



*Learning Activities*

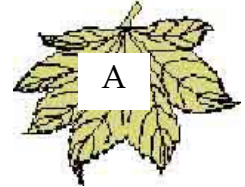
## CREATING A KEY – INTRODUCTION TO TREE-LEAF IDENTIFICATION

Materials (per group of 2 students):

8-10 leaves 8-10 stick on dots

Students will be creating their own key based on the characteristics of 8 - 10 different leaves. Keys should be neat enough for another group to use. *Facilitator can demonstrate with 4 leaves (live, cut-out or drawn on board).*

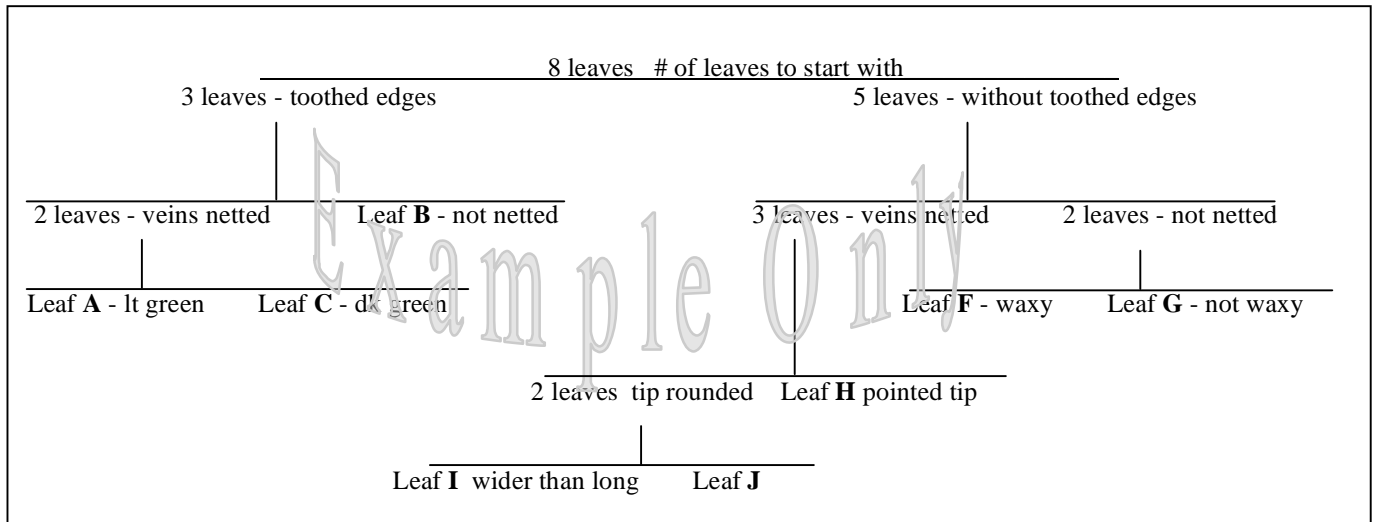
1. Collect 8-10 leaves from different plants for each group of 2 students. Pick a "standard leaf" and note persistent patterns.



2. Students should **label the back of each leaf** with a stick-on letter (A, B, C, etc.).

3. Have each group divide up the leaves into 2 groups based on characteristics each group has in common. Students should write down the criteria for how they are dividing up their leaves. Continue to divide each group into more groups with appropriate descriptions. You are creating a dichotomous key. **THERE ARE MANY WAYS TO DO THIS; TABLE 1 IS ONE EXAMPLE.**

**Table 1: Example of how you can set up a key. Starting with 8 different types of leaves.**



4. Turn leaves over, making sure all the letter-labels are concealed. Carefully place leaves together in a mixed arrangement. Pick one leaf from the pile for another team to identify by letter, using the key each group developed.

*Note: Students will be tempted to divide up leaves according to color or size. After the activity discuss how certain features are variable (ie. leaves change color in the fall; size varies according to sun exposure; disease or insect damage could alter appearance).*

*Flowers are more consistent in form than leaves and are used when identifying shrubs and herbaceous plants. However flowers on trees are often hard to see and don't stay on nearly as long as leaves.*

## TREE-LEAF IDENTIFICATION WORKSHEET

Drawing of leaf

Answer the following questions, circle the description that best matches the tree and leaf.

1. The tree is: **evergreen** or **deciduous** (loses leaves seasonally).
2. Arrangement of leaves on branch: **opposite** or **alternate**.
3. Type of leaf: **simple** or **compound**.
4. Type of veins on leaf/leaflet:  
**single main vein with small side veins** or **several main veins from one point**
5. Edge of leaf: **smoothe** or **dentate** (toothed) or **sinuate**
6. Is base of leaf symmetrical? **Yes** or **No**

### Identification of Tree

\_\_\_\_\_ [Latin name]

\_\_\_\_\_ [common name]

## MACROINVERTEBRATE ID CARD GAME

### Materials:

macroinvertebrate flashcards\*  
clothes pins

macroinvertebrate identification key

### Preparation:

- Brainstorm names of familiar insects.
- Draw a generic insect body with help of participants.
- Show caterpillar photo asking if it is an insect. Discuss life stages and common larval stage found in aquatic systems.
- Introduce Macroinvertebrate ID key and generate a list of words regarding insect anatomy that are unfamiliar to the participants.
- Explain words showing images of aquatic macroinvertebrate anatomy.
- Play card game activity.


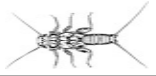



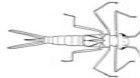



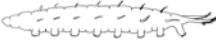


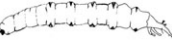




### Instructions:

1. Participants find a partner.
2. One individual selects a macroinvertebrate card and fastens it to the back of their partner without them seeing the card.
3. The individual with the card on their back holds the macroinvertebrate identification key in front of them and tries to figure out what macroinvertebrate they have by going through the key, *strictly* asking questions that get a “Yes” or “No” response.
4. The individual answering the questions looks only at the macroinvertebrate photograph on the card for their response.
5. Once the individual with the key is *certain* of the macroinvertebrate fastened to their back, they can name the macroinvertebrate and discover whether they are correct.
6. Now reverse roles choosing a different macroinvertebrate card.






Project Name: \_\_\_\_\_

### Biotic Index Worksheet - LPN

Directions: Multiply each taxa in column B by column C and record in column D.

Taxon	A Total # in your pack	B Average # from all packs	C Pollution Tolerance Value	D Total Tolerance Value
EPHEMEROPTERA (Mayflies) 			3.6	
PLECOPTERA (Stoneflies) 			1	
TRICHOPTERA (Caddisflies) Hydropsychidae (Common Netspinners)  Other caddisflies 			5	
ANISOPTERA (Dragonflies) 			4	
ZYGOPTERA (Damselflies) 			7	
MEGALOPTERA Corydalidae (Hellgrammites)  Sialidae (Alderflies) 			3	
COLEOPTERA (Beetles) 			4.6	
DIPTERA (True Flies) Athericidae (Watersnipe flies)  Chironomidae (Midges)  Simuliidae (Black flies)  Tipulidae (Crane flies)  Other Diptera 			2	
AMPHIPODA (Scud) 			6	
ISOPODA (Aquatic sowbugs) 			8	
DECAPODA (Crayfish) 			5	

turn page

<i>Taxon</i>	<b>A</b> <i>Total # in your pack</i>	<b>B</b> <i>Average # from all packs</i>	<b>C</b> <i>Pollution Tolerance Value</i>	<b>D</b> <i>Total Tolerance Value</i>
OLIGOCHAETA (Aquatic Worms) 			8	
HIRUDINEA (Leeches) 			8	
TURBELLARIA (Planarians) 			8	
GASTROPODA (Snails) 			7	
SPHAERIIDAE (Fingernail clams) 			8	

Σ Column B = \_\_\_\_\_

Σ Column D = \_\_\_\_\_

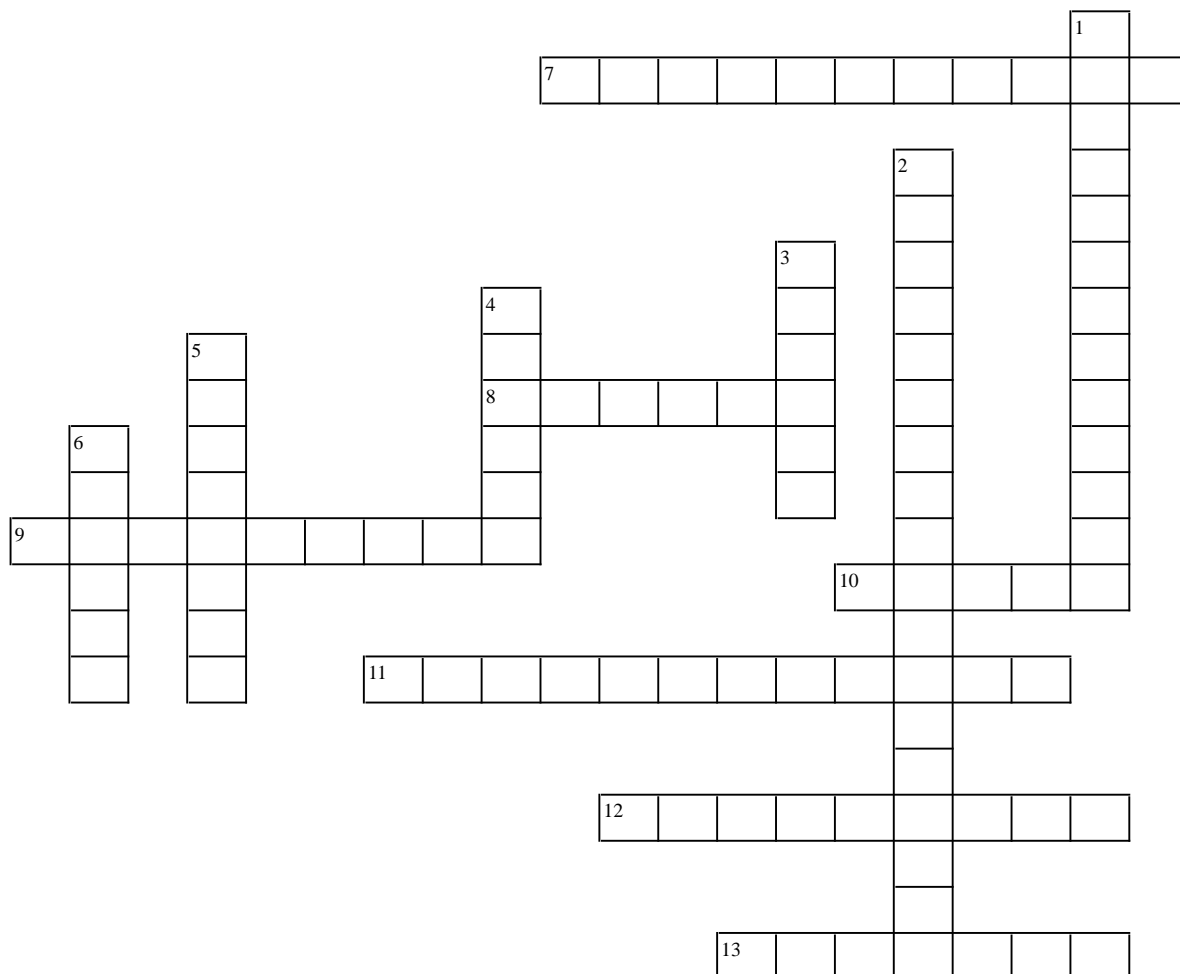
TOTALS: \_\_\_\_\_

Divide:  $\frac{\text{total tolerance value (Col. D)}}{\text{total \# of individuals (Col. B)}} =$

Water Quality =

<b>Biotic Index</b>	<b>Water Quality</b>	<b>Degree of Organic Pollution</b>
<3.75	Excellent	Organic pollution unlikely
3.75-5.0	Good	Some organic pollution
5.1-6.5	Fair	Substantial pollution likely
6.6-10.0	Poor	Severe pollution likely

# LEAF PACK NETWORK® CROSSWORD PUZZLE



## ACROSS

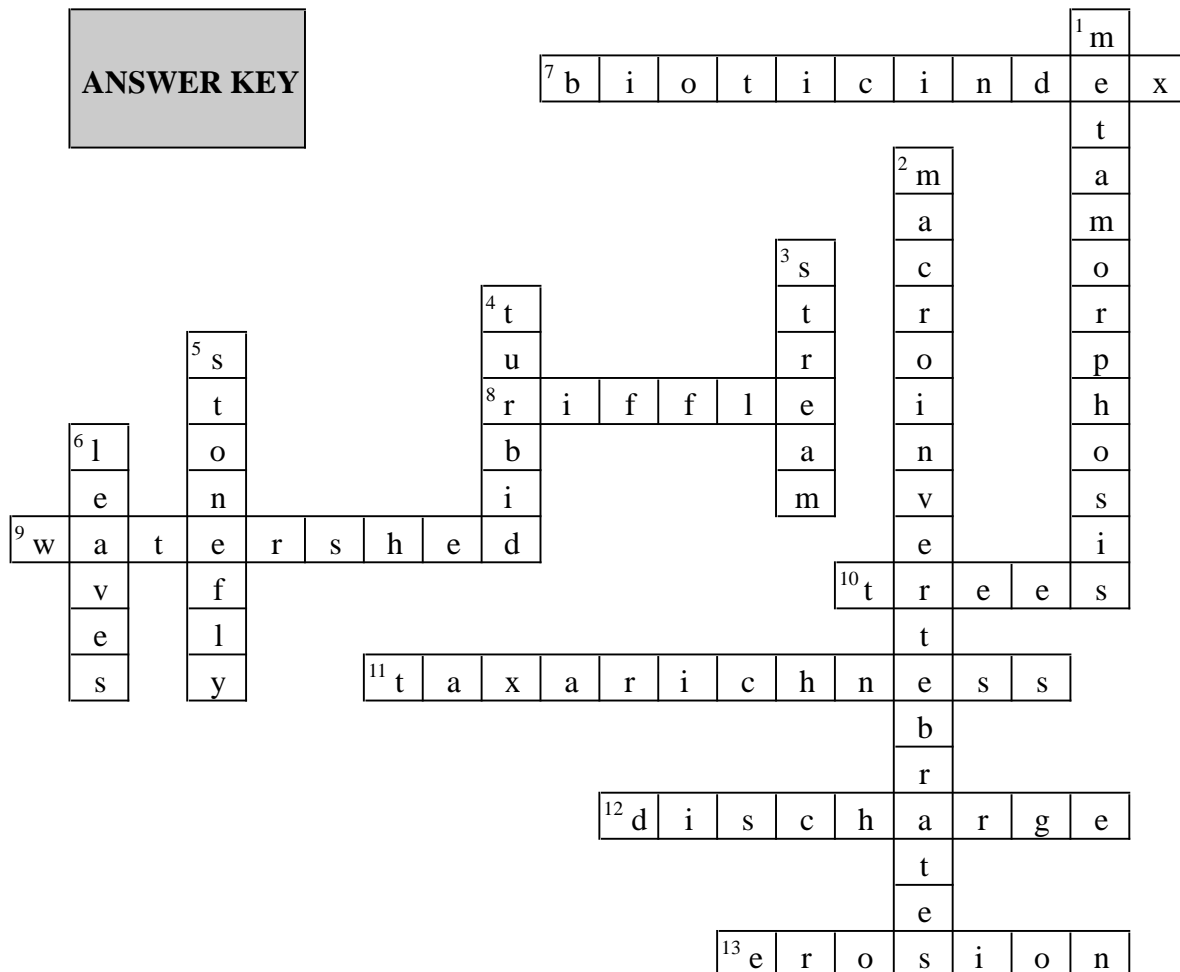
7. \_\_\_\_\_ is used to measure the relative sensitivity to, or tolerance of macroinvertebrates to environmental stress.
8. A \_\_\_\_\_ is a shallow area in a stream with a rocky bottom and fast moving water.
9. An area of land that drains to a particular body of water is a \_\_\_\_\_.
10. The leaf pack experiment demonstrates the importance of \_\_\_\_ to the stream ecosystem.
11. \_\_\_\_\_ is a measure of the diversity of different species of macroinvertebrates within a sample.
12. \_\_\_\_\_ measure of the amount of water moving past a point in a stream.
13. The wearing away of soil by wind or rain is \_\_\_\_\_.

## DOWN

1. The series of changes insects go through during their life cycle is called \_\_\_\_\_.
2. Insects and other animals with no backbone, that are big enough to see are called \_\_\_\_\_.
3. Autumn leaf fall is an important source needed to support life within the flowing water ecosystem of a \_\_\_\_\_.
4. After a storm the stream may look \_\_\_\_\_; in other words cloudy or opaque.
5. Aquatic insect with six jointed legs, two tails and wing pads but without abdominal gills.
6. \_\_\_\_\_ from the three dominant trees surrounding the stream are placed in mesh bags.

# LEAF PACK NETWORK® CROSSWORD PUZZLE

## ANSWER KEY



### ACROSS

7. \_\_\_\_\_ is used to measure the relative sensitivity to, or tolerance of macroinvertebrates to environmental stress.
8. A \_\_\_\_\_ is a shallow area in a stream with a rocky bottom and fast moving water.
9. An area of land that drains to a particular body of water is a \_\_\_\_\_.
10. The leaf pack experiment demonstrates the importance of \_\_\_\_ to the stream ecosystem.
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