

OSU Academic Integrity Statement

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The allowed resources are: any notes you have collected during this course (handwritten, printed, or saved locally on your computer), blank sheets of paper or a digital tablet, writing utensil, a ruler, a protractor, and a non-communicating calculator. **Accessing the internet** while taking the quiz for any reason other than downloading, viewing, or turning in the quiz **is strictly prohibited**.

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<https://studentlife.oregonstate.edu/studentconduct/academicmisconduct>

Any incidence of academic misconduct will be dealt with in accordance with Oregon State University's policies.

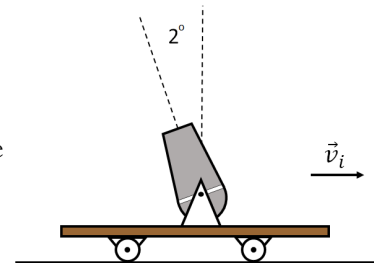
Physics 201

Weekly Quiz 9 | Ecampus

11/25/2020

Collaboration is not allowed. You will have 30 minutes to download, solve, take pictures, AND upload this exam to Gradescope.

1. After failing with his weather rockets, Benny decides to try launching a weather probe into the air with a giant cannon. To make matters more interesting for physics students, Benny mounts the cannon onto a train car. The cannon and train car are bolted together and can be treated as one object for this question. The train car + cannon, and weather probe are initially rolling to the right on the level train tracks at a constant, unknown, speed. The train car + cannon together have a mass of 1000 kg, while the weather probe has a mass of 70 kg. The cannon fires the weather probe into the air at an angle of 2 degrees with respect to the vertical. The weather probe's velocity right after it leaves the cannon is 1 km/s directly upwards, with zero horizontal velocity.



- (a) Examining the system containing the probe, and train + cannon, is momentum conserved in the horizontal direction? In the vertical direction? Explain your reasoning using words, diagrams, mathematical arguments, etc.
- (b) What is the velocity of the train car + cannon system after the launch?