Physics 11

**Work & Power Worksheet**

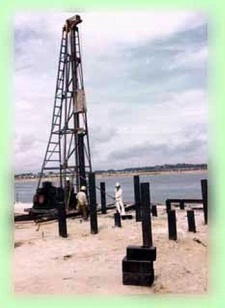
1. Calculate the work done on moving a 25 kg box a distance of 3.7 m by an applied horizontal force of 65 N. Calculate the power if this is done in 13 s.

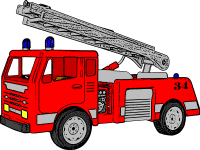
65 N

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?
   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?

1. 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?
2. 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?
   2. The hoist slowly lowers the car back down to the ground. How much work does the hoist motor do in lowering the car?



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?
   2. How many strikes would the pile driver have to make to drive 50 piles 7.5 m into the ground?
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? (Hint: Consider the power expended vs the work)
3. 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.
   2. Find the average power delivered by the engine in this time interval.
4. 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?
5. 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?
   2. How large is the average force during the car’s motion?

Answers: 1. 240.5J, 18.5W 2. a)2820J b)1772W 3. 4.4m 4. a)17s b)-31000J 5. a) 0.055m b) 6803 strikes 7. 75000J, 25000W 8. 1.4×105W 9. a)4.28×106J b)10400N