

Vector Word Problems 2

1. The pilot of a plane points his airplane due South and flies with an airspeed of 120 m/s. Simultaneously, there is a steady wind blowing due West with a constant speed of 40 m/s.
 - a. Make a sketch that shows how to find the resultant velocity of the plane. Roughly in what direction is the resultant velocity?

 - b. What is the resultant speed of the airplane?

 - b. After one hour, how far away is the plane from its starting point?

2. A swimmer is able to swim with a speed of 5 m/s in a pool (this is her “water speed”). This same swimmer goes swimming in a river which has a current flowing to the East with a constant speed of 3 m/s. Assume her water speed is always 5 m/s.
 - a. What would be her resultant velocity if she tries to swim due East with the current? (Include a vector sketch.)

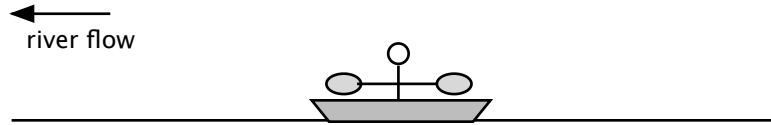
 - b. What would be her resultant velocity if she were to try to swim due West against the current? (Include a vector sketch.)

 - c. What would be her resultant velocity if she points herself due North straight across the river? (Include a vector sketch.)

3. A plane is flying due North at 80 m/s. There is a cross wind of 30 m/s that is blowing due East.
 - a. Draw a vector diagram showing how these velocities add. Roughly in what direction is the resultant velocity?

 - b. How fast is the plane flying with respect to the ground?

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4. A 50 meter wide river is flowing at 5 m/s to the left, as shown in the diagram above. A person in a kayak always rows with a water speed of 8 m/s.
- a. If the kayaker points straight across, what is the final speed of the kayaker? (Include a vector sketch.)
 - b. What would be the maximum possible speed of the kayaker (and in what direction should they point?)
 - c. What would be the slowest possible speed of the kayaker (and in what direction should they point?)
 - *d. How long would it take the kayaker to cross from part a? (Hint: what is the component of the velocity straight across the river?)
 - **e. In what direction should they point so that their resultant velocity is straight across the river? (Include a vector sketch.)
5. A 50 meter wide river is flowing at 5 m/s to the left, as shown in the diagram above. A person in a kayak always rows with a water speed of 3 m/s.
- a. What would be the maximum possible speed of the kayaker (and in what direction should they point?)
 - b. What would be the slowest possible speed of the kayaker (and in what direction should they point?)
 - *c. If the kayaker tries to kayak heads straight across the river, how long would it take the kayaker to cross?

Answers: 1. a) ~SW (71.6° S of W) b) 126.5 m/s c) 455,000 m (=455 km) 2. a) 8 m/s E b) 2 m/s W
 c) 5.83 m/s 3. a) ~NE (69.4° N of E) b) 85.4 m/s 4. a) 9.43 m/s b) 13 m/s W c) 3 m/s E
 d) 6.25 s e) ~NE (51.3° N of E) 5. a) 8 m/s W b) 2 m/s W - but they point E c) 16.7 s