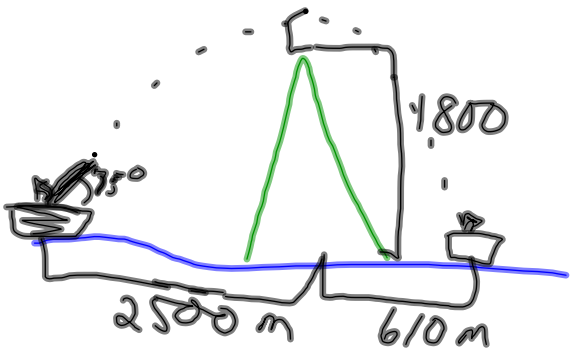
Physics Problem Solving Sheet

Problem 3 pg 110

Useful Description

Picture & Given Information:



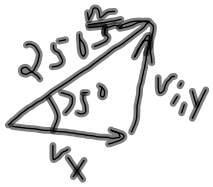
y	x
$\Delta y =$	$\Delta x =$
$v_{i,y} = 241$	$v_x = 64.7 \frac{m}{s}$
$v_{f,y} =$	
$a = -9.8 \frac{m}{s^2}$	

$\Delta t = 38.6 s$

$v_i = 250 \frac{m}{s}$ @ 75° above horiz.

$v_{i,y} = 250 \sin 75° = 241 \frac{m}{s}$

$v_x = 250 \cos 75° = 64.7 \frac{m}{s}$



Question: a) what is the range of the missile?

Target Quantiy: a) Δx

Physics Approach

Physics Concepts and/or Principles:

y: const. acc.

x: const vel.

Specific Application of Physics

Assumptions/ Constraints:

ignore air res.

Specific Equations:

a) $\Delta x = \frac{v_i^2 \sin 2\theta}{9.8 \frac{m}{s^2}}$

Mathematical Procedures

Employ specific equations to solve for target quantity.

a) $\Delta x = \frac{(250 \frac{m}{s})^2 \sin(2 \cdot 75°)}{9.8 \frac{m}{s^2}} = 3189 m$

- enemy is 3110 m away so overshot by 79 m

b) $v_x = \frac{\Delta x}{\Delta t}$

$\Delta t = \frac{\Delta x}{v_x} = \frac{2500 m}{64.7 \frac{m}{s}} = 38.6 s$

$\Delta y = v_{i,y} t + \frac{1}{2} a t^2$

$= 241 \frac{m}{s} (38.6 s) + \frac{1}{2} (-9.8 \frac{m}{s^2}) (38.6 s)^2$

$= 210 m$

Check units & calculate