

Physics 20 Practice Midterm - 50 minutes

2 Pages - turn over!!

Harry Nelson

Friday, October 22

Write your answers in a blue book. Calculators and one page of notes allowed. No textbooks or wireless communications allowed. Please make your work neat, clear, and easy to follow. It is hard to grade sloppy work accurately. Generally, make a clear diagram, and label quantities. Make it clear what you think is known, and what is unknown and to be solved for. Except for extremely simple problems, derive symbolic answers, and then plug in numbers (if necessary) after a symbolic answer is available. **Put a box around your final answer... otherwise we may be confused about which answer you really mean, and you could lose credit.**

1. Consider the two vectors \vec{A} and \vec{B} :

$$\vec{A} = \frac{5}{13\sqrt{2}}\hat{i} + \frac{5}{13\sqrt{2}}\hat{j} - \frac{12}{13}\hat{k}$$

$$\vec{B} = \frac{12}{13\sqrt{2}}\hat{i} + \frac{12}{13\sqrt{2}}\hat{j} + \frac{5}{13}\hat{k}$$

- (a) Evaluate $\vec{A} \cdot \vec{B}$
(b) Evaluate $|\vec{A} \times \vec{B}|$

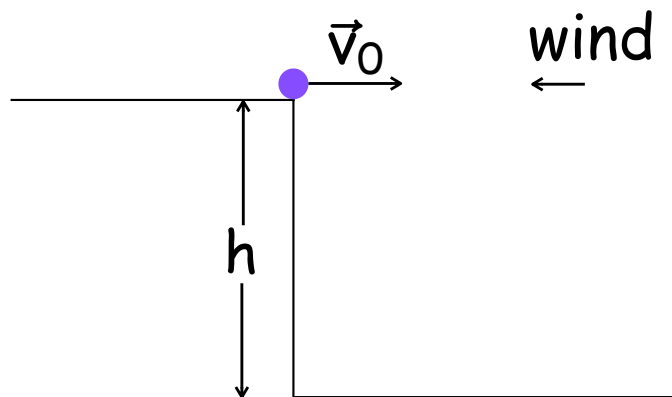


Figure 1: Problem 2.

2. A ball is launched from a cliff of height $h = 45$ m with velocity of magnitude $v_0 = 4$ m/s and direction purely horizontal, as shown in Fig. 1. There is a horizontal wind blowing back toward the cliff that accelerates the ball from right to left with an acceleration that has magnitude $a = (2/3)$ m/s². How far from the base of the cliff does the ball hit the ground? Take $g = 10$ m/s².

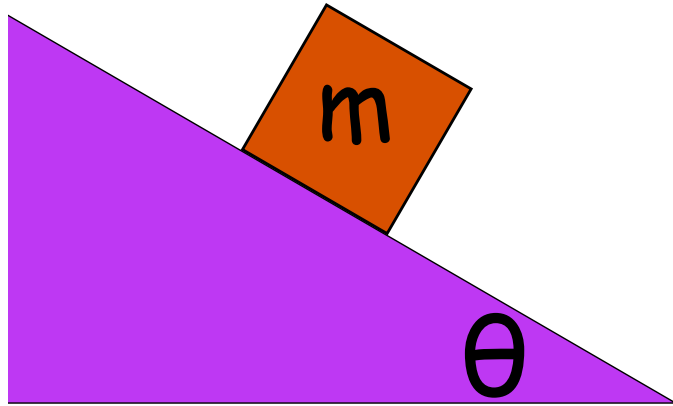


Figure 2: Problem 3.

3. A block of mass m slides without friction on an incline on Earth as shown in Fig. 2. Find the magnitude and direction of the force of the block on the incline in terms of g , m , and θ .
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