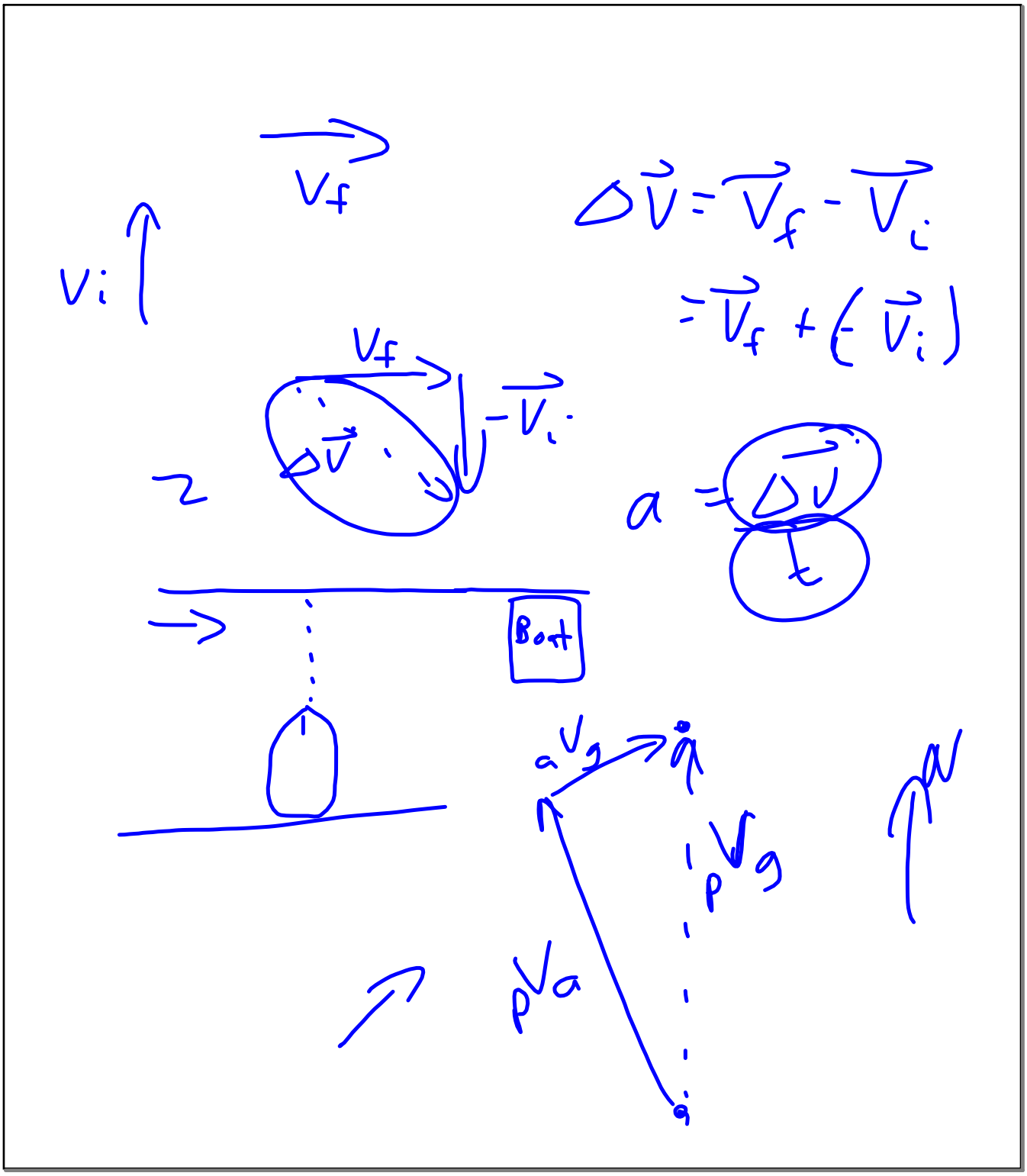
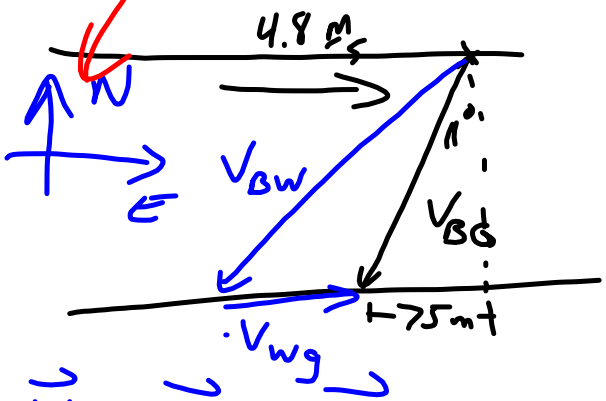
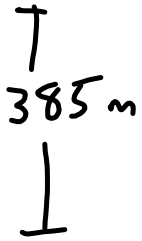

$\vec{v}_f$
v_i
$\Delta\vec{v} = \vec{v}_f - \vec{v}_i$
$= \vec{v}_f + (-\vec{v}_i)$
$\vec{v}_f$
$-\vec{v}_i$
$\Delta\vec{v}$
2
$a = \frac{\Delta v}{t}$
Boat
$a\vec{v}_g$
$p\vec{v}_g$
$p\vec{v}_a$

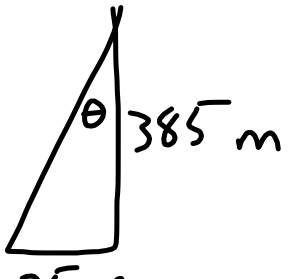
Sep 10-2:04 PM

6. The Raging River flows east at 4.8 m/s. It is 385 m wide and Bart is on the northern shore. If he can swim at 6.9 m/s, determine his heading to land across the river but 75 m upstream from where he starts.

Let's Say...







$\tan\theta = \frac{75}{385}$

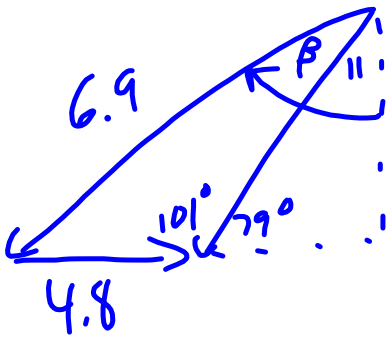
$\theta = 11^\circ$

$\vec{V}_{BW} + \vec{V}_{WG} = \vec{V}_{BG}$

$V_{BW} = 6.9\ \frac{m}{s}\ [?]$

$V_{WG} = 4.8\ \frac{m}{s}\ [E]$

$V_{BG} = x\ [S\ 11^\circ\ W]$



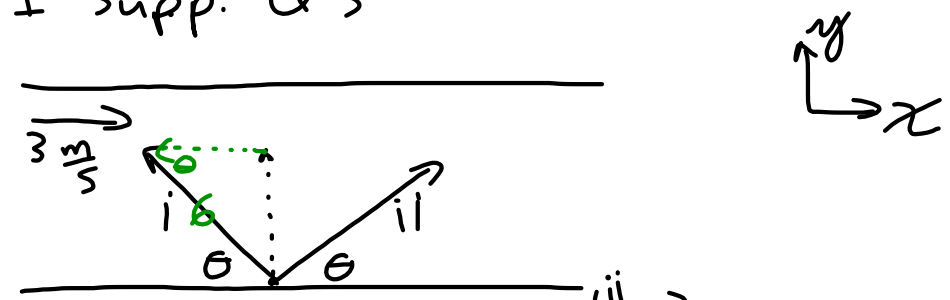
$\frac{\sin 101}{6.9} = \frac{\sin\beta}{4.8}$

$\beta = 43^\circ$

∴ Bart must head [S 54° W]

Ch. 1 Supp. Q's

#9



i $\vec{V}_{wg} = 3\frac{m}{s}[x]$

$\vec{V}_{sw} = 6\frac{m}{s}[-x \theta y]$

$t = T$

ii $\vec{V}_{wg} = 3\frac{m}{s}[x]$

$V_{sw} = 6\frac{m}{s}[x \theta y]$

$t = T$

Split into components

i)

x-dir

$V_{sw} = -6\cos\theta$

$V_{wg} = 3\frac{m}{s}$

$V_{sg} = \frac{d}{t} = \frac{-7}{T}$

$V_{sg} = V_{sw} + V_{wg}$

$= -6\cos\theta + 3$

$\frac{-7}{T} = -6\cos\theta + 3$ (1)

ii)

$V_{sw} = 6\cos\theta$

$V_{wg} = 3$

$V_{sg} = \frac{d}{t} = \frac{55}{T}$

$V_{sg} = V_{sw} + V_{wg}$

$\frac{55}{T} = 6\cos\theta + 3$ (2)

Rearrange (1) $6\cos\theta = \frac{7}{T} + 3$

(2) $6\cos\theta = \frac{55}{T} - 3$

$6\cos\theta = \frac{7}{8} + 3$

$6\cos\theta = \frac{31}{8}$

$\cos\theta = \frac{31}{48}$

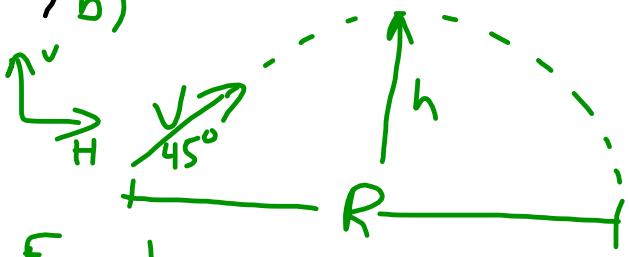
$\theta = 50°$

$\frac{7}{T} + 3 = \frac{55}{T} - 3$

$6 = \frac{55}{T} - \frac{7}{T}$

$6 = \frac{48}{T}$ $T = 8\,s$

7b)



For h

vert.

$V_i = v\sin 45$

$= 0.707v$

$V_f = 0$

$d = h$

$a = -g$

$V_f^2 = V_i^2 + 2ad$

$0 = (0.707v)^2 + 2(-g)(h)$

$= 0.5v^2 - 2gh$

$2gh = 0.5v^2$

$h = \frac{0.5v^2}{2g} = \frac{v^2}{4g}$

for R

vert.

$v = 0.707v$

$a = -g$

$t = \frac{T}{1}$

$d = 0$

$d = v_i t + \frac{1}{2}at^2$

$0 = 0.707vT - \frac{g}{2}T^2$

$0 = T\left(0.707v - \frac{g}{2}T\right)$ $T = 0$ or

$0.707v - \frac{g}{2}T = 0$

$0.707v = \frac{g}{2}T$

$\frac{1.414v}{g} = T$

hor.

$V_H = v\cos 45$

$= 0.707v$

$d = R$

$t = T = \frac{1.414v}{g}$

$d = vt$

$R = 0.707v\left(\frac{1.414v}{g}\right)$

$\boxed{R = \frac{v^2}{g}}$

If $R = 4h$

then $R = 4\left(\frac{v^2}{4g}\right)$

$= \frac{v^2}{g}$

$h = \frac{v^2}{4g}$

Sep 14-1:05 PM