

Physics 20 Midterm - 50 minutes

2 Pages - turn over!!

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Wednesday, October 27

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} :

$$\vec{A} = -3\hat{i} + 4\hat{k}$$

$$\vec{B} = 4\hat{i} + 3\hat{k}$$

- (a) Evaluate $\vec{A} \cdot \vec{B}$
- (b) Evaluate $\vec{A} \times \vec{B}$
2. You have a cannon that, when aimed straight up, causes its ball to be in the air a time T between launch and hitting the ground. When you aim the cannon at $\phi = 45^\circ$ above the horizontal, what is the duration of the ball's flight? Give your answer in terms of g and T . Neglect the height/length of the cannon.

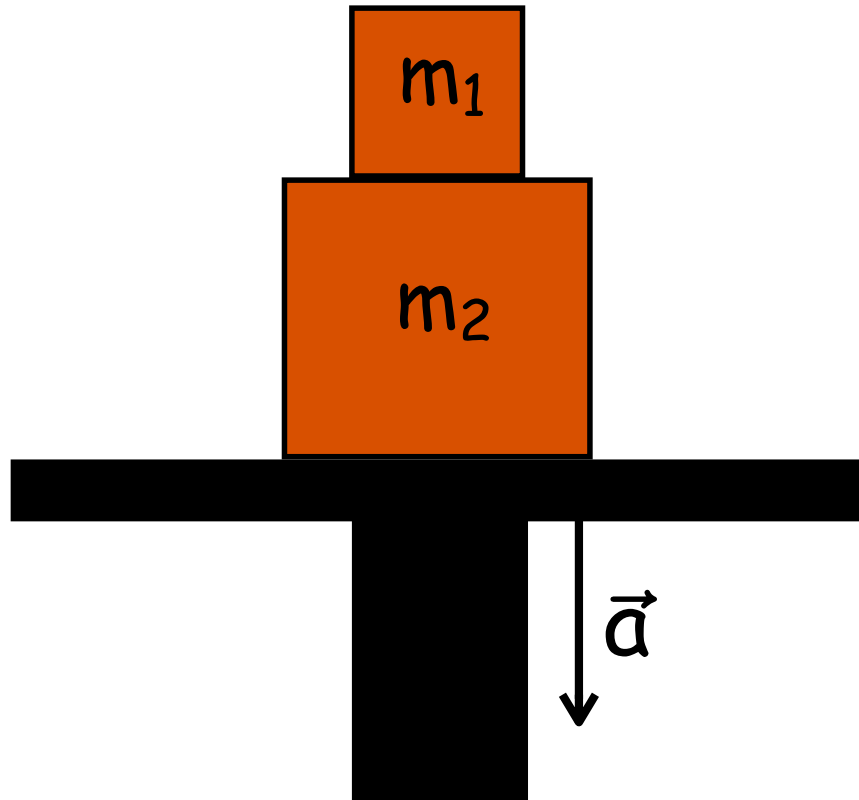


Figure 1: Problem 3.

3. Blocks of mass m_1 and m_2 are stacked as shown in Fig. 1 on a lift. The lift accelerates the blocks **downward** with an acceleration of **magnitude** $a < g$. Describe the magnitude and direction of the force that the lift applies to block 2 in terms of m_1 , m_2 , g , and a .
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