Vector Applications
Worksheet 3

1. A plane takes off from Lake Arrowhead airport on a bearing of 100 degrees. A south wind is blowing (toward the north) at 25 miles per hour. Find the groundspeed and true course of the plane.

2. A pilot is flying at 168 mph . She wants her flight path to be on a bearing of 57°. The wind is blowing from the north at 37.1 miles per hour. On what bearing should she fly to have the wind blow her plane on to course?

3. A plane is headed due south with an airspeed of 192 mph. A wind from a direction of 78° is blowing at 23 mph. Find the groundspeed and resulting bearing of the plane.

4. In a military test, a ballistic missile has a target 250 miles east and 280 miles south of its launching site. How far must it travel to the target? If a second missile is sent from the target site to intercept the first missile, at what heading should it be sent?

5. At what bearing and speed would a pilot head if he wants to fly due north at 345 mph when a 40 mph west wind is blowing?

6. A Major League baseball diamond is a square having 90 ft. sides. If the pitcher stands 60 feet 6 inches from home plate, how far is he from 2^{nd} base?

7. Jim can swim at a rate of 3 mph. If he heads for a point directly across a river in which the current is 10 mph, by how many degrees does the direction in which he actually swims differ from his intended direction? If the river is 32 yards wide, will he make it across before reaching the falls that are 112 yards downstream?

8. In a naval maneuver, two ships rendezvous at point A. One then proceeds east 10 miles and north 14 miles to point B. At what bearing should the second ship head to meet the first ship at point B?

9. The string to a box kite makes an angle of 60° with the ground. If the string will break when subjected to a 30 lb. force, and if the kite requires a minimum horizontal force of 5 lbs. to fly, what is the possible range of the horizontal force of the wind in which the kite could be flown?

10. A wire cable on a crane can withstand a 20-ton tension. If the crane is extended at an angle of 50° from vertical, what is the greatest weight it can lift to leave a safety margin of two tons in the wire?