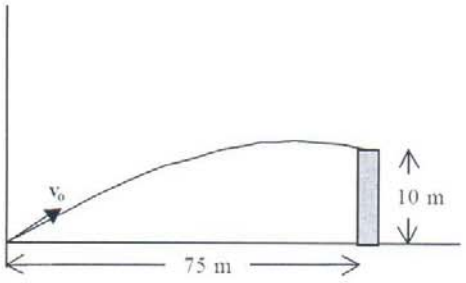
QUIZ#4- CHAPTER4
DATE: 01/10/18

Name: Key Id#: Sect.#:

A ball is thrown from ground level as shown in the figure. Four seconds later the ball is observed to strike the top of a 10-m tall wall that is a horizontal distance of 75 m from the point of throw. Determine the initial speed with which the ball was thrown.



$$x - x_0 = V_{ox}\, t \qquad (75 - 0 = V_{ox}\, 4)$$

$$V_{ox} = \frac{75}{4} = 18.75 \text{ m/s}$$

$$y - y_0 = V_{oy}\, t - 4.9 t^2 \qquad (10 - 0 = V_{oy}\, 4 - 4.9 (4)^2)$$

$$10 = 4 V_{oy} - 78.4 \Rightarrow V_{oy} = 22.1 \text{ m/s}$$

$$\vec{V}_o = 18.75\, \hat{i} + 22.1\, \hat{j} \text{ m/s}$$

$$\text{Speed} = \sqrt{(18.75)^2 + (22.1)^2} = 29 \text{ m/s}$$

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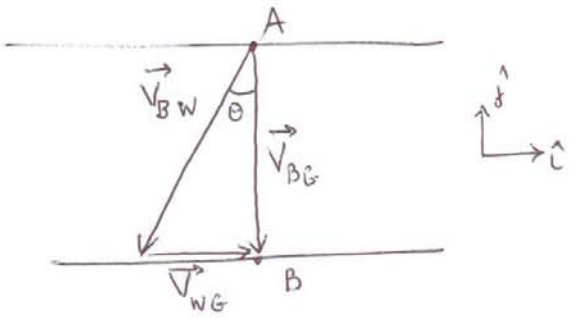
A 140-m wide river flows with a uniform speed of 4.0 m/s toward the east. Starting from a point on the north bank it takes 20 s for a boat to cross the river with constant speed to a point directly across on the south bank. What is the magnitude and direction of the speed of the boat relative to the water?

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

$$= \vec{V}_{BG} - \vec{V}_{WG}$$



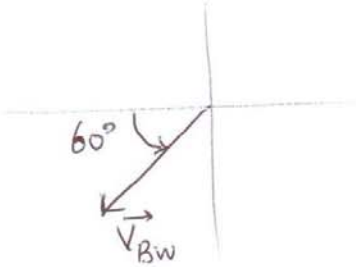
$$\vec{V}_{BW} = -7\hat{j} - 4\hat{i}$$

$$V_{BG} = \frac{x}{t} = \frac{140}{20} = 7 \text{ m/s}$$

magnitude $V_{BW} = \sqrt{(-4)^2 + (-7)^2}$

$= \boxed{8 \text{ m/s}}$

direction $\theta = \tan^{-1}\left(\frac{-7}{-4}\right) = \boxed{60^\circ}$



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A particle leaves the origin at t=0 with a velocity = (8.0 i) m/s. The constant acceleration of the particle is a = (–2.0 i + 3.0 j) m/s^2.

(a) Find the y-coordinate of the particle when it reaches its maximum positive x-coordinate.

$$V_x = V_{ox} + a_x t = 0 = 8 - 2t \Rightarrow t = 4 \text{ sec}$$

$$y - y_o = V_{oy} t + \frac{1}{2} a_y t^2$$

($y_o = 0$, $V_{oy} = 0$)

$$y = \frac{1}{2}(3)(4)^2 = \boxed{24 \text{ m}}$$

(b) What is the velocity of the particle in this case?

$$V_x = V_{ox} + a_x t = 0$$

$$V_y = V_{oy} + a_y t = 0 + (3)(4) = 12 \text{ m/s}$$

$$\boxed{\vec{V} = 0\,\hat{i} + 12\,\hat{j} \text{ m/s}}$$