Energy Equation Questions for GCSE Physics

1. A rock with a mass of 5 kg is lifted to a height of 10 meters. Calculate the gravitational potential energy gained by the rock. (Take g = 9.8 m/s^2)

2. A car with a mass of 1,000 kg is traveling at 20 m/s. Calculate the car's kinetic energy.

3. A spring has a spring constant of 200 N/m and is stretched by 0.5 meters. Calculate the elastic potential energy stored in the spring.

4. A 2 kg ball is held 4 meters above the ground. What is the potential energy stored in the ball?

5. A 0.2 kg ball is thrown at a speed of 15 m/s. Determine the kinetic energy of the ball.

6. A rubber band is stretched by 0.1 meters and has a spring constant of 50 N/m. What is the elastic potential energy stored in the rubber band?

7. A cliff diver has 2,940 J of potential energy before jumping off a cliff. If their mass is 75 kg, how high is the cliff?

8. A car has a kinetic energy of 50,000 J and is moving at 25 m/s. What is the mass of the car?

9. A spring is stretched by 0.25 meters and stores 8 J of energy. What is the spring constant?

10. A book on a shelf has 147 J of gravitational potential energy. If the shelf is 3 meters high, what is the mass of the book?

11. A motorcycle with a mass of 200 kg has a kinetic energy of 18,000 J. How fast is it moving?

12. An elastic cord with a spring constant of 80 N/m stores 32 J of elastic potential energy. Determine the extension of the cord.

The following questions require you to use more than one equation.

13. A 60kg diver jumps from a platform that is 8m above the surface of the water. What speed will they be doing as they hit the water?

14. A bow is drawn to fire an arrow that has a mass of 120g. The spring constant is 80N/m and the bow is stretched by 0.15m. What is the speed of the arrow as it is fired?

15. A 70 kg skier starts from rest at the top of a hill that is 20 meters high. Assuming no friction, what is the skier's speed at the bottom of the hill?

16. A slingshot has a spring constant of 100 N/m and is stretched by 0.2 meters. If the mass of the projectile is 0.3 kg, what is the speed of the projectile when fired?

17. A diver with a mass of 65 kg jumps off a diving board that is 10 meters high. What will the diver's speed be just before hitting the water?

18. A mass of 0.4 kg is attached to a spring with a spring constant of 40 N/m. The spring is compressed by 0.1 meters. What is the velocity of the mass when the spring returns to its equilibrium position?

19. A spring with a constant of 200 N/m is stretched by 0.3 meters and is used to launch a 0.4 kg ball. What is the speed of the ball when the spring returns to its natural length?

20. A 0.2 kg ball is dropped from a height of 5 meters. Ignoring air resistance, what is its speed when it has fallen halfway (2.5 meters)?