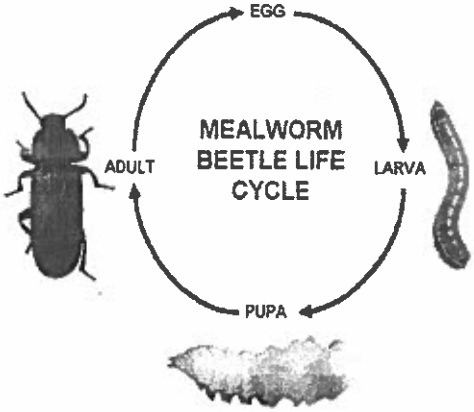
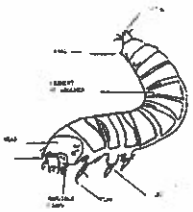


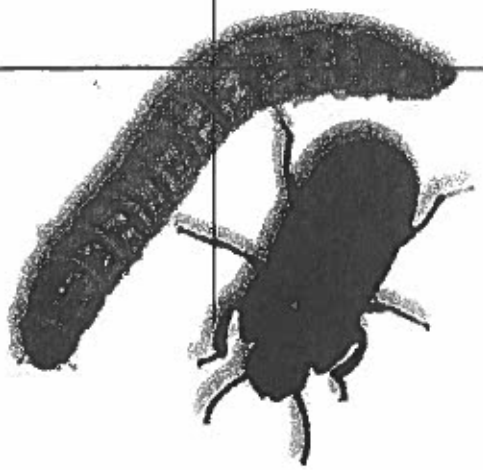
My Mealworm Journal



Name _____

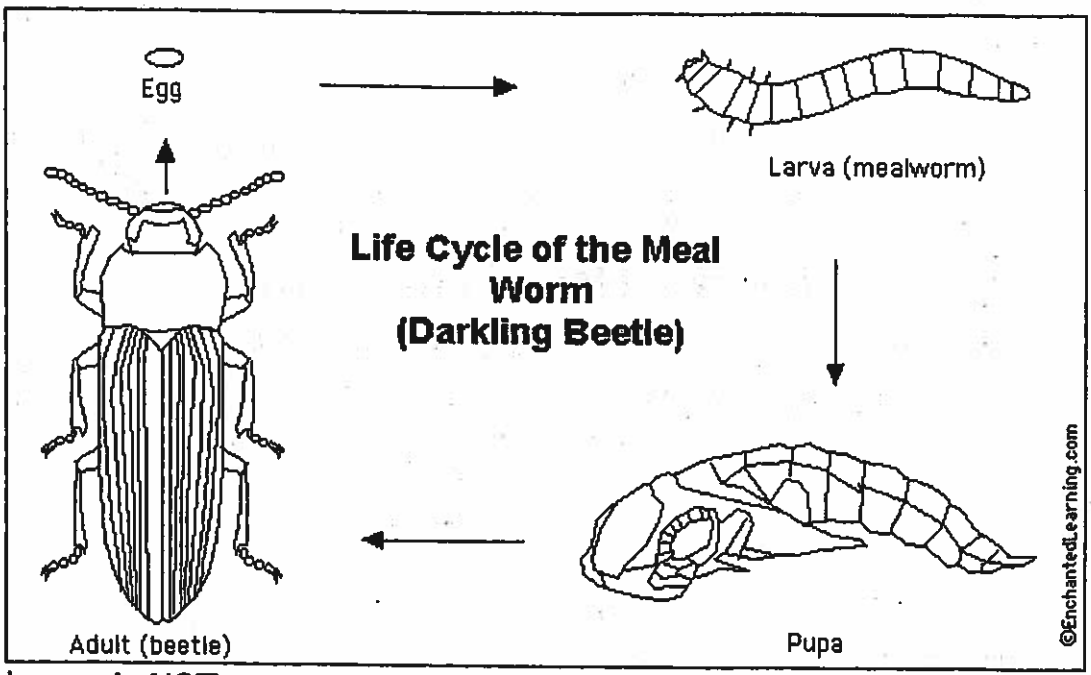
Mealworms/Darkling Beetle Name:

What did I *Know*?	What do I *WANT* To Know?	What did I *Learn*?



Mealworm Lifecycle

Tenebrio molitor



The mealworm is NOT a worm. It is the larval stage (grub) of the yellow mealworm beetle, also called the darkling beetle (*Tenebrio molitor*). Although the grub looks a bit like a worm, the mealworm has six small, jointed legs. Both the larva and the beetle are nocturnal (active at night), but they are also active during the day.

Life Cycle: The mealworm undergoes complete metamorphosis. The female darkling beetle lays hundreds of tiny, white, oval eggs, which hatch into tiny mealworms (the larval stage) - it takes from 4 to 19 days to hatch. Each mealworm eats a tremendous amount and grows a lot, molting (shedding its exoskeleton) mar times as it grows. It then enters the pupal stage (this stage lasts from 2-3 weeks u to 9 months, if the pupal stage over-winters). The pupa does not eat and seems inactive, but it is transforming itself into an adult. After pupating, a white adult darkwing beetle emerges from the pupa -- it soon turns brown and then almost black. The adult lives for a few months. The entire life cycle takes about a year.

Anatomy: The tiny, white, bean-shaped eggs are about 2 mm long by .9 mm wide Larvae are dark yellow with brown bands; they are up to about 35 mm long, have a segmented body, six legs (towards the front of the body) and two antennae. The pupa is white/cream with a large head and a pointed tail (it darkens as it grows). Like all insects, this beetle has a hard exoskeleton, six jointed legs, two antennae, compound eyes, and a body divided into three parts (the head, thorax, and abdomen). The adult is from 12 to 25 mm long and is dark brown.

Diet/Enemies: Both the adults and the larvae are scavengers that eat grains (hence the name mealworm) and some seedlings. Because of this, it is considered a

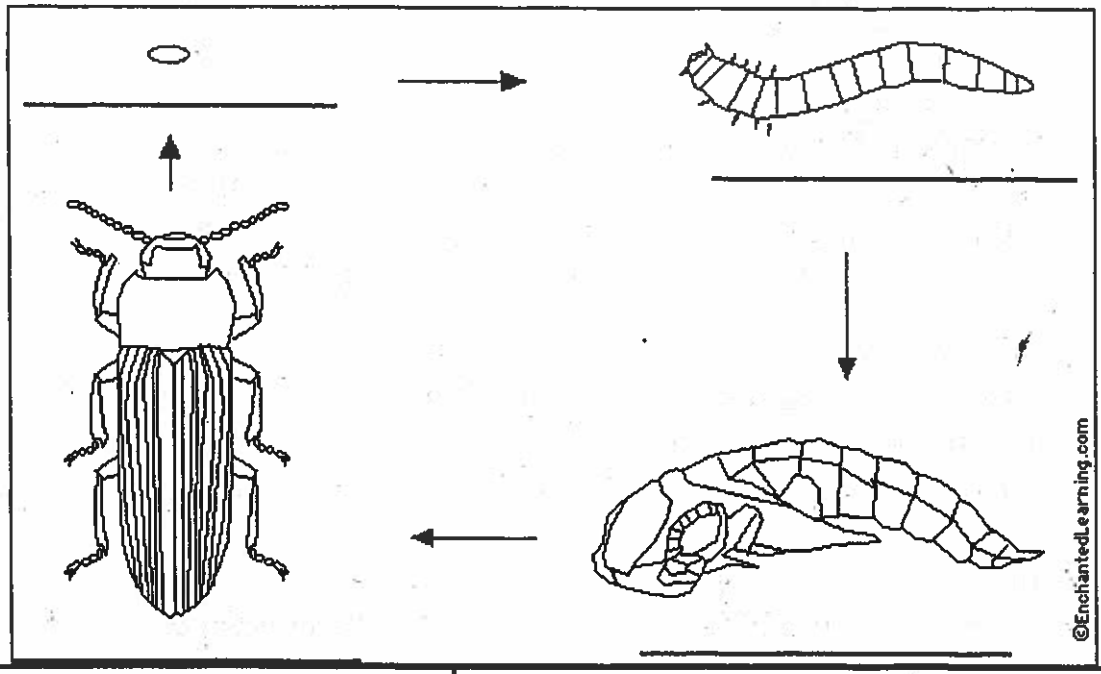
pest. They also eat decaying material, like decomposing animals and dead plants. They get all the water they need from the food they eat. Mealworms are eaten by many animals, including many birds, rodents, spiders, lizards, and some other beetles.

Range: This beetle is found in temperate and other regions around the world. The usually live in dark, cool, moist places, like under rocks and logs.

Classification: Kingdom Animalia (animals), Phylum Arthropoda (arthropods), Cla Insecta (insects), Order Coleoptera (beetles), Family Tenebrionidae, Genus Tenebri Species *T. molitor*.

Label the Life Cycle of the Mealworm/Darkling Beetle Diagram

Read the definitions, then label the life cycle of the mealworm/darkling beetle anatomy diagram below.



adult - The adult is the dark brown darkling beetle. The female lays many, many eggs on the host food. **egg** - White, oval-shaped eggs will hatch into the worm-like larva.	**larva (mealworm)** - The tan/brown larva looks like a worm, but has six legs and two antennae. It will molt many times as it grows. **pupa** - The white/cream pupa has a large hea and a pointed tail. The adult will emerge from the pupa.

Colour, label each stage

Label the Beetle Anatomy Diagram

Read the definitions, then label the beetle anatomy diagram below.

abdomen - the segmented tail area of a beetle that contains the heart, reproductive organs, and most of the digestive system

antenna - like all insects, beetles have 2 segmented antennae

compound eye - a faceted eye made up of many hexagonal lenses

elytron - (plural elytra) elytra are hardened fore wings that protect the longer hind wings

head - the head is at the front end of the beetle's body and is the location of the brain, the two compound eyes, the mouth parts, the pharynx (the start of the digestive system), and the points of attachment of its two antennae.

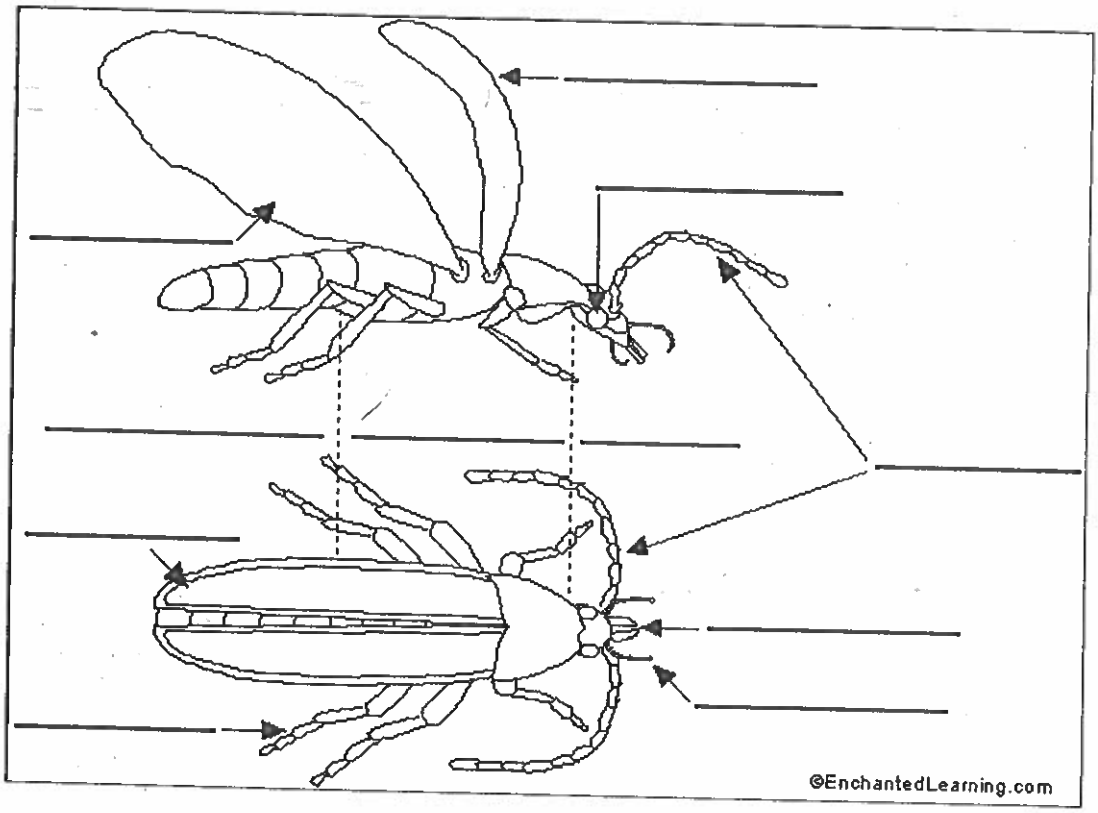
hind wing - beetles have two hind wings, used for flying (or swimming). These long wings can be folded under the elytra when not in use.

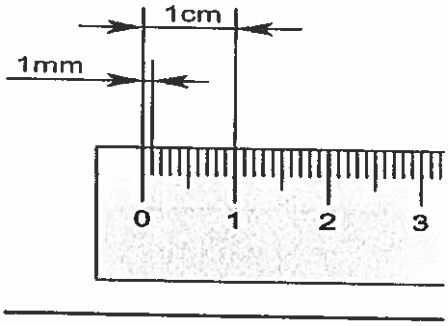
legs - like all insects, beetles have 6 jointed legs

mandibles - the jaws

maxillary palps - long, segmented mouth parts that grasp the food

thorax - the middle area of the beetle's body - where the legs and wings are attached

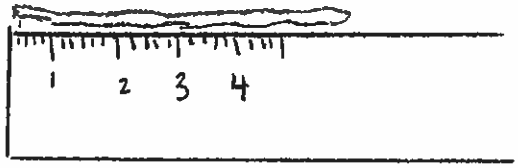


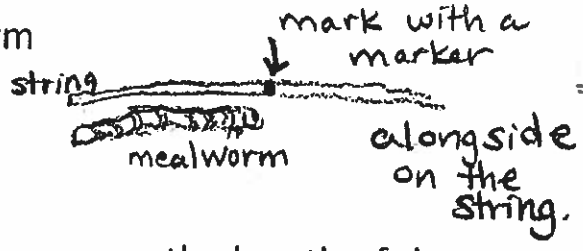


Measuring Mealworms

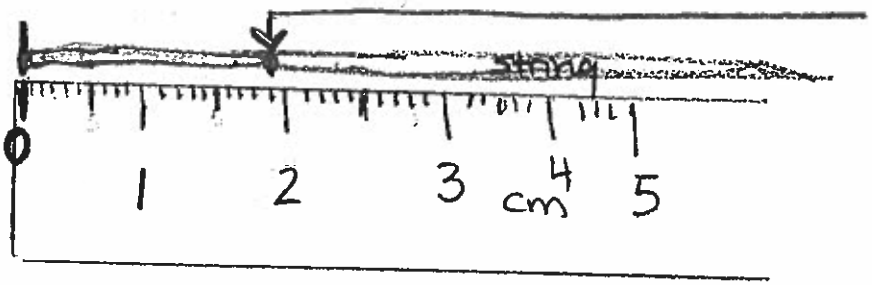
Tips: the larva are "squishy" or easy to hurt. A good way to gather information your mealworm is to gently handle them:

1) Empty the container gently on an empty desk top
2) Route through the oats looking for movement, molted skin, etc
3) Use a flat piece of paper to gently slide under your larva
4) Place larva in the middle of your desk
5) Use a string to lay out alongside your mealworm and mark with a pen or marker to the end of the mealworm





6) Using a ruler, lay out the string at zero to measure the length of the mealworm larva



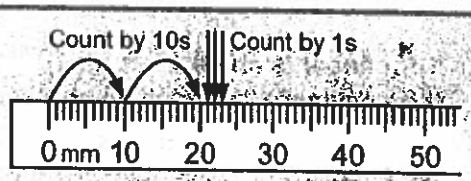
This mealworm measures
1 cm and 9 mm
1.9 cm
or 19 mm

7) Repeat for each mealworm, use a paper to slide underneath to return them to their habitat

***remember-be gentle and respectful, these are living things**

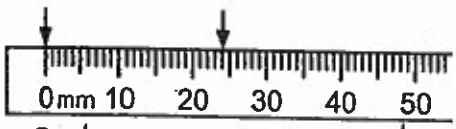
Jessica wants to mark off 23 mm.

It is hard to count every millimetre. Jessica counts by 10s until she reaches 20 mm or 2 cm. Then she counts millimetres by 1s.



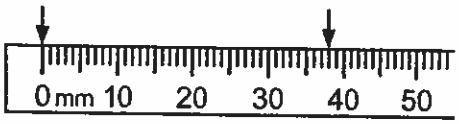
6. What is the distance between the two arrows?

a)



24 mm or 2.4 cm

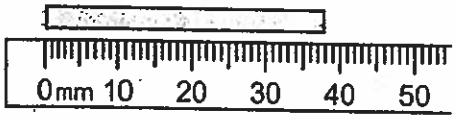
b)



____ mm or ____ cm

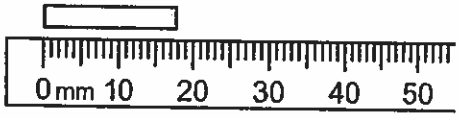
7. Find the length of the strip.

a)



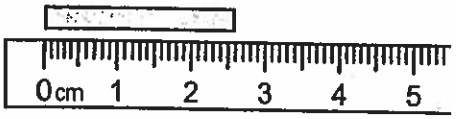
____ mm or ____ cm

b)



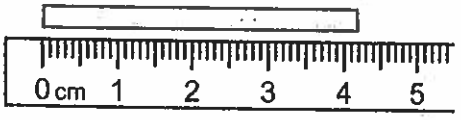
____ mm or ____ cm

c)



____ mm or ____ cm

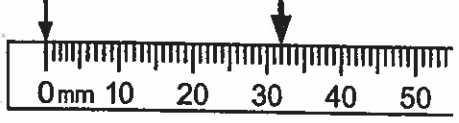
d)



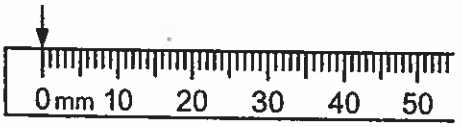
____ mm or ____ cm

8. Draw a second arrow to show where a line segment of the given length would end.

a) 32 mm ____ cm

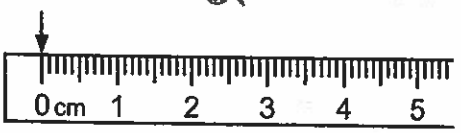


b) 18 mm or ____ cm



c) 26 mm ____ cm

d) 19 mm or ____ cm



9. Draw a line segment of the given length.

a) 16 mm

b) 41 mm

Use a ruler to draw the object to the exact millimetre.

a) a pencil 50 mm long

b) a house 25 mm tall

c) a flower 27 mm wide

d) a beetle 32 mm long

Mealworm or Darkling Beetle Journal Date _____

Draw

Illustrate by drawing and colouring your mealworm

Describe the colour and appearance of your mealworm.

What is the length of your mealworm (mm or cm).

Observe its behavior and note what it does:

Has any changes occurred? Did it shed any skin? If so describe what it looks like (draw)

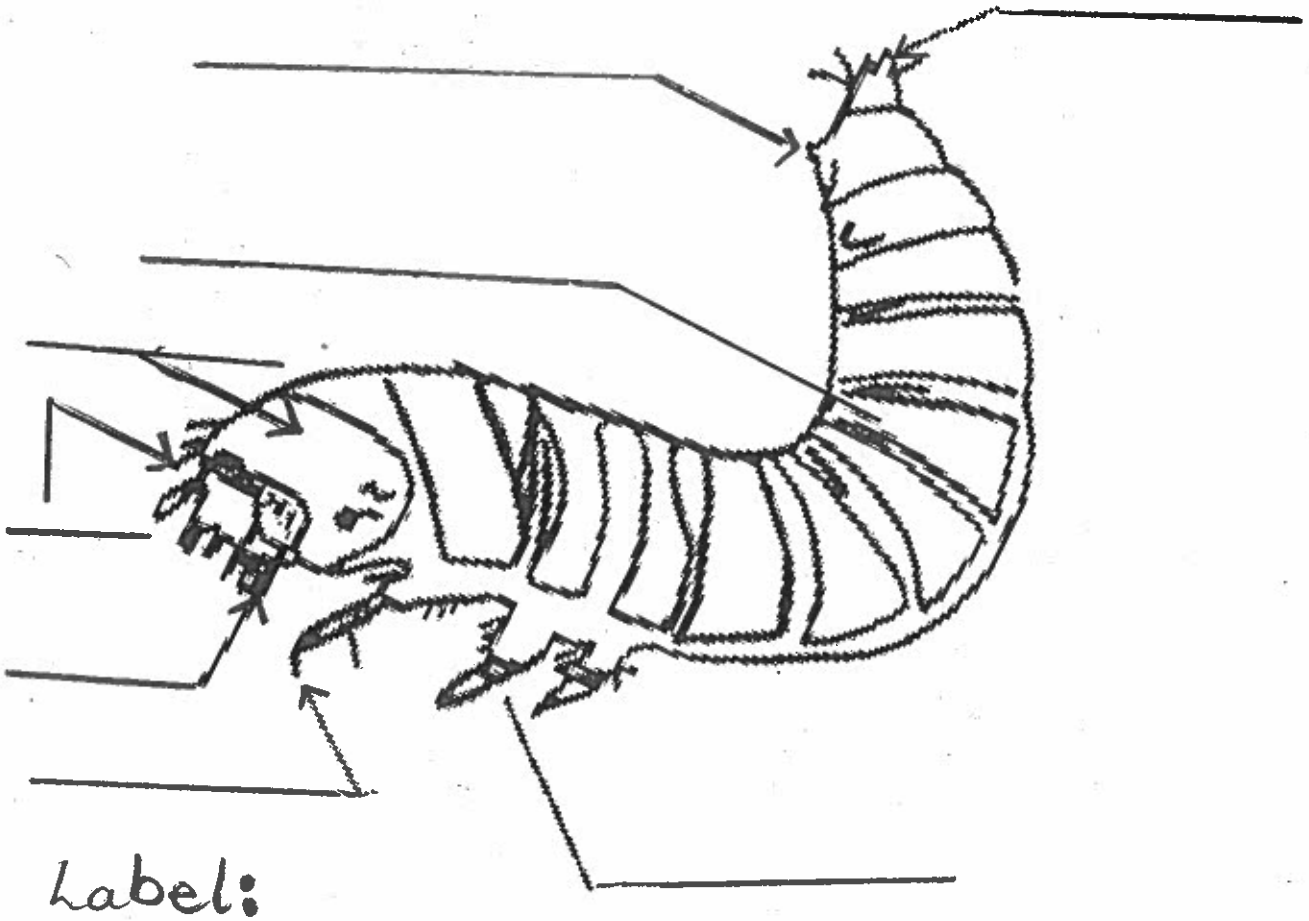
Mealworm Activity

Carefully place your mealworm in the middle of your desk. Using your hand lens look for the following parts and fill in the chart.

Body Parts	How Many
Mouth	
Eyes	
Antenna	
Legs	
Body Segments	

Write a good description of your mealworm. Describe the colour, size, and actions of the mealworm. Tell any interesting things you noticed while observing this mealworm.

Draw a picture of your mealworm. Label any body parts that you observed. Colour



Label:

- antenna
- head
- mandible (jaw)
- spine
- leg
- claw
- segment of abdomen
- anal leg

Name

What does a mealworm like to eat?

Mealworms are the larvae of one type of beetle. They pass through four stages of growth just like the butterfly: egg, larva, pupa, and imago. Mealworms are used for food by many reptiles and birds. Mealworms grow very fast if they eat a lot of food. Try to raise some mealworms. You may buy them from a pet store!

Put a mealworm in a plastic cup. Fill the plastic cup with two spoonfuls of oatmeal, a small piece of apple or potato, and cover with plastic wrap. Put a rubber band around the top of the cup to hold the plastic on tight.

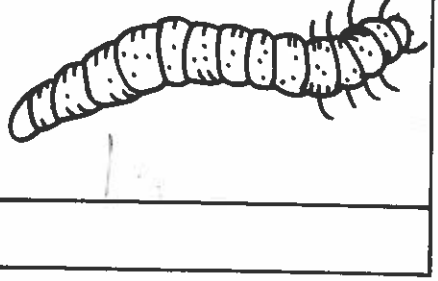
Watch your mealworm for a few days. Then answer these questions:

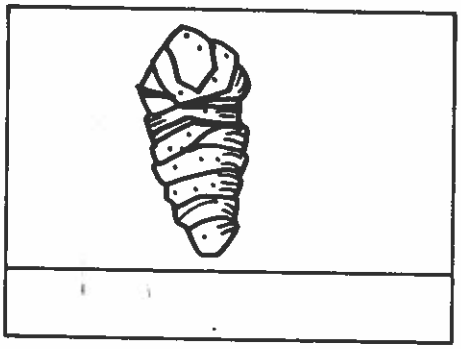
1. How does a mealworm move? How does it eat? Does temperature affect the mealworm? (Try placing your plastic cup in sunlight or in the refrigerator.)

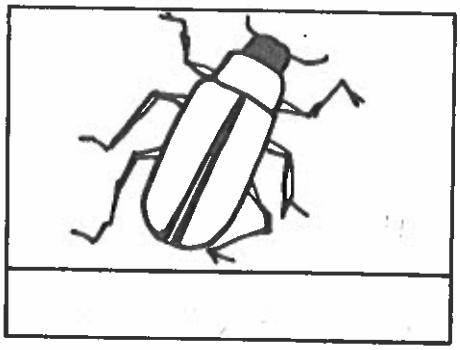
2. Draw what your mealworm looks like after:

1 week	2 weeks	3 weeks	4 weeks	5 weeks

3. Label these stages of a mealworm's life cycle.







Date:

Lab #

Food for a Mealworm

Purpose: You will need a potato chip, a fresh piece of fruit, granola bar, and bread. Crush each piece of food and place it around the centre of your desk. Place the mealworm in the centre of your desk an equal distance from each piece of food. Observe and record which piece of food the mealworm crawled to five different times.

Hypothesis: I predict that _____

Food	Tally Marks
Potato Chip	
Fruit	
Granola Bar	
Bread	

My mealworm went to _____.

Compare your results with ten classmates.

	Student	Potato Chip	Fruit	Granola Bar	Bread
	My mealworm				
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10					
11					
Tally	Class total				

When the chrysalis is formed, the students could be completing the drawings

Observations:

Conclusion: My prediction was _____

Lab#

Let's Find Out

Date

Hypothesis:

Tell what you think. Will your mealworm prefer wet or dry areas?

_____

Put your mealworm in the middle of your desk. Place four or five drops of water on one side of your desk and no drops of water on the other side of your desk. Observe to see if your mealworm prefers to be in the wet or dry area of your desk. Do this at least five times and record your results using tally marks.

Wet area_____ 

Dry area_____ 

My mealworm preferred the _____ area.

Draw a picture of what you observed in this activity.

Compare your results with ten other students in your class.

Student	Wet Area	Dry Area
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

11. From my observations and information I think most mealworms prefer to be in _____.

From these observations describe where you think mealworms are most likely to live. Give at least two reasons why you decided on this answer.

Conclusion: My prediction was

_____

_____

Lab# Date:

Daylight or Darkness -

Hypothesis:

Do you think your mealworm would rather be in the sunlight or in the dark?

_____ because

You will need a 3"x3" piece of black, white, yellow and green construction paper. Spread the four pieces of construction paper out near the centre of your desk. Place your mealworm in the centre of your desk equal distances from each piece of construction paper. Observe which colour your mealworm goes to most often. Do this observation five times and record the results using tally marks.

Black_____ Yellow_____

White_____ Green_____

Can you determine anything from five observations? If not do it five more times.

Draw a picture of this activity.

Ask ten classmates which colour their mealworm went to most often and record those results on the following chart.

Student	Black	White	Yellow	Green
My mealworm				

From my observations and the information I gathered I think mealworms prefer to be in the _____.

Observations:

Using the information you have gathered in the last three days, predict where you think mealworms live and tell why. (It's okay to change your mind from your first prediction.)

Conclusion:

Lab # **Fast or Slow** Date:

Hypothesis: I predict that the _____ climb over objects and move quickly.

Observations:

How fast is your mealworm? Measure the distance your mealworm moves in ten seconds.

My mealworm moved _____ in ten seconds.

Will your mealworm climb? Lay your pencil on your desk and see if your mealworm will climb on or over it. Record your result. _____

Try different objects to see if the mealworm will climb on or over them. What objects did the mealworm climb on?

_____

_____

_____

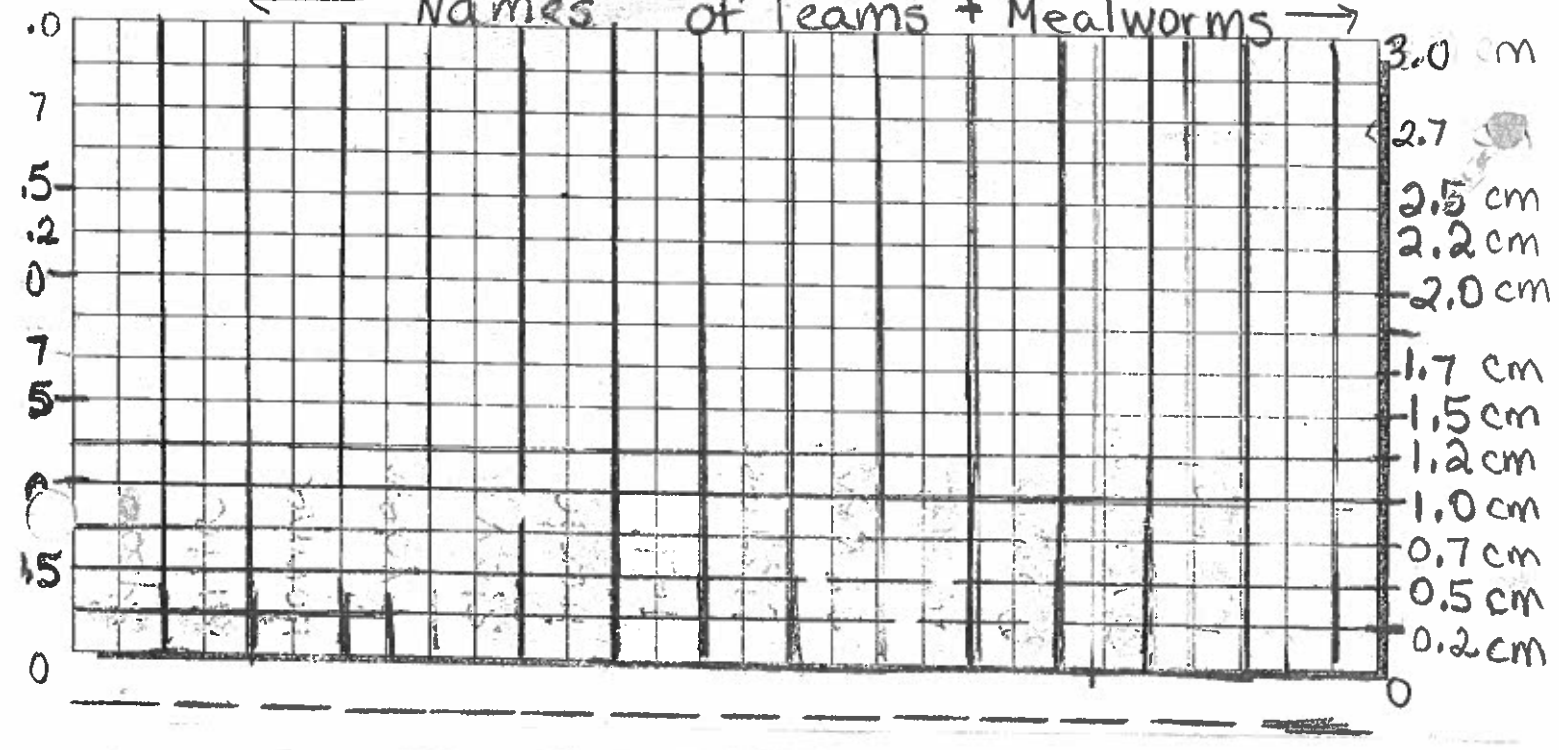
_____

Measure your mealworm. How long is it? _____

Conclusion:

Compare the length of your mealworm to other mealworms in the classroom. What did you discover?

NAME: Class Mealworm Measurement GRAPHS



Info on the Mealworm

Mealworm Quiz

Name_____

1. Is the mealworm a worm, an insect, or an amphibian?

_____

2. What are the four stages in the life cycle of the mealworm?

_____

_____

_____

_____

3. Does the mealworm undergo complete metamorphosis? _____

4. The mealworm is the larva of what animal?

_____

5. How many legs does the mealworm have? _____

6. How many legs does the darkling beetle have? _____

7. What are the three body parts of the darkling beetle?

_____

_____

_____

8. How many antennae does the mealworm have? _____

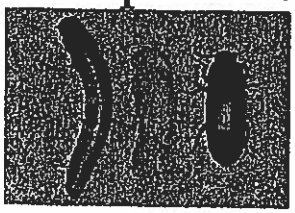
9. Does the darkling beetle have an internal skeleton or an exoskeleton?

_____

10. Does the mealworm eat grain? _____

Science: Mealworm Journal Checklist

- ☐ Are all the graphs, tables, and charts labeled?
- ☐ Are all illustrations coloured neatly, adequate size, and detail?
- ☐ Do all entries have a date?
- ☐ Are all journal entries neatly handwritten?
- ☐ Do they have correct spelling?
- ☐ Is the mealworm journal overall neat and well organized?
- ☐ Are all the journal entries complete?
- ☐ Is all the information presented in complete sentences?
- ☐ Is there new information and observations introduced for every entry?
- ☐ Are there good details presented?



Mealworm Journal Rubric

Name:

	Excelling	Meeting	Beginning to Meet	Needs Work
Accuracy of Data	-every entry has appropriate titles and dates -all charts and diagrams are completed/coloured	-most entries have dates and titles -charts, diagrams and mealworm illustration are complete	-half of the entries have correct dates and titles -some charts are labeled/complete	-diagrams are not labeled or complete -many entries are missing dates and titles
Neatness & Organization	-every journal entry is neatly handwritten -no spelling errors	-most journal entries are neatly handwritten or printed -very few errors in spelling	-entries have neat printing half the time -more than 5 errors in spelling	-printing is illegible with smudges and is messy -numerous careless spelling errors
Quality of Content/ Scientific Vocabulary	-observations provide thorough and detailed descriptions (in full sentences) -reference is made to technical names of body parts and the stages of growth -observes not only what is happening but predicts why it's happening (can support with evidence)	-outlines and describes daily observations -can describe in detail what changes happen in full sentences for each entry -can predict why changes are happening (or factors that could affect why there may not be any changes)	-documents daily activity and observations -observations are in point form or aren't in complete sentences -there isn't much detail of what happened or any prediction of future change -very basic observation presented	-there is very little information or observations outlined -many details or data are repeated from one entry to the next (example: no changes today) -data is not in complete sentences -data is incomplete
Illustrations	-exceptional details: accurate shape, size, colour, and body parts (head, mandible, stripes, 6 legs, etc) -careful colouring that supports the written observations	-accurate detail of shape and colour -illustration is clear and a good size -illustration supports observations: ex. drawing of the molted skin	-illustrations are included with every entry -illustrations are coloured -illustrations are some-what accurate to shape -not a lot of detail is included	-many illustrations are not coloured or lack accurate detail -some or many illustrations are incomplete or are poorly illustrated -illustrations are rushed and do not support any data

Effort	-extra ordinary effort in the overall appearance of journal entries: illustrations and presentation of data -checking work: making sure all assignments are completed with quality	-all assignments and entries are complete -all parts of the mealworm journal are organized neatly -there is no doodles, scribbles, or ripped pages	-most assignments are done -needs to take time to go through mealworm journal to "polish" or organize	-minimal effort in presentation, no revision of careless errors -there are many doodles and scribbles, -didn't take time to complete charts, illustrations or questions

Comments:

Darkling beetle (adult)