Digging Up the Past

---

1. Which one of these equations is correct?

    A. $\rho = \frac{Rl}{A}$

    B. $R = \frac{\rho l}{A}$

    C. $R = \frac{\rho A}{l}$

    D. $\rho = RAl$

    E. $R = \frac{A}{\rho l}$

2. State the units of resistivity.

3. Explain briefly how to determine the electrical resistivity of a piece of wire.

    ....
    ....
    ....
    ....
    ....
    ....
    ....
    ....
    ....

4. Consider the equation $I = nqvA$.

    (a) State what I represents, and write down its units.

    (b) State what n represents, and write down its units.

    (c) State what q represents, and write down its units.

    (d) State what v represents, and write down its units.

    (e) State what A represents, and write down its units.

    (f) Explain why there is a large range of resistivities for different materials.
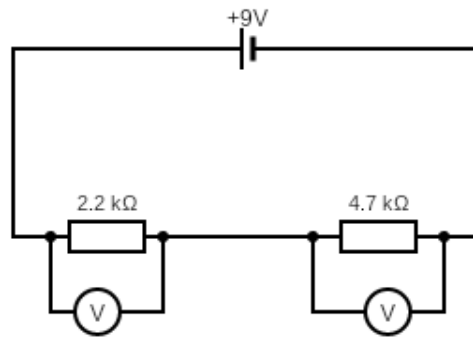
    ....
    ....
    ....
    ....
    ....

5. Consider the above circuit. The cell has negligible internal resistance.

   (a) Calculate the potential difference dropped across the smaller resistor.

   (b) Hence or otherwise, find the potential difference dropped across the larger resistor.

(c) The larger resistor is then removed, and replaced with a light dependent resistor (LDR). State and explain how the potential difference across the $2.2k\Omega$ resistor changes as the intensity of light incident on the LDR varies.

....

....

....

....

....

....

....

....

....

....

....

6. (a) Define the term diffraction.

....

....

....

(b) Maximum diffraction occurs when the size of the gap is...
      A. much smaller than the wavelength
      B. much larger than the wavelength
      C. equal to half of the wavelength
      D. equal to the wavelength
      E. equal to double the wavelength

(c) Which of these equations is correct?
      A. $d\lambda = n \sin \theta$
      B. $n\lambda = d \cos \theta$
      C. $nd = \lambda \sin \theta$
      D. $n = \frac{d \sin \theta}{\lambda}$
      E. $n\lambda = d \sin^{-1} \theta$

(d) A laser produces monochromatic light of wavelength $625nm$ which falls normally on a diffraction grating. A second order maximum is produced at an angle of $35°$ measured from the normal to the grating. Calculate the number of lines per metre on the grating.

7. Calculate the de Broglie wavelength of an electron with a kinetic energy of $2.2 \times 10^{-18} J$.

8. Explain why electrons can be diffracted by graphite, whereas a ball thrown through an open doorway does not show any observable diffraction effects.

....
....
....
....
....
....
....
....
....
....