

Monday Reading Assessment: Unit 2, Kinematics

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1 Memory Bank

1. Assume that acceleration is constant: $a = 3.0 \text{ (m/s}^2\text{)}$, and that $\Delta x = x_f - x_i$
2. $v_f(t) = at + v_i \text{ (m/s)}$
3. $x(t) = \frac{1}{2}at^2 + v_it + x_i \text{ (m)}$
4. $v_f^2 = v_i^2 + 2a\Delta x \text{ (m/s)}^2$.

2 Chapter 3 - Vectors (and review of units)

1. Suppose Captain Jack Sparrow is marooned on a small island in the Caribbean sea. The wind is blowing due West at 10 km/hr. He creates a raft and sets sail, moving West at 10 km/hr. After 2 hours, the wind shifts to the North East, and has a speed of 10 km/hr. One hour later, the wind shifts West again, at 10 km/hr. What is Jack's final location, relative to the island? (*Hint: draw a picture*).

2. Let $\vec{v} = v_x\hat{i} + v_y\hat{j}$, and $\vec{u} = u_x\hat{i} + u_y\hat{j}$. Compute the following:
 - $\vec{v} + \vec{u}$, if $v_x = 4 \text{ m/s}$, $v_y = -2 \text{ m/s}$, $u_x = 0 \text{ m/s}$, and $u_y = 2 \text{ m/s}$.
 - $\vec{v} \cdot \vec{u}$, if $v_x = 4 \text{ m/s}$, $v_y = -2 \text{ m/s}$, $u_x = 0 \text{ m/s}$, and $u_y = 2 \text{ m/s}$.

3 Chapter 3 - Addition of Velocities

1. Imagine you are playing rugby, carrying the ball and running down the field. A teammate runs beside you, and you pass them the ball. Answer yes or no: can they catch the ball if:
 - A: They are running much faster than you
 - B: They are running much slower than you
 - C: They are running at the same speed as you.
2. Imagine the same scenario, except your teammate is running behind you. If you are running at 6 m/s, and they are also running at 6 m/s, and you pass the ball *backwards* at -3 m/s, what is the speed of the ball relative to the ground?