Physics 11

**Work & Power Worksheet**

**40 marks**

1. Calculate the work done on moving a 25 kg box a distance of 3.7 m by an applied horizontal force of 65 N? *(2 marks)*

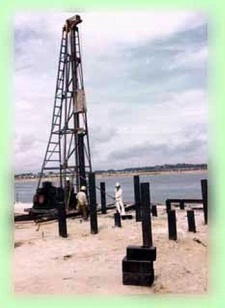
65 N

3.7 m

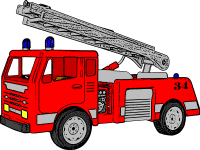
1. A 125 kg sled is lifted to the top of a 23 m high hill.
   1. What is the work done in lifting the sled? *(3marks)*
   2. A time of 15.9 s is required to lift the sled to the top of the hill. How much power does this require? *(2 marks)*
2. In 1979 the human powered Gossamer Albatross flew across the English Channel. The pedaling pilot averaged 190 W over the distance.  If the pilot’s power was used to lift a 110 kg mass, to what height would he lift the mass in a time of 25 s? *(3 marks)*
3. A 2.5 hp *(1 hp = 744 W)* motor is used to power a hoist to lift a 1700 kg car 1.86 m above the garage floor.



* 1. How much time does it take the hoist to lift the car? *(3 marks)*
  2. The hoist slowly lowers the car back down to the ground. How much work does the hoist motor do in lowering the car? *(2 marks)*

1. A pile driver is used to drive large piles in to soft ground to create a solid foundation for a building. The pile driver has a mass of 450 kg and is lifted to a height of 2.5 m above the pile and is then allowed to fall striking the pile. The ground offers a resistance of 2.0 x 105 N of force against the push of the pile.
   1. How far does the pile drive push the pile into the ground with each strike? *(4 marks)*
   2. How many strikes would the pile driver have to make to drive 50 piles 7.5 m into the ground? *(3 marks)*
2. Many mountain roads are built so they spiral around the mountain rather than go straight up towards the peak. Explain why such a spiral design is beneficial for vehicles?

*(2 marks)*

1. A 1500 kg car accelerates from rest to 10.0 m/s in 3.00 s.
   1. Find the work done on the car in this time period. *(4 marks)*
   2. Find the average power delivered by the engine in this time interval. *(2 marks)*
2. The Harrier Jet is a vertical takeoff and landing aircraft. What is the work done when the 8000 kg plane accelerates upwards at 1.0 m/s2 for a distance of 30 m starting from rest? *(Hint: Do not forget to include the weight of the plane in your calculation.) (4 marks)*
3. In fighting a fire a pumper fire truck must be able to list 18000 kg of water to a height of 27 m in a time of 35 s. What is the power of the pump in the fire truck pumper? *(3 marks)*
4. A 500 hp Mustang is able to push this 1750 kg car down a 410 m drag strip in a time of 11.5 s.
   1. What is the work done by the car? *(3 marks)*
   2. How is the average force during the car’s motion? *(2 marks)*