

LSU-PHYSICS IQ TEST (2013)

6 September 2013, start at exactly 4:00 PM

Hosted by Prof. J. Dowling

QUESTION LIST

1. What is Einstein's equation relating mass and energy?

Correct answer is $E=mc^2$

2. Here is a full Coke can and an empty Coke can, when I roll them down this ramp simultaneously, which reaches the bottom first, or do they get to the bottom simultaneously?

Correct answer FULL CAN REACHES BOTTOM FIRST. I will hand you in advance a pair of coke cans, and there will be a table nearby that you can lift up to form a ramp. So to answer the question, simply demonstrate that the full can reaches bottom first. The physics is that the full can has a small specific moment on inertia (more of its mass is close to its rotational axis), so it takes less energy to spin it up, so its potential energy goes into linear motion instead of rotational motion. Here are three ****wrong**** answers (well, they are real effects, just negligible or incomplete) that you can include in your 'patter':

***The full can 'wins' because its larger inertia overcomes air resistance

***They reach bottom at the same time, as ramps are just slowed down falling (or imagine a vertical ramp), and everything falling accelerates equally under gravity.

***The empty can 'wins' because there is no sloshing to steal the energy.

(Recall, how uncooked eggs spin down so fast, while boiled eggs keep spinning.)

3. Here is a pendulum with a one meter string, what is its period?

Correct answer TWO SECONDS ($2\sqrt{L/g}=2.007$ seconds). Accept anything from 1.5-2.5 seconds. I will provide you with a 1-meter string pendulum. You can let it have, say, one swing in advance, as a demo, and people should be able to get in the right ball park even if they don't do the equation.

4. ■■■■

6. Name one of our professors working on the T2K experiment that has just announced definitive evidence of muon to electron neutrino oscillations?

Correct answer THOMES KUTTER, or MARTIN TZANOV, or BILL METCALF