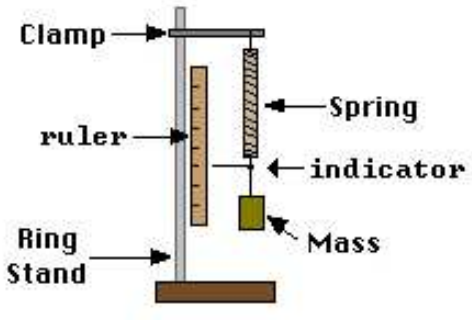
BETC National Diploma in Applied science/ Medical Science
Scientific Practical Techniques Assignment number one
Task 2
1) For this task I have done four different investigations, which is Hook's law, pH four unknown liquids, examine voltage, current change and growing yeast culture.

Hook's law

Hook's law given the relationship between the force applied to an unscratched spring and the amount the spring is stretched when the fore is applied. The purposes of this experiment is to see when we apply a force what will happen to the spring, therefore when we apply a force to a spring it will stretches, and if we apply double force it will stretches twice as much.



I performed this experiment to determine how the extension of a spring varies with the stretching force. A spring is hung vertically from a fixed point and a force is applied in stages by hanging weights from the spring. The apparatus is set up as shown above. For the purpose of the experiment I used different gram 50 to 400 gram, and the extension of the spring I measured it metres.

To start the experiment first I measured the unloaded length of the spring without touching, and then add the 50g loads, doing the same one at a time for all loads and measure the length of the stretched spring, and I recorded the results in the table.

Load/ g	Extension /mm
0g	0mm
50g	95mm
100g	130mm
150g	160mm
200g	190mm
250g	220mm
300g	250mm
350g	280mm
400g	310mm

D4
Applying hook's law, by using my theoretical knowledge I predict that the extension of the spring will be directly proportional to the mass added length.
In order to increase the accuracy of the result, first I have found more precise values of mass using the following formula mass/g, instead of just assuming each gram, and then I used a couple of equipment such as stand, spring, mass and a ruler marked with a millimetre scale for greater accuracy, then I began the reading by repeating at least twice, then take an average if any readings seem to be strange just to be sure.

Having done the experiment, I plotted my graph the average extension against mass.
To improve the accuracy of the result first it is important to set up the instrument precisely, although you have to know all spring are not the same, same spring are pre tensioned, this means that they coil up tight when not loaded. Therefore a minimum force must be applied to make them begin to stretch as a result they do not produce directly proportional result, but they produce a linear relationship.

2) Check the pH of the four unknown liquids

1) For this investigation I used four unknown buffer solution a solution the pH of which does not change significantly, pH meter and a stand to sport for the prop as we now the prop is very delicate. I used the instrument to calibrate the pH solution between the pH neutral and pH acidic.

2) pH 4= 4.01 PH 7= 7.01

pH 4-7 = 4.01	
Unknown A	10.05
Unknown B	1.68
Unknown C	11.95
Unknown D	3.06

pH 7 – 10	
Unknown A	10.02
Unknown B	1.68
Unknown C	11.96
Unknown D	4.01

D4
3) To start the investigation first I did visual inspection in all equipment, this was helped me to see any cracks on the meter, algae or salt lay on the probe or any matter that shouldn't be on the probe, and then once I have done this I knew I am ready to calibrate the pH meter. First to get accurate result I calibrated the pH meter with to pH solution which is pH7 neutral and pH4 acidic this will help me to obtain accurate result. The measurement equipment has been set up by lab technician before I start the investigation which is all vital equipment has been placed on the table, such as one beaker for the probe, stand supporter to support the meter and four unknown pH solution.

Method

- Rinse probe in water and briefly shake off excess
- Switch the meter on
- Place probe into pH 7 solution and allow the pH reading to settle
- Press the CAL key to enter the calibration mode. The display flashes wait until the screen goes from OFF to CAL
- 7 will appear on the screen and CAL will flash on the bottom corner the meter is now calibrating pH 7
- One I have done this I did the same thing for pH 4 and for the other unknown PH

To improve the measurement and get accurate result, I would suggest calibrating the metre once a week will help obtaining good result and using more equipment instead of using one baker, using three clean bakers it could improve the result.

3) Examining how the voltage and current change

1) In order to do the investigation how voltage and current changes I used different instrument, such as 1.5v batteries instead of using high power batteries, to two bulbs, ammeters and voltmeter. An ammeter measures the current and used in series and voltmeters measures the potential difference across the resistance and used in parallel.

2) Result table

	Series	
1 battery 1 bulbs	Ammeter 0.02	Voltmeter 1.45
2 battery 1 bulbs	Ammeter 0.03	Voltmeter 2.99
2 battery 2 bulbs	Ammeter 0.03	Voltmeter 3.00
1 battery 2 bulbs	Ammeter 0.02	Voltmeter 1.47
	Parallel	
1 battery 2 bulbs	Ammeter 0.02	Voltmeter 1.39
2 battery 2 bulbs	Ammeter 0.29	Voltmeter 2.78

D4

3) In order to use the equipment first I set up the ammeter in series to measure the current and voltammeters in parallel to measure voltage (potential difference). Because of the different quantities they measure and because of the make up of a circuit I did wired into a circuit differently to each other. I start the investigation by placing 1 battery and 1 bulb to see the change in the ammeter and voltmeter particularly in ammeter, because since the ammeter is in series in the circuit I need to make sure that it has lowest resistance possible, by doing this test several time and getting help from my lecturer I mange to obtain accurate result.

To improve the accuracy of the measurement it is important to understand the theory side of the tow measurement method, which is voltmeter are always wired in parallel to the circuit and ammeter are in series. In addition there are many things that can affect the accuracy of the investigating; this may be the battery, the battery has been used long time so if the battery is low it can affect the voltage, to improve this get new battery in every single investigation or use proper power supplier. Other thing that can improve the

investigation using new measurement metre, as the old one has been used for so many years.

4) Looking at a growing yeast culture at 30 degree

1) The instruments I chose for this investigation are microscope, which helps to distinguish tiny object that can not be seen through nicked eyes, haemocytometer a device originally used to count blood cells it is now used to count cells and many types of microscopic particles, micropipette a pipette designed for the measurement of very small volumes mostly used in hospital and also a growing yeast culture placed in a bakers at 30 degree temperature. I chose this instrument particularly haemocytometer counting chamber because it determine the concentration of the cells in a cell suspension, it has a grid etched into it and it is different from the normal counting chamber, because you can put more cells and it has squires which help to count the cell easily.

2) Result of the experiment presented in table

Sample 1	
Square	Number of cells
1	6
2	4
3	10
4	10
5	19
Total	**49 cells**
Sample 2	
Square	Number of cells
1	19
2	12
3	14
4	15
5	15
Total	**75 cell**
Sample 3	
Square	Number of cells
1	21
2	20
3	22
4	22
5	19
Total	104 cells
Sample 4	
Square	**Number of cells**
1	21
2	23
3	25
4	27
5	28
Total	**124 cells**

Calculation

$$\text{Cells/ ml} = \frac{1000 \times \text{number of cells} \times 4000}{\text{Number of squares counted}}$$

Sample 1

1) $\frac{10 \times 49 \times 4000}{5} = 39200$ cells/ml

2) $\frac{10 \times 75x \ 4000}{5} = 60000$ cells/ml

3) $\frac{10 \times 104 \times 4000}{5} = 83200$ cells/ml

4) $\frac{10 \times 124 \times 4000}{5} = 99200000$ cells/ml

D4

3, In order to did the investigation I set up the equipment properly first and then using my practical knowledge I put a drop of growing cell from the beaker which has been put in 30 degree temperature for while using Pasteur pipettes, then I transfer in to the haemocytometer counting chamber at the edge of the chamber then cover it by cover slip and place the chamber on the microscope stage and the counting grid is brought into focus at low power. Then using different magnification until I obtain clear view of the cell and the square I did the same things over and over again for about 1 hour and half by changing the sample every 15 minute to see how temperature can speed up the growth of a cell.

To make sure my measurement is accurate first I have to check my first sample, it should gave me leas cell because it is the early stage of the yeast to be placed on the higher temperature or it is the first test to be check, therefore the more the yeast culture stays on the temperature the more it will growth and the number of cell per square has to be increases.

To improve the accuracy of the measurement it is essential to be extremely careful with higher power objective, since the counting chamber is much thicker than a conventional slide. The chamber or an objective lens may be damage and the whole investigation may outcome an accurate result, so the user has to know the basic knowledge of using microscope and finding the square of the haemocytometer. In addition it is important to be precise when dropping the sample in to the chamber, make sure that the chamber is fully loaded with liquid and all the equipment needed for the investigation has to be clean before starting the experiment, also the haemocytometer and the cover slip has to be clean with sterile wipe tissue again and again before butting another sample for test, this will help getting accurate result. Generally to obtain accurate result consistently it is important not to overload the chamber as doing so will give an inaccurate count or result.