PHYSICS 9: Work, Power and Energy TEST: FREE RESPONSE KEY

Essay – 5 points – THIS QUESTION IS NOT AVAILABLE FOR RETAKE

1. You do work on something when you lift it against gravity. How does this work relate to gravitational potential energy? If the lifted object is released, what becomes of this energy? Be sure to define all terms that you use.

   The work you do when lifting something may be stored as gravitational potential energy. Then the force times the distance is equal to the weight times the height. If the lifted object is released, this energy transforms to motion energy (or kinetic energy). The kinetic energy as it returns to its starting point equals the gravitational potential energy at its highest point, which in turn equals the work done on it in the first place.

Problems – 4 points each: IF YOU ARE RETAKING THESE QUESTIONS YOU MUST SUBMIT A QUESTION WITH NEW NUMBERS AND SOLUTIONS IN THE SAME FORMAT AS THE KEY. REMEMBER FSA!

2. What is the work done in lifting 60 kg of blocks to a height of 20 m?

   Work = Force x Distance = (mass x acceleration) x Distance; acceleration= gravity = 10 m/s^2
   W = 60 kg x 10 m/s^2 x 20m
   W= 12,000J

2. What is the work done in raising a 20-kg block 5 m vertically?

   Work = Force x Distance = (mass x acceleration) x Distance
   W = 20 kg x 10 m/s^2 x 5m
   W= 1,000J

4. If possible, determine the power expended when a barbell is raised 5.0 m in 2 s.

   Not possible to calculate – if you redo this question supply a force for your work.

5. A toy cart moves with a kinetic energy of 10 J. If its speed is doubled, what will its kinetic energy be?

   Kinetic Energy (KE) = ½ mv^2
   KE = ½ m (2v^2) = 4 x KE
   KE = 4 x 10 J = 40 J

6. A 30-kg girl runs up the staircase to a floor 5 m higher in 8 seconds. What is her power output?

   Power = Work/Time; Work = Force x Distance = (mass x acceleration) x Distance
   Power = (30 kg x 10 m/s^2 x 5m)/8s
   W = 187.5 W