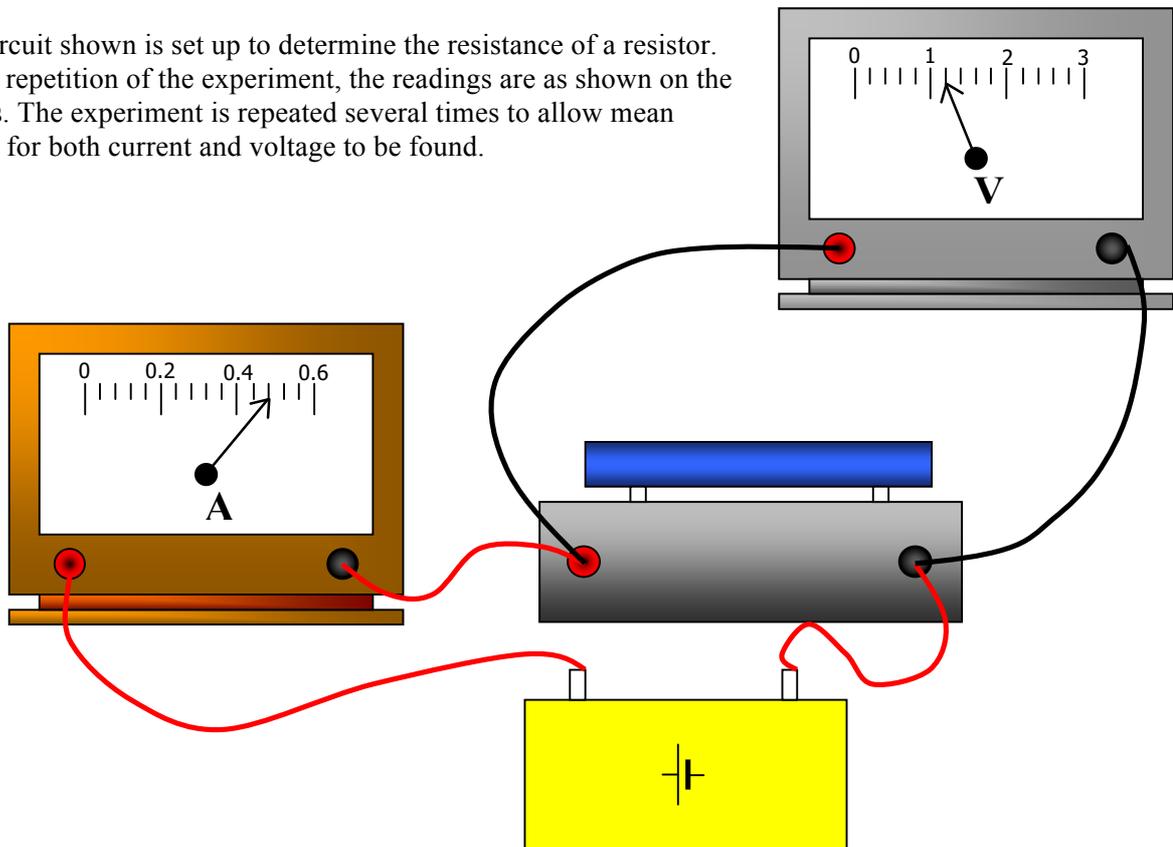


FORMAL HOMEWORK EXERCISE

Induction - Uncertainties & Significant Figures

Homework - Uncertainties

1. The circuit shown is set up to determine the resistance of a resistor. In one repetition of the experiment, the readings are as shown on the meters. The experiment is repeated several times to allow mean values for both current and voltage to be found.



- (a) Give the ammeter and voltmeter readings and state the scale reading uncertainty in each case. (2)
- (b) Using Ohm's Law ($V = IR$), calculate a value for the resistor. Estimate the **absolute** uncertainty in the calculated value of the resistance and explain how you arrived at your estimate. (3)
- (c) The experiment is repeated 5 times, and the values recorded for the current are as follows:

0.44 A; 0.43 A; 0.45 A; 0.42 A; 0.44 A

Calculate the mean current, and the random uncertainty in the mean. (3)

2. A current is measured with an analogue meter which has scale divisions of 0.1 A, and is found to be 5.4 A. The reading is double-checked with a digital meter, and again is found to be 5.4 A. Using which instrument gives the larger scale reading uncertainty? Explain your answer. (2)

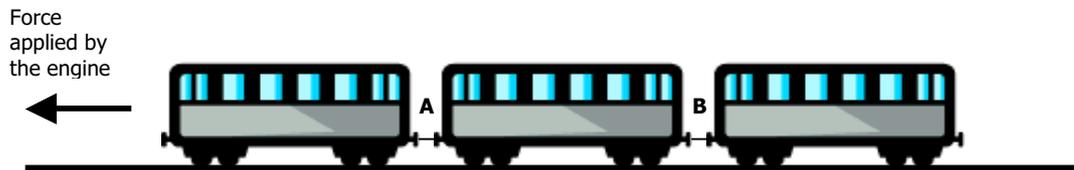
TOTAL 10 MARKS

FORMAL HOMEWORK EXERCISE

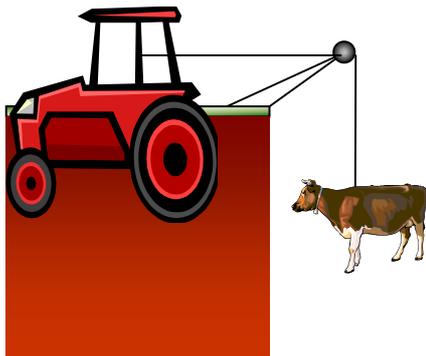
Mechanics & Properties of Matter

Homework - Forces

1. A train made up of 3 carriages is pulled along a level track by a force of 16 500 N. Each of the carriages has a mass of 8 000 kg, and each experiences 1500 N of resistive forces.

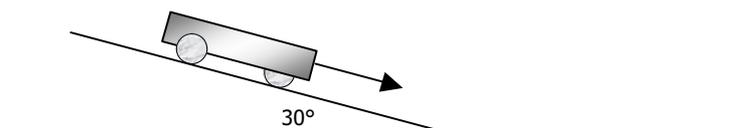


- (a) Calculate the acceleration of the train. (2)
(b) Work out the tension in link **B**. (2)
2. A cow has fallen over a cliff and cannot get back up to the field. The farmer has to rescue it by attaching a rope and harness, and lifting it using a pulley and his tractor (as shown in the diagram).



The tractor has a mass of 1500 kg, and the cow has a mass of 500 kg. The tractor's engine can apply a force of 6000 N. Ignore friction between the tractor and the ground.

- (a) Calculate the initial acceleration of the tractor as it lifts the cow. (2)
(b) Draw a free body diagram showing the forces acting on the cow as it is being lifted. (1)
(c) Calculate the tension in the rope lifting the cow. (2)
3. In the diagram below, calculate the component of the weight acting down the slope. The mass of the trolley is 24 kg. (1)



TOTAL 10 MARKS