

## Chapter 8 Vectors Review:

Topics: identify vector quantities (p.482), represent a vector geometrically (p.483), find the resultant of two vectors (p. 434), operations with vectors (p.485), rectangular components of vectors (p. 487), express a vector in component form (p.492, p.495), find direction angle (p.496), magnitude of vectors (p.493), operations with vectors using components (p. 493), find a unit vector with the same direction as a given vector (p.494), write a vector as a linear combination of unit vectors (p. 495), vector application problems (p.486, p.496)

1. State whether each quantity is a vector quantity:
  - i. a car driving 50 mph due east
  - ii. a gust of wind blowing 5 mph
  - iii. walking 4km east of west
  - iv. pushing down on an object with 7 Newtons of force
2. Use a ruler and a protractor to draw an arrow diagram for  $v = 10$  newtons of force at  $30^\circ$  to the horizontal. Include a scale on the diagram.
3. Find the resultant of:  
Vector 1: 2 kilometers N $30^\circ$ W  
Vector 2: 2 kilometers directly east
4. An airplane is flying with an airspeed of 475 miles per hour on a heading of  $070^\circ$ . If an 80-mile-per-hour wind is blowing from a true heading of  $120^\circ$ , determine the velocity and direction of the plane relative to the ground.
5. Will pushes a shovel into the ground with a force of 630 newtons at an angle of  $70^\circ$  with the ground. Draw a diagram that shows the vector and its rectangular components. Then calculate the rectangular components.
6. A. Find the component form of a vector with an initial point  $A(1, -3)$  and terminal point  $B(1, 3)$   
B. Find the component form of a vector with an initial point  $C(-4, -3)$  and terminal point  $D(5, 3)$
7. A. Find the magnitude of a vector with initial point  $A(1, -3)$  and terminal point  $B(1, 3)$   
B. Find the magnitude of a vector with initial point  $C(4, -2)$  and terminal point  $D(-3, -2)$
8. Find  $2w + y$  for  $w = \langle 2, -5 \rangle$ ,  $y = \langle 2, 0 \rangle$ , and  $z = \langle -1, -4 \rangle$
9. A. Find a unit vector  $u$  with the same direction as  $v = \langle 4, -2 \rangle$ .  
B. Find a unit vector  $u$  with the same direction as  $w = \langle 5, -3 \rangle$ .
10. A. A vector has initial point  $D(-4, 3)$  and terminal point  $E(-1, 5)$ . Rewrite the vector as a linear combination of the vectors  $i$  and  $j$ .  
B. Vector= $\langle 2, 9 \rangle$  Rewrite the vector as a linear combination of the vectors  $i$  and  $j$ .
11. Find the component form of the vector  $v$  with magnitude 7 and direction angle  $60^\circ$ .
12. A. Find the direction angle of  $r = -7i + 2j$  to the nearest tenth of a degree.  
B. Find the direction angle of  $p = \langle 2, 9 \rangle$  to the nearest tenth of a degree.
13. A soccer player running forward at 7 meters per second kicks a soccer ball with a velocity of 30 meters per second at an angle of  $10^\circ$  with the horizontal. What is the resultant speed and direction of the kick?