Work Energy Review:

1. A simple machine has a mechanical advantage of 120. If the user must apply a force over 20cm, what distance does the output force act over?

2. Kinetic energy is best described as the energy of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. Potential energy is best described as the energy of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. When a hydrocarbon reacts with oxygen, the reaction is exothermic. In what form is the released energy?

5. When sodium reacts with water, light and thermal energy are released. In what form was the energy before the reaction?

6. What are the two main energy transformations that occur when a book is dropped from 2.0m above the floor, and then allowed to land and come to rest?

7. Name two energy transformations that occur when you use a hand crank generator to power a lightbulb.

8. A baseball player swings a bat. The player moves her hands at 5m/s causing the bat head to move at 30m/s. What is the speed advantage of the bat? What is the mechanical advantage?

9. A baseball player swings a bat. The player moves her hands at 5m/s causing the bat head to move at 30m/s. If her bottom hand acts 10cm from the fulcrum (her top hand), how far is the bat head from the fulcrum?

10. What is the name for the type of energy resulting from the motion of the molecules of a substance?

11. What is the name of the type of energy that results from the vibration of air molecules that are detectable by human ears (and brains)?

12. A 16N force acts on a 14kg object over 3m, in the direction of motion. How much work is done by this force?

13. A 16N force acts on a 14kg object over 3m, in the direction of motion. How much does this force change the energy of this object?

14. A 16N force acts on a 14kg object over 3m, in the direction of motion. The object initially has 28J of energy. What is the final energy of the object?

15. A 16N force acts on a 14kg object over 3m, in the direction of motion. The object initially has 28J of kinetic energy and is moving on level ground. What is the final kinetic energy of the object?

16. A 16N force acts on a 14kg object over 3m, in the direction of motion. The object initially has a speed of 2m/s and is moving on level ground. What is the final kinetic energy of the object?

17. A 16N force acts on a 14kg object over 3m, in the direction of motion. The object initially has a speed of 2m/s and is moving on level ground. What is the final speed of the object?

18. A burlap sack full of beef fat and gummy worms is dropped from a 25m high bridge. What is its speed after falling 10m? Assume negligible air resistance.

19. A burlap sack full of chicken skin and Cheeze Whiz is dropped from a 50m high bridge. What is its speed after falling 10m? Assume negligible air resistance.

20. A burlap sack full of day old doughnuts and coffee grounds is dropped from a 90m high bridge. What is its speed after falling 10m? Assume negligible air resistance.

21. An average bowl of cereal with 1 cup of milk contains 1000 kilojoules (1 000 000J) of chemical potential energy (food energy). If you could convert ALL of that energy into one single jump, how high could you jump?

22. Most cars run on gasoline, which is a fossil-fuel. Explain how one could make a valid, although misguided, argument that most cars are “solar” powered.

23. What is the kinetic energy of a 25g bullet travelling at 900m/s?

24. How fast must a 1500kg car move to have 150 000J of kinetic energy?

25. How high in the air must a 1500kg car be to have 150 000J of gravitational energy?

26. According to Einstein’s theory of relativity and the famous equation E=mc2, a 1.0kg mass contains 9000000000000000000J of energy stored in the nuclei of its atoms. Explain why this energy does not usually factor in to our calculations.

27. A 100N force causes a 20kg mass to slow from 12m/s to 8m/s, on level ground. Does the force act in the same direction as motion, or opposite the direction of motion?

28. A 100N force causes a 20kg mass to slow from 12m/s to 8m/s, on level ground. Find the work done by the force.

29. A 100N force causes a 20kg mass to slow from 12m/s to 8m/s, on level ground. Find the distance over which the force acts.

30. A roller coaster cart has 7 500J of gravitational energy and 6 500J of kinetic energy as it crests a hill. The cart then rolls down that hill and up another. At the top of the second hill the cart has 11 200J of gravitational energy and 800J of kinetic energy.

A. Which hill is taller? Explain how you know.

B. At which point is the cart moving faster? Explain how you know.

C. Does the cart lose or gain energy? How much?

31. A 340kg roller coaster cart has 7 500J of gravitational energy and 6 500J of kinetic energy as it crests a hill. The cart then rolls down that hill and up another. In the process 4000J of energy is lost to the surroundings as heat and sound. At the top of the second hill the cart has 800J of kinetic energy.

A. What is the final gravitational energy?

B. What is the height of the second hill?