**Math Actually Works**! **OTF-OAPT 2018**

1. **A textbook question.** “A spring of force constant 22 N/m is compressed by 3.5 cm and shoots a 7.5 g eraser across a desk. The force of friction is 42 mN. How far will the eraser slide?” Is this a realistic question?
2. **12 Bungee Jump:** A basket is attached to a bungee cord made of many elastic bands to make a thrill ride for some mice. What is the maximum mass you can put in the basket, so that falls from the ceiling and just misses the floor?
3. **Physics 11 and 12: Rockin’ Pendulum Part 1:** Calculate how long a string you need to swing in time with the music.
4. **Physics 11 and 12: Rockin’ Pendulum Part 2:** Calculate how much mass you need to put in the basket attached to a spring to match the music.
5. **Physics 12 Conical Pendulum Part 1**: A large dense mass (or a flying pig) is on a string and swinging as a conical pendulum. Using measurements from the photograph, calculate what its period must be.
6. **Conical Pendulum Part 2 - PI Mystery Mass:** A rubber stopper is swinging around using a plastic tune, string and hanging mass as shown. Make measurements of the motion to determine the ratio M/m.
7. **Physics 12 Cart Jumping**: Measure how far you can do a standing broad jump. Calculate how far you could jump from a cart that another student is sitting on.
8. **Physics 11 A Falling Metronome:** How far apart must you attach nuts to a string so that they hit at five 0.2-s intervals?
9. What are other examples where math works?