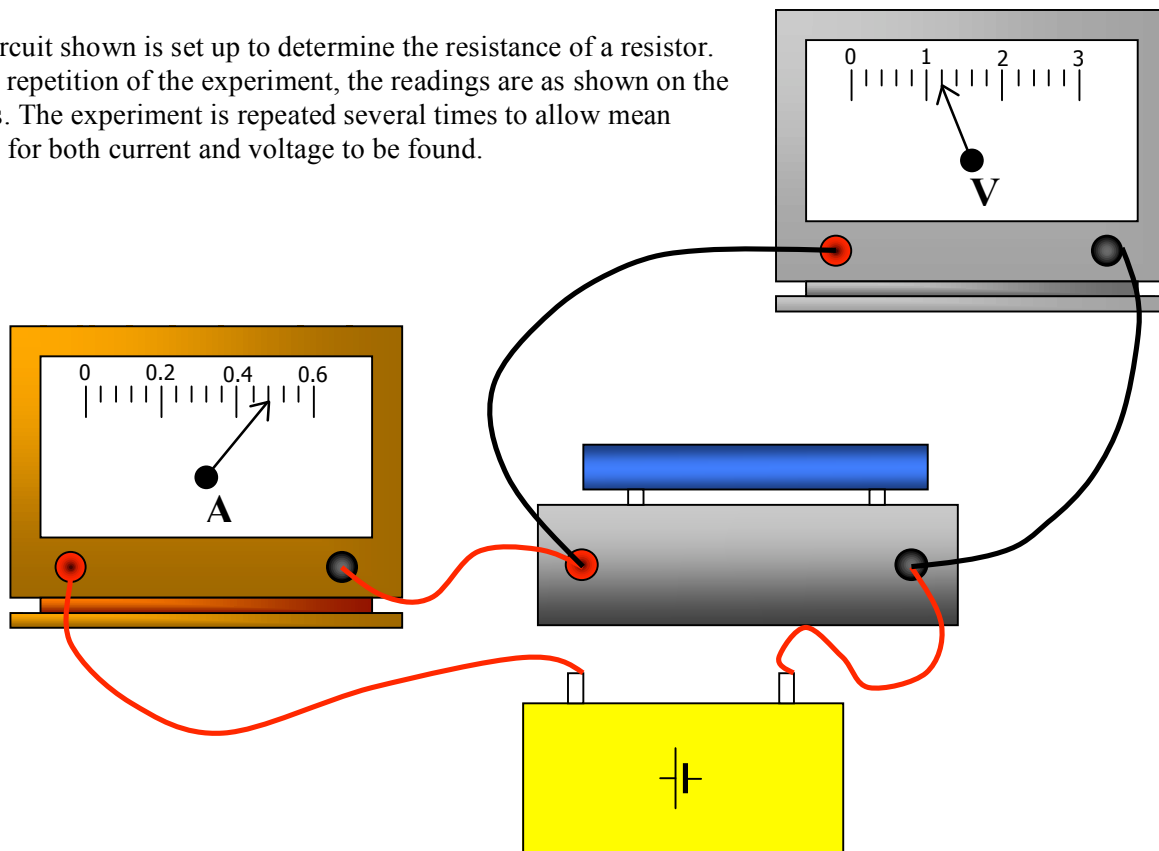


FORMAL HOMEWORK EXERCISE

Mechanics & Properties of Matter

Homework 1 - 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.
- (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.
- (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.

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.