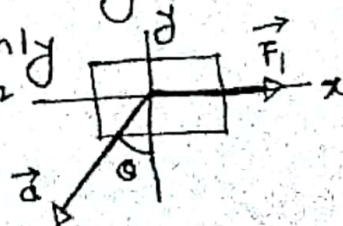


# phy 107.4 Assignment

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1. Two vectors are given by  
 $\vec{a} = (9.0\text{m})\hat{i} + (2.0\text{m})\hat{j}$  and  $\vec{b} = (2.0\text{m})\hat{i} + (1.0\text{m})\hat{j} + (3.0\text{m})\hat{k}$   
 In unit vector notation, find (a)  $\vec{a} + \vec{b}$ , (b)  $\vec{a} - \vec{b}$  and  
 (c) a third vector  $\vec{c}$  such that  $\vec{a} + \vec{b} - \vec{c} = 0$ .
  
2. Vectors  $\vec{A}$  and  $\vec{B}$  lie in an  $xy$  plane.  $\vec{A}$  has magnitude 5.00 and angle  $150^\circ$ ,  $\vec{B}$  has components  $B_x = -6.50$  and  $B_y = -9.20$ . What are the angles between the negative direction of the  $y$  axis and (a) the direction of  $\vec{A}$ , (b) the direction of the product  $\vec{A} \times \vec{B}$  and (c) the direction of  $\vec{A} \times (\vec{B} + 7.00\hat{k})$ ?
  
3. An iPhone is shot from the ground into the air. At a height of 7.8 m, its velocity is  $\vec{v} = (6.7\hat{i} + 3.2\hat{j})\text{m/s}$ , with  $\hat{i}$  horizontal and  $\hat{j}$  upward. (a) To what maximum height does the iPhone rise? (b) What total horizontal distance does the iPhone travel? (c) What are the magnitude and angle of the iPhone's velocity just before it hits the ground?

4. There are two forces on the 5.00 kg box in the overhead view of the figure, but only one is shown. Force  $F_1 = 25.0\text{ N}$ ,  $a = 17.0\text{ m/s}^2$  and  $\theta = 30^\circ$ , find the second force (a) in unit-vector notation and as



(b) a magnitude and (c) an angle relative to the positive direction of the  $x$ -axis.

5. A laborer drags a crate across a factory floor by pulling on a rope tied to the crate. The laborer exerts a force of magnitude  $F = 470 \text{ N}$  on the rope, which is inclined at an upward angle  $\theta = 43^\circ$  to the horizontal and the floor exerts a horizontal force of magnitude  $f = 125 \text{ N}$  that opposes the motion. Calculate the magnitude of the acceleration of the crate if (a) its mass is  $360 \text{ kg}$  and (b) its weight is  $360 \text{ N}$ .