A1-2: Use of Books and Graph Drawing

Apparatus

Selection of Physics books; 4 or 5 figure log tables; 1 sheet of graph paper.

Procedure

1. Use the books provided to answer the following:
    a. What is rectilinear motion?
    b. Name 3 ferromagnetic materials (is there a 4th?).
    c. What are the unit prefixes (letter and name) for:
    $10^{12},\ 10^{9},\ 10^{6},\ 10^{3},\ 10^{2},\ 10^{-2}, 10^{-3},\ 10^{-6},\ 10^{-9},\ 10^{-12}$
    d. What are the letters of the Greek alphabet? Give their names.
    e. What does 'Non-Ohmic conductor' mean? Give four examples.
    f. What is the velocity of sound in air at 0°C?
    g. 0°C equals how many K, exactly?
    h. What are the main types of experimental error?
    i. a = $5 \pm 0.005m$ and $b = 3.5 \pm 0.01m$. What is the error in $a + b$ in metres and in %? What is the % error in ab?
    j. Define the metre, the kilogram, the second, the newton, and the joule. Which are base units and why?
2. Use of 4 or 5 figure log tables. Calculate the following:
    a. i. 28.5×137
    ii. 0.056×55.62

iii. $0.0335 \div 0.48$

b. i. $73500 \div 0.6885$

ii. 5.322^4

iii. $\sqrt[3]{6.03}$

iv. $\log(0.002)$

v. $\sin(26^\circ 36')$

vi. $\cos^{-1}(0.391)$

vii. $\tan(53.552^\circ)$

viii. $\tan(216^\circ)$

ix. $\cos(126^\circ)$

c. i. Convert to radians: 90° 72° 200°

ii. Convert to degrees: $1.12rad$ $3\pi rad$ $3\pi/2rad$

d. i. $\ln 7.9$

ii. $e^{1.5}$

iii. $\ln 0.14$

iv. $\ln 40$

v. e^{15}

vi. $e^{0.02}$

e. i. $\sqrt{553}$

ii. $\sqrt{0.07}$

3. Graphs.

a. In an Ohm's Law experiment, where V = IR, the following readings were obtained:

V (volts)	0.69	0.90	1.11	1.32	1.57	1.80	2.00	2.20
I (amps)	3.05	4.00	5.01	5.95	7.03	8.00	9.00	9.90

Draw a graph of V against I, and hence find R.

b. A cell of internal resistance r and emf E supplies current through a resistor R. The equation which applies is:

$$r = R \times \frac{E - V}{V}$$

Readings of R and V are obtained, and $1/R$ is plotted against $1/V$. Explain how the gradient and y-intercept can be used to find E and r.