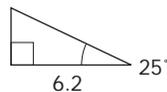


CHAPTER 4

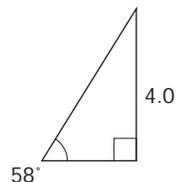
- Bob walks 80 m and then he walks 125 m.
 - What is Bob's displacement if he walks east both times?
 - What is Bob's displacement if he walks east then west?
 - What distance does Bob walk in each case?
- A cross-country runner runs 5.0 km east along the course, then turns around and runs 5.0 km west along the same path. She returns to the starting point in 40 min. What is her average speed? her average velocity?
- Car A is traveling at 85 km/h while car B is at 60 km/h. What is the relative velocity of car A to car B
 - if they both are traveling in the same direction?
 - if they are headed toward each other?
- Find θ if
 - $\tan \theta = 9.5143$.
 - $\sin \theta = .4540$.
 - $\cos \theta = .8192$
 - $\tan \theta = .1405$
 - $\sin \theta = .7547$.
 - $\cos \theta = .9781$.
- Find the value of:
 - $\tan 28^\circ$.
 - $\sin 86^\circ$.
 - $\cos 2^\circ$.
 - $\tan 58^\circ$.
 - $\sin 40^\circ$.
 - $\cos 71^\circ$.
- You walk 30 m south and 30 m east. Draw and add vectors representing these two displacements.

- Solve for all sides and all angles for the following right triangles.

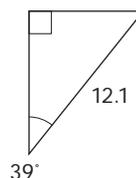
a.



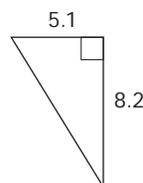
b.



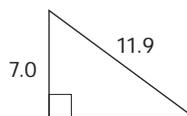
c.



d.



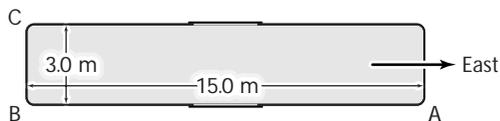
e.



- A plane flying at 90° at 1.00×10^2 m/s is blown toward 180° at 5.0×10^1 m/s by a strong wind. Find the plane's resultant velocity and direction.

Chapter 4 (continued)

9. A man hops a freight car 15.0 m long and 3.0 m wide. The car is moving east at 2.5 m/s. Exploring the surroundings, the man walks from corner A to corner B in 20.0 s; then from corner B to corner C in 5.0 s as shown. With the aid of a vector diagram, compute the man's displacement relative to the ground.



10. A plane travels on a heading of 40.0° for a distance of 3.00×10^2 km. How far north and how far east does the plane travel?
11. What are the x and y components of a velocity vector of magnitude 100 km/h and direction of 240° ?
12. You are a pilot on an aircraft carrier. You must fly to another aircraft carrier, now 1450 km at 45° of your position, moving at 56 km/h due east. The wind is blowing from the south at 72 km/h. Calculate the heading and air speed needed to reach the carrier 2.5 h after you take off. **Hint:** Draw a displacement vector diagram.
13. An 80-N and a 60-N force act concurrently on a point. Find the magnitude of the vector sum if the forces pull
- in the same direction.
 - in opposite directions.
 - at a right angle to each other.
14. One force of 60 N and a second of 30 N act on an object at point **P**. Graphically add the vectors and find the magnitude of the resultant when the angle between them is as follows.
- 0°
 - 30°
 - 45°
 - 60°
 - 90°
 - 180°
15. In tackling a running back from the opposing team, a defensive lineman exerts a force of 500 N at 180° , while a linebacker simultaneously applies a force of 650 N at 270° . What is the resultant force on the ball carrier?
16. A water skier is towed by a speedboat. The skier moves to one side of the boat in such a way that the tow rope forms an angle of 55° with the direction of the boat. The tension on the rope is 350 N. What would be the tension on the rope if the skier were directly behind the boat?
17. Two 15-N forces act concurrently on point **P**. Find the magnitude of their resultant when the angle between them is
- 0.0°
 - 30.0°
 - 90.0°
 - 120.0°
 - 180.0°
18. Kim pushes a lawn spreader across a lawn by applying a force of 95 N along the handle that makes an angle of 60.0° with the horizontal.
- What are the horizontal and vertical components of the force?
 - The handle is lowered so it makes an angle of 30.0° with the horizontal. Now what are the horizontal and vertical components of the force?