

PRACTICE C

Adding Vectors Algebraically

1. A football player runs directly down the field for 35 m before turning to the right at an angle of 25° from his original direction and running an additional 15 m before getting tackled. What is the magnitude and direction of the runner's total displacement?
2. A plane travels 2.5 km at an angle of 35° to the ground and then changes direction and travels 5.2 km at an angle of 22° to the ground. What is the magnitude and direction of the plane's total displacement?
3. During a rodeo, a clown runs 8.0 m north, turns 55° north of east, and runs 3.5 m. Then, after waiting for the bull to come near, the clown turns due east and runs 5.0 m to exit the arena. What is the clown's total displacement?
4. An airplane flying parallel to the ground undergoes two consecutive displacements. The first is 75 km 30.0° west of north, and the second is 155 km 60.0° east of north. What is the total displacement of the airplane?

SECTION REVIEW

1. Identify a convenient coordinate system for analyzing each of the following situations:
 - a. a dog walking along a sidewalk
 - b. an acrobat walking along a high wire
 - c. a submarine submerging at an angle of 30° to the horizontal
2. Find the magnitude and direction of the resultant velocity vector for the following perpendicular velocities:
 - a. a fish swimming at 3.0 m/s relative to the water across a river that moves at 5.0 m/s
 - b. a surfer traveling at 1.0 m/s relative to the water across a wave that is traveling at 6.0 m/s
3. Find the vector components along the directions noted in parentheses.
 - a. a car displaced 45° north of east by 10.0 km (north and east)
 - b. a duck accelerating away from a hunter at 2.0 m/s^2 at an angle of 35° to the ground (horizontal and vertical)
4. **Critical Thinking** Why do nonperpendicular vectors need to be resolved into components before you can add the vectors together?