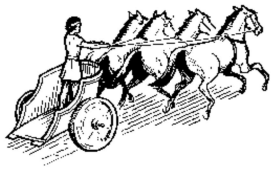
NAME_____

Year 11 Physics Extra Questions

Work, Energy and Momentum

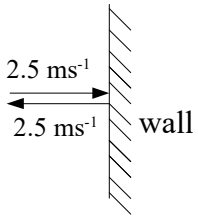
1. Calculate the kinetic energy of Jehu's chariot if its total mass (including Jehu) is 125 kg and it is moving at a speed of 11.9 ms^{-1}. /2



2. A 0.20 kg set of lab weights is lifted to a height of 1.0 m.
   a) Calculate the work done on the weights. /2
   b) State the gravitational potential energy of the lifted weights, and state a reason why. /2
   c) Draw a diagram of the lab weights falling. At the beginning, middle and end of its fall, write labels stating the potential and kinetic energy of the weights /3

3. An astronaut (mass 90 kg) is standing on the outside of a stationary spacecraft (of mass 1600 kg). If the astronaut pushes off from the spacecraft with a force of 150N for 1.02 seconds:
   a) Calculate the final momentum of the astronaut /3
   b) State the final momentum of the spacecraft /1
   c) Calculate the final speed of the astronaut /2
   d) Calculate the final speed of the spacecraft /2

4. A ball of mass 2.1 kg bounces off a wall without a change in speed, as shown below.



   a) Calculate the ball's change in velocity /3
   b) Hence calculate the ball's change in momentum /2
   c) Hence calculate the force the wall exerts on the ball, if the collision lasts 0.10 seconds /3
   d) State the force the ball exerts on the wall /1

5. If a 8.2×10^3 kg train moving at 2.2 ms^{-1} reverses into and connects to a stationary 3.0×10^3 kg rail car. Calculate the final speed of the train. /3

6. Calculate the change in total kinetic energy for questions 4 and 5 and conclude which (if any) are elastic collisions. /5