

## Unit 4: Vectors – Review

1. In your own words, write a clear definition of the resultant of two or more vectors. Do not tell how to find it, but tell what it represents.
2. Does anything happen to the vectors that produce a resultant vector? Do the original vectors disappear?
3. What is the vector sum of a 65 N force acting due East and a 32 N force acting due West?
4. An airplane normally flies at 200 km/hr [N]. What is the resultant velocity of the airplane if
  - a) it experiences a 50 km/hr tail wind?
  - b) it experiences a 50 km/hr head wind?
5. You head downstream [W] on a river in a canoe. You can paddle at 5.0 km/hr and the river is flowing at 2.0 km/hr [W]. How far downstream will you be in 30 minutes?
6. You walk 30 m South and then 30 m East. Draw and add vectors for these two displacements. Compute the resultant.
7. A hiker leaves camp and, using a compass, walks 4 km [E], 6 km [S], 3 km [E], 5 km [N], 10 km [W], 8 km [N], and 3 km [S]. At the end of three days, the hiker is lost. By drawing a diagram, compute how far the hiker is from camp and which direction should be taken to get back to camp.
8. Three forces act simultaneously on a point. One force is 10.0 N North; the second is 15.0 N West; the third is 15.0 N at 30° E of N. Determine the magnitude and direction of the resultant force.
9. Dave rows a boat across a river at 4.0 m/s [N]. The river flows at 6.0 m/s [E] and is 360 m across.
  - a) In what direction does Dave's boat go?
  - b) How long does it take Dave to cross the river?
  - c) How far downstream is Dave's landing point?
  - d) How long would it take Dave to cross the river if there were no current?
10. Kyle is flying a plane due North at 225 km/hr. Find the resultant velocity of the plane as seen from the ground if a wind carries it due East at 55 km/hr.
11. Sue and Jenny kick a soccer ball at exactly the same time. Sue's foot exerts a force of 66 N North. Jenny's foot exerts a force of 88 N East. What is the magnitude and direction of the resultant force on the ball?
12. Kym is in a boat travelling 3.8 m/s [N] straight across a river 240 m wide. The river is flowing at 1.6 m/s [E].
  - a) What is Kym's resultant velocity?
  - b) How long does it take Kym to cross the river?
  - c) How far downstream is Kym when she reaches the other side?
13. Kyle wants to fly to a point 450 km due South in 3.00 hours. A wind is blowing from the West at 50 km/hr. Compute the proper heading (direction) and speed that Kyle must choose in order to reach his destination on time.

14. Tammy leaves the office, drives 26 km due North, then turns onto a second highway and continues in a direction  $30^\circ$  N of E for 62 km. What is her total displacement from the office?
15. A plane flying at  $1.00 \times 10^2$  m/s [N] is blown West at  $5.0 \times 10^1$  m/s by a strong wind. Find the plane's resultant velocity.
16. In tackling a running back from the opposite team, a defensive lineman exerts a force of 500 N [W] while a linebacker simultaneously applies a force of 650 N [S]. What is the resultant force on the ball carrier?
17. 4.9 m at  $36^\circ$  S of W + 12.4 m at  $79^\circ$  N of E
18. 125 m/s at  $25^\circ$  W of N - 211 m/s at  $10^\circ$  E of N