Assignment 1

645261 ASSIGNMENT 1 – PHYSICS

IAN MPHO MALULEKA_22049096

Question 1

Fill in the table below:

Table 1.1: Derived SI units and abbreviations

Quantity	Unit	Abbreviation
Length	meters	m
Mass	Kilogram	kg
Time	Seconds	s
Electrical current	Ampere	A
Temperature	Kelvin	K
Velocity	meters per second	m/s
Acceleration	meters per second squared	m/s^2
Force	Newton	N
Work, energy	Joule	J
Power	Watt	W
Electric charge	Coulomb	C
Electric potential	Volt	V
Resistance	Ohm	Ω
Capacitance	Farad	F
Magnetic field strength	Tesla	T
Magnetic flux	Weber	Wb

Question 2

Show all working outs for each convection before filling in the final answer on the table.

Table 2.1 Conversion to SI units in scientific notation

	Quantity	Measurement	Measurement in SI units
2.1	Distance to the nearest clinic	$3.65\ km$	3650 m
2.2	Volume of water tank	$5000\ l$	$0.005\ m^3$
2.3	Ground area of a bedroom	$4.5 \times 10^4\ cm^2$	$0.045\ m^2$
2.4	Mass of a car	$2.06\ tons$	1868.801 kg
2.5	Resistance of a stove	$0.500\ k\Omega$	500 Ω
2.6	Distance between Cape Town and Johannesburg	$1,3975\ Mm$	13.975 m

Question 3

Fill in the table below with the most significant, the least significant and the number of significant figures for each number;

Table 3.1 Significant figures

	Number	Most significant figure	Least significant figure	Number of significant figures
3.1	5000	5	0	1
3.2	101010.0	1	0	7
3.3	0.00230	2	3	2
3.4	18.005	1	5	5
3.5	999.99	9	9	5
3.6	400001	4	0	6

Question 4

Conduct and experimental set-up where you will collect water from a running source, e.g. tap, rain water, water spring, shower, etc. Use your phone timer to see how much water you can collect into the container over 3 min. Make sure the water does not overflow from your container. Repeat the measurements 30 times. Draw a table to record the volume of water you collect each time.

Takes	Volume (liters)
1	
2	
3	
.	
.	
30	

4.1. Give an appropriate title to the table you have drawn with your results.
4.2. List the tools/ apparatus used for your experiment.
4.3. Calculate the mean value of the quantities.
4.4. Calculate the standard deviation form the mean value of the experiment you conducted.

Water Flow Rate Experiment Results

Takes	Volume (ml)	Volume(l)
1	230	0,23
2	200	0,2
3	220	0,22
4	230	0,23
5	250	0,25
6	180	0,18
7	220	0,22
8	290	0,29
9	210	0,21
10	220	0,22
11	400	0,4
12	330	0,33
13	480	0,48
14	260	0,26
15	420	0,42
16	340	0,34
17	340	0,34
18	390	0,39
19	330	0,33
20	260	0,26
21	370	0,37
22	250	0,25
23	290	0,29
24	470	0,47
25	300	0,3
26	410	0,41
27	400	0,4
28	330	0,33
29	240	0,24
30	420	0,42
Total	9280	9,28

(4.2) Apparatus used

- Measuring jug : 500 ml
- Smartphone : Timer
- Tap : Running source of water

(4.3) The mean value of the quantities

Mean Volume = $\dfrac{\text{total volume}}{\text{number of take}}$

$= \dfrac{9280}{30}$

$= 328\,ml$

The mean value of the quantities is $0.328\,l$

(4.4) Standard deviation

$S = \sqrt{\dfrac{\Sigma(x-\bar{x})^2}{n-1}}$

$S = \sqrt{\dfrac{(0.23-0.328)^2 + (0.2-0.328)^2 + \ldots (0.42-0.328)^2}{30-1}}$

$S = \sqrt{\dfrac{80.1383}{29}}$

$S \approx 2.05\,l$

∴ The standard deviation for the data is approximately $2.05\,l$.