Required practicals P2

Human Reaction time

Aim - to investigate the effect of practice / repitition of a ruler drop test

Equipment:

- metre ruler
- chair
- table

Method:

1) Sit down on the chair and press your forearm of your non-dominant hand on the table with your hand hanging over the end of the table.

2) Have your partner hold a ruler with the bottom end between your fingers so you can practice holding the ruler with 2 fingers.

3) Have your partner hold the ruler and remove your fingers.

4) Have your partner hold the ruler in line so that the 0 mark is level with the top of your thumb.

5) Your partner will drop the ruler without telling you beforehand, and you will catch the ruler as quickly as you can.

6) Note and record the number level with the top of your thumb after you have caught the ruler in a table such as in diagram.

7) Repeat the test at least 5 times.

8) Swap places with your partner and repeat steps 1-7.

9) Find reaction times using a conversion table to convert the ruler measurements.

Table of results example:

drop test attempts	ruler measurement (cm)		reaction time (s)	
	person 1	person 2	person 1	person 2

Sources of error:

Participants may have different experiences in performing a similar task previously i.e. some participants may have already practiced the test.

Sample sizes may be too small to make a valid conclusion.

Germination

Aim: To investigate the effect of light or gravity on the growth of newly germinated seedlings.

Equipment:

- white mustard seeds
- petri dishes
- cotton wool
- ruler
- water
- window with exposure to light
- dark cupboard

Method:

1) Pour a fixed volume of water into 3 petri dishes and add cotton wool.

2) Place 10 seeds in each petri dish

3) Place the petri dishes in a warm location eg. incubator, not to be disturbed.

4) Allow time for the seeds to germinate. If necessary, add more water to the petri dishes (same volume for each dish)

5) If not all the seeds have germinated into seedlings, remove any excess ones so that the petri dishes have the same number of seedlings.

6) Place one petri dish in full sunlight by a window. Place a 2nd in partial sunlight and the 3rd in the dark cupboard.

7) Use a ruler to measure the height of each seedling every day for at least a week. Record in the table as seen below.

8) Find the mean height of the seedlings each day.

9) Plot a graph of 'mean height of seedling' against 'day'.

Table of results example:

Repeat for each petri dish

day	height of seedling in full sunlight in mm								
	1	2	3	4	5	6	7	8	mean
1									

Sources of error:

Seedlings in the same petri dish may not recieve the same exposure to sunlight.

Sample size for each environmental condition may be too small

Temperature may be another factor that affects the growth of the seedlings in addition to light exposure.

Field investigations

Aim: A) use random sampling to estimate the population size of a plant species. B) use continuous sampling with a transect line to investigate the effect of variation in a factor on the distribution of a plant species.

Equipment:

- frame quadrat (25cm x 25cm)
- tape measures
- clipboard
- pen
- paper

Method for part A:

1) use a random number generator to obtain 2 numbers, which are to be used as coordinates to find a location on the 2 tapes measures set up.

2) Set down the quadrat on the coordinates.

3) Count and record the number of required plant species in the quadrat.

4) Repeat steps 1-3 to take 9 more samples.

5) Estimate the population size using this formula.

$$\frac{\text{area sampled}}{\text{total area}} \times \text{no. of plant species counted}$$

Method for part B:

1) Write down a hypothesis of the effect of a change in an abiotic factor (eg. light intensity) on the distribution of the plant species.

2) Lay down a tape measure from the base of a tree to an open area of ground along a location with an ecological gradient.

3) Place the quadrat along the '0' end of the tape measure, with one corner touching the '0' mark.

4) Count the number of plants and record it in the table as seen below.

5) Place the quadrat 5m up the tape measure and repeat step 3.

6) Repeat step 4 at 5m intervals until you reach the end of the transect line.

7) Gather data from your class and find the mean number of plants at each point along the transect.

8) Plot a graph of 'number of plants' against the ecological gradient that is observed as the distance along the transect line increases. Compare your results to your hypothesis.

distance along the transect (m)	number of plants	light intensity

Source of error: without repititions the results may be anomalous.

Risk assessment:
Wash hands after the experiment.

Decay

Aim: To investigate the rate of decay of fresh milk by measuring pH change.

Equipment:

- full fat milk or single cream
- sodium carbonate solution (0.05 mol/dm^3)
- 5% lipase solution
- 250cm^3 beakers
- boiling tubes
- boiling tube rack
- marker pen
- thermometer
- syringes
- calibrated pipette
- stopwatch
- (pH indicator)
- Electrical kettle
- ice

Method:

1) Write down a hypothesis of the effect of temperature on the rate of decay of milk.

2) Carefully, fill half of a beaker with hot water (60°C or below) from the kettle for a water bath.

3) Use a syringe to transfer 5cm^3 of lipase solution into a boiling tube and label as 'lipase'.

4) Add 5 drops of cresol red into another boiling tube and label as 'milk'.

5) Use a calibrated pipette to transfer 5cm^3 of milk into the 'milk' tube.

6) Use another calibrated pipette to transfer 7cm^3 sodium carbonate solution to the 'milk' tube, which should make a purple solution.

7) Place a thermometer into the 'milk' tube.

8) Place both boiling tubes into the water bath.

9) Allow the solutions to reach the same temperature as the water bath.

10) Use another pipette to transfer 1cm^3 of lipase from the 'lipase' tube into the 'milk' tube and start timing immediately.

11) Record the time required for the colour to change to yellow.

12) Repeat steps 2-11 at the same temperature and get a mean.

13) Repeat steps 2-11 using a range of different temperatures (20° to 60°C) and plot a graph of time taken against temperature.

temp. of milk (°C)	time taken for solution to turn yellow (s)			
	trial 1	trial 2	trial 3	mean

Sources of error: The colour change at the end point may be difficult to judge.