202: Principles of electrical science  
**Worksheet 15: Basic mechanics**

**Answer guide**

1. If a mass of 500kg is lifted through a height of 2m, calculate the amount of work done.

9,810Nm

1. A mass of 300kg is raised through a vertical height of 8m. Calculate the amount of work done.

23,544Nm

1. Calculate the work done when a force of 750N moves an object through a horizontal distance of 15m.

11,250Nm

1. Calculate the work done when a force of 350N moves an object through a distance of 3.5m.

1,225Nm

1. If the amount of work done by a force of 100N is 800Nm, calculate the distance the object has moved.

8m

1. Calculate the distance covered by a trolley of 51kg when the amount of work done is 1,020Nm.

20m

1. Calculate the opposition force of a transformer that moves 40m when the work done is 14,000Nm.

350N

1. Calculate the weight of a transformer that moves 25m when the work done is 23,298.75Nm.

95kg

1. An object is moved across a distance of 20m in 5 seconds by a force of 50N. Calculate the power used.

200 watts

1. Calculate the power required to move a weight of 300N through a vertical distance of 5m in 2 seconds.

750 watts

1. A mass of 40 litres of water is lifted through a height of 10m in 5 seconds. Calculate the power that has been used.

784.8W

1. Calculate the power required to raise 2.5m3 of water from a well 12.5m deep in 30 seconds. NB: 1m3 of water = 1,000kg.

10,218.75W

1. A hoist raises a load of 3 tonnes through 8 metres in 15 seconds. Determine the power developed by the hoist. NB: 1 Tonne = 1,000kg.

15.696kW

1. An electric motor drives a pump that raises 1,000 litres of water each minute to a tank 20m above ground level. Calculate the power that the motor must provide if the pump is only:
   1. 50% efficient
   2. 80% efficient.

6.540kW

4.088kW

1. A pump raises 0.15m3 of water per minute from a well 7.5m deep. Calculate the power required to drive the pump if it is only 75% efficient.

245.25W

1. An electric motor drives a pump that raises 0.15m3 of water per minute through a vertical height of 35m. Calculate:
   1. the power required
   2. the power required to drive the pump if it has an efficiency of 72%
   3. the line current if the supply voltage to the motor is 220 volts d.c.

858.375W

1 192.19W

5.419A

1. A pump, which raises 0.12m3 of water per minute from a well 8.5m deep, is driven by a 250 volt d.c. motor. Assuming that the efficiency of the pump is 72% and that that of the motor is 78%, calculate the current drawn from the supply by the motor.

1.19A