

CLASS: PHY _____

STUDENT #: _____

NAME: _____

Assignment 5: Work and Energy

Assigned: Oct 7 14:30 Due: Oct14 18:00

1. When a 4.00-kg object is hung vertically on a certain light spring that obeys Hooke's law, the spring stretches 2.50 cm. If the 4.00-kg object is removed, (a) how far will the spring stretch if a 1.50-kg block is hung on it, and (b) how much work must an external agent do to stretch the same spring 4.00 cm from its unstretched position?

2. If it takes 4.00 J of work to stretch a Hooke's-law spring 10.0 cm from its unstressed length, determine the extra work required to stretch it an additional 10.0 cm.

3. A 100-g bullet is fired from a rifle having a barrel 0.600 m long. Assuming the origin is placed where the bullet begins to move, the force (in newtons) exerted by the expanding gas on the bullet is $15\,000 + 10\,000x - 25\,000x^2$, where x is in meters.
(a) Determine the work done by the gas on the bullet as the bullet travels the length of the barrel.
(b) **What if?** If the barrel is 1.00 m long, how much work is done, and how does this value compare to the work calculated in (a)
NOTE: this problem requires integration

CLASS: PHY _____

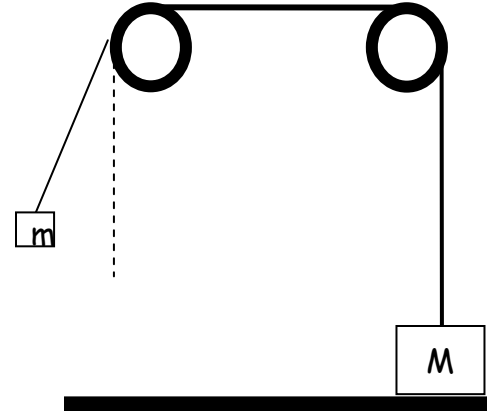
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Assignment 5: Work and Energy Cont.

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4. The mass $m = 1 \text{ kg}$ is set up as a pendulum of length 0.6 m as shown on the diagram. Initially in the position of $h = 0.2 \text{ m}$ above the lowest point, and the pendulum is given initial speed of 1 m/s . What is the largest mass M that could be temporarily lifted in such setup?



5 For the potential energy curve shown

- (a) determine whether the force F_x is positive, negative, or zero at the five points indicated. (b) Indicate points of stable, unstable, and neutral equilibrium. (c) Sketch the curve for F_x versus x from $x = 0$ to $x = 9.5 \text{ m}$.

