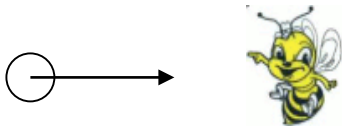


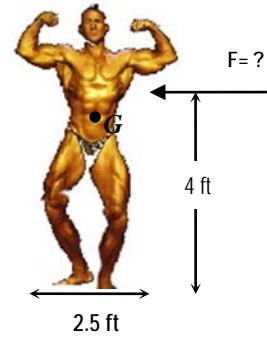
Exercises

- Betty Sue is taking eggs out of a hen house at a rate of one egg per minute. The hen house contains two hens. One is a genetically enhanced super-hen and is laying eggs at a rate of 80 eggs per hour. The other hen, living in the shadow of the super-hen, is depressed and therefore sleeping. What is the rate of egg accumulation in the hen house?
- A soft drink machine in the Moench Hall snack bar contains 74.1 kg of product. (Product includes both soda and can.) Suddenly the machine becomes possessed by the evil demon of ES201, Conappucus, and goes berserk. The machine starts dispensing cans of soda at a rate of one can every two seconds and hurls them at any passers by. If a can of soda has a mass of 300 grams, how long does it take before the possessed machine is completely empty?
- A spitball with a mass of 30 g is traveling in a straight horizontal line with a velocity of 1.5 m/s when it suddenly strikes an unsuspecting bumblebee hovering over a marigold. If the spitball sticks to the bee after impact and the bee has a mass of 40 g, what is the velocity of the spitball/bee just after impact?



Don't spit spitballs at bees, please.

- The Danville Bonker, a heavyweight bodybuilder from Danville, IL, is standing in a front-double-biceps pose when Dr. Thom foolishly decides to push him over. The Bonker is 6 ft tall, weighs 220 lbs and is standing with his feet 2 1/2 feet apart when Dr. Thom makes his poorly advised attempt to topple him. If Dr. Thom pushes the Bonker on his left side at a point 4 ft above the ground, what is the minimum force he must use to ensure the Bonker topples over his right foot?



The notorious Danville Bonker

- A starving ConApps student decides to heat a frozen bean burrito in the microwave when she discovers that it too has become suddenly possessed by Conapucus, its door opening and closing repeatedly while it beeps S.O.S. in Morse code. The ConApps student smashes the microwave with a hammer, and devises a new scheme for heating the burrito. She decides to use the heat from her desk lamp to cook the burrito. If the desk lamp utilizes a 100 W bulb and 30% of that heat is transmitted to the burrito, how long does it take to thaw a 0.228 kg frozen burrito to room temperature? Assume the burrito is originally at 0°C, room temperature is 22°C, and the specific heat of refried beans is 4196 J/kg-°C.
- Clyde McCheese, a salesman for The Midwest Inventors Consortium, Ltd., claims to have a new invention that converts waste thermal energy from hair dryers into stored electro-chemical energy. The invention consists of small hair clasps equipped with miniature turbines connected to tiny storage batteries. Clyde claims that if one wears these hair clasps while blow-drying their hair, 80% of the heat from a 2 kW hair dryer can be converted to mechanical energy, which can then in turn be converted to electro-chemical energy. If the average temperature of a hairdryer heating element is 1200°C, and the temperature of the air in an average bathroom is 22°C, do we believe Clyde's claim?