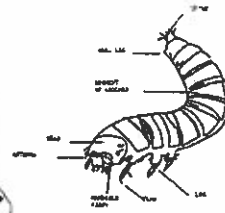


# My Mealworm Journal



Name teacher key

April 16th

**Mealworms/Darkling Beetle Name:**

**What did I  
Know?**

**What do I WANT  
To Know?**

**What did I  
Learn?**

- not a worm but a beetle
- is an insect
- they go through metamorphosis
- "pupa", chrysalis
- Cocoon
- can't climb because 6 legs on the front of "grubs"

- do they eat their shell like butterflies?
- are they introvert
- (solitary) or extravert (social)
- Why do they eat each other, pupa, larva, or eggs?

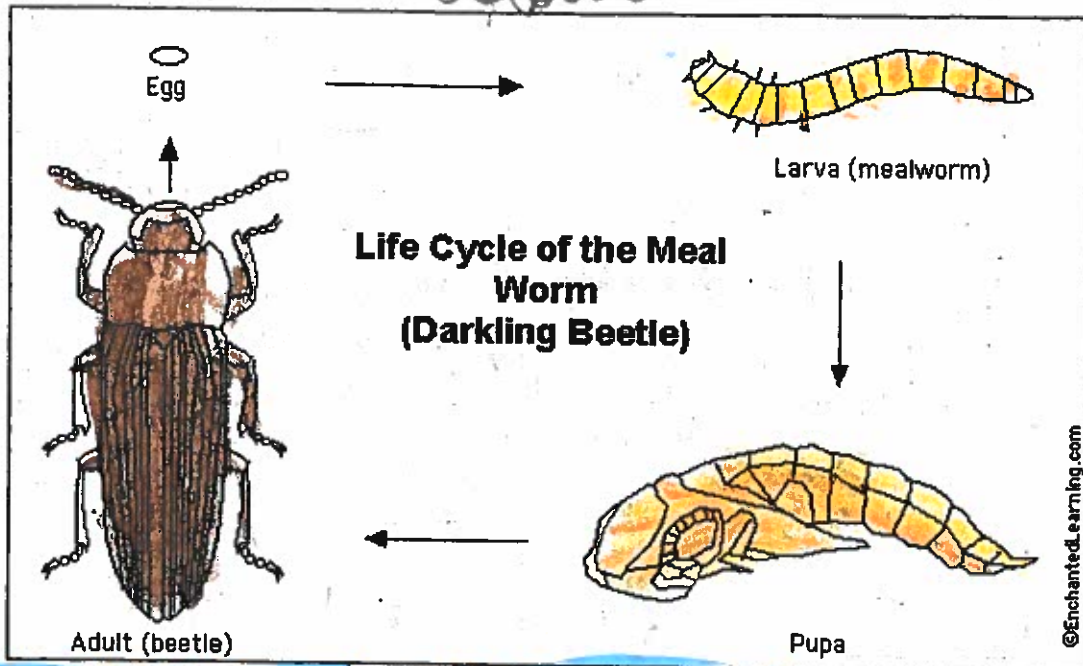


# Mealworm Lifecycle

*Tenebrio molitor*

2

Colour



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) many times as it grows. It then enters the pupal stage (this stage lasts from 2-3 weeks up 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.

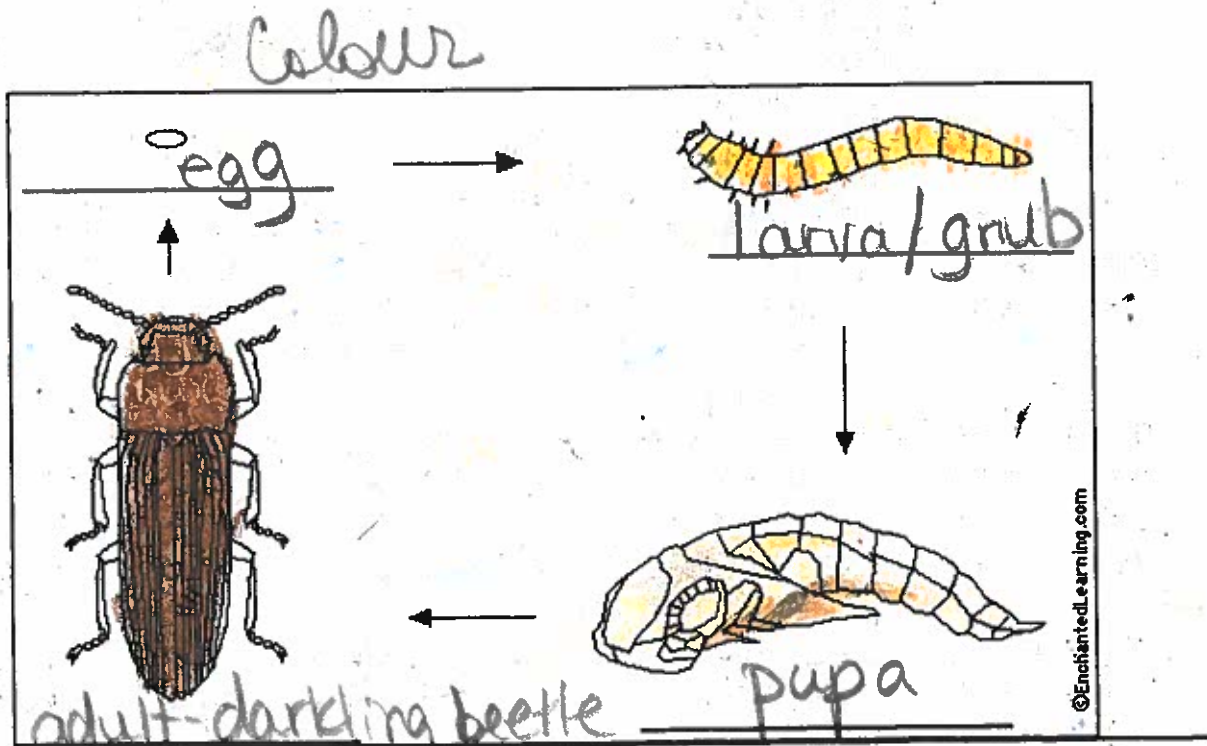
predators ↑

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

**Classification:** Kingdom Animalia (animals), Phylum Arthropoda (arthropods), Class Insecta (insects), Order Coleoptera (beetles), Family Tenebrionidae, Genus Tenebrio 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 head and a pointed tail. The adult will emerge from the pupa.

Colour, label each stage

Teacher  
Key

April 16<sup>th</sup>

(4)

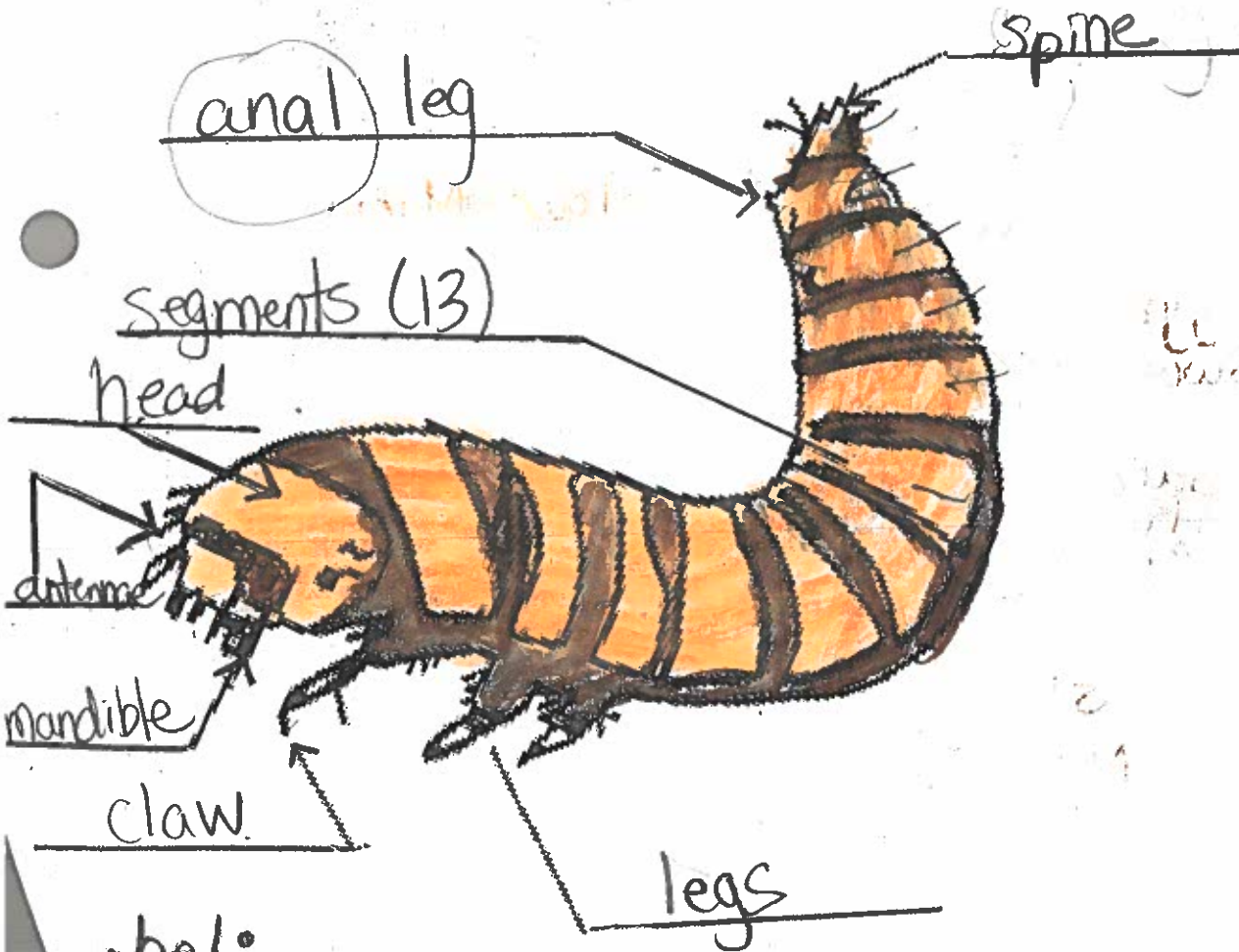
## Mealworm Activity—Day One

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	1
Eyes	2 compound eye
Antenna	2
Legs	6
Body Segments	13 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  
1

- spine  
- leg

- segment of  
abdomen

mandible (jaw)

- claw

- anal leg

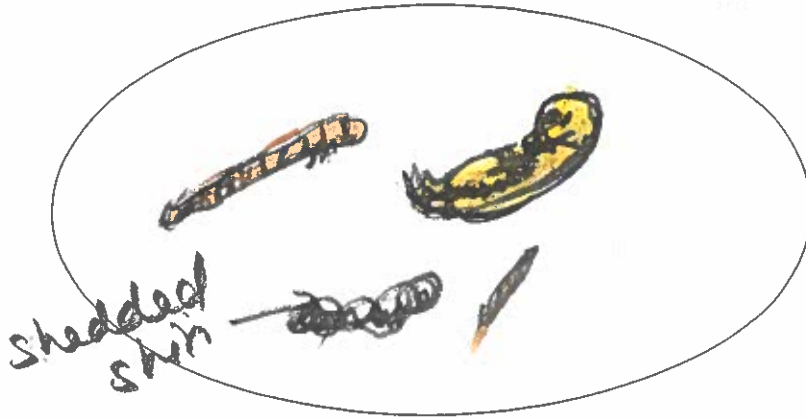
Teacher Key ⑤

# Mealworm or Darkling Beetle Journal

Date

April 21st

Draw



Illustrate by drawing and colouring your mealworm

Describe the colour and appearance of your mealworm.

Oswaldo is still a mealworm, he has dark bands and is a tan colour. He or Mygym grew. My Pupa is a creamy white colour, Mygym is a pupa. Brian is tiny.

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

Mygym is 1.7 cm (pupa) Brian 0.8 cm  
Oswaldo is 2.5 cm

Observe its behavior and note what it does:

Oswaldo doesn't move too much so I think he is getting ready to pupate. Mygym is a pupa so he only moves if I touch him hard. Brian hides, so he's shy.

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

I have shedded skin which means someone grew. I am thinking either Mygym before he pupated or Oswald.

6

# Let's Find Out—Day Two

April 23<sup>rd</sup>

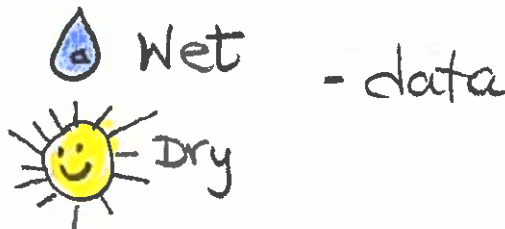
Tell what you think. Will your mealworm prefer wet or dry areas? dry (hypothesis)

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
Myda my mealworm -		
1. Lanza		
2. Ellagail		I
3. Hallan		
4. Phyllis		
5. Madari		
6. Matheen		
7. Hailana		
8. Jonson		I
9. Korin	I	
10. Lolby		
11. Xeli		
From my observations and information I think most mealworms prefer to be in <u>dry</u> more, because they <u>can drown in water</u> .		
	27	30

Observations

Conclusion

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

I think they like moist areas, but not wet. They thrive on mold - which is decayed grains. I think they like dry because they live in oats, and get water from vegetables.

7

April 28th

# Daylight or Darkness – Day Three

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

~~dark~~ because they are nocturnal, so more active at night

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
Miyda				
My mealworm	I	II	II	IIII I
Xeli + Liamza	IIII	IIII	IIII II	IIII II
Lolby	IIII	I	II	I
Korin	III	I	I	IIII
Jonson	IIII II	IIII	II	II
Hilbna	I	I	I	
Matheen		IIII		I
Madran		IIII	I	IIII
Dhruv dyn	I	II	I	III
Hailvan	IIII I	III	IIII	IIII I
Ellagail			II	III

From my observations and the information I gathered I think mealworms prefer to be in the darker (black + green)

31

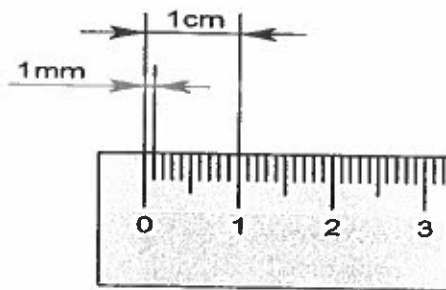
27

23

38

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.)

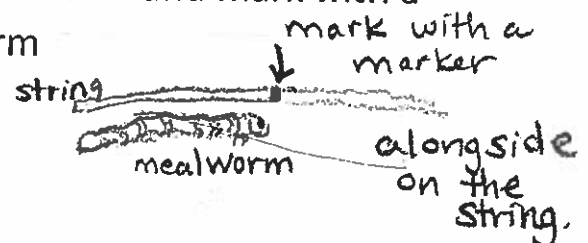
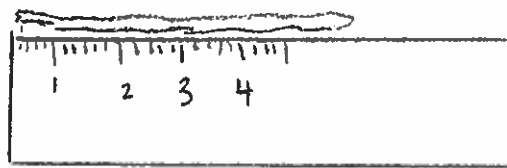
My prediction was correct, they do prefer dark areas.



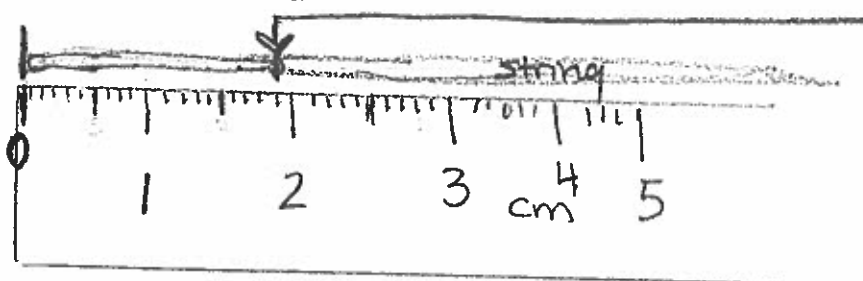
### Measuring Mealworms

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**

May 5<sup>th</sup>

# Fast or Slow—Day Four

9

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

My mealworm moved 9 cm 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. no, mealworm yes, beetle

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

pencil - no they go around  
ruler - they will turn or go under  
sticky note walls - only the beetles climb

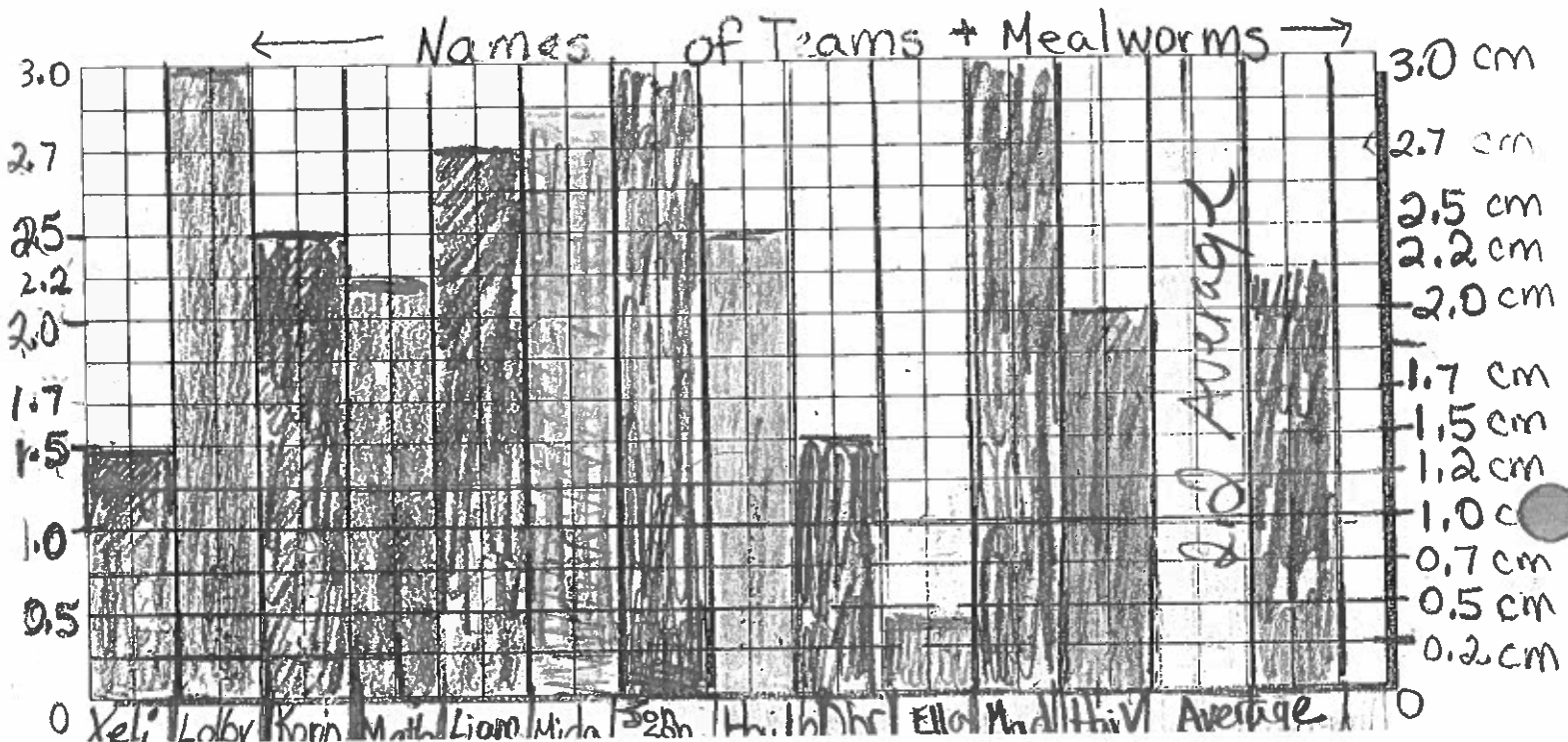
Measure your mealworm. How long is it? 2.3 cm

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

Oswald 2.6 cm My mealworm beetles  
Mygurn 1.1 cm are above average

## MAKE YOUR OWN GRAPHS

NAME: Class Mealworm Measurement



Food for a Mealworm—Day Five

May 12th

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.

I predict apple will be the preferred food.

Food	Tally Marks
Potato Chip	
Fruit - <u>apple</u>	
Granola Bar	
Bread	I

My mealworm went to granola bar.

Compare your results with ten classmates.				
Student	Potato Chip	Fruit	Granola Bar	Bread
My mealworm <sup>Tally</sup>				I
1. Miyda				
2. Xeli		I		
3. Korin				
4. Jonson				I
5. Hilbri				
6. Matheen				
7. Madran				
8. Dhruv dyn				
9. Hailvan		I		
10. Ella gail		I		
11. Liamza				
Tally class total	57	37	66	47

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

Conclusion: My meal worm/beetle preferred granola bar.  
 The class average preferred granola bar.  
 My prediction was incorrect I predicted apple.

Chrysalis Development

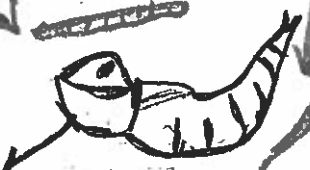


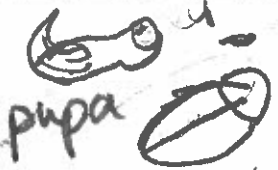

Brian

RIP  
water-drowned

Mygym

Brian

Oswaldo  
Mygym

 April 20 <sup>th</sup>	 April 28	 May 13 <sup>th</sup>
 pupa May 14 <sup>th</sup>		

Draw and Colour a picture (write dates)  
of your mealworms / beetles / pupas

# 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.

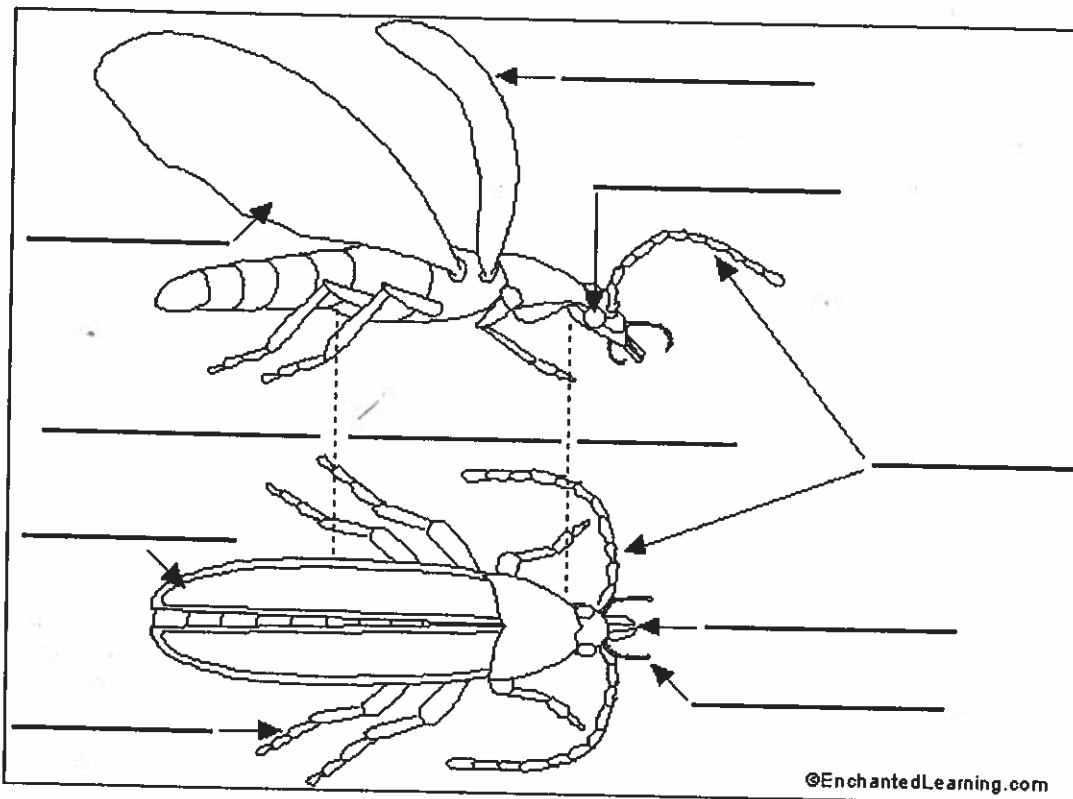
**legs** - like all insects, beetles have 6 jointed legs

**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

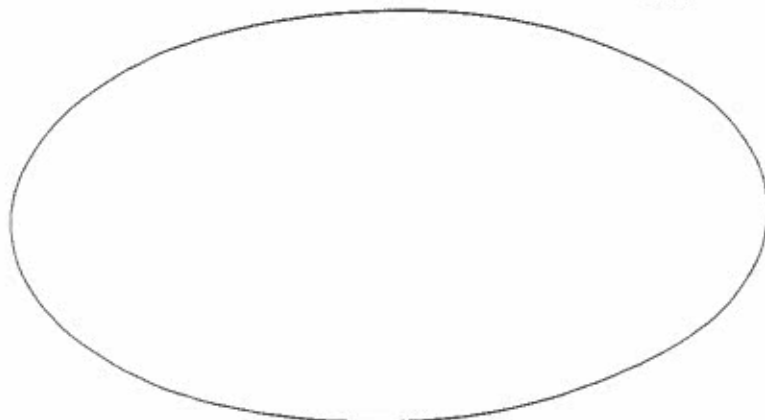


# Mealworm or Darkling Beetle Journal

Date \_\_\_\_\_



Draw



Illustrate by drawing and colouring your mealworm

Describe the colour and appearance of your mealworm.

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

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Observe its behavior and note what it does:

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

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## Mealworm Quiz

Name \_\_\_\_\_

12

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

insect

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

1) egg

2) larva - meal worm

3) Pupa - chrysalis

4) adult - Darkling Beetle

3. Does the mealworm undergo complete metamorphosis? yes

4. The mealworm is the larva of what animal?

Darkling Beetle

5. How many legs does the mealworm have? 6

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

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

1. head

2. abdomen

3. thorax

8. How many antennae does the mealworm have? 2

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

exoskeleton

10. Does the mealworm eat grain? yes

13

## 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?
- ☒ Is all the journal entries complete?
- ☒ Is all the information presented in complete sentences?
- ☒ Is there new information and observations introduced?
- ☒ Is there good details presented?



# Mealworm Journal Rubric

Name:

	<b>Excelling</b>	<b>Meeting</b>	<b>Beginning to Meet</b>	<b>Needs Work</b>
<b>Accuracy of Data</b>	-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
<b>Neatness &amp; Organization</b>	-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
<b>Quality of Content/ Scientific Vocabulary</b>	-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
<b>Illustrations</b>	-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

15

<b>Effort</b>	<ul style="list-style-type: none"><li>-extra ordinary effort in the overall appearance of journal entries: illustrations and presentation of data</li><li>-checking work: making sure all assignments are completed with quality</li></ul>	<ul style="list-style-type: none"><li>-all assignments and entries are complete</li><li>-all parts of the mealworm journal are organized neatly</li><li>-there is no doodles, scribbles, or ripped pages</li></ul>	<ul style="list-style-type: none"><li>-most assignments are done</li><li>-needs to take time to go through mealworm journal to "polish" or organize</li></ul>	<ul style="list-style-type: none"><li>-minimal effort in presentation, no revision of careless errors</li><li>-there are many doodles and scribbles,</li><li>-didn't take time to complete charts, illustrations or questions</li></ul>
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Comments:

20

Student ☐  
teacher ☐