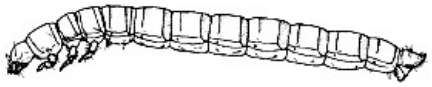
***Tenebrio molitor* Inquiry Lab**

Scientific Inquiry in Biology begins by making observations about things in nature. Next, the scientist asks questions about something of interest. The scientist will then research the topic to see what is already known. Finally, scientists conduct investigations (experiments) to find answers to their questions.



Today, you will observe mealworms. While making your observations you will develop a question and an experiment to answer the question based on mealworm preferences. Your experiment must not harm the mealworms.

DAY 1 – Wednesday

I must initial all parts of today's work before you begin the lab.

(YOU CANNOT PERFORM THE LAB UNLESS YOU HAVE ALL PARTS INITIALED)

1. STATING A PROBLEM OR QUESTION

A scientific question is a question that can be investigated (capable of collecting quantitative (you can measure it) data!!). It should not simply be a yes or no question.

For example a **good question** would be: Do mealworms prefer dark or light environments? (Answer can be counted)
A **bad question**: Do mealworms have eyes? (Answer is either yes or no…no investigation required)

Some suggestions for your experiment could include:

- Light preference of mealworms
- Smooth or rough surface preference of mealworms
- Burrowing material preference of mealworms
- Smell preference of mealworms
- Wet or dry surface preference of mealworms

Within your group, identify and choose a question that you can INVESTIGATE regarding mealworms. MAKE SURE IT CAN BE ANSWERED THROUGH SCIENTIFIC INVESTIGATION USING A CONTROLLED EXPERIMENT!!!

RECORD YOUR QUESTION BELOW (5 pts)

For teacher use only

3. FORMING A PREDICTION (A hypothesis is formed from prior knowledge or research, you are only predicting what will happen)

RECORD YOUR PREDICTION BELOW (5 pts)

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4. IDENTIFY YOUR VARIABLES

This will be a controlled experiment, which means you are only testing one variable and all other variables will stay the same. The variable you are changing/testing is the **independent variable**. What you decide to measure is your **dependent variable**. The variables that stay the same are called your **constants or control variable**. You will have different experimental groups. The group that is not involved in the experiment is the **control group**. Everybody will have the same control group, which will be the mealworms in the same container as yours with nothing in it.

RECORD YOUR VARIABLES BELOW (5 pts)

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1. Independent variable –
2. Dependent variable –
3. Constants or control variable –
4. Control group -

5. DESIGNING YOUR EXPERIMENT AND SUPPLIES

You will be given 5 to 6 mealworms to use for the experiment. You need to decide how you will set up the experiment to answer the question. Check with your teacher to see if the supplies can be provided for you or if you will need to bring them in. Things to consider when designing your experiment.

1. When the experiment will be over. How will you know when the mealworms have made their final "decision" on where they want to be or what they want to do? This must be consistent for all trials.
2. How many trials you will run. If a mealworm does the behavior just once, it could be just plain "luck". However, if a mealworm performs the same behavior 50 times or even 49 out of 50 times, that is very convincing! How many trials will you perform?

RECORD YOUR EXPERIMENTAL DESIGN DRAFT BELOW (10 pts)

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RECORD YOUR SUPPLY LIST BELOW. HIGHLIGHT THE SUPPLIES YOU MUST BRING TOMORROW FOR THE LAB (5 pts) HOW WILL YOU REMEMBER TO BRING YOUR SUPPLIES?

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DAY 2 – Thursday

I must initial all parts of today's work before you leave class.

1. **TABLES**
   You will design two data tables for this experiment. One data table should be for the **quantitative data** (numbers, etc.) that will be collected. The second should be for general observations.

DRAW YOUR TWO TABLES BELOW *BEFORE* YOU START YOUR EXPERIMENT (10pts) You may want to use scratch paper to decide what your tables will look like.

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2. **EXPERIMENTATION AND DATA COLLECTION (10 pts)**

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Assign roles within your group. You will need an experimenter, a data recorder, a timer (if applicable) and observers.

Experimenter _____
Data Recorder _____
Timer _____
Observer(s) _____
_____

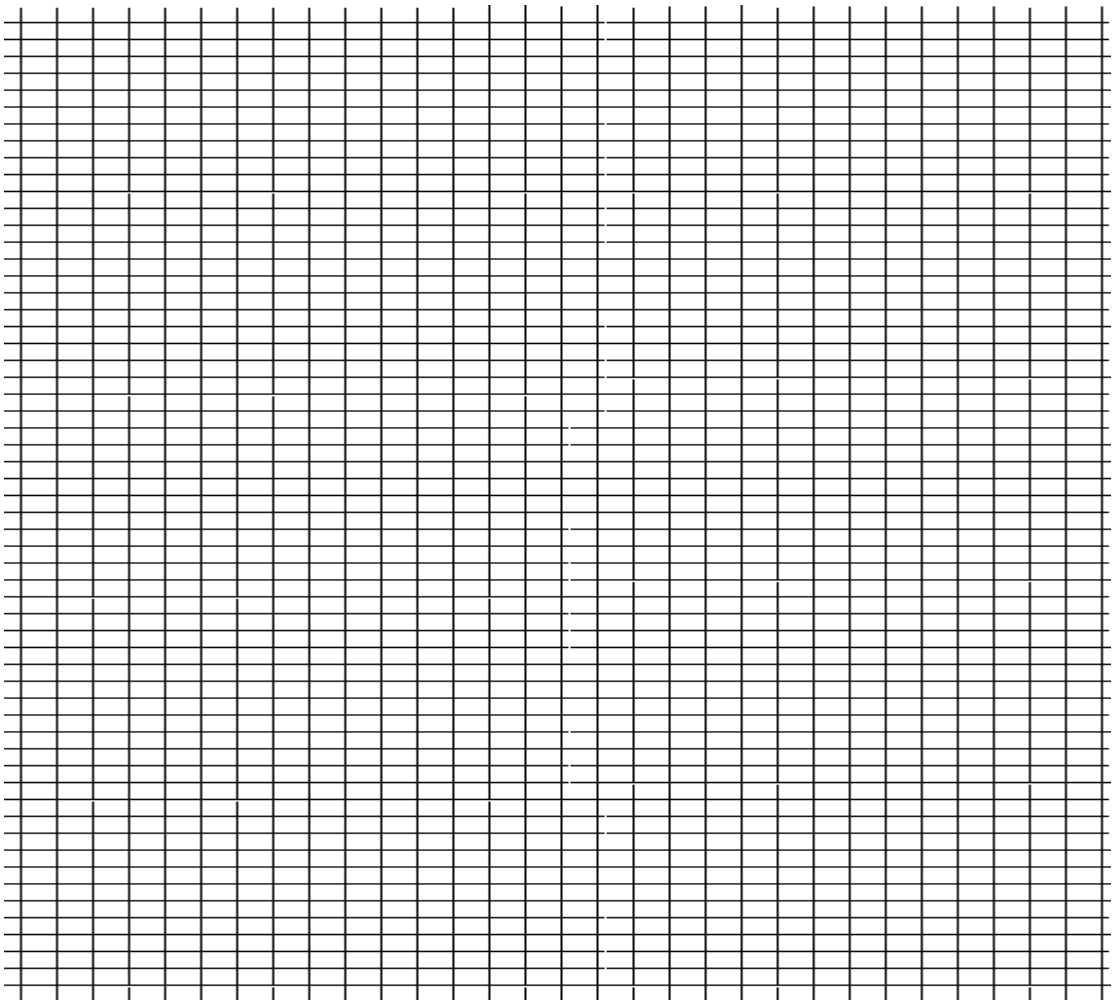
You should set up your experiment and run the procedure as many times as time will allow (these are your **experimental trials).** Allow time for proper cleanup!

As you run your experiment, you may find that your procedures you created yesterday may not work. Edit the procedures on your paper as you change them in the experiment.

DAY 3 – Friday

1. **GRAPH OF DATA (20pts)**

You should set up a graph to help analyze the data you collected. A line graph is used when examining how things changed over time while a bar graph is used to compare different groups. The graph should consist of the independent variable on the x-axis and the dependent variable on the y-axis. Each axis should be labeled with the variable name and quantified. The graph should also have a title.



2. CONCLUSION (30 pts)

This is the most important part of the lab report. IT MUST BE WRITTEN IN COMPLETE SENTENCES. This is where you interpret your data (discuss the trends shown on the graph) and summarize your findings. You will be using the CER format.

Claim *a conclusion statement of what happened*
Evidence *summary of the data that supports your claim*
Reasoning *background knowledge or science that supports the claim based on the evidence*

1.) What errors or problems occurred during the procedure?

2.) What might you do differently if you repeated this experiment?