

Vector Magnitudes and Directions

Name: _____ Period: _____ Date: _____

Answer the following questions and SHOW ALL WORK. Drawings are REQUIRED. Leave all answer in 3 Sig. Figs.

1. In 1926, Gertrude Ederle of the U.S. became the first woman to swim across the English Channel. Suppose Ederle swam 25.2 km east from the coast near Dover, England, then made a 90° turn and traveled south for 21.3 km to a point east of Calais, France. What was Ederle's resultant displacement? (Both magnitude and direction in meters)
2. The emperor penguin is the best diver among birds: the record dive is 483 m. Suppose an emperor penguin dives vertically to a depth of 483 m and then swims horizontally a distance of 225 m to the right. What is the magnitude and direction of the penguin's resultant displacement?
3. An ostrich cannot fly, but it is able to run fast. Suppose an ostrich runs east for 7.95 s and then runs 161 m south, so that the magnitude of the ostrich's resultant displacement is 226 m.
 - a. Calculate the magnitude of the ostrich's eastward component.
 - b. What is the ostrich's average velocity while traveling east?
4. Kangaroos can easily jump as far as 8.00 m. If a kangaroo makes five such jumps westward answer the following questions.
 - a. How many jumps must it make northward to have a northwest resultant displacement with a magnitude of 68.0 m?
 - b. What is the direction of the resultant displacement?
5. How fast must a truck travel to stay beneath an airplane that is moving 105 km/h to the right at an angle of 25° above the ground? (Leave your answer in m/s)
6. What is the magnitude of the vertical component of the velocity of the plane in the previous problem in m/s?
7. A truck drives up a hill with a 15.0° incline. If the truck has a constant speed of 22.0 m/s moving in the eastward direction, what are the horizontal and vertical components of the truck's velocity?