

Unit 3: Practice Test

1) a. Mr. Trask is on top of a train moving at 12 m/s east doing wind sprints (get it? *Wind* sprints...HI-larious...) . What is his velocity relative to a stationary observer if he is running at:

- a. 8.0 m/s east
- b. 4.0 m/s west
- c. 14.0 m/s west

2) A 425 m wide river flows North at 12.0 m/s. A turtle points himself directly East and swims at 8.0 m/s.

a. How long will it take to cross the river?

b. How far down river does he end up?

c. What is his resultant velocity as he crosses the river? (include a vector diagram)

3) A plane can fly at 320 km/h in still air. The plane needs to travel due south to an airport 1200 km away and there is a crosswind blowing at 85 km/h West.

a. What heading should he take in order to head directly south? (include a vector diagram)

b. How long will it take the plane to reach the airport at this heading?

4) A rugby player drop kicks a ball, which leaves the ground traveling at 17 m/s 33° above the horizontal.

a. Draw the total initial velocity of the ball and find its vertical (v_{y0}) and horizontal (v_x) components

b. Assuming the ball traveling over level ground, how long is it in the air?

c. How far downfield does it land?

5) Two students are having an argument. They are discussing what it would be like to run horizontally off of a cliff on a planet that has the same gravity as earth but no atmosphere (and so no air resistance). Student A says that if the cliff is tall enough that eventually you will be falling straight downwards. Student B disagrees.

Which student do you agree with? Explain your answer using principles of physics, include diagrams.