1. Energy is defined as the ability to do what?
   a. move
   b. float
   c. work
   d. none of the above

2. In order for work to be done on an object, what two things are needed?
   a. Force and time
   b. Force and displacement
   c. mass and time
   d. mass and displacement

3. Which of the following types of energy looks at objects at the atomic level?
   a. Mechanical Energy
   b. Non-Mechanical Energy
   c. Total Energy
   d. Renewable Energy

4. Mechanical Energy is the energy associated with what?
   a. motion and mass
   b. motion and position
   c. mass and position
   d. position and time

5. Which types of energy make up Mechanical Energy?
   a. Kinetic
   b. Potential
   c. Kinetic and Potential
   d. none of the above

6. Which of the following is a form of Non-Mechanical Energy?
   a. Kinetic
   b. Potential
   c. Solar
   d. None of the above

7. Potential Energy is also called what?
   a. energy of ability
   b. stored energy
   c. hopeful energy
   d. none of the above
8. Two objects of different masses are moving with the same speed. Which one has more Kinetic Energy?
   a. the heavier one
   b. the lighter one
   c. They both have the same Kinetic Energy
   d. Neither one has Kinetic Energy

9. A baseball is thrown to a batter. Which pitcher throws the ball with more Kinetic Energy?
   a. a little league pitcher
   b. a middle school pitcher
   c. a major league pitcher
   d. they all have the same kinetic energy

10. When is the only time that an object does not have Kinetic Energy?
    a. when it is on Earth's Surface
    b. when it is above Earth's surface
    c. when it is not moving
    d. an object always has Kinetic Energy

11. Two identical objects sit on top of roofs at different heights above the Earth's surface. Which has more Gravitational Potential Energy?
    a. the one on the shorter roof
    b. the one on the taller roof
    c. they both have the same Gravitational Potential Energy
    d. Neither one has Gravitational Potential Energy

12. Two objects sit on top of the roof of a building. The first object is a bowling ball and the second is a tennis ball. Which one has more Gravitational Potential Energy?
    a. the bowling ball
    b. the tennis ball
    c. they have the same Gravitational Potential Energy
    d. They both have zero Gravitational Potential Energy

13. An object is lifted to a height of 10 m above a planet's surface. On which planet would the object have more Gravitational Potential Energy?
    a. on Earth where gravity is 9.8 m/s²
    b. on Jupiter where gravity is 24.5 m/s²
    c. on Mars where gravity is 3.7 m/s²
    d. the Gravitational Potential Energy would be the same on all planets

14. What is the "tightness" of a spring called?
    a. relaxed length
    b. spring constant
    c. Tension
    d. none of the above
15. In order for a spring to have stored energy, the spring must be ...
   a. stretched
   b. compressed
   c. stretched or compressed
   d. none of the above

16. Two identical rubber bands are stretched. Rubber band A is stretched 1 m. Rubber band B is stretched 2 m. How many times larger is the stored energy in rubber band B compared to rubber band A?
   a. equal
   b. 2 times larger
   c. 4 times larger
   d. none of the above

17. A rubber band and a trampoline spring are both stretched by 0.25 m. Which has more Elastic Potential Energy present?
   a. the rubber band
   b. the trampoline spring
   c. neither one has Elastic Potential Energy Present
   d. They both have Elastic Potential Energy Present

18. Which of the following is allowed according to the Law of Conservation of Energy?
   a. Energy is lost
   b. Energy is gained
   c. Energy is transferred
   d. None of the above

Questions 19 – 24 refer to the diagram shown below:

19. At which point on the diagram shown does the roller coaster car have the largest Gravitational Potential Energy?
   A
   B
   C
   D
20. At which point in the diagram shown does the object only have Kinetic Energy?
   A
   B
   C
   D

21. At which point does the object have Elastic Potential Energy?
   A
   B
   C
   D

22. At which point in the diagram is the object traveling the fastest?
   A
   B
   C
   D

23. At what point in the diagram does the object have both Kinetic and Gravitational Potential Energy?
   A
   B
   C
   D

24. What must be true in the diagram shown in order for all of the energy of the system present at point D to be in the form of Elastic Potential Energy?
   a. the object must be moving
   b. the object must be stopped
   c. it is impossible for all of the Energy to be Elastic Potential Energy

25. Which of the following types of Energy Resources is considered a Renewable Energy Resource?
   a. Wind
   b. Water
   c. Solar
   d. All of the above

26. Wind Turbines convert what type of energy into Electrical Energy?
   a. Potential
   b. Kinetic
   c. Solar
   d. None of the above

27. Which of the following forms of energy resources does not use a turbine in converting Mechanical Energy into Electrical Energy?
28. Which of the following types of Energy Resources emits Carbon Dioxide when consumed to produce Electrical Energy?
   a. Coal
   b. Oil
   c. Natural Gas
   d. All of the above

Free Response:

29. What is the Kinetic Energy of a 2 kg object that is moving with a speed of 5 m/s?

30. What is the Kinetic Energy of a 1000 kg car that is traveling with a speed of 15 m/s?

31. What is the change in a 2 kg object’s Kinetic Energy if it increases its speed from 5 m/s to 10 m/s?

32. What is the Gravitational Potential Energy of an object that has a mass of 5 kg and is at a height of 10 m above the Earth’s surface?

33. What is the Gravitational Potential Energy of a 200 kg boulder that is resting on the surface of the Earth?

34. What is the Gravitational Potential Energy of an object that has a mass of 2 kg and a height of 10 m on Earth where gravity is 9.8 m/s²?

35. What is the change in a 2 kg object’s Gravitational Potential Energy if the object is raised from a height of 5 m to a height of 10 m?

36. An elastic band has a spring constant of 100 N/m. If it is stretched by 0.5 m, how much Elastic Potential Energy is stored in the band?

37. A spring with a spring constant of 75 N/m is compressed by 2 m. How much Elastic Potential Energy is stored in the spring?
38. Based on the graph below, is positive, negative, or no work being done on the object? Explain how you know.

![Velocity vs. Time graph](Image)

39. Draw on the graph below a situation where no work is done on an object. Explain your reasoning.

![Velocity vs. Time graph](Image)
40. At what time on the graph below does work start to be applied to the object? Explain if it is positive or negative work.
Answers:

1) C  
2) B  
3) B  
4) B  
5) C  
6) C  
7) B  
8) A  
9) C  
10) C  
11) B  
12) A  
13) B  
14) B  
15) C  
16) C  
17) B  
18) C  
19) A  
20) C  
21) D  
22) C  
23) B  
24) B  
25) D  
26) A  
27) A  
28) D  
29) 25 J  
30) 112,500 J  
31) 75 J  
32) 490 J  
33) 0 J  
34) 98 J  
35) 980 J  
36) 12.5 J  
37) 150 J  
38) Positive, the velocity is increasing meaning that the acceleration is in the direction of displacement  
39) Any line which has a slope of zero. This means no acceleration and therefore no force applied.  
40) At time equal to 1 second. Negative work is done because the velocity is decreasing meaning that the force is applied in the opposite direction of the displacement.