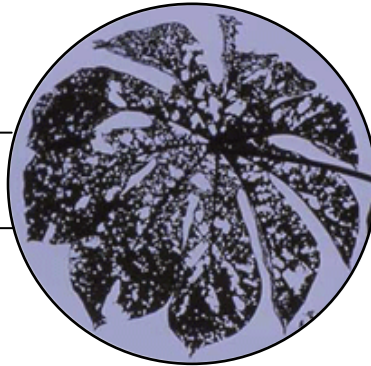


LEAF LITTER

It's a Critter's World

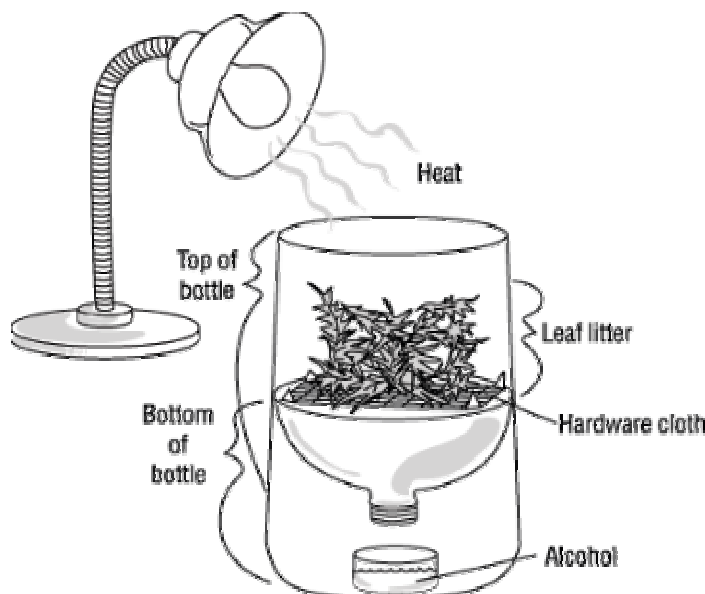
ACTIVITY



Activity Overview

Arthropods are animals that have hard outer skeletons and legs that have joints. The largest group of arthropods is called insects, like butterflies, bees, ants, beetles, and flies. One of the places you can find arthropods is in leaf litter. Leaf litter may also contain other types of arthropods like arachnids, better known as spiders, centipedes, millipedes, and more.

In this activity, you will collect leaf litter, and then use a Berlese Funnel and a lamp to separate the arthropods. When you place leaf litter in the funnel and the light is turned on, the arthropods migrate away from the heat. You will collect the animals in a bottle below the funnel. Then you will sort the species of arthropods and use a TI-73 Explorer™ to make a circle graph showing the different groups represented in your collection.



How many arthropods are in your leaf litter? How many different types of arthropods are in your sample? Do different samples of leaf litter contain the same type and number of species of arthropods?

What types and how many arthropods are in your leaf litter sample?



LEAF LITTER

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Procedure

1 Build a Berlese Funnel

Each team will have a Berlese Funnel.

- If you need to build a Berlese Funnel follow the steps described in the document *Berlese Funnel Instructions*.

2 Collect your leaf litter sample

Each team will collect and analyze a different leaf litter sample.

- With the help of your teacher, select a location to collect your leaf litter sample. You can collect leaf litter under different types of trees or shrubs. The leaf litter will contain the most organisms if the weather is warm, and neither very wet nor very dry.
- To collect the sample, one member of your team will put on the rubber gloves and gather two cups of leaf litter in your assigned spot. For best results, remove the surface layer of leaves and collect the layers below it. Collect all the way down to the soil, but try not to get too much soil.
- Store your sample in a plastic bag, then seal the bag, and label it with your group number.
- In your journal, record the following information for your sample area: location, date, time of day, amount of vegetation, and types of plants present.

3 Extract arthropods from your litter sample

- Follow the directions in the document *Berlese Funnel Instructions*. Start the extraction process as soon as possible, preferably within a few hours of collecting your sample. **Use safety goggles while working with the alcohol.**
- Once you complete the extraction, carefully remove the collecting jar, and discard the leaf litter outside where you found it.

4 Collect your data

- While wearing your safety goggles, remove the jar with alcohol and arthropods from underneath the funnel. Pour the alcohol through some paper toweling. The arthropods will remain on the paper towel.
- Copy Table 1 in your journal.

Table 1

Name of Arthropod	Number of Individuals

ACTIVITY

Materials

- T-73 Explorer™
- Safety goggles
- Leaf Litter
- Plastic bag
- Rubber gloves
- Magnifying lens
- Paper towel
- Arthropod Identification Chart
- Berlese Funnel made out of the following:
 - 2-liter soda bottle (preferably clear plastic with the label removed)
 - Piece of hardware cloth with a mesh of ¼ inch (10 in x 10 in)
 - Desk lamp or similar light source (with a 20 to 40 watt light bulb)
 - Small jar or dish (2 cm deep) to catch the litter critters
 - Alcohol (rubbing alcohol is fine)
 - Scissors



TI-73 Explorer™



It's a Critter's World

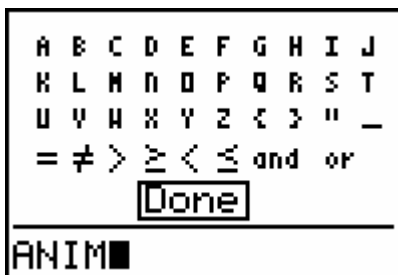
- c. Lay out your collection and use the magnifying lens to gently sort the arthropods according to type. Use your *Arthropod Identification Chart* to name your arthropods. Be as specific as possible.
- d. Enter your data in Table 1 in your journal. You may need to add more rows in the table depending on how many different arthropods you are able to identify.

5 Reset the TI-73 Explorer™ to the default settings.

- a. Turn on the TI-73 Explorer™.
- b. Press **[2nd] [MEM] [7] [2] [2]**.
- c. Press **[2nd] [MEM] [6] [ENTER]**.

6 Create a list on the TI-73 Explorer™ called ANIM (animal)

- a. Press **[LIST]**.
- b. Press **[↑]** and then press **[▶]** until you get to the first unnamed list, highlighting the column heading.
- c. To name the list **ANIM**, press **[2nd] [TEXT]** and use the arrow keys to spell **ANIM**, pressing **[ENTER]** after each letter.



- d. When finished, press **[↓]** to move down to **Done** and press **[ENTER]**.
- e. Press **[ENTER]** again and the list will be named.

7 Create a list on the TI-73 Explorer™ called AMT (amount)

- a. Press **[▶]** to move to the next unnamed list, highlighting the column heading.
- b. To name the list **AMT**, press **[2nd] [TEXT]** and use the arrow keys to spell **AMT**, pressing **[ENTER]** after each letter.
- c. When finished, press **[↓]** to move down to **Done** and press **[ENTER]**.
- d. Press **[ENTER]** again and the list will be named.

LG	ANIM	AMT	B
-----	-----	-----	
AMT =			

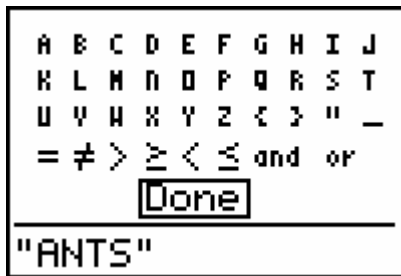


It's a Critter's World

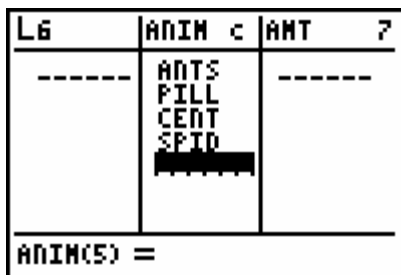
8 Enter the names of the arthropods into the list.

You will list your arthropods in the data list titled ANIM (animal). You may enter up to 7 different animals. For this illustration, 4 animals will be listed: ants, pillbugs, centipedes and spiders.

- Press \downarrow \leftarrow to get **ANIM(1)=** (Your cursor should be under ANIM).
- Press 2nd [TEXT] and use the arrow keys to spell the name of the arthropod pressing ENTER after each letter. **Important: You must enclose the name of the first animal in quotation marks in order to make this list a category list. See below.**

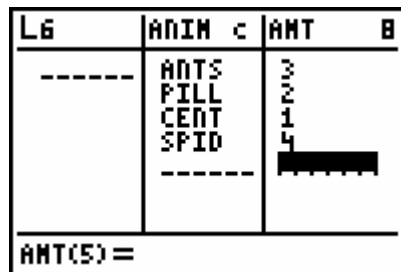


- When finished, press \downarrow to move down to **Done** and press ENTER .
- Press ENTER again to see the name of the arthropod on the list.
- Continue this process until you have entered all names of arthropods.



9. Enter the number of arthropods into the list.

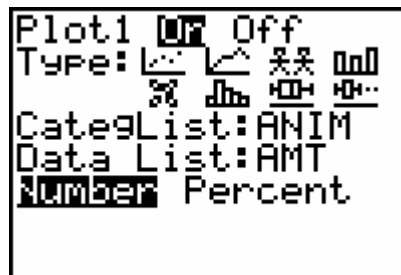
- Press \rightarrow to get **AMT(1)=** (Your cursor should be under AMT).
- Enter the number of each arthropod in this list, pressing ENTER after each number. In the example below, there are 3 ants, 2 pillbugs, 1 centipede and 4 spiders.



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10 Create a circle graph from the data.

- Press $\boxed{2nd}$ [PLOT] $\boxed{1}$ [ENTER].
- Press $\boxed{\downarrow}$ $\boxed{\rightarrow}$ $\boxed{\rightarrow}$ $\boxed{\rightarrow}$ $\boxed{\rightarrow}$ [ENTER] to select circle graph (⊙).
- Press $\boxed{\downarrow}$ $\boxed{2nd}$ [STAT]. Use $\boxed{\downarrow}$ to select **ANIM** for **CategList**, and press [ENTER].
- Press $\boxed{\downarrow}$ $\boxed{2nd}$ [STAT]. Use $\boxed{\downarrow}$ to select **AMT** for **Data List**, and press [ENTER].
- Press $\boxed{\downarrow}$ [ENTER].



Before graphing, make sure all other plots are turned off.

- Press $\boxed{2nd}$ [PLOT].
- If a plot other than Plot1 is turned on, use the arrow keys to highlight that plot and press [ENTER].
- Use the arrow keys to highlight **Off** and press [ENTER] to turn it off.
- Press [GRAPH] to see the circle graph.

Data Analysis

A circle graph shows the relative amounts of each type of arthropod you have collected. By pressing [TRACE] you can see the name of the arthropod and the number you counted. By pressing $\boxed{\rightarrow}$ you can move through the sectors of the circle graph. Use your circle graph to answer the following questions in your journal.

- Which type of arthropod has the greatest number of individuals?
- Which type of arthropod has the least number of individuals?



It's a Critter's World

- 3** Write a paragraph comparing your results with the results of a different team in your classroom. How do you think the characteristics of each site (Step 2d) might explain any differences between types of arthropods and number of individuals? (Hint: Use the circle graphs to compare types of arthropods and number of individuals.)

The circle graph can also represent the number of individuals in percentage form. Follow the steps below to change to percentage and answer questions 4 and 5.

- Press **[2nd]** **[PLOT]** **[1]** **[ENTER]**.
 - Press **[↓]** **[↓]** **[↓]** **[↓]** **[↓]** **[ENTER]** to select percentage.
 - Press **[GRAPH]** to see the circle graph expressed in percentages. The percentages are listed in the upper left hand corner. By pressing **[TRACE]** and by pressing **[↓]** you can move through the sectors of the circle graph.
- 4** Which type of arthropod has the largest percentage?
- 5** Which type of arthropod has the smallest percentage?
- 6** According to your data and the research article, what role do you think the arthropods you collected play in your local ecosystem?

