

Homework 3 — Vectors and 2-D Kinematics

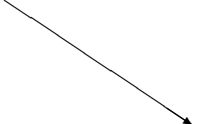
Due Wednesday, February 9.

Question 1. Vector Exercises [4 pts.] Consider the following vectors in a right-handed coordinate system where the x axis is directed to the east, and north is at the top of the page:

\mathbf{A} = the vector of magnitude 7.8 in the direction 28° counter-clockwise from the x axis in the xy plane.

\mathbf{B} = the vector of magnitude 12.4 in the direction 15° west of south in the xy plane.

$$\mathbf{C} = 5.0\hat{\mathbf{x}} - 9.7\hat{\mathbf{y}} + 10.3\hat{\mathbf{z}}$$

\mathbf{D} =  in millimeters. [ignore uncertainties in measuring this quantity.]

- a) Find the magnitudes A , B , C , and D . [.5]
- b) Find the components A_x , A_y , A_z , B_x , B_y , B_z , C_x , C_y , C_z , D_x , D_y , and D_z . [.5]
- c) Find the quantity $\mathbf{A} + \mathbf{B}$. [.5]
- d) Find the quantity $\mathbf{C} - \mathbf{D}$. [.5]
- e) Find the quantity $\mathbf{A} \cdot \mathbf{C}$. [1]
- f) Find the quantity $\mathbf{A} \times \mathbf{B}$. [1]

Question 2. Cookie-Cutter Book Questions. [2 pts.] Cutnell & Johnson Chapter 1 Conceptual Questions: 12, 18, 19 [1].

Question 3. [1 pts.] Can two vectors of differing magnitude be added to obtain 0? Can three vectors of differing magnitudes? For each question, either explain why not or give an example.

Question 4. [1 pts.] An airplane travels northwest for 20 miles, then west for 8 miles, then south for another 11 miles. After completing this course, how far is the airplane from the starting point?

Question 5. Cookie–Cutter Book Problems. [7 pts.] Cutnell & Johnson Chapter 1 Problems: 30, 36, 39 [2], 48 [2], 58.

Question 6. Cookie–Cutter Book Questions. [2 pts.] Cutnell & Johnson Chapter 3 Conceptual Questions: 5, 8, 10, 16.

Question 7. Cookie–Cutter Book Problems. [3 pts.] Cutnell & Johnson Chapter 3 Problems: 16, 19, 36.

Total Points Possible: 20