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}	30^0, 45^0, 90^0 etc.

Table of results

Always remember that;   *example*

1. it must be well enclosed

2. it must be columnar

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

Rs = 5 Ω   E =   3.00 V

y (m)	y^2 (m^2)	$\frac{1}{y}$ (m^{-1})	$\frac{1}{y^2}$ (m^{-2})	V (V)	$\frac{1}{V}$ (V^{-1})	E-V(V)	$\frac{E}{V}$

			Complete this column with ease				
0.200	0.040	5.00		1.20	0.833	1.80	2.50
0.300	0.090	3.33		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	↓	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. $\dfrac{1}{1.50}$

✓ 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:

✓ 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. cos50 = 0.6427876 approximated to 0.643 (3 d.ps)

2. cos60 = 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 zeroes before non-zero digits in a decimal number are not significant*

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

<u>Illustration</u>

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