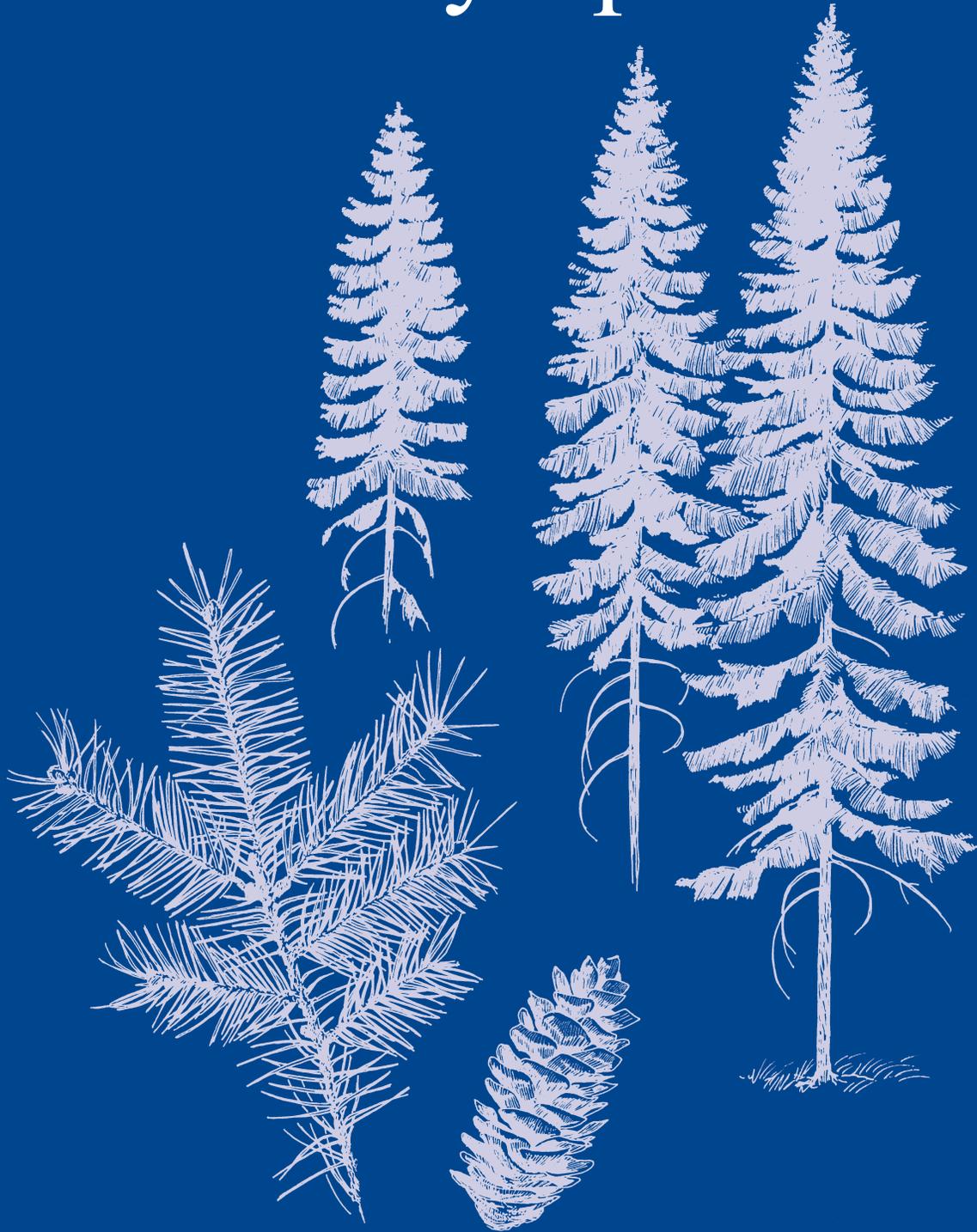


ALBERTA ENVIRONMENT

Treelympics



Alberta
ENVIRONMENT

Kananaskis Country

This publication is part of a series of field study programs produced by the Environmental Education Program of Natural Resources Service in Kananaskis Country and Fish Creek Provincial Park. The publications have been written to address the mission of Alberta Environment and increase students' environmental awareness, understanding, interaction and responsibility for the natural world in which they live.

The publications are developed in a close working relationship with teachers, community educators and program writers. Programs focus on the areas of environmental education, science, social studies and language arts. They are also developed to emphasize elements of environmental literacy, lifestyle, and citizenship.

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Treelympics

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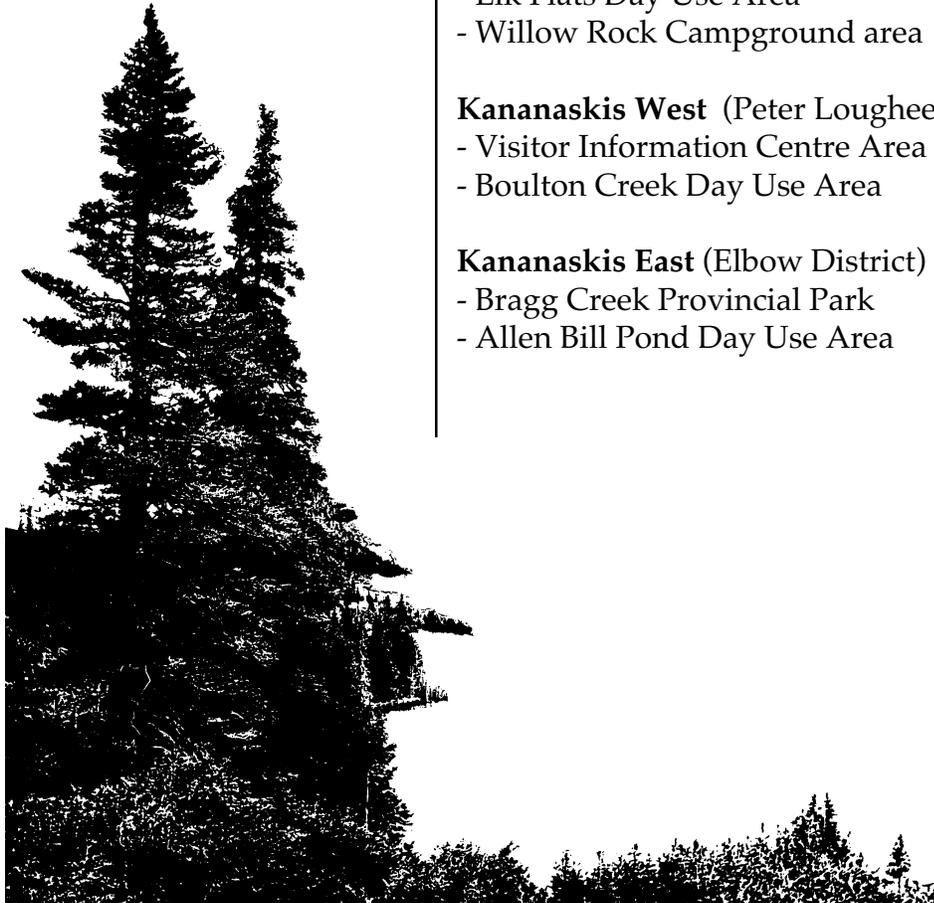
Treelympics Student Booklet

March, 1991

1.0 OVERVIEW

1.1 AT A GLANCE

TOPICS	Trees
PROGRAM LEVEL	Grades 1 - 3 / Ages 6 - 8
TIME REQUIRED	Pre-field Study: 20 - 30 minutes Field Study: 1 - 1.5 hours Post-Field Study: varies
STAFF REQUIRED	One teacher with parent volunteers Recommended ratio 1 adult: 7 students
BEST SEASON	Spring or fall
SUGGESTED LOCATIONS	Kananaskis Central (Bow Valley Provincial Park) - Elk Flats Day Use Area - Willow Rock Campground area Kananaskis West (Peter Lougheed Provincial Park) - Visitor Information Centre Area - Boulton Creek Day Use Area Kananaskis East (Elbow District) - Bragg Creek Provincial Park - Allen Bill Pond Day Use Area



1.2 PROGRAM SUMMARY

During the *Treelympics* program, students will gain an understanding of the functions of trees. The Olympic-style events demonstrate to students that the seemingly ordinary processes of a tree are indeed wonders of the natural environment.

This program can take place in the school yard or as part of a day long field study. Activities include the following:

- **Let's Make a Tree**
Students are introduced to the functions of a tree by working together as a class to role-play the different parts of a tree.
- **How Old?**
Students will estimate the ages of trees by looking at tree rings and tree branches.
- **Tree Tug**
In this series of three mini-activities, students compare their individual strengths with those of a tree.
- **Sugar Shuffle**
A team relay race in which students investigate the way a tree moves its food from its leaves to its roots.
- **Big Gulp**
A water drinking contest in which students compare their fluid consumption with that of a tree.
- **Big Slurp**
In this relay, sponges and water are used to simulate a tree's movement of water and minerals from the roots to the crown. The effect of human vandalism on trees is also discussed.
- **Cone Toss**
An activity in which students simulate a tree dispersing its seeds.
- **Plant a Tree**
At the end of the program, students will be shown how to plant and care for their own tree.

This program is part of a written unit for Division I on forest communities and interrelationships. Each program can be used separately or as an entire unit of study. The complete unit includes:

Treelympics - A field study in which students compare their strengths with those of a tree in a series of Olympic-like activities.

Friends of the Forest - A story and activity guide about two boys who build a fort under an enormous tree in the forest. During their frequent visits to the tree, the boys meet many of the other forest inhabitants and discover some of the interrelationships that exist in a forest community. Activities are included that relate to topics covered in each chapter.

Canopy Communities - A field study in which students discover how plants and animals meet their needs and interact in a forest community. Pre- and post-field study activities are included.



1.3 PROGRAM OBJECTIVES

1. Students will recognize basic tree functions.
2. Students will compare their own strengths with those of a tree.
3. Students will discover how trees move water and sugar from their roots to their leaves.
4. Students will discover how trees disperse their seeds.

1.4 CURRICULUM TIE-INS

This program supports the themes and objectives outlined in the Alberta Curriculum for Division I Science and Physical Education. Selected themes and objectives are covered using the natural environment as the focus. Such a focus allows students, at their own level, to explore the Environmental Education concept that they are **a part of** rather than **apart from** the world in which they live.

Curriculum tie-ins are indicated in each activity. In general, the following areas are addressed:

DIVISION	SUBJECT	SUBJECT MATTER
One	Science	Living Things and Environment - Plants and Animals
One	Physical Education	Games

2.0 PRE-FIELD STUDY

2.1 LET'S MAKE A TREE

Before beginning the *Treelympics* games, it is valuable for the students to have a basic understanding of the functions of a tree. In this activity, the whole class will work together to role-play the various parts of a tree.

Objective

Students will recognize the basic functions of various parts of a tree.

Curriculum Tie-in

Science: Living Things and Environment - Plants and Animals

Plants and animals are living organisms. Each has its specific characteristics and particular needs to sustain life.

Time Required

20 - 30 minutes

Materials

None

Instructions for the Teacher

1. Gather the students in an open area or a large room. Explain that they will be working together to build a tree. Give the students the following tasks:
 - a) Select two of the taller students to be the **heartwood**. They should stand back to back. Tell them that the heartwood is the sturdy core of the tree.
 - b) Select 3 - 4 students to be the **tap roots**. Have them sit on the ground with their backs to the heartwood and their legs outstretched on the ground. The job of the tap roots is to support the heartwood.
 - c) Select 3 - 4 students to be the **fibrous roots**. They should lie with their heads at the tree base and their bodies outstretched on the ground. These roots extract water from the soil so these students should be coached to make sucking noises on demand - as loudly as possible!
 - d) Select 2 students to be **leaves**. They should stand close to the heartwood and orient their upraised hands towards the strongest light source (the sun or an overhead light). Leaves turn water and sunlight into food. Being a leaf and making this food can be exhilarating. The two leaves should shout "Yippee!" as loudly as they can when asked to do so.

- e) Select 4 - 5 students to be the **xylem** (zi'lem). They should stand around the heartwood and join hands. Direct them where to stand so they don't hurt any of the roots. The xylem cells carry water and nutrients from the roots to the leaves. Younger students can simply call them the "water tubes". The students playing this part should bend down low and, while still holding hands, they should rise up together and throw their hands above their heads while shouting "whee!" as they carry fluid upwards.
- f) Select 5 - 6 students to be the **phloem** (flÓ'em). They should form a circle around the xylem. The phloem cells carry food from the leaves down to the roots and can therefore be called the "food tubes". These students should hold hands and raise them high above their heads and then move their hands down to the ground while shouting "vroom!" in a descending tone. The phloem and xylem together form the cambium layer which is the layer of soft, growing tissue between the bark and wood of trees from which new bark and wood grow.
- g) Have the rest of the students, except one, form one last ring around the tree. They will be representing the **bark** or outer layer of the tree which protects the tree from insects and diseases.
- h) The last student represents a **boring insect** or a **tree disease**. He or she will try to get through the bark and cambium layer. The teacher can demonstrate the harmful effects of tree bark removal by taking away one of the "bark students" temporarily, allowing the insect to enter the body of the tree.
- i) As a last step, the teacher can get the various tree parts to make their noises and perform their functions, first separately and then in unison. This activity ends with all the students working in a noisy unison as the boring insect tries in vain to penetrate to the heartwood.

Teacher's Notes

3.0 FIELD STUDY: ACTIVITY GUIDE

The following activities will give students an opportunity to discover how a tree functions and to compare their strengths and abilities with those of a tree.

Objectives

1. Students will recognize basic tree functions.
2. Students will compare their own strengths with those of a tree.
3. Students will discover how trees move water and sugar from their roots to their leaves.
4. Students will discover how trees disperse their seeds.
5. Students will be shown how to plant and care for a tree.

Curriculum Tie-in

Science: Living Things and Environment - Plants and Animals

Plants and animals are living organisms. Each has its specific characteristics and particular needs to sustain life. Plants differ from animals in specific ways relative to the food they eat, how they obtain it, react to stimuli, and move.

Physical Education: Games

Games develop teamwork and cooperation.

Time Required

1 - 1.5 hours

Materials

For a class of 30 students you will require the following materials:

Introductory Event - How Old?

- 1 illustration of a cross-section of a tree for each student (see page 9 for sample), **or** 1 actual tree cross-section for each student. You can make these yourself by cutting an old Christmas tree into 4 cm thick cross-sectional slices. The annual rings on the cuttings will be more obvious if the tree cuttings are sanded on one side.

Event #1 - Tree Tug

- 1 group of large, well-established evergreen trees on your program site
- 1 box of toothpicks
- flagging tape or other markers

Event #2 - Sugar Shuffle

- 4 boxes of sugar cubes
- 8 large ice cream pails

Event #3 - Big Gulp

- 1 small paper cup for each student, or each student can be responsible for bringing a plastic cup from home.
- masking tape and pen to label cups
- clean drinking water in jugs, enough for several servings for each student
- 1 large garbage bag to collect cups

Event #4 - Big Slurp

- 4 plastic ice cream pails, each large enough to hold approximately 1.5 litres of water
- 4 household sponges
- 4 litres of water

Event #5 - Seed Toss

- 5 large aluminium pie plates for each group of 5 - 6 students
- 5 paper seeds for each student (see page 9 for pattern). These can be cut from scrap writing paper.

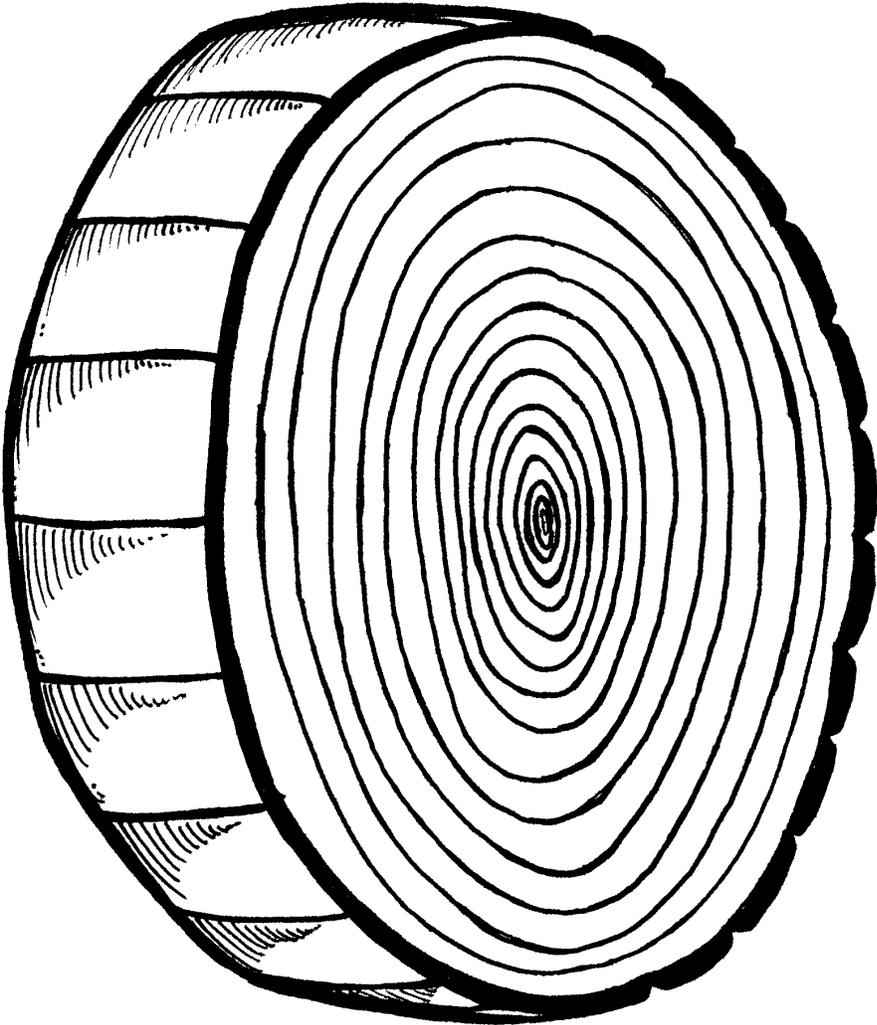
Concluding Event - Plant a Tree (optional)

- Arrange to have the students plant their own tree at home or plant a class tree. This activity must be done in May and can be accomplished by:
 - a) obtaining seedlings or small trees and planting instructions from a local greenhouse, and having students plant the trees at their school or at home, or
 - b) calling the Elbow Ranger Station in Bragg Creek (949-3846) to arrange to go to the Jumping Pound Demonstration Forest to participate in a reforestation project.

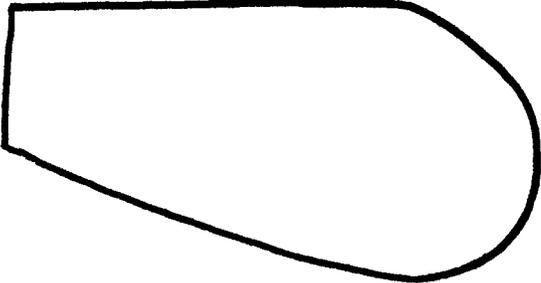
General Materials

- 1 whistle
- 1 stop watch or a wrist watch with a second hand
- signs to designate each of the events. Mount them on sharpened wooden dowels.
- paper, pencil, and clipboard to record times (optional)

CROSS SECTION OF A TREE (TREE COOKIE)



SEED PATTERN



Instructions for the Teacher Before the Field Study

1. Choose an area for the field study. The area should consist of a large, open field with some well-established trees next to it.
2. Arrange for program assistance by enlisting the help of parents, school volunteers, or high school students. During this program, the students will work in teams. A ratio of 1 volunteer to 7 students is recommended. The volunteers' roles are to assist you by physically lining students up where required, distributing and collecting materials, and acting as referees when needed.
3. Collect the materials for each game as listed on pages 7 and 8.
4. Divide the class into 4 groups with approximately 7 students per group, ensuring that the fitness level on each team is equal. If more than one class is participating, divide the group into 8 teams and have the teams rotate through the activities in pairs.

Teacher's Notes

Setting Up the Treelympics Activities

1. Before starting the *Treelympics* games, meet with the volunteers to go over the games with them and to answer any of their questions.
2. At the field study location, lay out all the materials needed for each game and activity with a sign labelling each game. Set up the activities as follows:

Introductory Event - How Old?

Place the tree cross-sections or illustrations adjacent to an open area.

Event #1 - Tree Tug

There are three components to this event. Component 1 requires a cluster of large, well-established trees. If these are not available, delete this component and proceed to component 2. For component 2, place the box of toothpicks in your pocket or in an easily accessible spot. For component 3, mark off an area with markers or flagging tape. The area should be large enough to enable the students to stand in a large circle with their arms outstretched, and not touching each other.

Event #2 - Sugar Shuffle

To prepare for this event, fill four ice cream pails with sugar cubes. Place the filled pails on the ground about two metres apart. Place the four empty pails on the ground at a predetermined distance from the first four pails. To determine the distance, take the number of students in your class, divide by 4 and add 3. The resulting number is the number of metres the filled and empty bowls should be apart. For example, if you have 28 students in your class, your bowls would be $(28 \div 4) + 3 = 10$ metres apart.

Event #3 - Big Gulp

Place paper cups and a garbage bag adjacent to the site. If the students have brought their own cups, ensure that each cup is labelled with the student's name. Have water available in several large water jugs.

Event #4 - Big Slurp

Set up the materials in a similar manner to that used in the sugar shuffle (event #2). Place two plastic pails on the ground approximately two metres apart. Fill each with two litres of water. Set the other two empty pails on the ground. Allow enough space between the two sets of pails so that each team can form a line standing side by side, their feet touching their neighbour's, between the full and the empty pails. Place one sponge in each of the four pails.

Event #5 - Seed Toss

For each group of five to six students, place five aluminium pie plates in a small circle on the ground. Have a bag of at least five cone seed patterns for each student available within easy reach. Each group of students will stand in a circle around a circle of plates.

Place a numbered sign beside each site, to guide the students' movement from event to event. Have a whistle, stopwatch, recording sheet, and pencil on hand.

Concluding Event

Obtain local tree seeds or seedlings for the concluding event which can be completed immediately after the *Treelympics* events, or at a later date.

Teacher's Notes

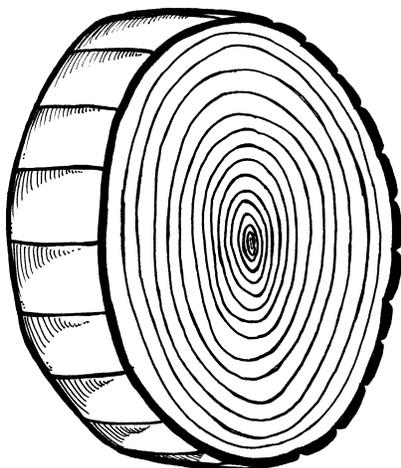
Instructions for the Teacher During the Field Program

1. Assemble your class at the field study site. Begin the program by asking students what makes up a forest. After the students have listed some of the components of the forest (trees, plants, animals, insects), mention that during this program they will be finding out more about the largest living things in the forest, trees.
2. Ask the students to list some of the parts of the tree and their functions. They may remember the parts they role-played in the *Let's Make a Tree* activity. Tell them that trees are remarkable things and that today they will do some activities and play some games to find out just how remarkable trees are.
3. **Introductory Activity**
As an introduction to trees, ask the students to guess the ages of the teacher, other students and the volunteers. (You can decide how accurate you want their guesses to be.) By having students focus on the ages of their peers and teachers, you will provide them with a relative yardstick against which to compare their ages with those of trees. The remarkable life span of many trees becomes more apparent to children when compared against their very young ages.
4. Ask them what the oldest living thing in the world is. (Stress oldest living thing, as students tend to suggest non-living objects such as mountains and prehistoric animals.) The students are usually able to arrive at the correct answer, a tree. Explain to the students that there are some trees alive today that are thousands of years old. (A Bristlecone Pine in California is over 4600 years old.) The oldest known living tree in Alberta is a 720 year old Engleman Spruce that grows near the Columbia Icefields in Jasper National Park.)
5. Refer to the students' estimates of your age. Explain that while it may be difficult to guess the age of some people, a tree may offer some clues to its age.



One way to roughly estimate the age of a coniferous (also known as evergreen) tree such as a pine, is to count the number of sets of branches, called whorls, that grow out from the trunk. Every set of whorled branches shows approximately one year's growth.

If possible, use one of the trees in your schoolyard to illustrate this. With your students, count the sets of whorled branches from the base of the tree to the top of its trunk. The total number will give the approximate number of years the tree has lived. Compare the age and height of the tree to that of the students.



Another way to find out the age of a tree is to cut it down, and look at a cross-section of its tree trunk. This can tell you some important things about the tree's age.

Hand out one illustration or an actual sample of a tree cross-section to each student. Have the students describe what they see. The cross-sections will have a series of rings that become progressively smaller toward the centre of the trunk. Ask students how long they think it would take their tree to grow each ring (one year). If a class is looking at actual tree samples, ask the students to determine the age of their own sample. Have the students find the smallest circle in

the centre of the cross-section. They should then count the number of rings found from the centre to the outer bark. Depending on your group, you may wish to discuss why some rings are wider than others. Each ring consists of a lighter area and a darker area. The light area is spring growth, the dark area is summer growth. Different conditions (temperature, rainfall, etc.) affect the amount of growth each year.

Collect the illustrations or cross-sections.

6. Briefly review the idea that trees are the oldest living things in the world. Ask the students what the tallest and heaviest living things on earth are. Again, the answer is trees. (Some trees reach a height of 40 stories, and contain enough wood to build 80 houses.)
7. Have students compare the structure of trees with their own body structures. Ask students to think of the parts of a tree that would be similar to their body parts:
 - our skin is like a tree's ... (bark)
 - our arms are like a tree's ... (branches)
 - our body is like a tree's ... (trunk)
 - our hair is like a tree's ... (leaves)
8. Summarize the group's conclusions to this point; trees are similar to people in some ways, yet very different from people in others. For instance, have your students predict who would win a foot race across the schoolyard, the class or a tree? The answer, of course, is that the children would win. Explain that one of the interesting characteristics of trees is that they are able to survive even though they can't move from one place to another. In spite of not being able to move, trees can do some amazing things. Today, the students will have the opportunity to discover just how amazing trees are.

Treelympics Activities

9. Prepare your students for their competition by reviewing the purpose of Olympic events, games in which athletes from many countries compete to see which individuals are the strongest, fastest, and most skilled. Explain that in *Treelympics* the class will be competing in a series of events against trees. Students will compare their own strength, speed, endurance, and abilities to those of trees.
10. To prepare for the athletic events have the students join you in a warm-up activity. (After all, athletes participate only after preparing their bodies. This also allows the class to burn off some excess energy!) Warm-ups could include:
 - reaching as tall as a tree, 5 times
 - side flexing (bending like a tree in the wind)
 - toe touches, 10 times
 - jumping jacks, 10 times
11. Once you have done the warm-ups, have the students compete in the following *Treelympics* events:

Event #1 - Tree Tug (Three Tests of Strength)

This event is composed of three tests of strength. If a grove of large trees is available, start the event with component A. If it is not available, delete A and begin with component B.

Component A - Push Me/Pull You

Explain that the first event includes three tests of strength. Stressing the need for safety, challenge 5 members of your class to work together to try to push you gently and make you take three steps in any direction. (Offer your students a challenge by telling them that you have been in serious training for the event!) Students should group behind you and listen for a "1-2-3" count to begin the test. Allow yourself to be shifted after some effort.

Congratulate your students and then challenge the class to work together to try to move a tree. Have the children gather together in small groups around trees that are at least 20 cm in diameter. Stress that the tree and its branches are not to be damaged. On the signal, have the students push against the tree trunks for a few seconds. Can they move the trees as easily as they moved you? Cheer them on. After a few seconds, gather back as a large group. Ask why they were able to move you so easily, but were unable to budge a tree from its position. Answers usually focus on tree size or the characteristic strength of wood and tree roots.

Component B - Toothpick Pull

As some students may think that a tree derives its strength solely from its size, ask pupils to test their strength against a tiny sample of wood, a toothpick. Hand out one toothpick to each student. Have players hold their toothpick at each end between the thumb and the first finger of each hand, with their elbows pointing to the horizon to ensure that no bending of the toothpicks occurs. The task is to try to pull the toothpick apart without bending it. It is almost impossible for a child or adult to pull a toothpick apart. Wood derives its strength both from the materials of which it is made and from the way the cells fit together.

Collect the toothpicks.

Component C - Out on a Limb

Move to an open area and have the group form a large circle. The students should be spaced so that each player can extend both arms without touching the surrounding players.

Find out if the students are familiar with weight lifters. If required, provide a brief explanation. In *Treelympics*, the competitors will be weight holders rather than lifters. The students will compete against the trees to see how long they can support their branches (arms) when suspended in a horizontal position.

Students can simulate a tree "posture" by holding their arms out to the sides of their bodies like branches. On a signal start the event. The players must hold their branches straight out to the sides for as long as possible. If either arm drops, the player sits down on the ground and becomes a referee. While your students are role-playing, use seasonal analogies to describe situations a tree might face. (For example: "You're a tree. It's winter, and a blizzard arrives. Can you feel the weight of the snow on your branches? How do you feel as a tree?" Pause. "Now, it's spring...")

After a few moments, the arms of the first students begin to drop. There may, however, be a few determined players who refuse to admit defeat! If this is the case, when you have only a third of the players remaining, adjust the competition. Announce that you will time them to see how many of the trees can survive until the end of the season. Continue for 15-30 seconds and then end the competition.

Congratulate all the players. Remind participants that trees are never able to relax their branches as people are able to rest their arms. Trees can hold the weight of their branches for years, because of the amazing material they are made of, wood.

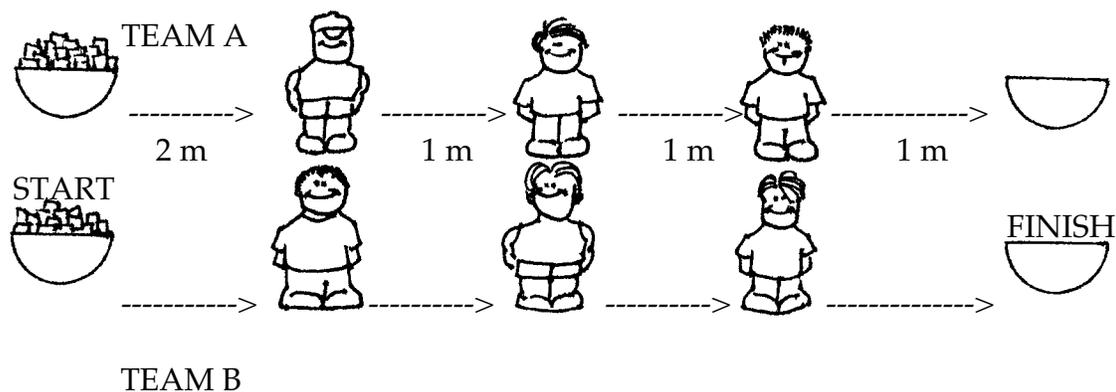
Ask students who they feel are better suited for weight holding, trees or people? The answer should be clear, the trees.

Move to Event #2.

Event #2 - Sugar Shuffle (Food Transport)

Ask students how they feel if they miss a meal. Explain that both people and trees need a steady supply of food. People get food from plants and animals. Trees make their own food using water, nutrients from the soil, and energy from the sun. This food and water is circulated through the tree in a liquid called **sap**. This process is similar to the way blood circulates food and water through the bodies of animals. Sap moves through tubes called the phloem (flŌ'em) which are located in a thin layer just inside the bark of the tree.

In this activity, competitors will race to see whether trees or people are more efficient at moving sugar. Divide the class into four teams. Each of the teams will line up in single file behind their bowls. Players are to face the bowls containing the sugar cubes.



The object of the game is for each team to move all the sugar cubes from the full bowl to the empty bowl as quickly as possible. On a signal, the leader of each team runs to his team's bowl, picks up one sugar cube and runs back to the second player on the team. The cube is then passed from one member to another down the team's line. The last player then runs and drops the cube into his team's empty bucket. As soon as the leader has handed over the first cube, he/she returns to the bucket for a second cube. Each team should try to keep as many sugar cubes moving down the line at any one time as possible.

Suggestions:

Start with four end players who like to run. After a few passes, when the leaders begin to tire, reverse the positions of the first and second players from each team. (The second players move into the leaders' positions and become runners. The former leaders assume the #2 positions.) As leaders continue to tire, replace them with the next players in line so that each child has a turn as his team's runner.

After each minute of play, increase the number of cubes which may be picked up from the bowl. This helps shorten the game considerably.

During the event, stress the time factor and encourage both teams to be finished by a certain time. Four to five minutes should be the maximum time allowed. If you estimate the relay will last any longer than this, quickly increase the number of cubes that may be passed at one time.

Cheer for both teams. Upon completion of the relay, congratulate your students for winning the **speed event**. It would take a tree all day to move an equivalent quantity of sugar. Stress, however, a tree's endurance. Trees move sugar constantly for five months of the year. In a single growing season, a mature tree can move enough sugar to fill four half-ton pick-up trucks with sugar cubes. Trees produce their own sugar supply using water, air, nutrients from the soil and energy from the sun as ingredients. Ask students who wins the **Sugar Shuffle endurance event**. Most will admit that the trees win hands down.

Move to Event #3

Event #3 - The Big Gulp (Water Consumption)

Have the group form a standing circle, with all players facing the centre of the ring. Hand out one paper cup to each student or give the students the cups they brought from home.

Ask the students what they would want most after working hard on a hot day (water). Trees, like people, work hard each day to survive. One of the most important things for a tree's day-to-day survival is water. Water is one of the basic needs for both people and trees. Water comes from our environment and is essential for all living organisms' survival.

The *Big Gulp* will demonstrate that trees consume more water each day than people. The students' goal is to count and see how many glasses of water they can consume in 30 seconds.

Have the parent helpers fill each child's cup with water. Parents should then stand inside the circle. On a given signal, the children are to carefully drink the first glass of water. If players feel able to drink another glass of water, the empty cup should be held up to be refilled by the parent volunteers. Stress that the children are to stop drinking at once if they begin to feel waterlogged. As you time the event, ensure that the children remember to count the number of glasses of water they consume. Indicate the 30-second mark so that parents stop refilling the cups. The students may finish drinking the last glass of water poured. Quickly calculate the number of glasses consumed by the class. Compare the class' consumption with that of the average tree.

Based on 30 seconds of consumption, the class is very fast at drinking water. Again, the students win the **speed event**. Trees, however, use water continually and can use up to 900 litres (~200 gallons) of water per day. (This would be the equivalent of 8,533 three-ounce paper cups or more than four 45 gallon drums.)

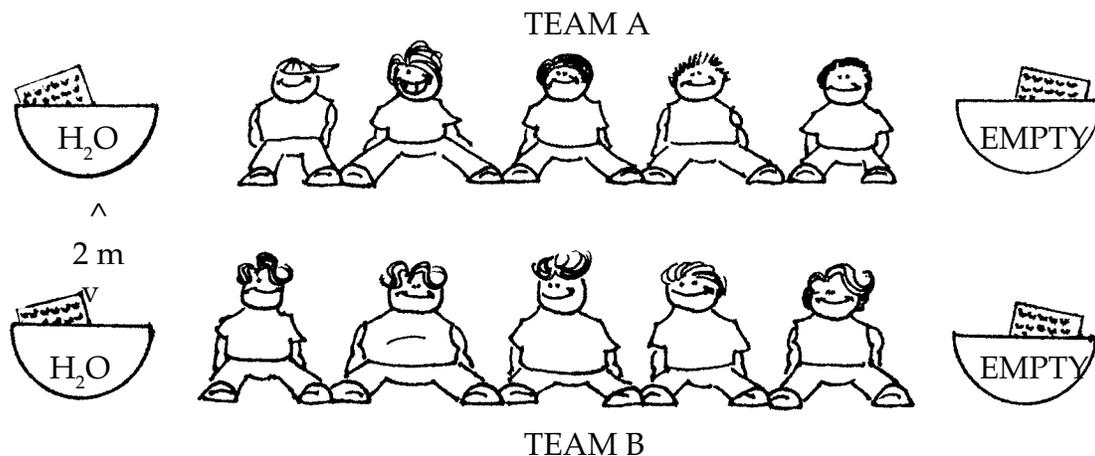
Ask the class who wins the **Big Gulp endurance contest**. They should agree that the trees win again. Collect the student's cups in the garbage bag.

Move to Event #4.

Event #4 - The Big Slurp (Water Transport)

Trees require water to produce their food. As with the downward movement of sugar, trees face a challenge in moving water upwards from the roots to their leaves. Trees have solved this problem through specialized structures. The roots act like sponges and absorb water from the soil. This water is then carried from the soil up the trunk through tiny tubes, known as the xylem (zi' lem). The tubes are found in a thin layer underneath the bark, and resemble a set of long straws stretching the length of the trunk. The leaves then use the water to produce food.

In the **Big Slurp**, two teams of students will simulate a tree and move water from the roots to the leaves (or from one end of the line to the other). Space each member of the two teams in a line between the water-filled bucket and the empty bucket. Players should stand side by side, with feet touching. The players standing closest to the water-filled buckets will become the tree's roots; those in the middle portion of the line will be the tubes (xylem); and those at the end of the line, the leaves. The game's objective is to see how quickly each team can use sponges to move the water from one bucket to the other.



On a signal, each player standing closest to the water filled bucket soaks up their sponge and then passes it to the player standing next in line. At the same time, each player next to the empty bucket sends the dry sponge back down the line in the opposite direction. The passing of the saturated sponge represents the upward movement of water from a tree's roots to its leaves. When the water-filled sponge is passed to the last player, its contents should be squeezed into the empty bucket and the sponge passed back down the line. When this empty sponge reaches the student at the head of the line it should be dipped back into the water. This procedure is then repeated as the sponges move up and down the line. Continue until all of the water has been moved from one bucket to the other.

You may structure the activity so that the teams compete against each other, or compete together against the clock.

Upon completion of the event, congratulate the players for their fast efforts. Remind students, however, that a tree moves water during the entire growing season. As before, the students win the **speed category** while the trees win the **endurance category**. Students will likely agree that trees are more effective water-movers over the course of a year.

Ask the students to imagine what would happen if some of the middle players in the line were removed during the relay race. (Water could not be moved effectively.) Explain that the same thing happens to a tree if parts of it are damaged. In the tree, water tubes are located just under the bark and any cut or wound to the trunk can sever the water tubes (xylem) leading from the roots to the leaves. The water supply is then cut off. Trees, in spite of their apparent size and strength, are vulnerable to human and natural attacks. Ask the students if carving their initials in a tree or cutting a ring around the tree would harm it. From what they now know about trees, they should realize that the removal of the tree's bark will affect the tree in some way.

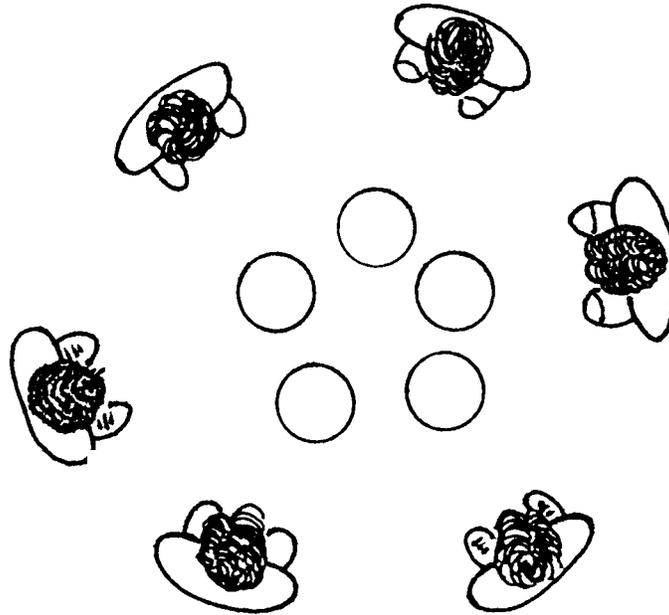
Move to Event #5.

Event #5 - Seed Toss (Seed Dispersal)

This event demonstrates how trees increase the chances of their seeds taking root, thereby ensuring their survival as a species.

Trees are unable to get up and move to a new location in search of better growing conditions. When evergreen trees produce cones there are no guarantees that the seeds in the cones will land in places which offer enough soil, sunlight, water and space to allow the seeds to grow. However, if the seeds are able to land where all of their needs are met, the chances are much greater that the seeds will grow into trees.

In this event, students will imagine that they are trees in the forest. Each tree is ready to distribute seeds by releasing them from the mature cones (a cone is represented by a bag containing the paper seeds) that are attached to the tree. Each player is to release their paper seed and try to send it spiralling down to a good growing place, a place represented by aluminium pie plates.



Have groups of 5 - 6 students form circles facing the pie plates. Players should be standing about 30 cm from the nearest plate. Hand out the paper seeds to the participants.

Have the students hold their arm out in front of them as if it were a tree branch. Their paper seed should be held in their outstretched hand. On a signal, have them let go of their paper seeds and watch them flutter to the ground. Count to see how many of the paper seeds successfully landed in the plates. Have the students remove the paper seeds from the plates and repeat the activity with students tossing three and then five paper seeds simultaneously per round.

Compare the success rate of paper seeds landing on the plates for each round. Students should observe that more seeds land in the plates when the total number of seeds tossed is increased. Explain that trees do the same thing; the more seeds a tree produces, the greater the chance that at least a few will reach good soil and grow into healthy trees. If possible, point out cones growing on a nearby evergreen tree. (Studies have shown that a viable spruce, pine or fir cone (one containing seeds that are capable of growing) will contain approximately 32 seeds.)

Have students collect the paper seeds and the pie plates for use in future programs.

Concluding Event

If possible, return to the area where the program was introduced and have students sit comfortably underneath the trees. Quickly review the five activities. Conclude with the idea that trees are very special living things. Ask the students to think of ways in which people can help trees. (Students could plant a tree, care for a tree, use less paper, and recycle paper so that fewer trees need to be cut down.)

Have the students and parent volunteers help you gather together all the materials used for each event and then return to class.

Optional

1. An excellent ending to this program is to offer students the opportunity to plant a tree in a forested area. This can be done in cooperation with the Alberta Forest Service. They can, with an advanced booking, arrange a reforestation program with you and your students at the Jumping Pound Demonstration Forest in the Sibbald Flat area of Kananaskis Country. This program is offered in May, as that is the best time of year to plant tree seedlings. You can obtain seedlings and information about how to plant them from most local greenhouses.
2. If you wish to have your students plant a tree at home, it is important for them to know that seeds and seedlings collected in one area of the province must be planted in that same area. This is because all trees in the province, even if they are the same species, have had to adapt to the conditions in which they live. For example, a tree growing in the Bow Valley is well adapted to chinook winds. Seeds from that tree should be planted in the Bow Valley where they will have the greatest chance of surviving.

It is also important for students to know that small trees need good soil, water, protection from animals, and shade. Contact your local greenhouse or the Alberta Forest Service for further information on a planting activity.

4.0 POST-FIELD STUDY

The following activities will give students the opportunity to further explore the concepts learned during the *Treelympics* games and activities.

ADOPT-A-TREE

Have your students adopt a tree. Ideally, the trees chosen should be easily accessible to your class. If their tree(s) can be seen from your classroom window, all the better. Make several visits throughout the year, and compare observations from each trip.

The accompanying list offers suggestions of how to help focus your student's attention to their tree. Pick and choose as you see fit. Students can record their observations in booklets.

ALPHABET TREE

Can you find an "A" word, a "B" word, a "C" word, and so on, that describes your tree? Use all of your senses.

BARK STUDY

Investigate the colour, texture, and shape of the tree's bark. Look for different kinds and ages of bark. Take a piece of paper and a crayon and make a bark rubbing from two different kinds of tree bark.

COMPOSTING TREE WASTE

In a corner of the school grounds, build a 1 m x 1 m box from chicken wire and 2 x 4's. Fill the box with leaves from your tree, layered with dirt, and fruit and vegetable waste from the school cafeteria. Keep the pile moist but not soggy, and turn it over regularly. Watch as the leaves and other materials begin to decompose and turn into compost. (This could also be a home project.)

HOMES

Find out who else has adopted your tree. Look for nests in the branches, holes in the trunk, cocoons under the bark or amongst the leaves, burrows under the tree, and other mini-homes.

LEAF COLOURS AND SHAPES

Compare the colours and shapes of different leaves. Can the same tree have leaves of different shapes and colours? How many different shapes and colours of leaves can you find in the school yard or neighbourhood?

CONE ANIMALS

Collect cones from different evergreen trees. Use the cones to make cone animals. Use construction paper, felt, twigs, and seeds to add arms, legs, wings, tails, eyes, plumes, hair or other features.

MUSICAL TREES

Some native people used to listen to the music of a tree by putting their ear against the trunk. This is especially fun with aspen trees on windy days.

MYSTERY TREES

Make up clues about your tree. See if someone else can find your tree using your clues.

NAME CALLING

How many different kinds of trees are in your schoolyard, or in the park? Can you invent a name for each tree based on its characteristics?

POETREE

Make a list of five, ten, or twenty words about your tree. Arrange the words in a way that they sound best. Print them on a piece of paper in the shape of a tree.

SMILE, YOU'RE ON!

Take pictures of your tree throughout the seasons.

TALKING TREE

If your tree could talk, what would it tell you? Share some of its secrets in a paragraph.

TREE SIZE

How big is your tree? How many ways can you think of to measure it?

WILL IT HEAL?

Go outside and try to locate different forms of damage on trees. What caused the injury? How do trees work to heal themselves? Think of three ways people can work to protect trees.

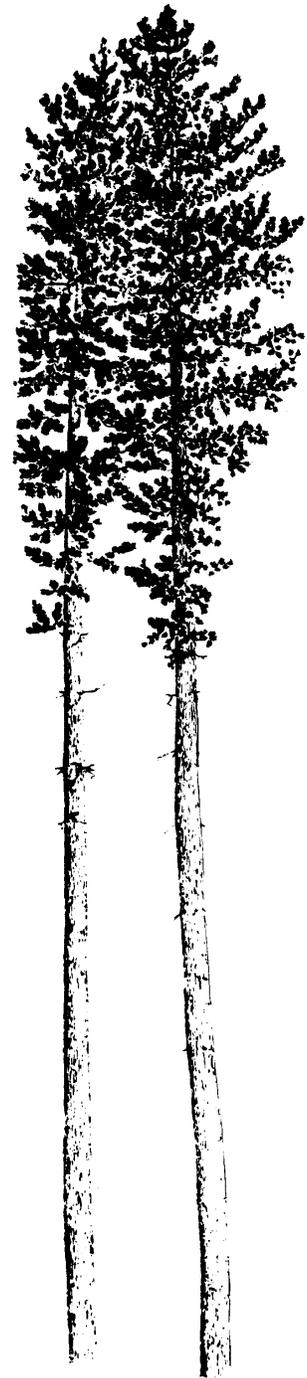
TREE PATROL

After looking for signs of tree damage, form a tree patrol to go around and help the trees heal themselves. Trim broken branches and apply tar to stop the "cut" from bleeding and to seal the trees against bacterial and insect invasion.

ARE YOU A TREE EXPERT?

Answer the following questions true or false to see if you are a tree expert. Put a **T** (True) or an **F** (False) beside the number.

- ___ 1. Trees have clues that tell you how old they are.
- ___ 2. Because wood is weak, a human can easily push over a tree.
- ___ 3. Wood is stronger than flesh or bone.
- ___ 4. In the speed event, humans can move sugar faster than trees.
- ___ 5. In the endurance event, trees would be better at moving sugar than trees.
- ___ 6. In the speed event, humans can drink water faster than trees.
- ___ 7. In the endurance event, trees would be better at moving water than humans.
- ___ 8. If you were a tree, you would like to have as many cones as possible to give you a better chance of making other trees.
- ___ 9. If a tree's water tubes (phloem) are harmed, the tree may die.
- ___ 10. A small human armed with only a pocket knife can kill a tree.



5.0 FURTHER READING

Alberta Forestry Association. Alberta Trees of Renown—An Honour Roll of Alberta Trees. Alberta Forestry Association, 1984.

Hosie, R.C. Native Trees of Canada. Ottawa: Canadian Forestry Service, 1975.

Junior Forest Wardens Girl Forest Guards Training Manual: Forestry I. Vancouver, B.C.: Junior Forest Wardens Association of Canada, 1973.

Kananaskis Country. Tracking the Trees and Shrubs of Kananaskis Country. Alberta Recreation and Parks.

Kananaskis Country Environmental Education Section. Forests and Timber Management. Alberta Recreation and Parks.

Kananaskis Country Environmental Education Section. Vegetation. Alberta Recreation and Parks.

Suzuki, David. Looking at Plants. Toronto: Stoddart Publishing Co. Limited, 1986.

Wilkinson, Kathleen. Trees and Shrubs of Alberta. Edmonton: Lone Pine Publishing, 1990.

6.0 TREELYMPICS PROGRAM EVALUATION

Kananaskis Country Environmental Education materials have been developed to provide you with teacher-directed units of study. These are *living documents* that undergo changes on a continual basis.

The purpose of this questionnaire is to find out if these materials are meeting your teaching needs. Your comments are valuable to us. Please take a few minutes to complete this evaluation so that we may continue to improve your materials.

School name	Grade level taught	Your name <small>(optional)</small>

- ★ How did you hear about the program?
- workshop
 administration
 in-service
 newsletter
 fellow teacher
 other (please specify) _____

- ★ Did you use all of the program? yes no
- If you answered **no**, which part did you **not** use and why?
- _____

- ★ On the bar line below how would you rate the program in the following categories:

	YES	NO
• appropriate for grade level (✓)	-----	-----
• clear instructions	-----	-----
• text easy to follow	-----	-----
• relevant to curriculum	-----	-----
• materials easy to use	-----	-----
• did you enjoy the material	-----	-----
• did your students like the material	-----	-----
• program of appropriate length	-----	-----

- ★ Approximately how long did it take you to complete these materials?
 1-2 weeks 3-4 weeks 5-6 weeks longer than one month
 program was spread over the year

- ★ Were you satisfied with how these materials fulfilled the curriculum objectives?
 yes no
If you **were not** satisfied, please elaborate: _____

- ★ Did you require any additional information to complete any part of the program?
 yes no
If **yes** please tell us what was required:

- ★ Would you use these materials next year?
 yes no
If you answered **no** please tell us why: _____

- ★ Any additional comments about the program in general? _____

Thank you for completing this questionnaire. Please place the completed questionnaire in an envelope and mail to:

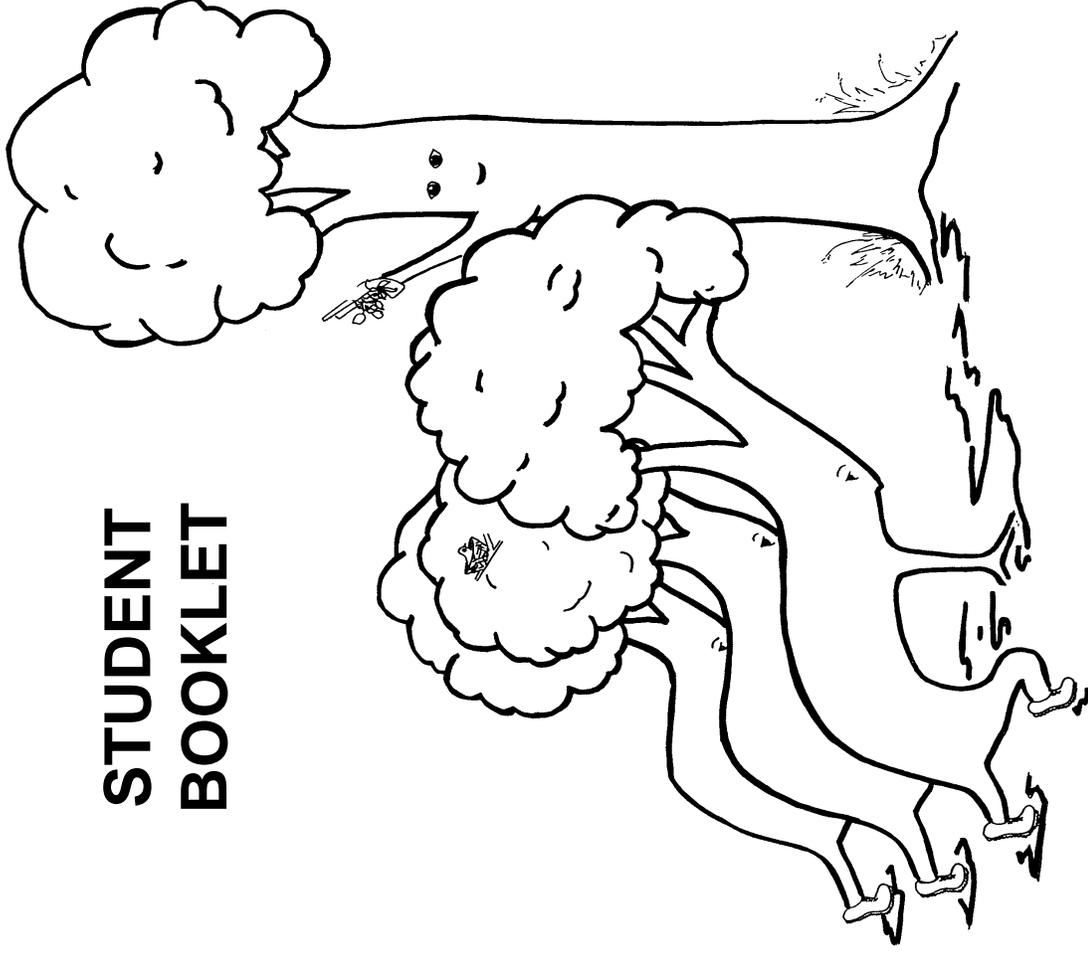
**Environmental Education Coordinator
Alberta Environment, Natural Resources Service
Kananaskis Country
Suite 201, 800 Railway Avenue
Canmore, AB T1W 1P1
Phone: 403-678-5508 Fax: 403-678-5505**

SUMMARY

In the space below, write how you FEEL about trees. You could write a sentence, a poem, a drawing, or just some describing words.

TREELYMPICS

STUDENT BOOKLET

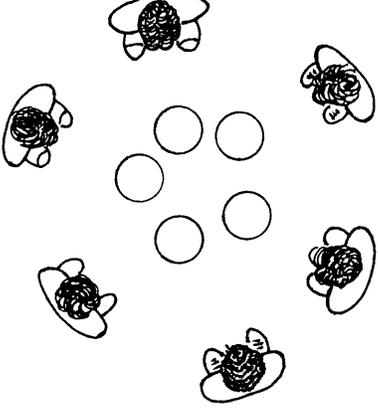


HOW OLD IS IT?

Draw your tree cookie in the space below.

EVENT #5: SEED TOSS

Write what you did during this event.

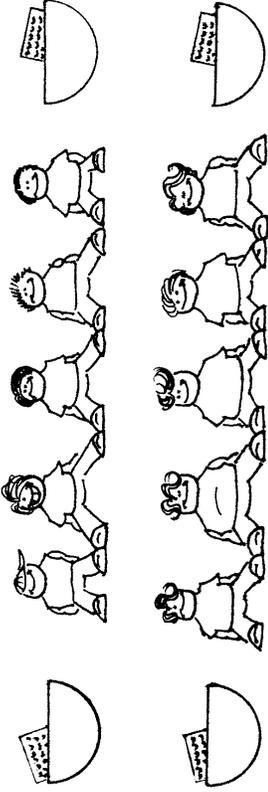


Write one thing that you learned during this event.

How old is your tree cookie?

EVENT #4: THE BIG SLURP

Write what you did during this event.



Write one thing that you learned during this event.

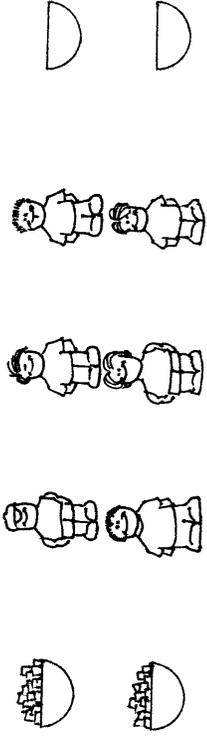
EVENT #1: TREE TUG

Draw what you did during this event.

Write one thing that you learned during this event.

EVENT #2: SUGAR SHUFFLE

Write what you did during this event.



Write one thing that you learned during this event.

EVENT #3: THE BIG GULP

Draw a picture of what you did during this event.

Write one thing that you learned during this event.
