

Planet Holloway **websheet 4.4 – This one is challenging!!! (Good luck)**

*AP Physics C* - Chapter 4

You may print this out and write on it or work on your own paper.

**Show all work.**

1. The evil biologist, Dr. Byaulijust, first name Kneeval is up to his old tricks again. He has captured two dancing penguins and connected them together by a 0.6 m string. The first penguin 5.2 kg is also attached to a 1.4 m string that is pulled by the biologist. The second penguin has a mass of 3.8 kg. If the two penguins have an acceleration of 1.2 m/s/s as they are dragged along the ice experiencing a coefficient of kinetic friction of 0.14, what is the tension in each cord?
2. A box of water moccasins (45 kg) rests on a level surface. What is the acceleration of the box if you push with a force of 160 N, 30° above horizontal, and the coefficient of kinetic friction is 0.3 ?
3. A crate of used origami paper (38 kg) is launched up a 30° incline at 12 m/s. If the coefficient of static friction is 0.3 and the coefficient of kinetic friction is 0.18, what is the speed of the crate when it returns to the bottom of the ramp (the starting point)?
4. A snowboarding elephant moving at 17.5 m/s down a 22.5° slope encounters a section of snow with a coefficient of kinetic friction of 0.6. How far will the snowboarder take to stop?
5. A 123.21 kg pyramid shaped box of pyramid snow globes bound for the pyramid lake gift shop rests on a 15° incline on the loading dock of the Luxor casino. The coefficient of static friction is 0.5. If the box is motionless, what is the force due to friction?
6. While Fezzik (165 kg) is climbing the rope up the Cliffs of Insanity during a practice run for Vizzini, 120 m up he slips losing his grip and begins to slide down the rope at 7.5 m/s/s. Quickly, 0.33 seconds later, he instantaneously applies a force of 5500 N perpendicular to the rope surface (think normal force) and maintains that force. If the rope/hand junction has a coefficient of kinetic friction of 0.3, what happens? (if he stops, how far down does he stop? If he does not stop, how long does it take him to reach the ground?)

Answers:

1. 23.4 N and 9.88 N

4. 89.2 m

2. 0.613 m/s/s

5. 318.9 N

3. 8.69 m/s (I hope this is right. I did it three times and found three answers) (I really should start working these out on paper, but will I...probably not)

6. He reaches the ground moving 2.475 m/s, 48.3 seconds after he applies the force