# Physics Practical work simplified

### Note.

Avoid these in your final work	Ensure availability of, (MUST)
- Pencil	- Scientific calculator
- poor hand writing	- long ruler (30 cm)
	- geometry set.
	- PRACTICAL MANUAL

# List of some of the apparatus and their accuracy

apparatus	Decimal places	Unit in ()	examples
1. Meter rule	1	cm	2.4cm, 3.0cm, 10.9cm
2. Vernier caliper	2	cm	1.02cm, 4.45cm, etc.
3. Micrometer screw gauge	2	mm	5.32mm, 6.10mm etc.
4. ammeter	2	A	2.00A, 3.42A etc. (even no. at the end)
5. voltmeter	2	V	1.50V, 2.35V etc. (with 0

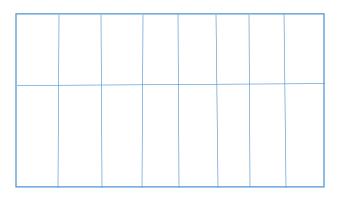
			or 5 at the end)
6. stop clock	1	S	2.5s, 5.0s etc. (with 0 or 5 at the end)
7. protractor	0 (NO dp)	0	30°, 45°, 90° etc.

# Table of results

# Always remember that;

- 1. it must be well enclosed
- 2. it must be columnar

# example



3. it must be in pen

## **DATA MANIPULATION IN A TABLE**

# guiding tips

- ➤ for addition/subtraction —— consider decimal places
- > for multiplication/division consider significant figures

# guiding example

# consider this practical in which the following values were obtained

 $R_{S} = 5 \Omega$  E = 3.00 V

|--|

0.200	0.040	5.00	Complete this	1.20	0.833	1.80	2.50
0.300	0.090	3.33	column with ease	1.25	0.800	1.75	2.40
0.400	0.160	2.50		1.30	0.769	1.70	2.31
0.500	0.250	2.00	<b>\</b>	1.35	0.741	1.65	2.22
0.600	0.360	1.67		1.40	0.714	1.60	2.14
0.700	0.490	1.43	2.04	1.50	0.667	1.50	2.00

3 d.ps 2 d.ps 2 d.ps 2 d.ps 3 d.ps 2 d.ps ? d.ps

Related quantities arranged near each other. E.g. y,  $y^2$ ,  $\frac{1}{y}$  etc.

(this is very important)

## Comprehensive analysis of the columns

**Column 1**: (with y (cm))

> 3 d.ps because it was recorded in meters

Column 2: (with V (V))

> 2 d.ps because it is a reading from a voltmeter.

#### Column 3:

- ✓ Look for the biggest value in column 2, i.e. the column having V (in this case 1.50)
- ✓ Divide 1 by this biggest value , i.e.  $\frac{1}{1.50}$
- ✓ Record your answer correct to the number of significant figures of that biggest value of V (in this case 3sf)
- ✓ Count the number of decimal places for your answer (in this case 3 d.ps)
- ✓ Work out all other values in this column correct to those counted number of decimal places. i.e. all have 3 d.ps

#### Column 4:

➤ Repeat the same procedure as done for column 3, but this time use "y" values

#### Column 5:

- Again look for the biggest value of y in column 1 (in this case 0.700)
- Square that value i.e.  $(0.700^2)$
- Record your answer correct to the number of significant figures for the biggest vale (in this case 3sf.). The answer is 0.490
- Count the number of decimal places for your answer. (in this case it is ......)
- Work out all other values in this column correct to the

counted number of decimal places. i.e. all values have.......d.ps

#### Column 6:

➤ Follow the same procedure as used in column 5 and 6 but this time using values of E and V.

#### Column 7:

This is subtraction (the rule of decimal places should be remembered as mentioned earlier)

- Subtract the values the way they appear
- > Your final answer should be recorded correct to the same number of decimal places as those of the value with the least number of d.ps.
- ➤ E.g. 3.00 1.20 = 1.80. (in this case, we are lucky that both E and V have 2 d.ps)

#### column 8:

- $\checkmark$  this is the reciprocal of  $y^2$ .
- ✓ In this case, You should be extremely happy, because the procedure is the same as that used in column 4., but in this case using  $y^2$

#### The following should be noted

## For tables requiring;

 sin, cos and tan of angles, your recordings should be correct to 3d.ps

- the same is done for logarithms (log) and exponents (e) of numbers
- the same is done for roots of numbers e.g.  $\sqrt[3]{x}$

#### illustration:

- 1.  $\cos 50 = 0.6427876$  approximated to 0.643 (3 d.ps)
- 2.  $\cos 60 = 0.5$  approximated to 0.500 (3d.ps)

#### **Questions**

- 1. have you learnt something?
- 2. Do you think you need more help?

Then see your teacher immediately!

## **UNDERSTANDING SIGNIFICANT FIGURES**

## Rules governing significant figures

- Values of all instrumental readings are significant
- All non-zero digits in a decimal number are significant
- All <u>zeroes before non-zero digits</u> in a decimal number are not significant

 All <u>zeroes between or after</u> non-zero digits in a decimal number are significant

#### Illustration

- 1. 0.256178 has 6 significant figures (the zero before is not significant)
- 2. 0.01301 has 4 significant figures

  (1st and 2nd zeroes aren't significant but

  the 0 between 3 and 1 is)
- 3. 1.1130 has 5 significant figures.

  All the digits are significant
  - > State the number of significant figures here
  - i). 0.00102 ii). 10.3310 iii). 1.02300000 iv). 1003