Work, Power, Energy Review Name:_____

Basic Work Problems. Equations used: $W = F\ d$

1) a) How much work does a weightlifter do to lift a 20 kg weight from the floor to a height of 2 m? b) How much work does the weightlifter do if he holds the weight above his head?

a) b)

2) If the same weightlifter uses a different weight and does 15000 J of work, what is the mass of the new weight?

3) One summer while mowing the lawn you wonder, "How much work am I actually doing?" You push the lawnmower down at an angle of 20^o below the horizontal, with a force of 100 N a distance of 500 m. Answer your own question.

Basic Power Problems. Equations used: $P = W/t$

4) If the weightlifter from the first and second problem does 15000 J in 2 seconds, how powerful is he?

5) Reading the paper this weekend, I noticed Value City was selling a 1500 W generator for $159. It was advertised to run 9 hours on one tank of gas. How much work/energy could it do/provide on one tank of gas?

6) An 80kg freshman runs up the 3.45 m stairs in 5 seconds. How powerful is the freshman?

Basic Energy Problems. Equations used: $KE = .5\ m\ v^2$ $PE_G = m\ g\ h$ $PE_E = .5\ k\ x^2$

7) How fast is a 40 kg sledder moving if they have 20000J of energy?

8) A 15 kg monkey is sitting in a branch. How high is the branch if the monkey has 10000 J of energy?

9) A mischievous student pulls a rubber band back .02 m. If the rubber band has 400 J of stored energy, what is the spring constant of the rubber band?

Work/Energy Theorem Problems. Equations used: $W = \Delta NRG$

10) An 8kg bowling ball sits at rest on the ground. If you push the ball with a force of 10 N over a distance of 30 m, how fast is it going after the 30 m?

11) 4000 J is used in lifting a 20 kg crate. How high was the crate lifted?

12) A race car takes off from rest and reaches a maximum speed of 100 m/s in a distance of 400m. What force is applied to the car?

Conservation of Energy Problems. Equations used: NRG bef = NRG during = NRG aft

13) A roller coaster starts at the top of a 200 m initial drop. How fast does the coaster travel at the bottom of the hill?

14) How high will an 0.2 kg arrow shoot if it is pulled back 0.3m in a bow that has a spring constant of 500 N/m?

15) How fast would that same arrow be going as soon as it leaves the bow?

Law of Conservation of Energy Worksheet

Use the Law of Conservation of Energy to solve the following problems.

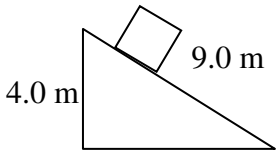
1. Physics student is dropped (don't ask why or you're next). If they reach the floor at a speed of 3.2 m/s, from what height did they fall?

2. A heavy object is dropped from a vertical height of 8.0 m. What is its speed when it hits the ground?

3. A bowling ball is dropped from the top of a building. If it hits the ground with a speed of 37.0 m/s, how tall was the building?

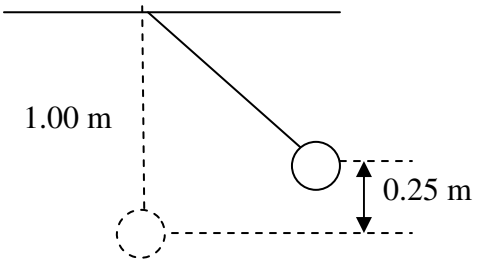
4. A safe is hurled down from the top of a 1.3×10^2 m building at a speed of 11.0 m/s. What is its velocity as it hits the ground?

5.



A box slides down a frictionless ramp. If it starts at rest, what is its speed at the bottom?

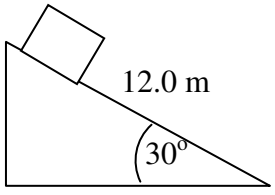
6.



A pendulum is dropped from the position shown, 0.25 m above its equilibrium position. What is the speed of the pendulum bob as it passes through its equilibrium position?

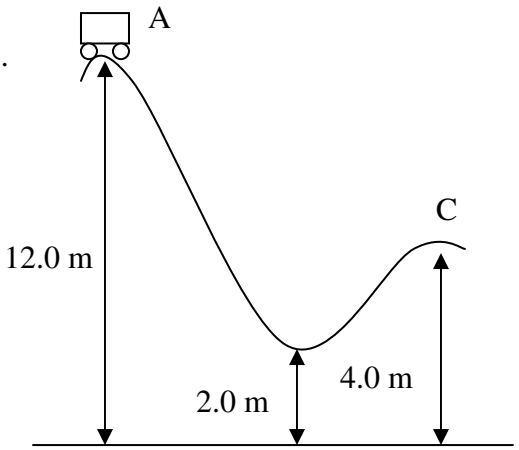
B

7.



A box slides down a frictionless incline as shown. If the box starts from rest, what is its speed at the bottom?

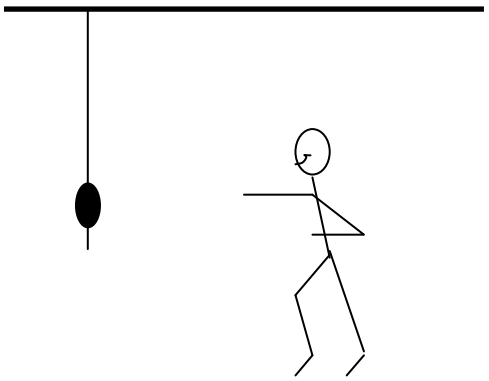
8.



A roller coaster car starts from rest at point A. What is its speed at point C if the track is frictionless?

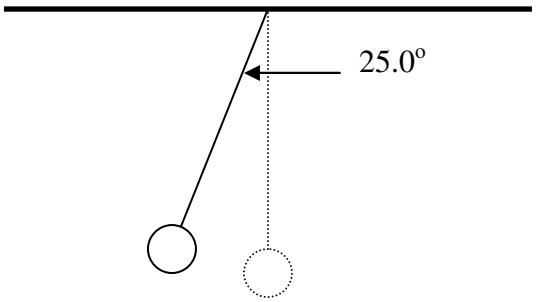
9. A 2.5 kg object is dropped from a height of 10.0 m above the ground. Calculate the speed of the object as it hits the ground.

10.



An 80.0 kg student running at 3.5 m/s grabs a rope that is hanging vertically. How high will the student swing?

11.



A pendulum is 1.20 m long. If the pendulum is pulled until it makes a 25.0^{o} angle to the vertical, what is the speed of the pendulum bob when it passes through its equilibrium position? HINT: Determine the vertical drop of the pendulum bob first.

1) 0.52 m 2) 13 m/s 3) 69.8 m 4) 52 m/s 5) 8.9 m/s 6) 2.2 m/s 7) 10.8 m/s 8) 13 m/s 9) 14 m/s 10) 0.63 m 11) 1.49 m/s