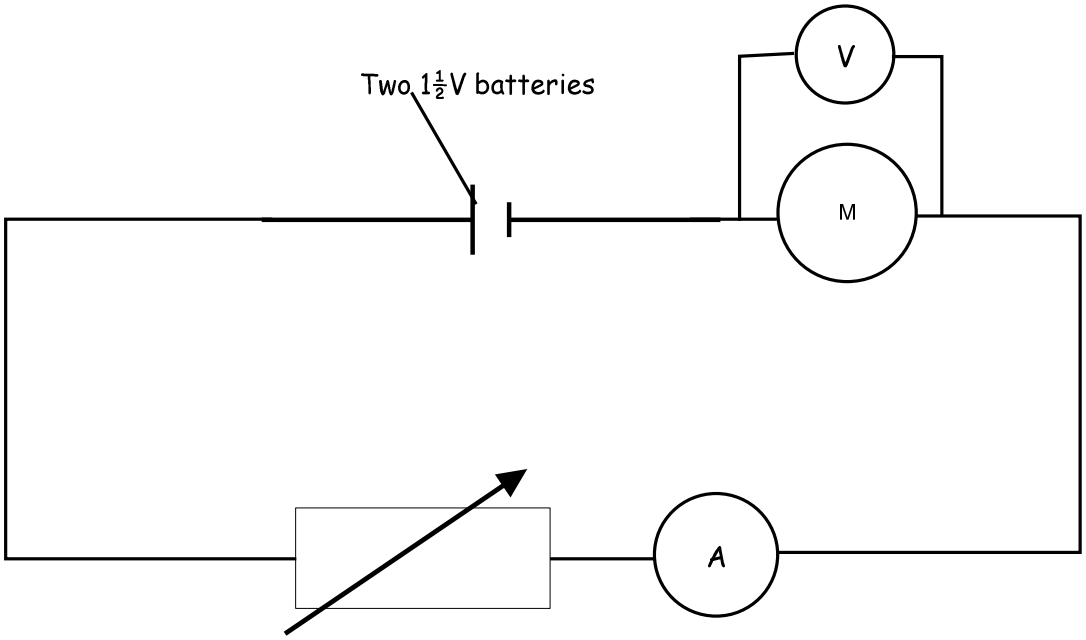
Experiment to measure the efficiency of an electric motor

Apparatus

Electric motor
Digital voltmeter and ammeter plus leads
Variable resistor
Sellotape
Selection of masses
Cotton thread and small lump of plasticine
Comboplate
Stopwatch
Metre rule

Procedure

1. Set up the circuit as shown in the diagram below



2. Sellotape the motor to the Comboplate and also the Comboplate to the bench so the shaft of the motor is projecting over the edge of the bench.
3. Attach the cotton thread by tying a knot and wrapping it around it several times. Attach a very small piece of the plasticine to the end of the shaft so that the cotton will not unravel and come off the shaft.
4. Tie the end of the thread around the 50g (or 100g) mass.
5. Lower the mass until it is 1m lower than the shaft.

6. Using the variable resistor adjust the current so that the mass is just lifted by the motor.
7. Note the following measurements:-
    - The reading on the ammeter;
    - The reading on the voltmeter
    - The time taken to lift the mass
8. Repeat this at different reading of current and voltage and different masses

RESULTS and CONCLUSIONS

Complete the table below:-

Expt	Current /A	Voltage /V	Electrical Power/W	Weight lifted/N	Distance Lifted/m	Time taken/s	Mechanical power/W
1							
2							
3							
4							
5							
6							

1. Plot a graph of electrical power (horizontal axis) against mechanical power (vertical axis).

2. From the gradient of the graph find the ratio of mechanical power to electrical power and from there the efficiency of the motor.

3. Explain all the steps in your working.

4. Give reasons why the efficiency of the motor less than 100%.