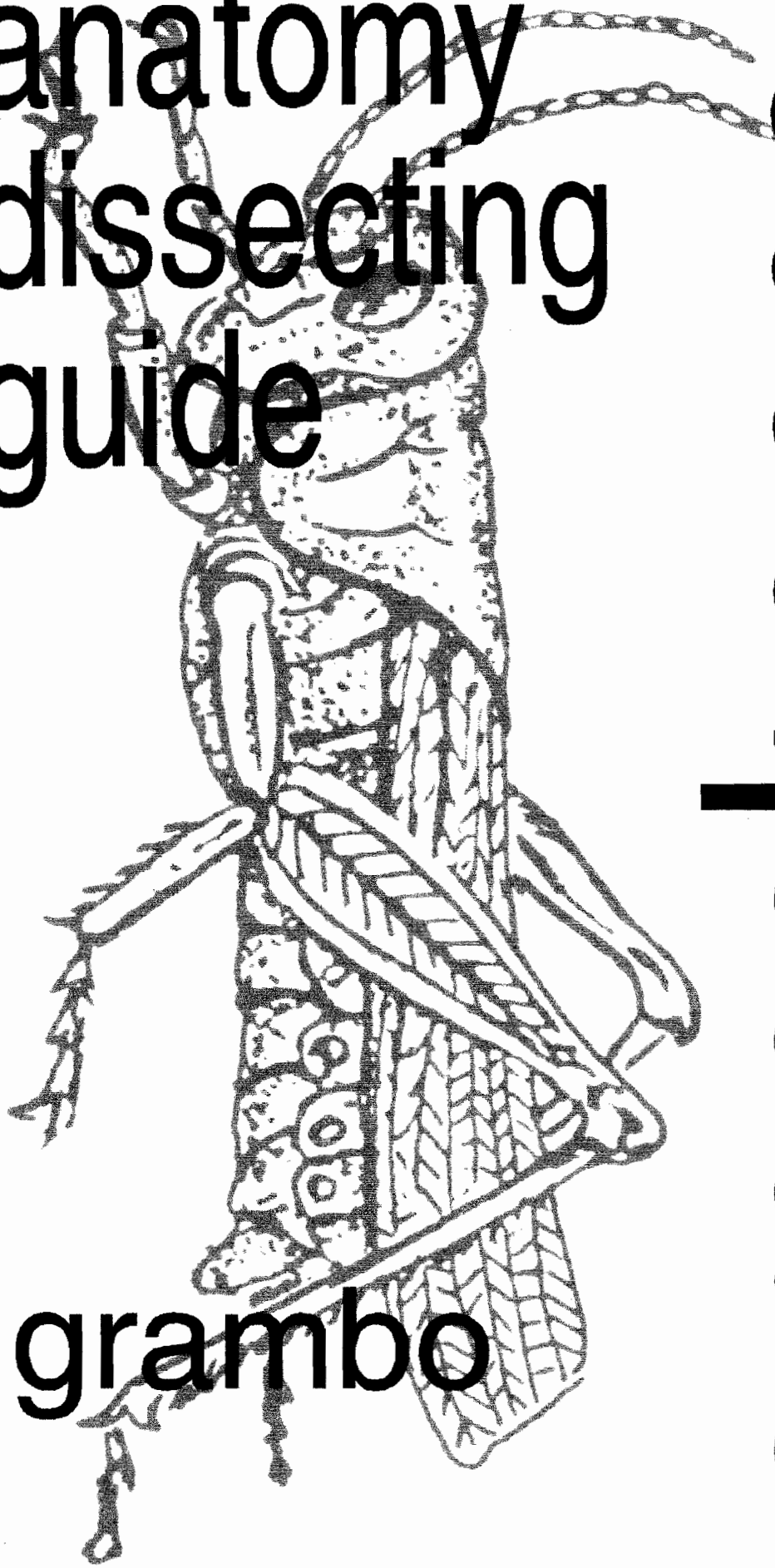


**anatomy
dissecting
guide**

grambo

grasshopper



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A- Hands-On Dissection Guide To The Grasshopper

B- This is a hands on dissection unit intended for use in the middle school. It can, however, be modified for use in lower or upper grades. While this unit is intended to be used with a real grasshopper, a computer program simulation can be substituted.

C- Students will work cooperatively to conduct scientific investigations that will help them solve a scientific problem using a variety of inquiry skills including observing, predicting and testing solutions. Students will communicate their experiences through their student worksheets and in class presentations.

D- Materials include- grasshopper (or computer simulation), scissors, tweezers, probe, zipper style gallon bags, work tray, labels, marker, lab sheets.

E- Each experiment in this unit will require one class period (approx 45 min) to complete. The entire unit requires one week.

F- There are five Hands-on experiments, A practice grasshopper dissection sheet and a quiz. Since the experiments will require more than one weeks time, the teacher may wish to place the clams onto styrofoam or cardboard meat or lunch trays and then place these items into gallon size zipper seal bags. The students names and classes can be written onto labels placed on the outside of the bags. Bags can then be stored for later use. Students should work in cooperative groups of three or four, with each child having a job such as experimenter, supply gatherer, recorder, presenter, reader, etc. I have found that students in my middle school classroom can do these experiments without the use of a scalpel or knife; they need only a pair of scissors, a tweezer and a probe which is a stick that has a pin attached.

G- Since the children will be using sharp instruments, it is important to go over the proper use of these instruments.

H- Teachers should send a note home to parents explaining the upcoming unit. It is important to explain that the children will be sharing equipment and grasshoppers. It is also important to explain the need for dissection and how it will help the children understand physiological processes that go on inside their own bodies.

I- Questions for students are on the worksheets.

J- Assessment- After collection and review, the student worksheets should be graded from one to ten, ten being the highest grade. During lab time, question the students to see if they understand the material being presented to them. See if the students are engaged in the activity and if they are working cooperatively. Finally, after students finish with the unit test, have the students write in their lab notebooks their ideas on the dissection process.

K- References- This work was completely designed by Mr. Grambo, hence there are no outside references.

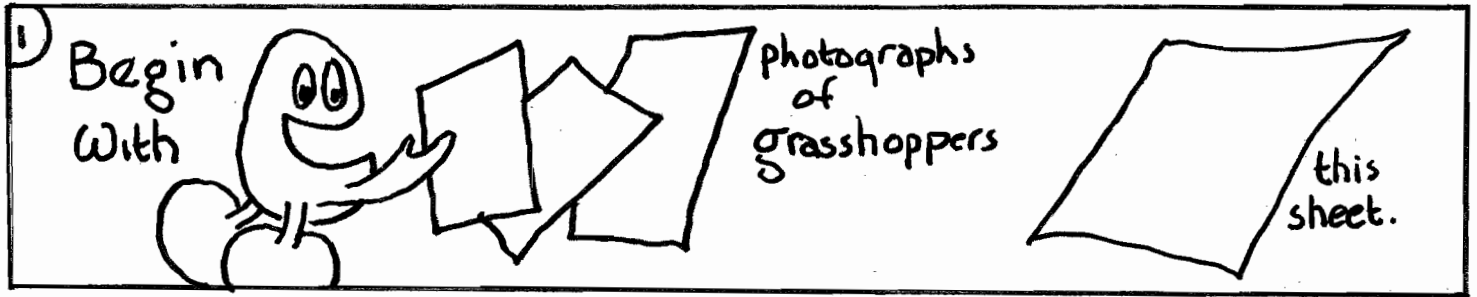
Anatomy experiment 1

name _____

class _____ group no. _____

problem- What is a grasshopper?

1

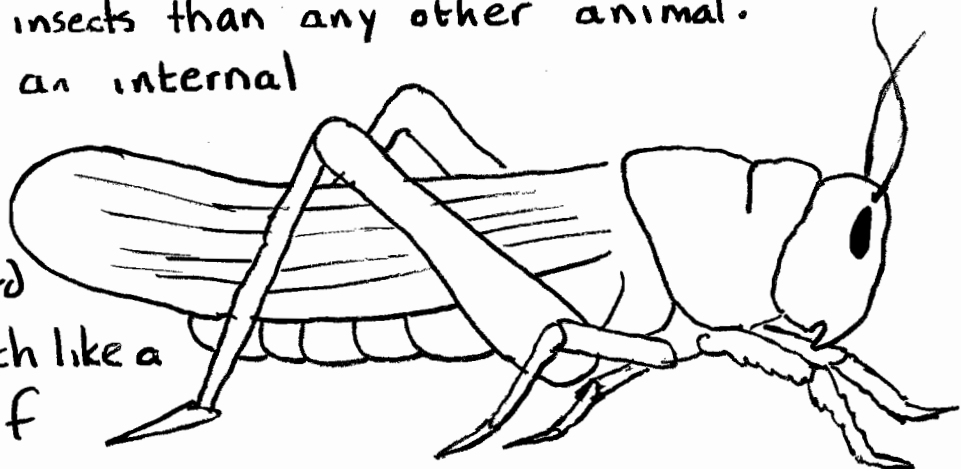


2) examine the photographs of a grasshopper.
Describe a grasshopper

3) How many wings does this insect have?

Why would it need wings?

The grasshopper belongs to a group of animals called insects. There are more insects than any other animal. Insects do not have an internal skeleton, as we do, to support our weight. Instead they have a hard exo-skeleton. It feels much like a shell on the outside of their bodies



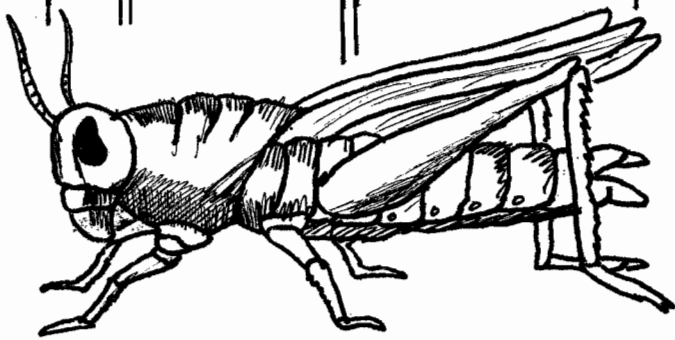
GRAMBO

4

head

thorax

abdomen



How many body sections does a grasshopper have?

How many legs do this (and all insects) have?

Grasshoppers have a system of tracheal tubes that enable this animal to breathe air. Their ability to fly helps them find food. They live in patches of weeds and in grasslands. They eat leafy vegetation.

5) How would the grasshoppers coloring help it in the grasslands where it lives?

Homework -

1- What holds the grasshopper together?

6) Do you think insects have blood? Why or why not?

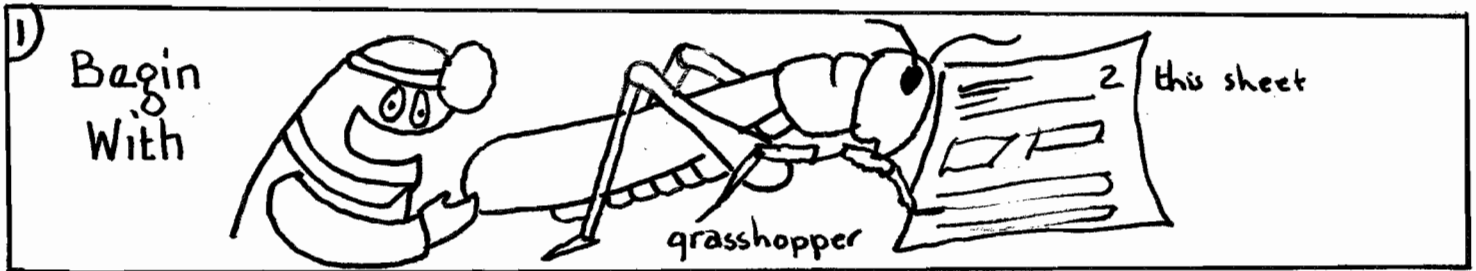
2- Why is this animal considered an insect.

Anatomy experiment 2

Name _____
class _____ group _____

problem- What does a grasshopper
look like?

2



2) look at the grasshopper
It has two sides. One is
the back or Dorsal
side. The other is the chest
or Ventral side of
the insect.

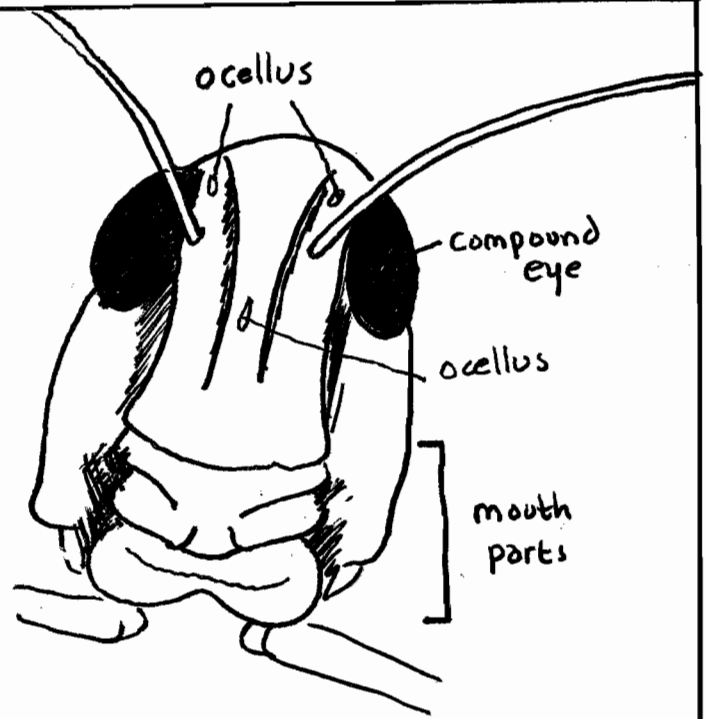
3) Touch the grasshopper
In what ways is the insect's skin
different from yours?

4) How is the dorsal side of the grasshopper different from
the ventral side?

5) Make a drawing
of the
grasshopper

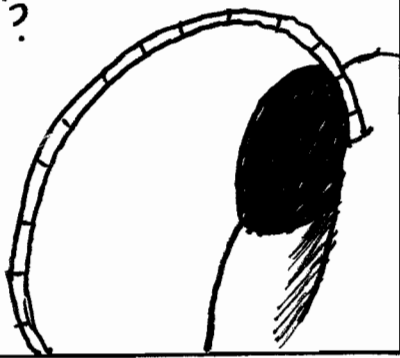
6) The head has a thin pair of jointed antennae. There are two large compound eyes and three simple eyes, called ocelli.

The grasshopper can chew food. Look at and describe the mouth parts.



(you can draw if you want)

7) Why do you think grasshoppers have antenna?



Homework -

In what ways (at least 5) is a grasshopper different from a human?

8) Why do you think they need so many legs?



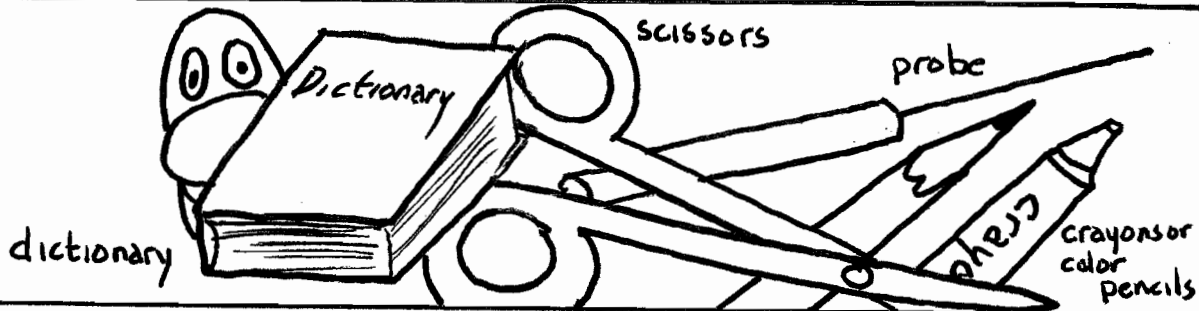
Anatomy experiment 3

Name _____
Class _____ Group _____

problem- How can we find out what is inside of a grasshopper?

3

1) Begin with




dictionary scissors probe crayons or color pencils

2) We have explored the outside of a grasshoppers body. How can we find out what is inside the grasshoppers body?

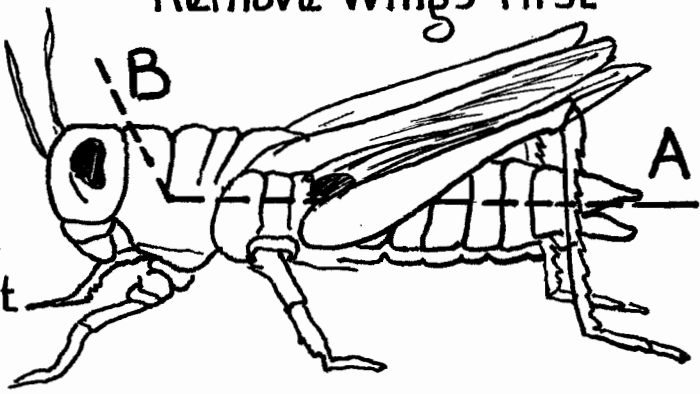
3) define (look in a dictionary)

dissecting



4) Place grasshopper on a tray. Since the exo-skeleton is so hard it must be removed. Cut a hole in the skin with a sharp scissor at point A. cut along the dotted line to point B towards the head

note:
Remove wings first



5) remove the top (dorsal wall) of the grasshoppers body. look inside first.

look around inside the animal using your probe.

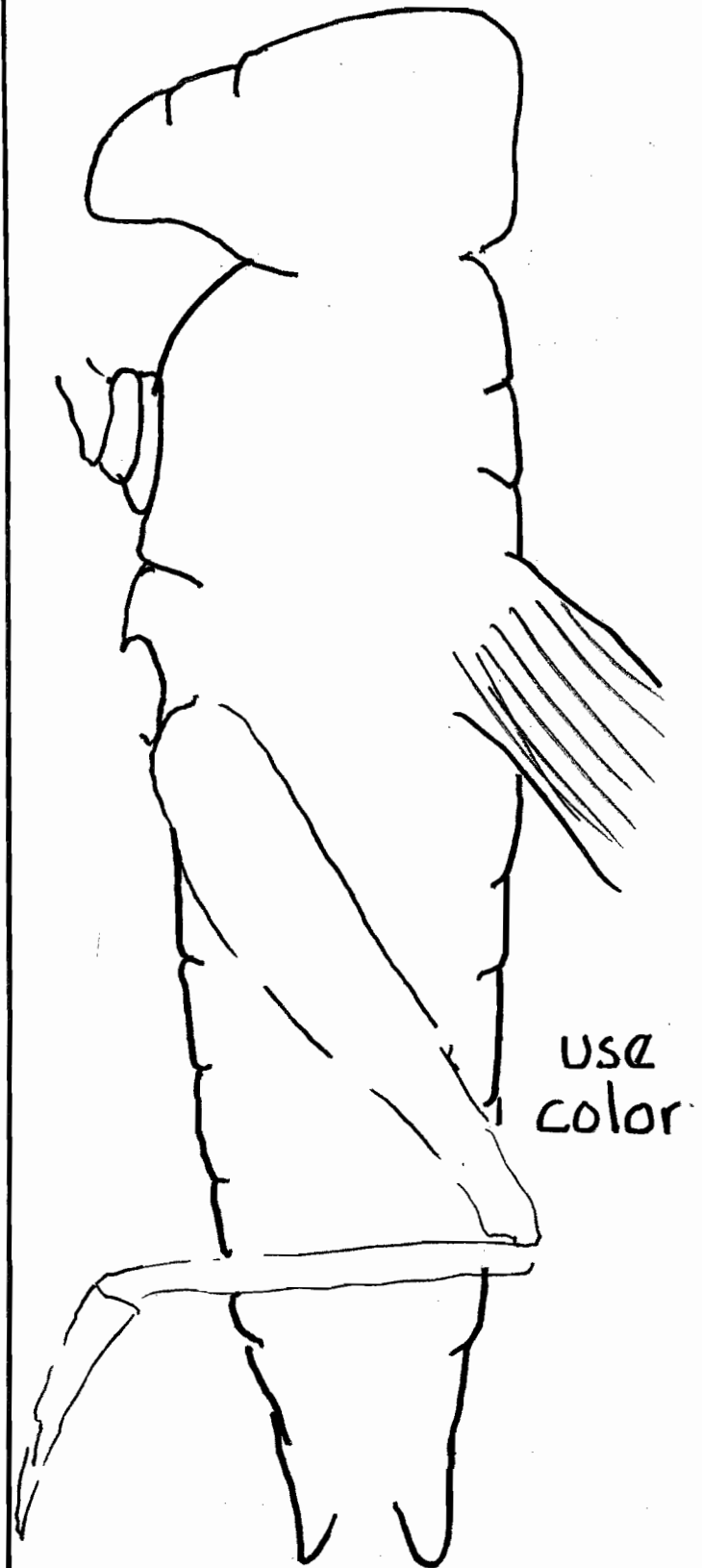


Homework -

1- How can you find out what is inside the grasshopper?

2- Why are there no bones?

6) draw what you see inside the animal

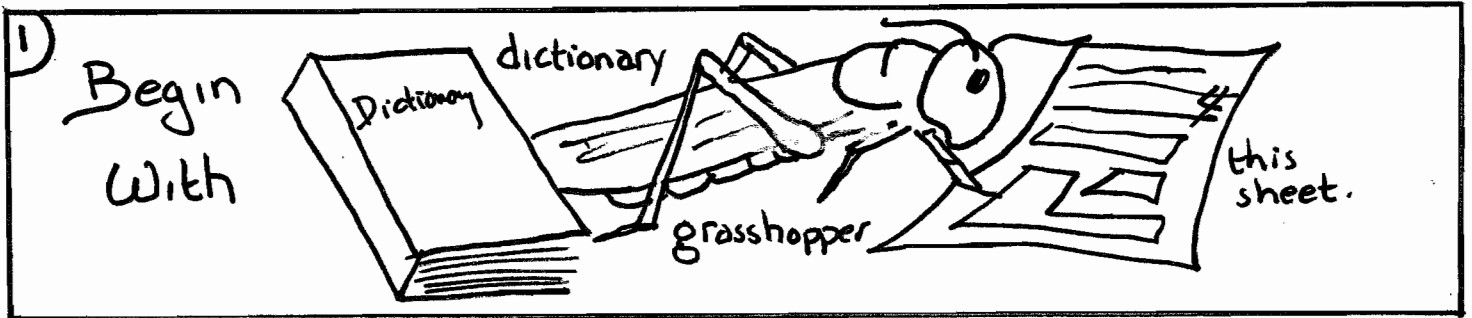


Anatomy experiment 4

Name _____
class _____ group _____

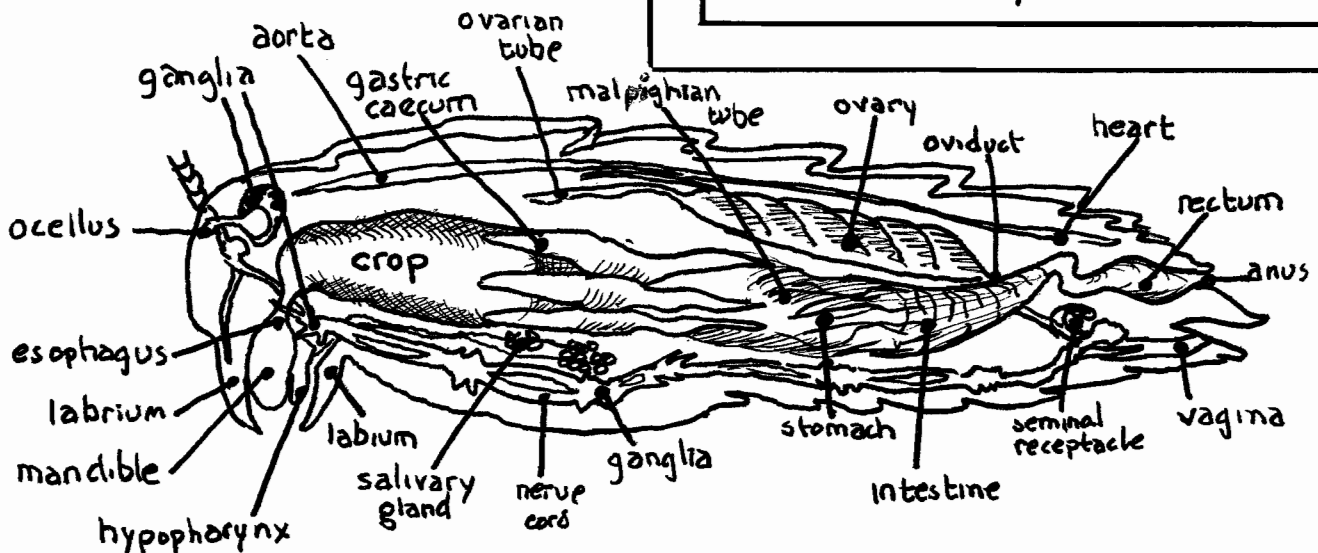
problem - What is inside of a grasshopper?

4



2) Since the exo-skeleton is so hard the preservative liquid does not always keep the internal organs in good shape. Inside the animal you should see:

3) There are many systems operating inside the insect. The digestive system, excretory system, circulatory system, reproductive system, respiratory system and nervous system.



4) Notice that there are muscles on the inside of the body wall. What do you think their function is?

5) At the anterior end is the mouth which opens between the mandibles and continues through a short esophagus into the crop. This is followed by the stomach.

6) Attached to the stomach are six finger shaped digestive glands. They produce enzymes.

What is an enzyme?

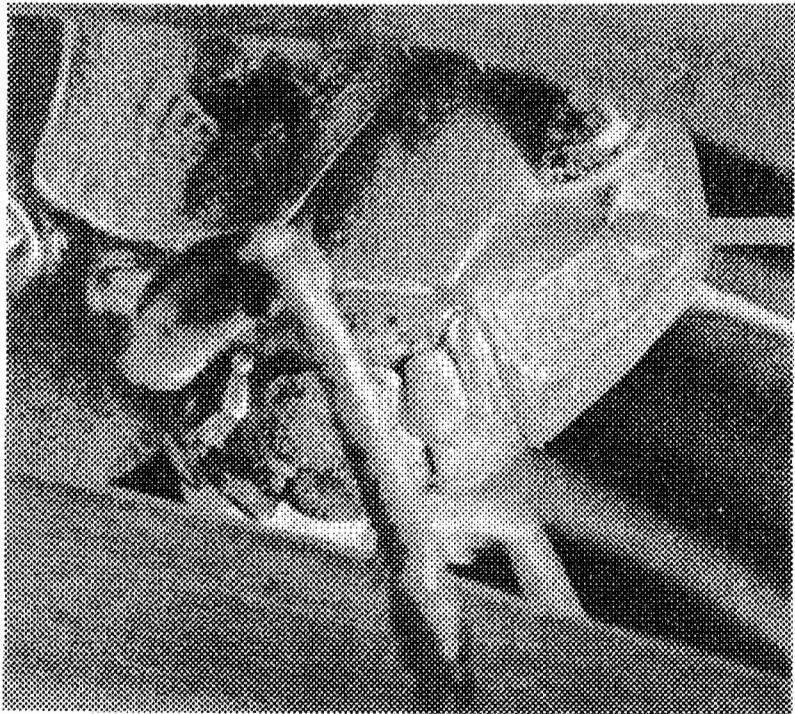
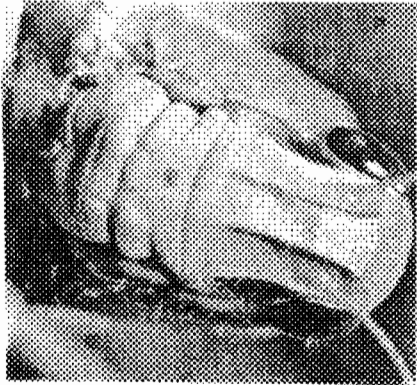
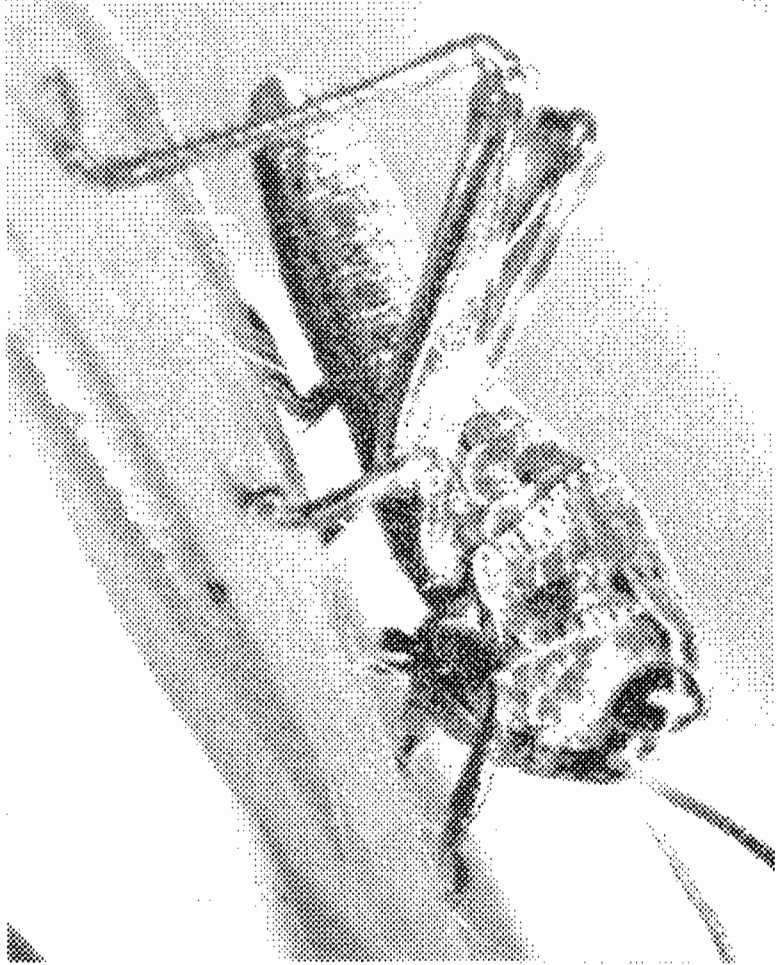
7) The digestive system continues as the intestines widen finally reaching the anus.

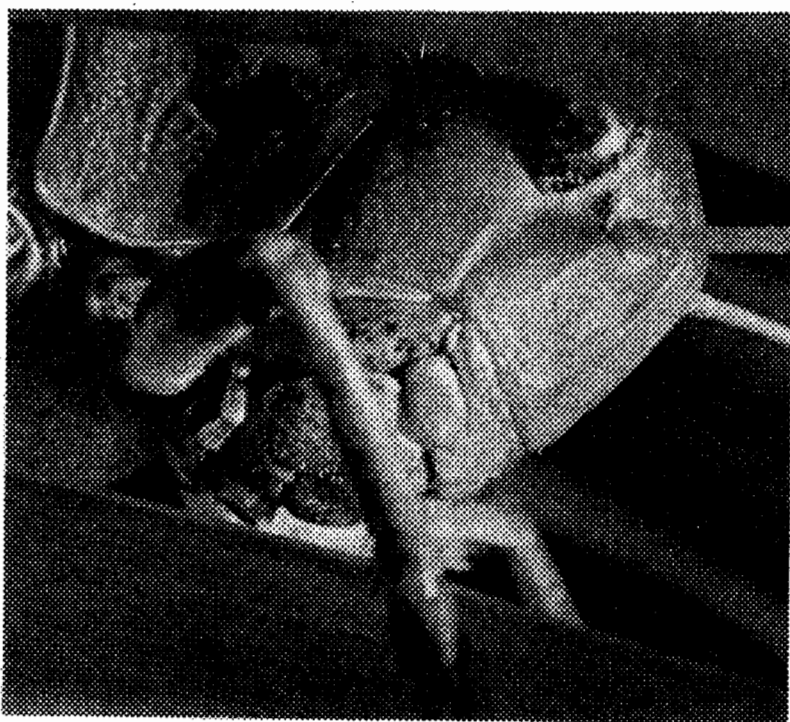
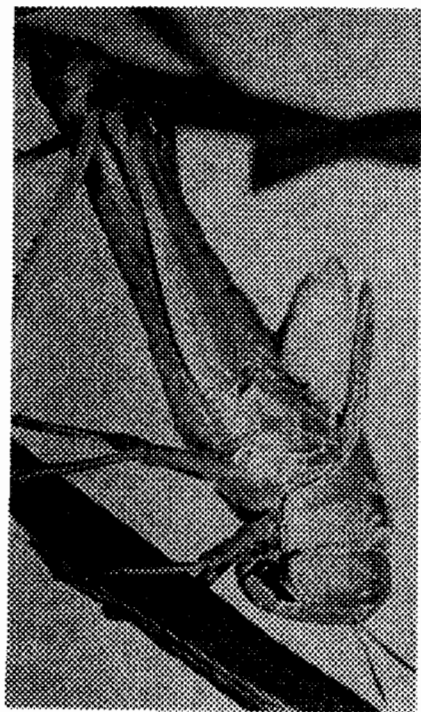
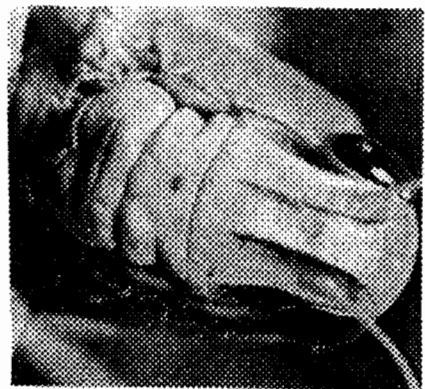
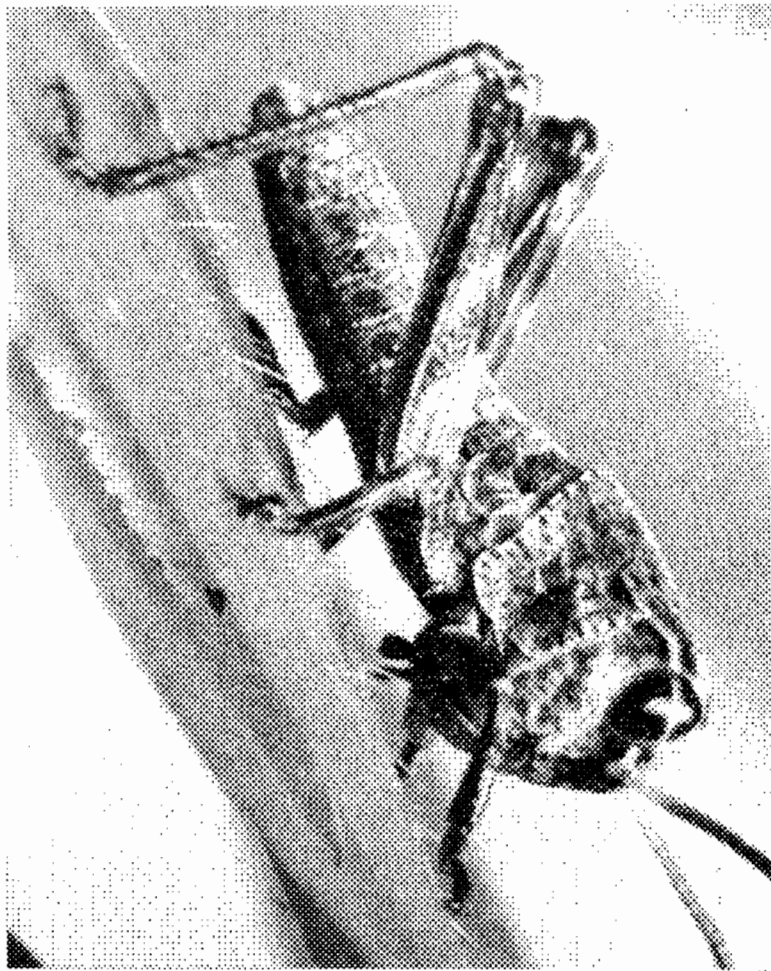
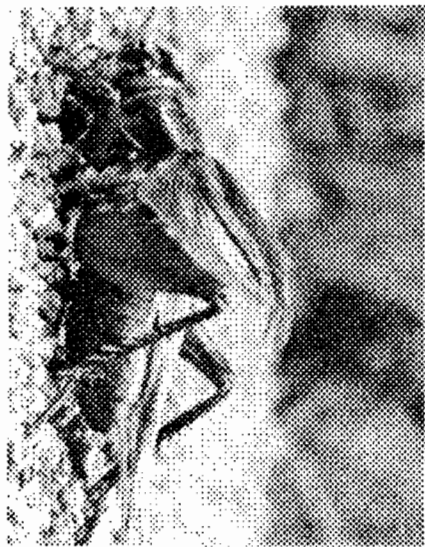
Draw a picture of the digestive system.

Homework-

1) What body systems are needed for life?

2) Tell about the color of the insects blood.





The following pages are from
the grasshopper dissection
guide included in the Bug Camp
entomology unit.



Grasshopper Dissection

We have been examining insects from the outside and now it is time to go inside the animal. This dissection activity takes three class periods. Give each student a pair of Vinyl gloves and zipper style bag. Allow students to put their name and workgroup on the bags with permanent marker. Place an insect (grasshopper) on a supermarket meat tray and place it inside a gallon size zipper style bag. For students that feel they can not go near the grasshopper, we have put a virtual dissecting manual on line. This virtual dissection was created by the eighth grade life science class for use with our sixth graders. This dissection manual includes photographs of all stages of the dissection. The manual includes instructions for opening the animals exoskeleton and viewing the inside of the animal. It is important to include photos of grasshoppers and drawings/photographs of the insides of the animals so that the children can make comparisons. These photographs can be obtained by your students by going on-line. At the end of each class period during the dissection process, give out wet wipes to clean tools and tables. Collect all animals and gloves in a box to keep materials from different classes separate from each other.

Supplies for this activity:

Worksheets

Science Journals

Crayons / Color Pencils

Insect (Grasshopper)

Vinyl gloves

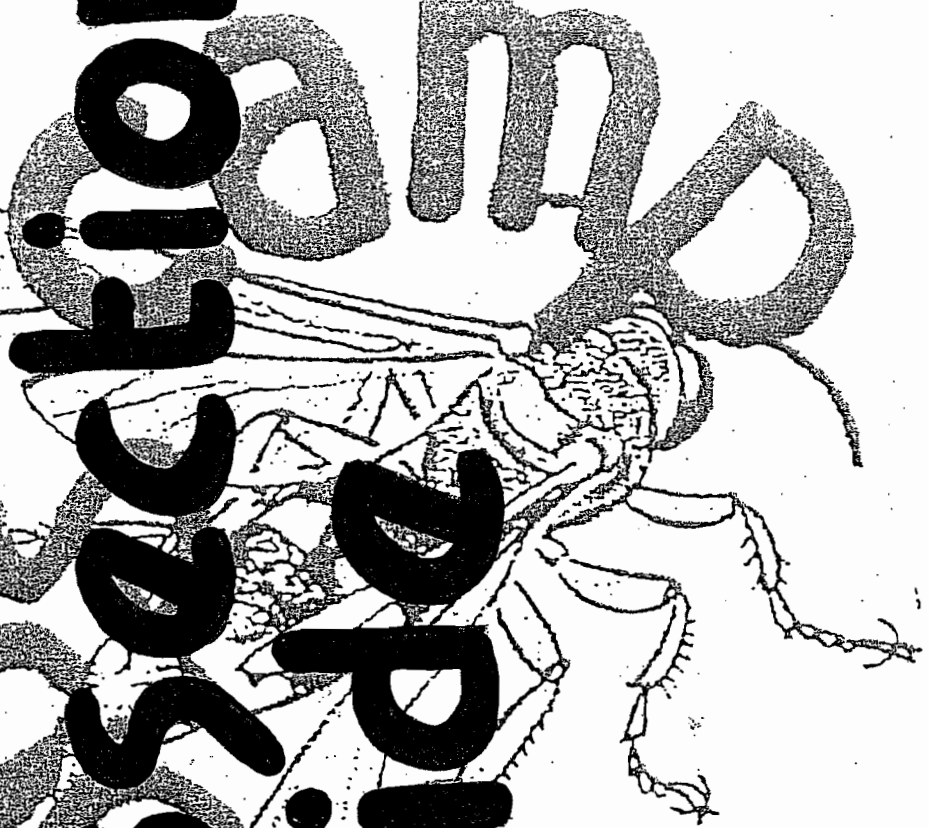
Zipper style bags (for gloves and insects)

Styrofoam meat tray

Dissecting set (includes: scissors, probe [wood handle with needle], tweezers, ruler)

grasshopper dictionary camp

name _____
class _____ date's _____
team _____ seat _____



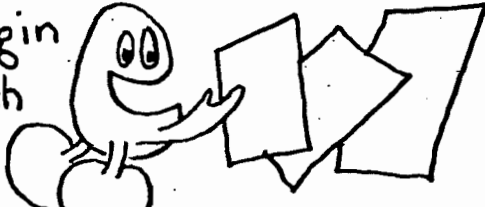
8½ x 14 booklet

8½" x 7"


What is a grasshopper?

A

1) Begin with



photographs of grasshoppers



this sheet.

2) examine the photographs of a grasshopper.
Describe a grasshopper

3) How many wings does this insect have?
Why would it need wings?

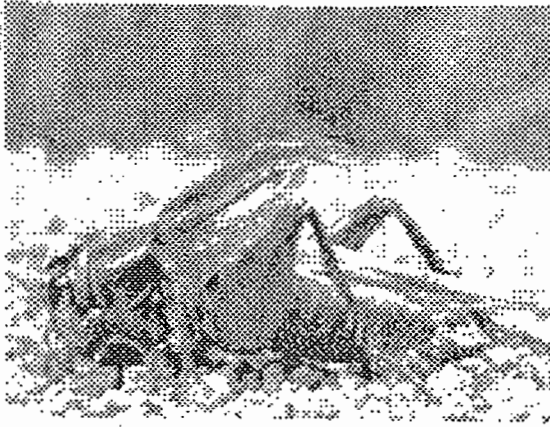
The grasshopper belongs to a group of animals called insects. There are more insects than any other any other animal. Insects do not have an internal skeleton, as we do, to support our weight. Instead they have a hard exo-skeleton. It feels much like a shell on the outside of their bodies



A


8½" x 14" booklet

8½" x 7"



4)

head	thorax	abdomen
------	--------	---------



How many body sections does a grasshopper have?

How many legs do this (and all insects) have?

Grasshoppers have a system of tracheal tubes that enable this animal to breathe air. Their ability to fly helps them find food. They live in patches of weeds and in grasslands. They eat leafy vegetation.

5) How would the grasshoppers coloring help it in the grasslands where it lives?

6) Do you think insects have blood? Why or why not?

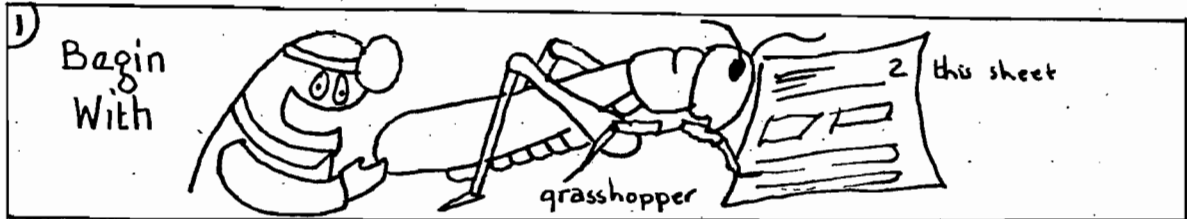
stop
B

$8\frac{1}{2}$ " x 14" booklet

$8\frac{1}{2}$ " x 7"

What does a grasshopper look like?

B



2) look at the grasshopper
It has two sides. One is the back or Dorsal side. The other is the chest or Ventral side of the insect.

3) Touch the grasshopper
In what ways is the insect's skin different from yours?

4) How is the dorsal side of the grasshopper different from the ventral side?

5) Make a drawing of the grasshopper

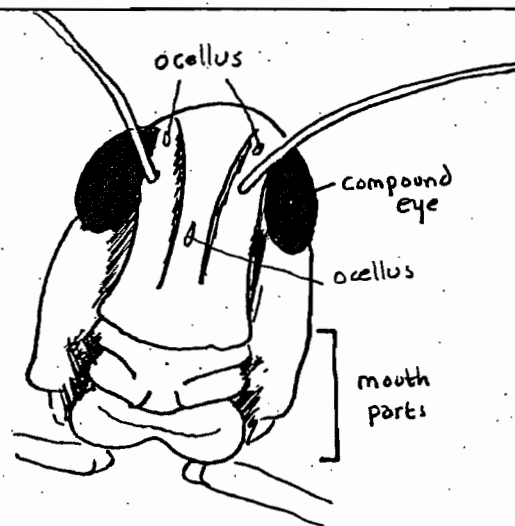
C

$8\frac{1}{2}$ " x 14" booklet

$8\frac{1}{2}$ " x 7"

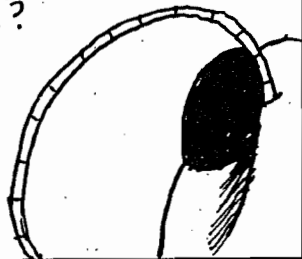
6) The head has a thin pair of jointed antennae
 There are two large compound eyes and three simple eyes called ocelli

The grasshopper can chew food. Look at and describe the mouth parts.



(you can draw if you want)

7) Why do you think grasshoppers have antenna?



8) Why do you think they need so many legs?



9) In what ways (at least 5) is a grasshopper different from a human?

stop
D

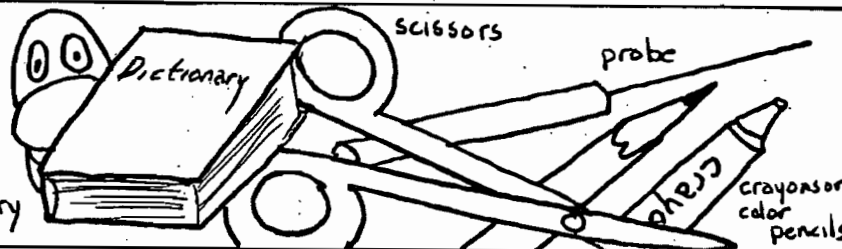
8 1/2" x 14" booklet

8 1/2" x 7"

how can you find out what is inside a grasshopper?

C

1) Begin with.




dictionary scissors probe crayons or color pencils

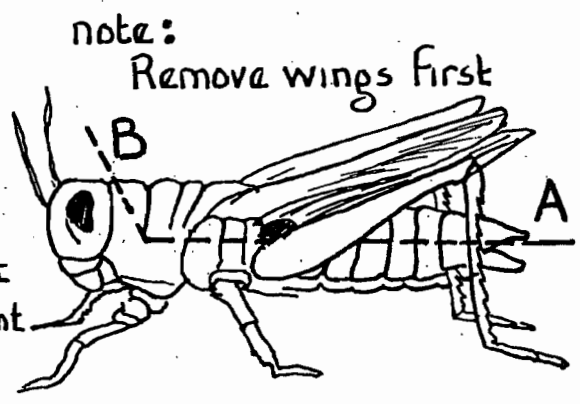
2) We have explored the outside of a grasshoppers body. How can we find out what is inside the grasshoppers body?

3) define (look in a dictionary)

dissecting



4) Place grasshopper on a tray. Since the exo-skeleton is so hard it must be removed. Cut a hole in the skin with a sharp scissor at point A. cut along the dotted line to point B towards the head



E

8 1/2" x 14" booklet

8 1/2" x 7"

5) remove the top (dorsal wall) of the grasshoppers body. look inside first.

look around inside the animal using your probe.

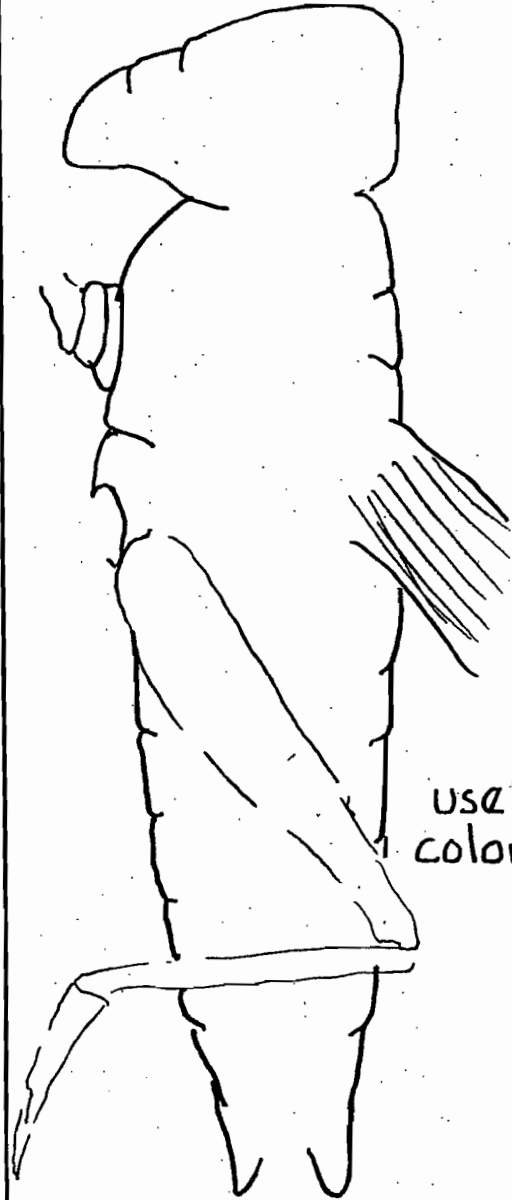


7) How did you find out what is inside of the grasshopper?

8) Why are there no bones?



6) draw what you see inside the animal



use color

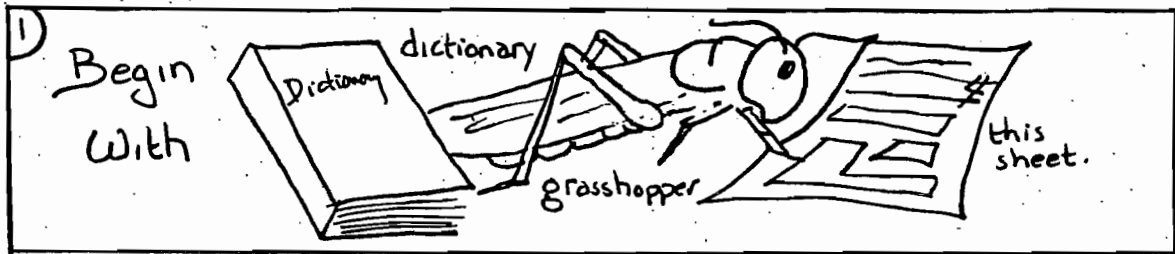
stop
F

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8 1/2" x 7"

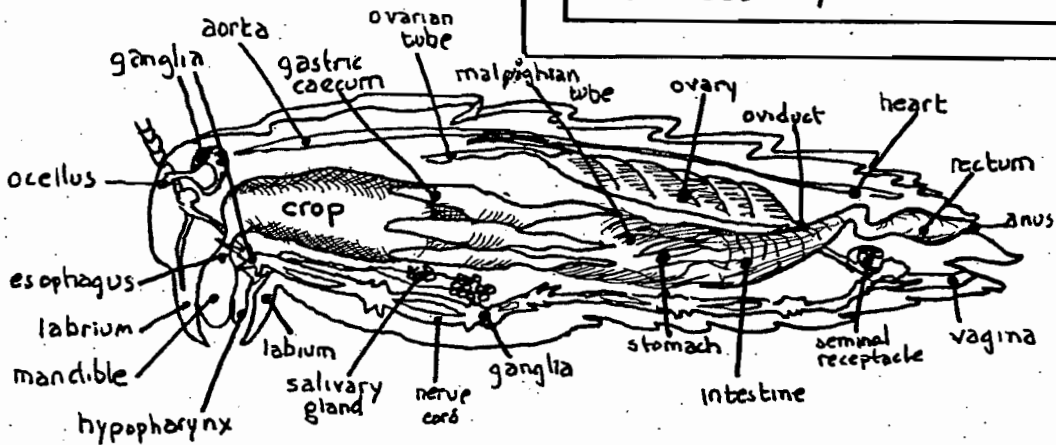
What is inside a grasshopper?

D



2) Since the ex-skeleton is so hard the preservative liquid does not always keep the internal organs in good shape. Inside the animal you should see:

3) There are many systems operating inside the insect. The digestive system, excretory system, circulatory system, reproductive system, respiratory system and nervous system.



G

8 1/2" x 14" booklet

8 1/2" x 7"

4) Notice that there are muscles on the inside of the body wall. What do you think their function is?

5) At the anterior end is the mouth which opens between the mandibles and continues through a short esophagus into the crop. This is followed by the stomach.

6) Attached to the stomach are six finger shaped digestive glands. They produce enzymes.

What is an enzyme?

look this up.

7) The digestive system continues as the intestines widen finally reaching the anus.

Draw a picture of the digestive system

8) Tell about the systems of this insect that kept it alive.

stop
H

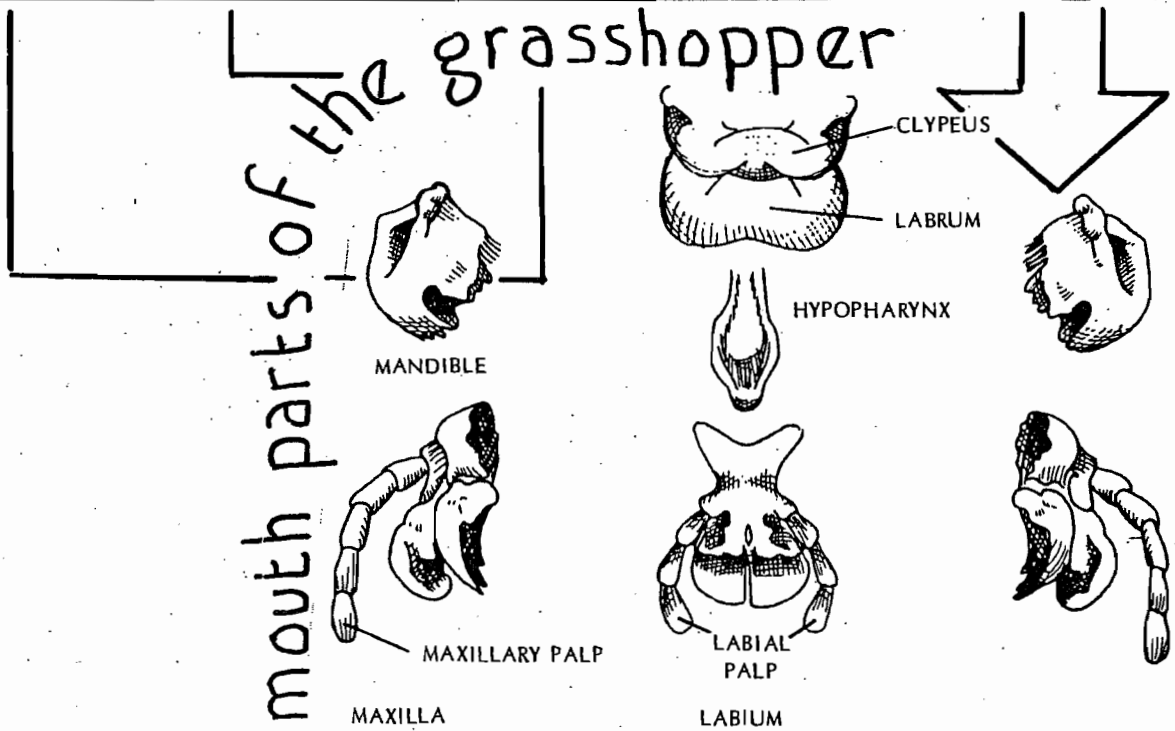
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$8\frac{1}{2}$ " x 7"

OVERVIEW

The head has one pair of slender, jointed antennae, two compound eyes, and three simple eyes or ocelli. The mouth parts are of the chewing type and include: 1) a broad upper lip or labrum; 2) a tongue-like hypopharynx; 3) two heavy blackish lateral jaws or mandibles, each with teeth along the inner lateral margin for chewing food; 4) a pair of maxillae of several parts including palps (sensory appendages) at the side; and 5) a broad lower lip or labium, with two short palps.

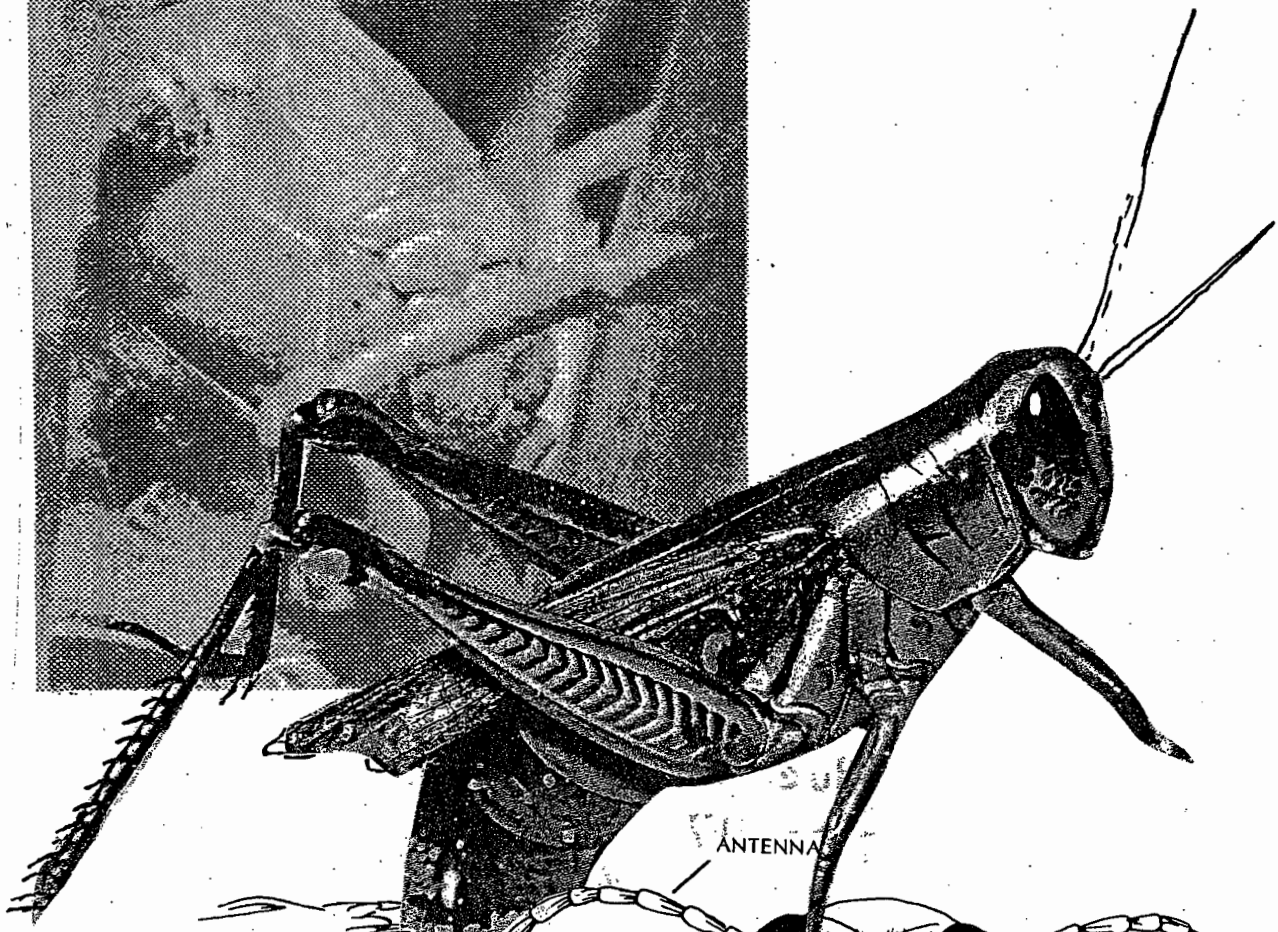
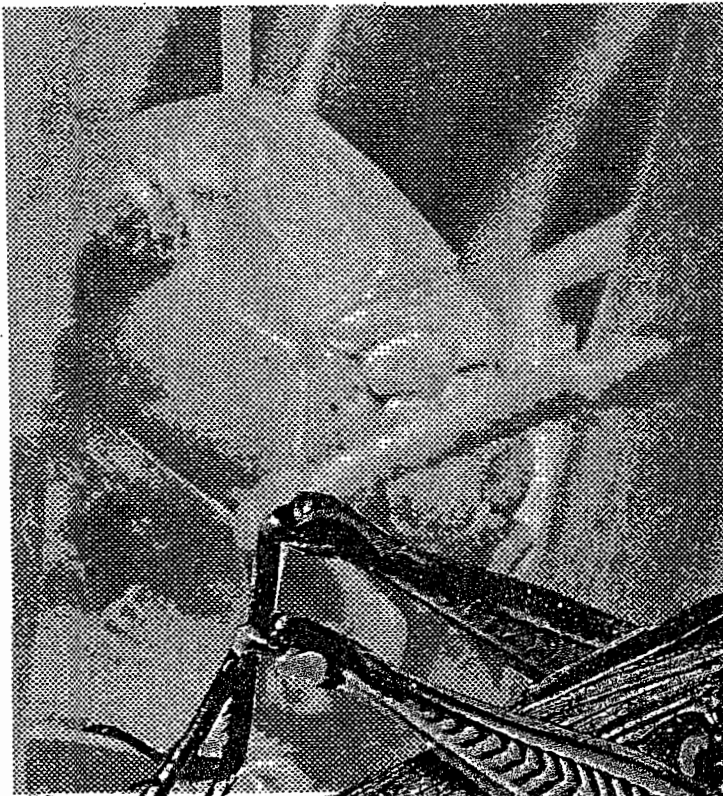
what did you Learn because you did this dissecting activity?



I

8 1/2" x 14" booklet

8 1/2" x 7"



ANTENNA

COMPOUND EYE

OCELLUS

SIMPLE EYE (OCELLUS)

CLYPEUS

MANDIBLE

LABRUM

LABIUM

MAXILLARY PALP

LABIAL PALP

How the grasshopper eats

J

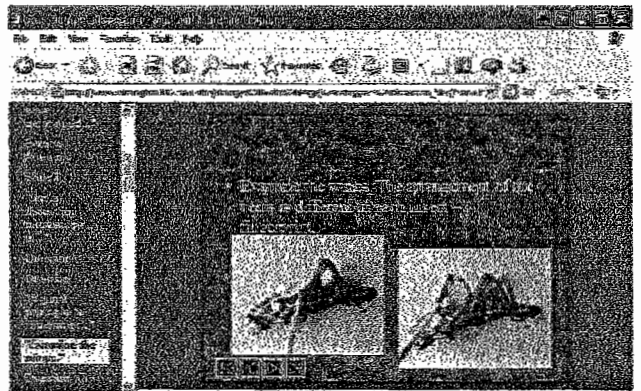
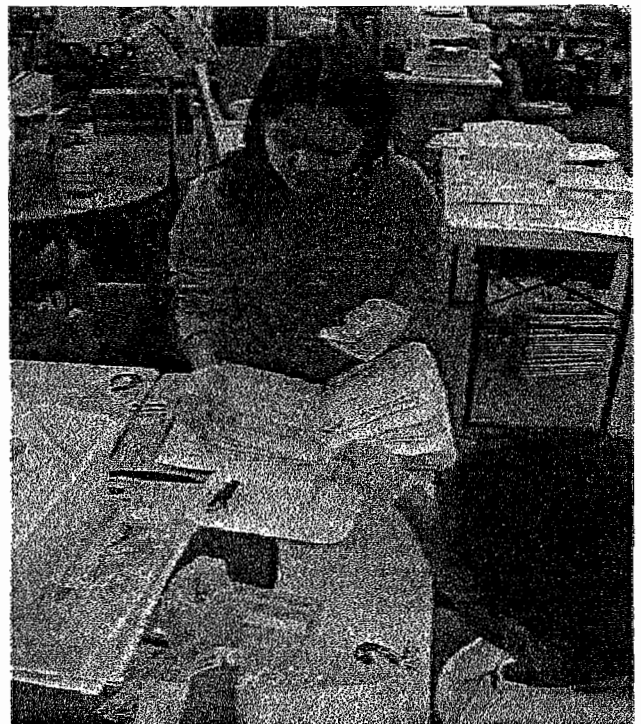
8 1/2" x 14" booklet

8 1/2" x 7"

Grasshopper Dissection



Through dissection (Manual or Virtual) students get a first hand look at the anatomy of an insect



On Line Dissection