



7 An electric motor may be used to lift loads. The efficiency  $\eta$  of a motor is given by

$$\eta = \frac{\text{mechanical power output}}{\text{electrical power supplied}}$$

The efficiency of a motor is thought to depend on the angular velocity  $\omega$  of the motor. The relation between the efficiency and the angular velocity of the motor may be written in the form

$$\eta = a \omega^b$$

where  $a$  and  $b$  are constants.

You are provided with a low voltage electric motor. You may also use any of the other equipment usually found in a Physics laboratory.

Design an experiment to determine the value of  $b$ .

You should draw a labelled diagram to show the arrangement of your apparatus. In your account you should pay particular attention to

- (a) the identification and control of variables,
- (b) the equipment you would use,
- (c) the procedure to be followed,
- (d) how the efficiency and the angular velocity of the motor would be determined,
- (e) any precautions that would be taken to improve the accuracy and safety of the experiment.

#### Diagram

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Examiner's  
Use

