Assignment No. 1

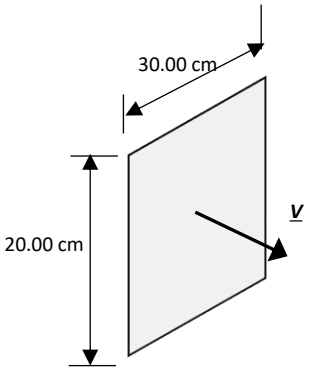
Problem 1

The drag force,D, on a plate moving with a velocity of (80.0 ± 0.1) km/h through air of density $\rho = (1.200 \pm 0.010)$ kg/m^3 with a surface area of (20.00 ± 0.01cm) x (30.00 ± 0.01cm) is given by

$$D = C_d \rho A V^2$$

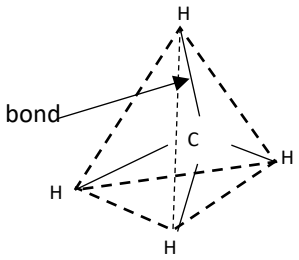
where $C_d = 2.1$ is a nondimensional constant.

Determine the drag force D.



Problem 2

In a methane molecule, CH_4, each hydrogen atom is at a corner of a regular tetrahedron with carbon atom at its center. In coordinates for which one of the C-H bonds is in the direction of $\underline{i} + \underline{j} + \underline{k}$, an adjacent C-H bond is in the $\underline{i} - \underline{j} - \underline{k}$ direction. Calculate the angle between these two bonds.



Problem 3

if **C** is the vector sum **A** and **B**, **C** = **A** + **B**, what must be true about the directions and magnitutude of **A** and **B** if :

a) $C = A + B$? b) C = 0

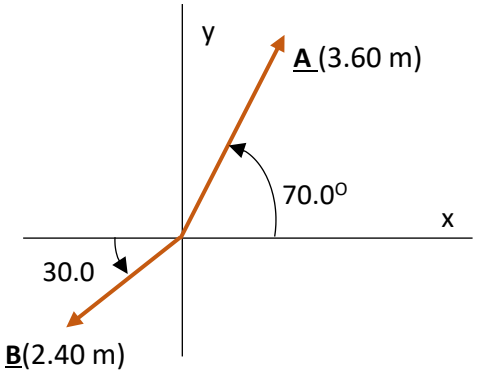
Explain your answer.

Problem 4

a) Write each vector in terms of the unit vectors $\underline{i}$ and $\underline{j}$.

b) Use unit vectors to express the vector **C** = 3.00**A** - 4.00**B**.

c) Find the magnitude and direction of **C**.



Problem 5

The length of a rectangle is given as $L \pm l$ and its width as $W \pm w$

Assume that the uncertainities l and w are small, so that the product lw is very small and can be ignored.

a) Show that the uncertainity in its area A is a = $L\,w + l\,W$

b) Show that the fractional uncertainity in the area is equal to the sum of the fractional uncertainity in length and the fractional uncertainity in width.

Problem 6

Consider the vectors shown.

Find the magnitude and direction of the vector ***E*** = ***A*** + ***D***