Energy Review with a dusting of momentum

Give All Answers with 2 Sig Figs

1. A system of massive objects has 280J of kinetic energy and 620J of potential energies. The object then has 180J of work done to it while losing 240J as heat. What is the final mechanical energy of the object?

2. A system of massive objects has 300J of gravitational energy, 200J of spring energy and 500J of kinetic energy. The system has -400J of work done to it while losing 100J of energy as heat and sound. What is the final mechanical energy of the system?

3. A system of massive objects has 33kJ of gravitational energy, 2kJ of spring energy and 8kJ of kinetic energy. 14kJ of work is done to the system. The final energy of the system is 50kJ. How much energy was lost by the system (as heat and sound)?

4. A system of massive objects has 1240J of gravitational energy, 700J of spring energy and 100J of kinetic energy. Then some stuff happens. Really awful stuff. Like, really, really bad. You can’t even imagine. Anyhoooo, after the stuff the system has 1460J of gravitational energy, 40J of spring energy and 600J of kinetic energy.

 A. Find ΣW.

 B. Find Wnc

 C. Find Wc

 D. Find Wg

 E. Find Ws

5. A 220kg roller coaster cart is travelling at 18m/s as it enters a vertical loop with a height of 6.0m. Find the normal force acting on the cart as it passes the highest point. Assume negligible friction.

6.0m

18m/s

6. A massive object has 24J of kinetic energy and 8.0kgm/s of momentum. Find the speed of the object.

7. A 1600kg car accelerates uniformly up a hill. The car is initially travelling at 8.0m/s and ends up moving at 24.0m/s. The hill is inclined at 4.00o and the acceleration requires 12.0s. Find the net work done to the car.

8. A 1600kg car accelerates uniformly up a hill. The car is initially travelling at 8.0m/s and ends up moving at 24.0m/s. The hill is inclined at 4.00o and the acceleration requires 12.0s. Find the work done to the car by non conservative forces.

9. A 1600kg car accelerates uniformly up a hill. The car is initially travelling at 8.0m/s and ends up moving at 24.0m/s. The hill is inclined at 4.00o and the acceleration requires 12.0s. If the average resistive force on the car is 1200N, find the work done by the car’s engine.

10. An object is moving along level ground. An applied force causes the cars kinetic energy to double. What happens to the magnitude of the objects momentum?

 A. it doubles B. it quadruples C. It is halved D. it is quartered

 E. it increases by a factor of $\sqrt{2}$ F. it decreases by a factor of $\sqrt{2}$

11. A 2.00kg object accelerates from 3.00m/s right to 4.00m/s right in 5.00s.

 A. What is the change in K?

 B. What is the change in $\rightharpoonaccent{p}$?

 C. What is $\sum\_{}^{}W$?

 D. What is the impulse?

 E. What is the average force?

12. A 2.00kg object accelerates from 4.00m/s right to 3.00m/s right in 5.00s.

 A. What is the change in K?

 B. What is the change in $\rightharpoonaccent{p}$?

 C. What is $\sum\_{}^{}W$?

 D. What is the impulse?

 E. What is the average force?

13. A 2.00kg object accelerates from 3.00m/s right to 4.00m/s left in 5.00s.

 A. What is the change in K?

 B. What is the change in $\rightharpoonaccent{p}$?

 C. What is $\sum\_{}^{}W$?

 D. What is the impulse?

 E. What is the average force?

14. A 2.00kg object accelerates from 3.00m/s right to 4.00m/s down in 5.00s.

 A. What is the change in K?

 B. What is the change in $\rightharpoonaccent{p}$?

 C. What is $\sum\_{}^{}W$?

 D. What is the impulse?

 E. What is the average force?

15.

 d

 37o

A. In order to use the formula Wg= Fgdcosθ to find the work done by gravity as the block slides down the ramp, what is the appropriate value for θ?

B. In order to use the formula Wf= Ffdcosθ to find the work done by friction as the block slides down the ramp, what is the appropriate value for θ?

C. In order to use the formula WN= FNdcosθ to find the work done by the normal force as the block slides down the ramp, what is the appropriate value for θ?

16. A massive object has 160J of kinetic energy. Two (and only two) forces, force A and force B, do work to the object. Force A does 720J of work. The kinetic energy of the object increases to 660J. Find the work done by force B.

17. A bungee jumper goes bungee jumping, as bungee jumpers are wont to do. The bungee jumper jumps from a 110m tall bridge. The bungee jumper free-falls for 22.0m before the bungee chord begins to stretch. After falling an additional 25.0m the speed of the bungee jumper is 6.00m/s. Find the elastic constant (same as spring constant) of the bungee chord.

18. A ballistic slider is a mechanical device used to determine the speed of a bullet. the bullet is fired into, and becomes lodged within the slider on a frictionless surface. The slider then moves onto a surface with friction and slides to a stop. The distance to stop is then measured, and the speed of the bullet can be calculated. The apparatus is shown below:

 FRICTIONLESS FRICTIONAL

Slider

Slider

 μ =0.800

 μ =0 d

If the mass of the slider is 4.000kg, the mass of the bullet is 20.00g and the slider comes to rest in 1.400m on the frictional surface, determine the initial speed of the bullet.

19. The work required to accelerate a massive object from rest to a speed *v* on a frictionless horizontal surface is 128000J. How much additional work will it take to accelerate the object from *v* to 2*v*?

20. A 1.00kg cart travelling south at 12m/s collides with a 4.00kg cart travelling north at 8.0m/s. After the collision the 1.00kg cart is travelling north at 8.0m/s.

A. Find the final velocity of the 4.00kg cart.

B. Find the kinetic energy of the system before and after the collision.

C. Find the amount of heat and sound produced in the collision.