

Physics Investigation 6 Task Sheet

Observation

When the escalator carries more passengers, the handrail of the escalator move faster than the escalator steps.

Problem

What changes occur in the motor when a heavier load is to be moved?

Hypothesis

Aim

Principle

If a motor is operated by a supply voltage V and the current flowing through the motor is I , then the electrical power supplied to the motor, P , is the product of voltage and current, VI . The motor converts the electrical energy into mechanical energies (kinetic energy and potential energy) for raising the load. Some energy might be dissipated over the resistance of the circuit.

When a current is flowing through the motor, the motor rotates. A turning torque is provided by the motor. This torque is responsible for raising the load.

In this investigation, the following variables are involved :

independent variable - _____

dependent variable - _____

Equipment and materials

- data logging interface x 1
- current sensormeter x 1
- desktop computer x 1
- motor x 1
- scotch tape x 1
- scissors x 1
- 20g weights x 10
- inelastic string x 1
- battery pack (6V) x 2

Set-up of experiment



Procedure

1. Connect a current sensor, a motor and a switch in series to a battery (6V);
2. Connect the current sensor to the computer via the datalogging interface. Open the Datadisc 32 software programme;
3. Tie a load of 240g to a string which rotates around the wheel of the motor. Put the load on the floor;
4. On the computer, press the button “**Measure**”, followed by “**Record**”. Set the time interval to 10s and start recording. At the same time, close the switch to switch on the motor;
5. When the load has reached the motor, stop the motor and the recording;
6. Plot a graph of current against time;
7. Transfer the data of the part of the graph where the current is steady to Microsoft Excel and find a mean value of the steady current;
8. Repeat steps (3) – (7) with different loads of 220g, 200g, 180g, 160g, 140g, 120g, 100g;
9. Plot a graph of the average current against load.

Precautions

- 1) Add lubricant oil to the movable part of the motor to ensure that the rotating speed is more uniform;
- 2) Do not use a very heavy load, otherwise it will cause the motor to overheat ;
- 3) The motor should be switched off when not taking measurements.

Results

Interpretation

Possible errors

Improvement

Conclusion