

The trees in my neighbourhood

Module 1 I identify the trees around me

Summary of Module 1

Students learn to use a tree identification key through several activities that can be carried out in the schoolyard or in the classroom. After covering the basic concepts of taxonomy and binomial nomenclature through a set of observations, a series of questions and a discussion session, students understand the need to classify trees according to genus and species. A game helps them realize the importance of morphological criteria for identifying trees correctly. Ultimately, they are able to fully understand the use of an identification key through its application in the schoolyard.

Cross-curricular competencies

- CCC1 - Use information
- CCC5 - Adopt effective work methods
- CCC9 - Communicate appropriately

Subject area competencies

- SAC1 - Seek answers or solutions to scientific or technological problems: define a problem, choose an investigation or design scenario, carry out the procedure, conduct an experiment, analyze the results or solution
- SAC2 - Make the most of knowledge of science and technology: understand how technical objects work, understand natural phenomena
- SAC3 - Communicate in the languages used in science and technology: participate in exchanging scientific and technological information, divulge scientific or technological knowledge or results, interpret and produce scientific and technological messages

Objectives

- Know how to use an identification key
- Know how to identify the genus of trees near the school

Contents

- Diversity of life: taxonomy
- Life-sustaining processes: characteristics of a living being

Classroom organization

- In teams of 4 or 5, as a group or individually
- Duration: three class periods of 45, 15 and 45 minutes and one period of 60 minutes outdoors

Sequence of activities for Module 1

- **Activity 1: *Naming trees* – 45 minutes – in class**
Each student tries to name three trees, based on illustrations. The group discusses their answers. Students understand the necessity of having a common vocabulary to classify living beings. They discover binomial nomenclature, taxonomy, genus and species.
- **Activity 2: *The mystery student* – 15 minutes – in class**
A game in which a student's name is chosen at random. The group must guess who it is, by asking the teacher questions. In this way, the students come to understand the characteristics of the strategy involved in using an identification key.
- **Activity 3: *A key for identifying* – 45 minutes – in class**
The teacher introduces concepts of plant morphology that are useful in identifying trees. Students practice using the identification key. They find the genus of three trees. They fill out an **experiment worksheet** to consolidate what they have learned.
- **Activity 4: *Let's explore our surroundings* – about 60 minutes – outdoors**
In the schoolyard or nearby, students identify the genus of trees using the identification key.



Summary

Each student tries to name three trees, based on illustrations. The group discusses their answers. Students understand the necessity of having a common vocabulary to classify living beings. They discover binomial nomenclature, taxonomy, genus and species, and fill out the **experiment 1 worksheet** to consolidate what they have learned.

Classroom organization

45 minutes in class – individually and as a group

Material required

Worksheet title	Contents	Quantity/User
Concepts	Describe and classify a living being	1 teacher
Answer key 1	Answers to Experiment 1 worksheet	1 teacher
Experiment 1	Nomenclature questionnaire	1 per student
Visual aid	Illustrations of a maple, elm, spruce	1 teacher and one per student

Step-by-step procedures

- Announce to the class that they will learn to identify trees.
- Distribute the **visual aid worksheet** with the three tree illustrations.
- Ask the students:
 - > *What name would you give to each of these three trees?*
- Ask the students to write their answers on a piece of paper.
- Sort through the answers and write them on the board.
Possible answers for tree n°1: "tree", "maple", etc.
- Start a discussion on the different answers and ask for explanations:
 - > *Why do you say that?*
 - > *What clues support your statement?*
- Explain that there are different ways to name trees, and that some are less precise than others. We must be able to agree on vocabulary in order to know precisely which tree we are talking about. Introduce Linnaeus' binomial nomenclature and the definitions of genus and species (**concept 1 worksheet**).
- Explain that in binomial nomenclature, we name each living being according to the name of the genus and the species to which it belongs. This is somewhat like identifying a person by first name and last name. Define taxonomy and taxon (**concept 1 worksheet**).
- Answer questions 1 to 5 on the **experiment 1 worksheet**.
- Announce and write the three tree names on the board without revealing which name corresponds to which illustration.

- Ask the students:
 - > *How would you go about naming each of the three trees correctly?*Possible answer: use a list of the specific characteristics of each tree.
- Answer question 6 on the **experiment 1 worksheet**.
- State that naturalists have found an efficient way to distinguish trees: an identification key. Explain that using an identification key is a little like a guessing game with several steps.
- Suggest to students that they can learn how this works by playing a game (activity 2).
- Answer question 7 on the **experiment 1 worksheet**.

Summary

The activity consists of a game in which a student's name is chosen at random. The group must guess who it is, by asking the teacher questions. In this way, the students come to understand the characteristics of the strategy involved in using an identification key.

Classroom organization

15 minutes in class – group activity

Material required

Worksheet title	Contents	Quantity/User
Concepts	Describe and classify a living being	1 teacher
Answer key 2	Answers to Experiment 2 worksheet	1 teacher
Experiment 2	Mystery student questionnaire	1 per student

Step-by-step procedures

- Distribute **experiment 2 worksheet**.
- Ask students to write their last and first name on a piece of paper; then pick one name.
- Explain that the person whose name was been picked is the "mystery student", and that the others must guess who it is.
- Ask students to answer question 1 on the **experiment 2 worksheet**.
- Request that each student in turn ask you the questions presented in the **experiment 2 worksheet** in order to guess who the mystery student is. Answer yes or no to each question.
Sample questions: Is it a girl? Is she wearing a green sweater? Etc.
- Once the mystery student has been identified, ask if someone can explain the strategy used. Repeat the game if necessary.
- Explain the characteristics of the strategy:
 - Proceed from the general to the particular (a boy or a girl – green or white sweater).
 - Ask a series of questions that can be answered with yes or no.
 - Only after all the questions have been answered is it possible to identify the sole person corresponding to all of the chosen characteristics.
- Ask students to write their answer to question 2 on the **experiment 2 worksheet**.
- Ask the students:
 - > *How would you adapt this strategy to identify our three trees?*
Possible answer: use characteristics specific to trees.
- State that an identification key is based on a certain number of morphological criteria.
 - > *What criteria could you consider?*
Possible answers: leaf shape, leaf position, etc.

Summary

The teacher introduces concepts of plant morphology that are useful in identifying trees. Students practice using the identification key. They identify the genus of the trees in the three illustrations provided. They fill out the **experiment worksheet 3** to consolidate what they have learned.

Classroom organization

45 minutes in class – in teams of 4 or 5 students

Material required

Worksheet title	Contents	Quantity/User
Visual aid	Maple, elm, spruce illustrations	1 teacher and 1 per student
Concepts	Describe and classify a living being	1 teacher
Answer key 3	Answers to Experiment 3 worksheet	1 teacher
Tool	Identification key	1 teacher and 1 per team
Experiment 3	Identification key questionnaire	1 per student

Step-by-step procedures

- Distribute one identification key (**Tool worksheet**) per student.
- Ask students to turn to the introduction page of the key; present the morphological concepts (**Tool worksheet**, p. 1).
- Ask students to answer question 1 on the **experiment 3 worksheet**.
- Proceed with identification of the genus of tree 1, illustrated on the **visual aid worksheet**, by presenting the morphological concepts at each step.
- Ask students to answer question 2 on the **experiment 3 worksheet**.
- Divide the group into teams of 4 or 5 students.
- Ask each team to identify the two other trees (**visual aid worksheet**).
- Assess the progress of each team, and provide the correct answer, repeating the identification strategy.

Summary

In the schoolyard or nearby, students identify trees using the identification key.

Classroom organization

60 minutes outdoors – in teams of 4 or 5 students

Material required

Numbered cards

Worksheet title	Contents	Quantity/User
Concepts	Describe and classify a living being	1 teacher
Tool	Identification key	1 teacher and 1 per team
Answer key 4	Answers to experiment 4 worksheet	1 teacher
Experiment 4	Identification worksheet	1 or 2 per team

Preparation

30 minutes – prepare the route students will follow.

Place a numbered card at the base of each tree to be identified.

Identify the trees all along the route using the key; note the answers.

Step-by-step procedures

- In the courtyard or nearby, divide the class into teams and explain the route to follow.
- Remind the students that living beings can be named according to their genus and species using binomial nomenclature. Using the identification key, they can observe each tree, and associate it with a certain number of criteria until they recognize its genus (the key provided in Module 1 allows identification of the genus).
- Review how to use the identification key; ask students to identify the genus of trees and note the number of each.
- Have students fill out one or several identification cards (**Experiment 4 worksheet**).
- Assess the progress of each team, and provide the correct answer, repeating the identification strategy.

TREE # 1



TREE # 2



TREE # 3



Describe and classify a living being

Taxonomy is the science which classes living beings into hierarchical groups called taxons according to their shared characteristics in order to describe them.

A **taxon** is a group that unites several living organisms that possess shared characteristics. Taxons are then grouped into categories. The main categories of taxons are as follows, from the most general to the most specific: kingdom, phylum, class, order, family, genus and species.

Binomial nomenclature is a system for classifying living beings according to their genus and species only. It was invented by the Swedish naturalist Carl von Linné (1707-1778). The Latin scientific names are used in binomial nomenclature so that scientists around the world can use the same language to share their observations.

The **genus** is a taxon that groups together several species that share a certain number of morphological characteristics. Ex. **Acer** is the Latin name of the maple.

The **species** is the fundamental unit of taxonomy. It groups together individuals having similar morphological characteristics that can interbreed and produce fertile offspring. E.g. The silver maple (*Acer saccharinum*) and sugar maple (*Acer saccharum*) are two species.

Naturalists and the great exploratory voyages of the 19th century

Towards the end of the 18th century, long ocean voyages of exploration began. The British Empire and France competed fiercely to discover new lands to colonize. Cook, Vancouver and Bougainville each in turn brought glory to his respective nation. Scientists joined these exploratory missions and competed for discoveries that could bring prestige to the crown of France or England. Astronomers, geographers and naturalists sailed along on these ships. Some of these scientists were botanists too.

On these voyages, naturalists discovered previously unknown plants in these virgin, luxuriant lands. The number of known plants increased dramatically, and the scientific community came to see the importance of classifying them more accurately. It is in this context that the new rules of taxonomy developed and progressively became established. Explorer-botanists noted their observations in notebooks and compiled herbaria, which were sometimes elaborately illustrated.

To learn more, see the virtual exhibit [Trees Inside Out](#)

Introduction

Do you know how to recognize trees?

To identify a tree, we should observe and take note of one or many of the following characteristics:

- Its habitat: Does the tree live in a forest, in a garden?
- Its growth form: its shape, its mode of growth
- Its parts: bark, twigs position, inflorescences and flowers, leaves, fruits, etc.
- The blooming and fruiting seasons
-

For a tree not to be just another tree, but an individual living being with its own characteristics, there are tools to identify the species precisely:

- floras: description of plants in a given region
- field guides : illustrated field tools divided according to categories
- identification keys: devices to deduce the name by a choice of questions and answers
- encyclopaedias: general books with many plants described
- monographs: manual describing a plant or a plant group

Identification keys are usually dichotomous. They are called as such as they are constructed in paired statements or questions, of equal importance or opposed, forcing logical deduction, thus orienting following questions.

In this activity, discover how to use an identification key by observing tree leaves.

1. How would you name each of the three trees presented to you?

- Tree 1 (**maple**): Possible answers: tree, maple
- Tree 2 (**elm**): Possible answers: elm, tree, leafy
- Tree 3 (**spruce**): Possible answers: spruce, tree, conifer, Christmas tree

2. What do we call the system invented by Carl von Linné for naming living beings?

Binomial nomenclature

3. Give a definition of binomial nomenclature.

Binomial nomenclature is a system for classifying living beings according to their genus and species only.

4. Give a definition of taxon.

A taxon is a group that unites several living organisms according to certain shared classification criteria.

5. What are the two taxons used in binomial nomenclature?

Genus and species

6. Give three criteria that you could consider to determine the genus of a tree.

Sample answers: leaf shape, leaf position

7. Name and describe one of the tools used by naturalists to determine the genus and species of a plant?

Floras, identification keys, encyclopaedias, monographs (...)

- 1. Note below the questions you will ask to guess who the mystery student is. Don't forget that the teacher will only answer YES or NO:**

Question 1: Is it a girl?

Question 2: Does she have braids?

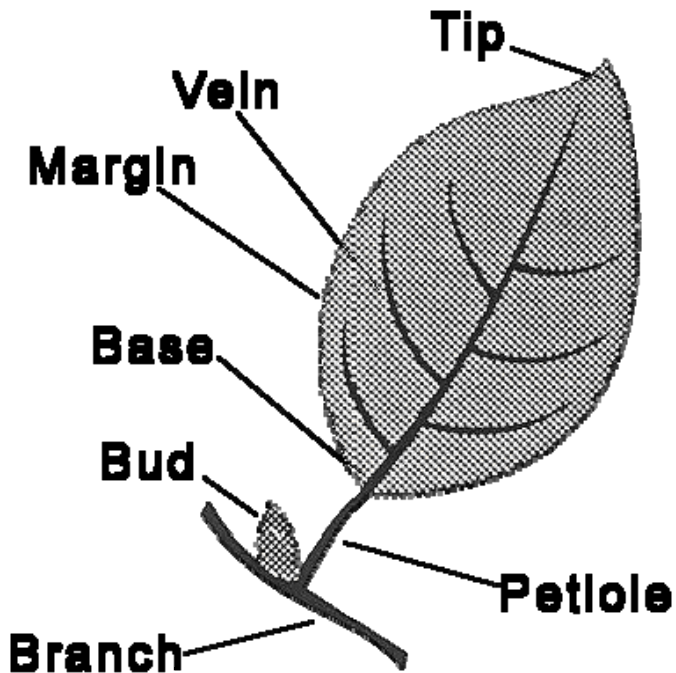
Question 3: Is she wearing a green sweater?

Question 4: Does she have an orange bracelet?

- 2. Describe below the characteristics of the strategy you used to find the mystery student:**

We go from the general to the specific ("a boy/a girl" to "a green sweater with white polka dots"). We ask a series of questions that can be answered by "yes" or "no" in order to make choices. Only after all the questions have been answered can we identify the one person corresponding to all the characteristics selected.

1. Complete the diagram below



Note the characteristics selected in the identification key to identify each of the trees.

Example: leaf → single → whole → etc.

Write the genus to which your observations correspond

2. Tree 1

Leafy → opposite leaves → simple leaf → lobed and toothed: maple

3. Tree 2

Leafy → alternate and simple leaves → leaf with an asymmetrical base → oval shape: elm

4. Tree 3

Conifers → with needles → single needles → can be rolled between thumb and forefinger → spruce

**Note the characteristics selected in the identification key to identify each tree.
Example: leaf → simple → whole → etc.
Write the genus to which your observations correspond.
Indicate the number of each tree (according to the route your team followed).**

Tree number:

_____ **Follow according to the trees on the route and the number of each** _____

Tree number:

Tree number:

Tree number:

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- The blooming and fruiting seasons
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1. How would you name each of the three trees presented to you?

- **Tree 1:**

- **Tree 2:**

- **Tree 3**

2. What do we call the system invented by Carl von Linné for naming living beings?**3. Give a definition of binomial nomenclature.****4. Give a definition of taxon.**

5. What are the two taxons used in binomial nomenclature?

6. Give three criteria that you could consider to determine the genus of a tree.

7. Name and describe one of the tools used by naturalists to determine the genus and species of a plant?

Your name: _____

1. Note below the questions you will ask to guess who the mystery student is. Don't forget that the teacher will only answer Yes or No:

Question 1:

Question 2:

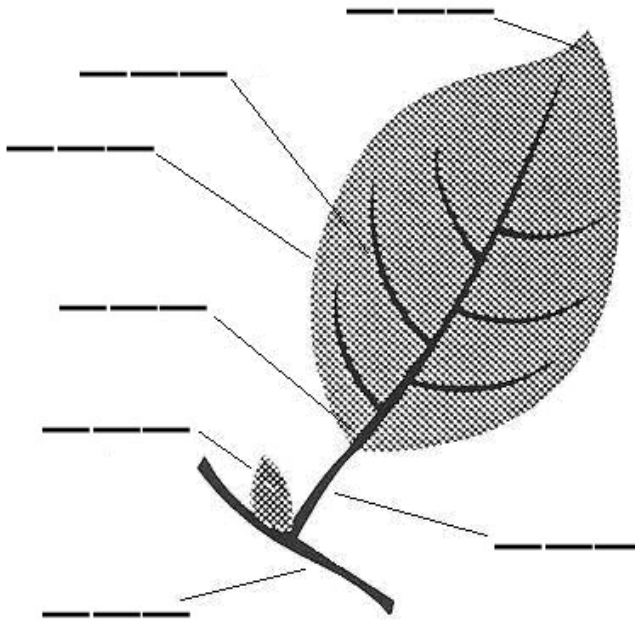
Question 3:

Question 4:

2. Describe below the characteristics of the strategy you used to find the mystery student:

Your name:

1. Complete the diagram below



Note the characteristics selected in the identification key to identify each of the trees.

Example: leaf → single → whole → etc.

Write the genus to which your observations correspond.

2. Tree 1

3. Tree 2

4. Tree 3

Your name:

Note the characteristics selected in the identification key to identify each tree. Example: leaf → simple → whole → etc. Write the genus to which your observations correspond. Indicate the number of each tree (according to the route your team followed).

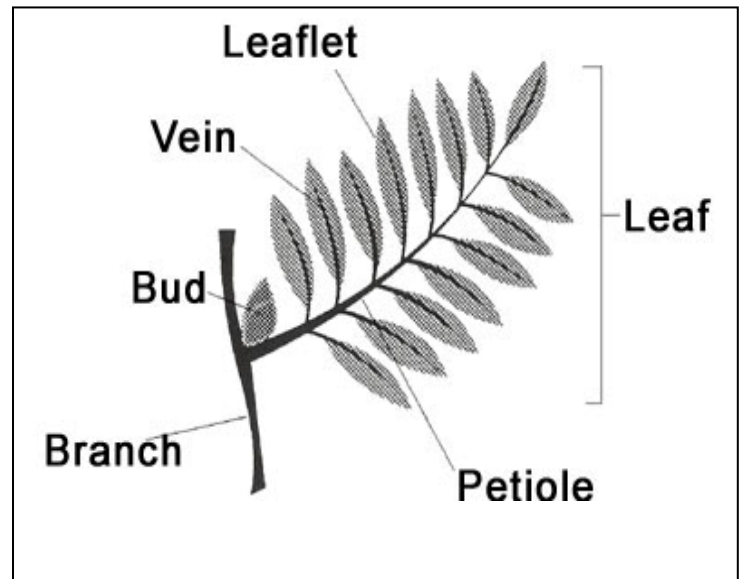
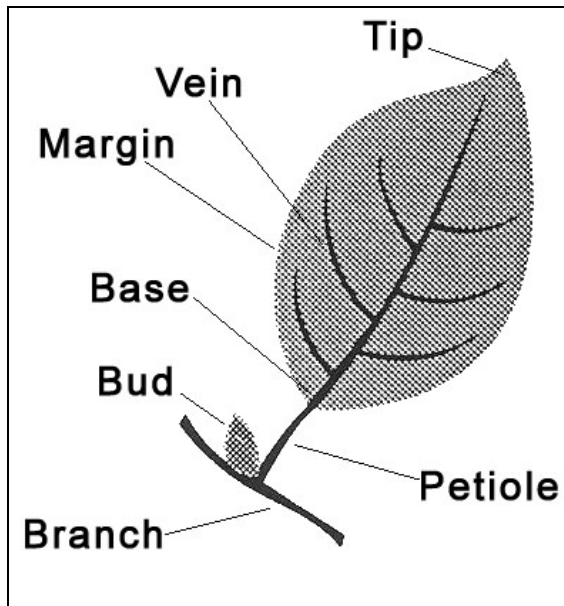
Tree number: ____

Tree number: ____

Tree number: ____

Tree number: ____

Your name:

The parts of the leaf

Base of the leaf: part of the leaf situated on each side of the petiole.

Bud: future leaf protected by scales that will spread open the following spring.

Leaflet: one of the sections of a compound leaf. It sometimes looks like a little leaf, but contrary to a leaf, there is never a bud at the base.

Leaf margin: the edge, contour of the leaf.

Veins: small channels in the leaf through which the sap circulates.

Petiole: stem by which the leaf is attached to the branch.

Leaf tip: the tip of the leaf is located opposite the point where the petiole is attached.

Branch: a secondary woody stem on which the leaves, flowers and fruits grow.

Tree identification key

Species common in urban environments in Québec

Is your tree leafy or coniferous?

- **Conifers** have needle- or scale-shaped leaves and their fruit is a cone. If your tree is a conifer, see the conifer identification key on page 7.
- **Leafy** trees have wide leaves (wider than a needle) and lose their leaves in the fall. If your tree is leafy, examine the leaves to see which group it belongs to.

Are the leaves opposite or alternate?	Are the leaves simple or compound?
They are opposite if they are attached to the branch 2 by 2, facing each other.	A simple leaf is not divided into leaflets (it is in one piece).
They are alternate if they are not attached to the branch facing each other.	A composite leaf is divided into several leaflets.

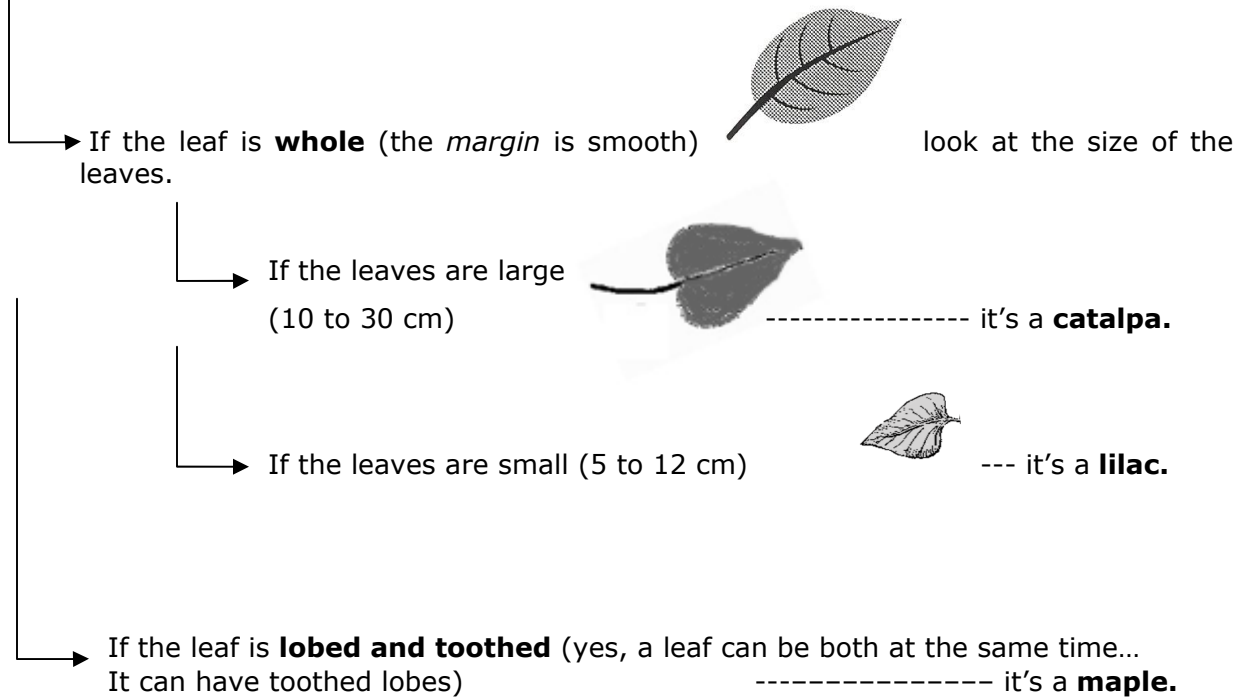
- If your tree has **opposite leaves** (simple or compound), see the identification key for **group 1** leafy trees on page 3.
- If your tree has **alternate and simple leaves**, see the identification key for **group 2** leafy trees on page 4.
- If your tree has **alternate and compound leaves**, see the identification key for **group 3** leafy trees on page 6.

Identification key for leafy trees

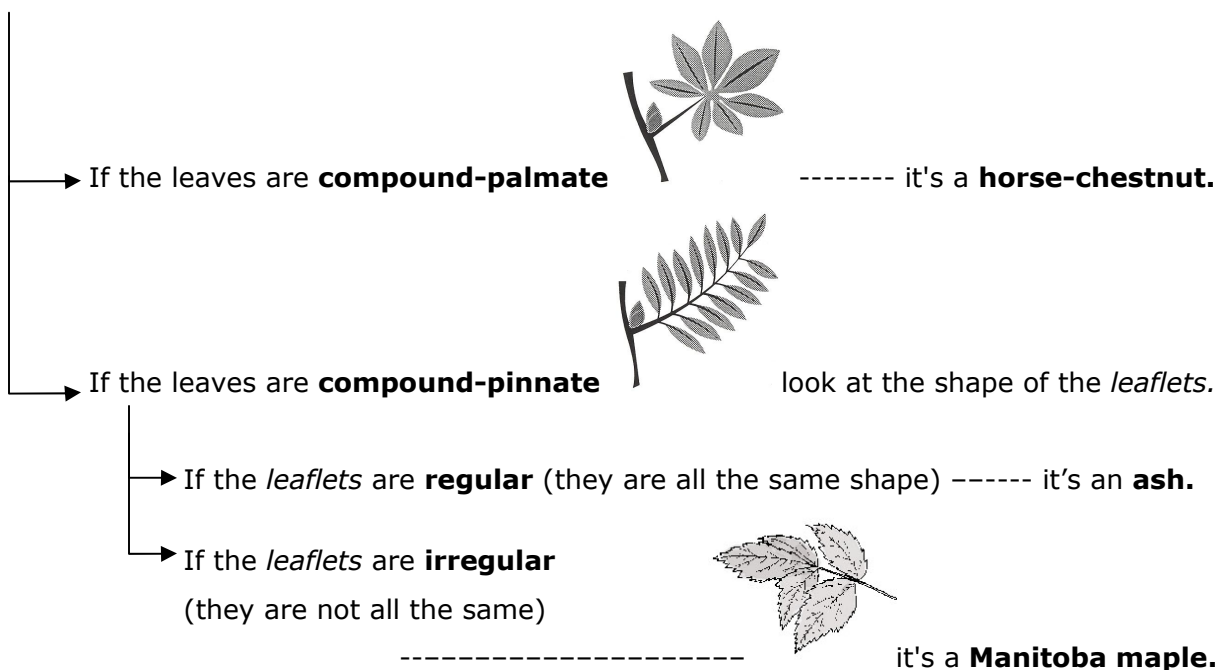
Group 1: Trees with opposite leaves

Does your tree have simple or compound leaves? (Remember the chart on page 2.)
If the leaves are simple, see number 1. If the leaves are compound, see number 2.




1. If the leaves of your tree are **simple**, look at the leaf *margin*.

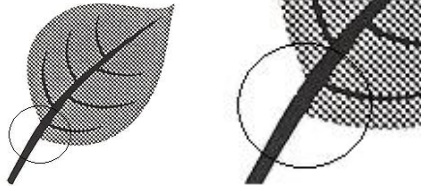
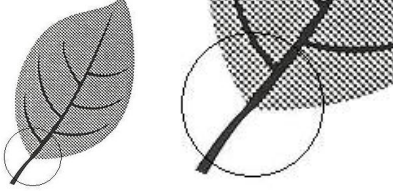


2. If the leaves of your tree are **compound**, look at the arrangement of the *leaflets*.





Group 2: Trees with alternate and simple leaves

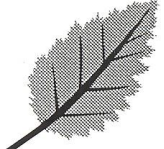

- If the leaves are **lobed**  ----- it's an **oak**.
- If the leaves are **lance-shaped** (long and thin)  ----- it's a **willow**.
- If the leaves are **cordate** (heart-shaped)  ----- it's a **linden**.
- If the leaves have a different shape, look at the *base of the leaf*, and go on to the next step.

<p>The leaf is asymmetrical if the <i>base of the leaf</i> is not the same on both sides of the petiole.</p> 	<p>The leaf is symmetrical if the <i>base of the leaf</i> is identical on both sides of the petiole.</p> 
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If the base of the leaf is **asymmetrical**

- Is the leaf oval-shaped?  ----- it's an **elm**.
- Is the *leaf tip* very long?  ----- it's a **hackberry**.

If the base of the leaf is **symmetrical**, look at the teeth on the *leaf margin*

- If the leaf is double-toothed (each tooth bears smaller teeth)  ----- it's a **birch**.
- If the leaf is single-toothed (there is one series of teeth), look at the petiole
 - If the petiole is long and flat ----- it's a **poplar**.
 - If the petiole is round and short (less than 2 cm), look at the teeth and veins of the leaf. 

→ If the teeth are pointed and always at the tip of a vein ----- it's a **beech**.

→ If the teeth are rounded and not always at the tip of a vein ----- it's a **cherry**, a **plum** or a **crabapple**.

Group 3: Trees with alternate and compound leaves


What size are the leaves?

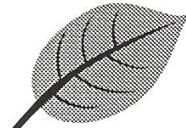
→ If the leaves measure more than 25 cm ----- it's a **walnut**.

→ If the leaves measure less than 25 cm, look at the *leaflets*.


→ If the *leaflets* are not all the same size and the one at the tip is bigger ----- it's a **hickory**.

→ If there are many little *leaflets*, all the same size, look at the *leaf margin* of the leaflets.

→ If the *leaflets* are toothed  ----- it's a **mountain ash**.

→ If the *leaflets* are whole (the *leaf margin* is smooth), count the number of *leaflets*. 

→ If there is an odd number of *leaflets*----- it's a **locust**.

→ If there is an even number of *leaflets*----- it's a **honey locust**. 

Identification key for conifers

Look at the leaves of your tree. Are they needles or scales?

