Chapter 3: TWO-DIMENSIONAL KINEMATICS

# 3.2 Vector Addition and Subtraction: Graphical Methods

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| 5. | *Suppose you first walk 12.0 m in a direction  west of north and then 20.0 m in a direction  south of west. How far are you from your starting point, and what is the compass direction of a line connecting your starting point to your final position? (If you represent the two legs of the walk as vector displacements*  *and**, as in Figure 3.56, then this problem finds their sum* *.)* |
| Solution |  |
| 16. | *Solve the following problem using analytical techniques: Suppose you walk 18.0 m straight west and then 25.0 m straight north. How far are you from your starting point, and what is the compass direction of a line connecting your starting point to your final position? (If you represent the two legs of the walk as vector displacements*  *and* *, as in Figure 3.60, then this problem asks you to find their sum* *.)* |
| Solution | Compass reading = |
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|  |  |
| 18. | *You drive*  *in a straight line in a direction*  *east of north. (a) Find the distances you would have to drive straight east and then straight north to arrive at the same point. (This determination is equivalent to find the components of the displacement along the east and north directions.) (b) Show that you still arrive at the same point if the east and north legs are reversed in order.* |
| Solution | (a) (b) It is easily seen that   |
| 24. | *Suppose a pilot flies*  *in a direction*  *north of east and then flies*  *in a direction*  *north of east as shown in Figure 3.63. Find her total distance  from the starting point and the direction  of the straight-line path to the final position. Discuss qualitatively how this flight would be altered by a wind from the north and how the effect of the wind would depend on both wind speed and the speed of the plane relative to the air mass.* |
| Solution | If the wind speed is less than the speed of the plane, it is possible to travel to the northeast, but she will travel more to the east than without the wind. If the wind speed is greater than the speed of the plane, then it is no longer possible for the plane to travel to the northeast, it will end up travelling southeast. |