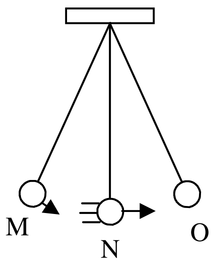
B-Day Due Wed., Nov 17
A-Day: Due Thurs., Nov 18

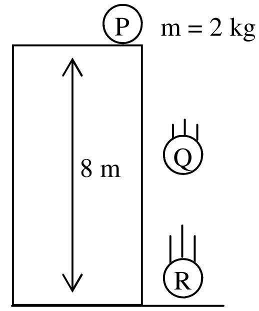
2010 PreAP Energy 3

1. Match the Conservation of energy equations at the right with the following situations.

A. ___ * An object is thrown into the air. Find how high it goes.		1.	Ek −W = Ek
B. ___ An object at rest is moved.		2.	Ep = Ep + Ek
C. ___ A moving object slows down due to friction.		3.	Ek = Ep
D. ___ An object is dropped. How fast is it going part way down?		4.	Ek −W = 0
E. ___ A spring is compressed.		5.	PEel = Ek + Ep
F. ___ A compressed spring shoots an object into the air.		6.	0 + W = Ek
G. ___ A moving object is stopped.		7.	0 + W = PEel

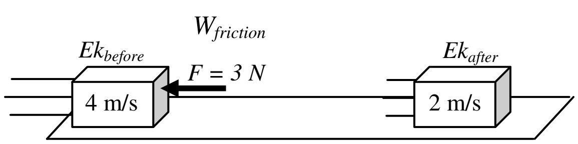


2. Use the pendulum at the left to answer the following.
   A. What kind of energy does it have at M?
   B. What kind of energy does it have at N?
   C. If it has 100 J of energy at M, how much energy does it have at N?
   D. How does the total energy change as the pendulum swings?



3. Use the diagram at the right to answer the following.
   A. Calculate the object's energy at the top.

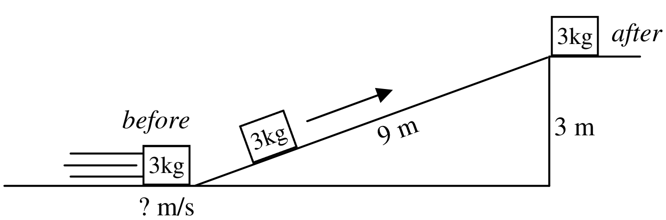
   B. How much kinetic energy does it have at the bottom?
   C. How much potential energy does it have half way down?
   D. Calculate its velocity just before it hits the ground.

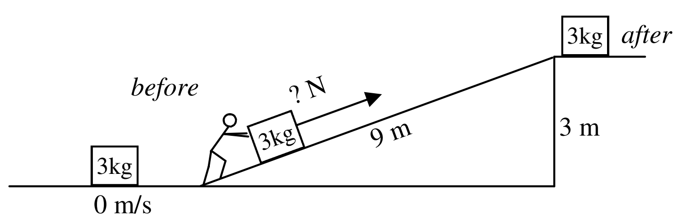


$\Sigma E_{before} \quad \pm W \quad = \quad \Sigma E_{after}$

4. * A 6 kg object is moving 4 m/s to the right. A 3N force slows the object down to 2 m/s.
   A. Write the Conservation of Energy formula under the diagram.
   B. Calculate the distance that the force acted on the object.

5. To simplify our discussion, let's assume the ramp is frictionless, but that Slim Jim can still apply a force.
   A. Calculate the energy of the object at the top of each ramp.
   B. In which example (left or right) is work done?

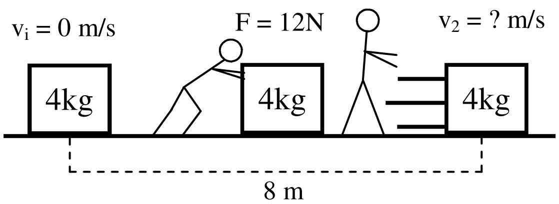


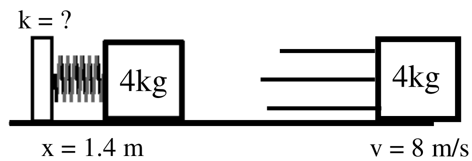


C. *Use the same process as above to calculate the velocity of the object at the bottom of the left ramp.

D. *Calculate the magnitude of Jim's force as he pushes

So, if the energy is just transferred, no work is done. OR no work is done if the energy of the system does not change.





6. A. What kind of energy does the left object start with?
   B. What kind of energy does the object end with?
   C. Was work done or was energy just transferred?
   D. Give the Conservation of Energy Equation:

   E. Calculate the final velocity of the object.

7. A. What kind of energy does the right object start with?
   B. What kind of energy does the object end with?
   C. Was work done or was energy just transferred?
   D. Give the Conservation of Energy Equation:

   E. * Calculate the spring constant of the spring.

8. A 10 kg object is at rest on the ground. It is lifted up 8 m. How much work was done to lift the object?
   A) Conservation of energy equation:
   B) Solve:

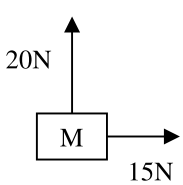
   C) If it was lifted up in 4 seconds, how much power was used to lift it.

So the "work" in the power formula could be the "energy" that the work created, since they have the same units.

Let me explain again the difference between scalars and vectors.

9. A scale has 4 kg of mass on it.
   A. If 2 kg is added, how much total mass is there?
   B. Then 3 kg is removed, how much total mass is there?

Mass is a scalar. You just add and subtract mass. There is no direction. Energy is also a scalar.



10. Two forces are acting on a mass, as shown at the left. Remember that forces are vectors. And since the vectors are at 90º to one another, calculate the net force on the object.

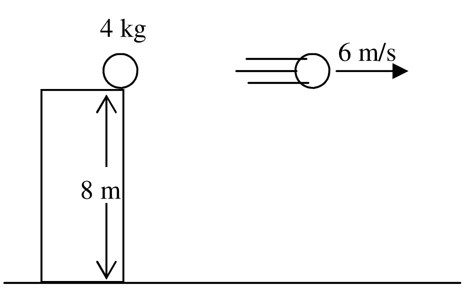
11. A 4kg ball is at the edge of an 8 m tall ledge.

    A. How much energy does it have on the ledge?

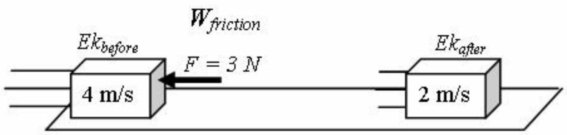
    B. Then it is hit perfectly horizontally so that it moves 6 m/s, while still 8 m above the ground. Calculate just its kinetic energy.

    C. How much total energy does it have?

    And as a scalar, you just add them together. Even though PE and KE are at right angles to each other you don't need Pythagorean theorem.



Q1A: 3



$\Sigma E_{before} \pm W = \Sigma E_{after}$

$\frac{1}{2}mv^2 - Fd = \frac{1}{2}mv^2$

$\frac{1}{2}(6)4^2 - 3(d) = \frac{1}{2}6(2)^2$

4. * A 6 kg object is moving 4 m/s to the right. A 3N force slows the object down to 2 m/s.
   A. Write the Conservation of Energy formula under the diagram.
   B. Calculate the distance that the force acted on the object.

$3(16) - 3d = 3(4)$ div by 3

$16 - d = 4$

$16 - 4 = 12\,m$

Q5C: 7.75 m/s Q5D: 10 N

Q7E: 130.6 N/m