WINTER DAY

Fifth Grade – Rahr Memorial School Forest

ENDURING UNDERSTANDING

Plants and animals have adaptations that allow them to survive Wisconsin's winter conditions. Winter can be harmful to humans in many ways, including hypothermia, if you are not prepared.

ASSESSMENT

Students will be able to demonstrate their understanding by listing signs and symptoms of hypothermia, displaying appropriate dress for outdoor activities in winter, graphing how well different materials insulate, explaining how plants and animals survive during winter, and identifying three tree species by examining their buds.

WISCONSIN'S MODEL ACADEMIC STANDARDS

English Language Arts: C.8.2, F.8.1
Mathematics: A.8.2, D.8.3, E.8.1
Science: B.8.4, C.8.6, F.8.1, F.8.2, F.8.6, F.8.7

OUTLINE

MATERIALS

Snowshoeing
- Snowshoes
- Directions and Tips for snowshoeing

You and winter
- Data sheets
- Clipboards
- Pencils
- Percolator w/ water
- Thermometers
- 40 small containers (10 with a lids)
- 4 tubs to use as covers
- 4 Styrofoam pieces
- Hypothermia poster
- Winter clothing samples
- Clothing insulation materials (fleece, fake fur, etc.)

Animal Adaptations
- Animal Signs Scavenger Hunt sheets
- Animal Track field guides
- Clipboards
- Pencils
- Winter scenario cards
- Food pyramid
- Cedar branch
- Branch with eat marks from rabbits
- Winter scene poster
- Photo of a fox
- Photo of a grouse
- Large bag of M&M's (one bag/school)

Trees in winter
- Examples of branches
- Dichotomous keys
- 15 labeled trees outside
- Paper
- Pencils
- Clipboards
- Map of labeled trees and teacher key
- Broken soda can
- Chalkboard

Snow Study
- small plastic jars with lids (16)
- white socks (4)
- blue socks (4)
- house insulation sample
- thermometers (8)
- Snow Study record sheets
- Pencils
- Clipboards
- Wind chill charts
- Jello
- Plastic cups
- Plastic spoons
- Percolators w/ water
- Chalkboard

CLASS PROCEDURES

I. Set-up

After setting up a date with the School Forest Secretary, teachers are also responsible for filling out and submitting a field trip request form. Teachers should also schedule a time when the School Forest Coordinator can meet with them at school to discuss the visit. Teachers will be asked to teach or co-teach one of the activities while the student groups rotate through the activities during the day. The School Forest coordinator may also teach at one of the stations during the day. Preparation time will be needed to review the activity.

All of the materials needed for this day can be set-up at the School Forest. Please let the School Forest Coordinator know the class needs. Teachers will need to bring a few things from school: first aid kits, emergency contact information, extra clothing, and any additional activities they feel necessary for the class. Students will need to bring a bag lunch (with a drink and nothing that needs a microwave) and adequate clothing for the day.

II. Sample Schedule:

9:00	Depart from school
9:30	Arrive at the School Forest
9:30 – 9:50	Welcome and Introduction
9:50 – 10:45	rotation 1
10:50 – 11:45	rotation 2
11:45 – 12:20	Lunch
12:20 – 1:15	rotation 3
1:20 – 2:10	rotation 4
2:15 – 2:25	Conclusion
2:30	Depart from the School Forest
3:00	Arrive at school

III. Introduction

All plants and animals (including humans) in Wisconsin have ways of protecting themselves from winter conditions. Deciduous trees lose their leaves to prepare for winter. While squirrels gather food for later, birds fly south where they can find food. All winter survival depends on food and heat. Why do living things need food? Animals need food to create energy to move around and to create heat. Heat must be retained in the animal's body. Today we are going to be studying snow and how plants and animals survive Wisconsin winters.

IV. Snowshoeing

Fitting the snowshoes:

- Smaller people=smaller snowshoes
- Larger people=larger snowshoes
- Put snowshoes on outside (do not walk on concrete with them on)
- Slide boot in so that your toe is halfway into the open space (not all the way over the open space). This allows you to 'dig in' with your toe.
- Bindings – Tighten by pulling the top two straps up, then down and out (fast). The back strap should be tight and then press the lock down. You should not be able to fit your finger between the straps and the boot.

Walking:

- Walk with PLENTY of space between people. You should not be able to reach out and touch the person in front of you.
- Step OVER logs/obstacles SIDEWAYS – the snowshoes can bend and break if you step on something that is not flat.
- Stay on snow. Do not walk on sidewalks, driveways, sand, gravel, etc.
- To turn – do it slowly and with small steps

V. You and winter

A. Energy

Before class: You may want to start experiment #2 to get the most dramatic results.

Energy is the foundation for survival for animals and for humans. It is created from the food we eat. Our bodies are like a car engine – gasoline makes the car move and creates heat. A car engine will stay warm for a while after the engine is shut off. Likewise, we eat food and it gives us energy to move and to stay warm. We must have food to make energy and heat. It is a good idea to keep a candy bar or snack on hand when outside in the winter. Besides food, we can also maintain our body heat by insulating ourselves with warm clothing. During this class, we will discuss how the weather affects humans and how we can dress for it.

B. Put a lid on it?

Students will use the data sheet to guide them through this experiment.

After the experiment, discuss the results. A lot of your body heat escapes from your head. Wearing a hat stops some to this heat loss. Wearing a hat is like putting a lid on. It holds in the heat. So, it's very important when you're going out in winter weather to wear a hat.

C. Where to sit?

Students will use the data sheet to guide them through this experiment.

After the experiment is complete, discuss the results. When you are out hiking in the winter and need a rest. Don't sit directly on the cold ground. The cold will pass through your clothes pretty quickly. Since you are not likely to have a piece of Styrofoam with you when you are on a hike, can you think of other things that you could use to insulate you from the cold ground? How about leaves, evergreen boughs, a log, a backpack? All will work to keep you a little warmer.

(Check results from the previous experiment.)

D. Hypothermia

Hypothermia is a dangerous condition that people cannot diagnose for themselves. During this part of class, students will learn about the signs and symptoms of hypothermia and its treatment. Hypothermia is when the body's core temperature drops below normal. This happens when the body's heat loss (by conduction, convection, evaporation, respiration, and radiation) exceeds our heat production. Use the Hypothermia poster to go through the different stages of hypothermia and how to treat each one (see the additional information section of this lesson plan for more details). Ask a few students to act out the stages.

E. Coping with the C-O-L-D

Prevention is the best way to avoid hypothermia. To avoid heat loss, stay out of the wind, stay dry, and dress correctly. As a rule, use the acronym COLD.

C - Keep your clothes *clean*. Clothes are made from intertwined fibers that help trap air to insulate the body. When dirt disrupts the fibers the clothing cannot retain heat.

O - Avoid *overheating*. Being too hot can also be dangerous. When the body overheats it uses up valuable energy that could be used more efficiently. Humans sweat to cool down. As the sweat evaporates it cools the body considerably, even to a hypothermic state. And just like dirt, sweat fills the spaces in clothes and decreases insulation.

L - Wear your clothes *loose and layered*. Insulation is formed when air is trapped between layers of clothing. If clothing is too tight, this area of warm, trapped air is lost. In addition, dressing in many layers allows a person to add and remove layers as necessary to regulate their body temperature.

D - Stay *dry*. Wet clothes lose their insulation quality. If snow gets on your clothes, shake is off instead of rubbing it away. Rubbing it off will only drive the snow's moisture into the fibers of your clothing. High quality raingear is a necessity for wilderness travelers.

F. What to wear

What kinds of clothing do we wear in the winter? We wear darker clothing to absorb more heat. As with house insulation, the air pockets in our clothing do not allow heat to escape from our body. One of the best ways to create air pockets is to dress in layers. This also helps when you become cold or warm because you can easily add or remove layers. Look through the catalogs to see how different winter clothing is described.

If you have time, choose a student to dress in winter wear. Demonstrate using layers while discussing the benefits of certain fabrics. Make sure to include wearing a hat (preferably their own), mittens or gloves, wool socks, boots, and a water/wind proof layer on the outside.

When you go outside this winter, be prepared. Review what the students have learned.

VI. Animal adaptations

A. How do animals survive

Discuss different ways animals have adapted to survive in winter. See the Additional Information section of this lesson plan for examples. You may want to save this discussion for during the Winter Scenarios activity.

B. Animal signs scavenger hunt

Divide the students into small groups. Give each group an Animal Signs Scavenger Hunt sheet, clipboard, and a pencil. Hike away from the buildings. As you are hiking, look for items on the scavenger hunt sheet. Use the field guides to help identify the animal tracks. You do not have to identify the name of the animal but you can discuss the size of the critter, which way it was traveling, and where it might be headed.

C. Winter scenarios

Divide the class into small groups. Give each group a Winter Scenario card that identifies an animal and its winter survival strategy. Provide time for the groups to plan and practice

skits that show what their animal does in the winter. Sound effects and props may be used. After each skit, the other children should try to guess the identity of the animal and its winter survival method.

D. M&M activity

Start by giving each student a small handful of M&M's. Tell them not to eat the candy now, but they will be able to later. Place the candies in front of you. These M&M's represent two-week's worth of food. (As the teacher, you may decide to vary this activity.) Now, ask the students a variety of questions such as:

> Pretend you are a fox. You must eat one rabbit every three days to survive. The blue M&M's represent rabbits. One blue equals one rabbit. That means that you must have at least four blue ones to stay alive. How many students will not make it for two weeks as a fox?
>
> The red M&M's are owls. Count your red M&M's. The yellow M&M's represent foxes. Count the yellow ones. You are a rabbit. If you have at least four owls and four foxes, you will probably be dinner for one of them. Is there anyone who will stay alive?

Discuss animal populations. At the beginning of winter there may be many rabbits, but that number decreases through the winter. How does that affect the fox and owl populations? What if we get a lot of snow and the foxes cannot catch the rabbits?

VII. Trees in winter

A. Tree survival

Discuss how trees survive winter. Have the students look outside at a pine tree. How do the needles survive without freezing? The needles reduce the water content in winter and replace it with oils. What happens when you leave a can of soda to freeze? The water in the can expands as it freezes and the can bursts. Relate this with the water in the tree leaves. If the water in the cells of the leaves were to freeze, what would happen? Think back to the soda can or remember what happens to a tomato or cucumber that freezes in the garden. They turn to mush because the cell walls were broken. That would happen to a leaf too. Look at the container of oil. Notice how oil is much thicker than water? So that is why coniferous trees can keep their leaves on during winter.

Now, how do deciduous trees survive the winter? They lose their leaves and they send their sap down into the roots in the fall. (The sap returns to the branches in spring, hence we collect maple sap to make syrup in the springtime. It takes 40 gallons of sap to make 1 gallon of syrup.)

B. Tree identification

It is very different to identify deciduous trees in the winter when there are not any leaves to help. The students will learn how to identify a tree by looking at the buds. We will learn three tree species: oak, maple, and beech. Pass out the dichotomous keys. Discuss what a bud is. Discuss how to use a dichotomous key. Show students the difference between opposite and alternate branching. Go through the key with example twigs.

C. Tree I.D. hike

Follow the Tree I.D. map located in the back of this lesson plan. Stop to identify different trees as you travel. Once you reach the Tree Identification Course, have the students get into groups of two. Tell the students that they will have to travel along the course, stopping at the marked trees to identify them. Encourage them to space themselves out along the trail and use their dichotomous keys. They should record their answers and bring them to you to check when they are done. Once everyone has completed the course, go through the answers to each of the course trees. Near the end of the hike, discuss what was learned and encourage the students to examine the buds on the trees near their homes.

VIII. Snow study

Start Jello experiment right away.

The objectives of this class are for students to understand how snow can be an insulator, identify the insulating qualities of various types of cloth, and define wind chill.

A. Conditions and temperature experiment

Assign the students to groups of 2-4. Give each group four bottles (labeled A, B, C, D), one blue sock, one white sock, a thermometer, a recording sheet, and a pencil. Ask students to carefully fill each bottle with hot water from the percolator. Now, record the temperature of each of the bottle on the recording sheet. Have one member of the group wet the blue sock. Before you go outside, review where the jars will be placed. Each jar will be subjected to the winter elements under different conditions:

Jar	Conditions
A	Unwrapped and placed on top of the snow
B	Unwrapped and placed in the snow
C	Wrapped in a WET cloth and placed on top of the snow
D	Wrapped in a DRY cloth and placed on top of the snow

After the jars have been placed, go inside and continue the class. After a while, go back outside to measure and record the temperatures of the jars.

B. Jello experiment

Discuss the need for animals to find protection from the wind in winter. Arrange students in pairs. Give each pair a plastic cup with hot jello in it (or have them make their own jello). This cup of jello is now their “animal” that lives at the School Forest. Instruct the students to take their container outside and place it in the warmest place they can find. Give them about 3 minutes to do this. Now go inside to discuss insulation in winter.

C. Insulation

Explain and discuss how insulation works by creating millions of tiny air “pockets” so heat passes through the material slowly. Show a sample of house insulation. For example, we use a hot pad in the kitchen to take a hot pan out of the oven because the pad insulates our hand from the heat. Now discuss the insulating properties of snow. Explain that there are millions of tiny air pockets in snow and that it can be warmer under the snow than on top of the snow. This is especially true in fresh snow that has not been compacted.

D. Results and Analysis

Now, go outside and check on the bottles. Measure and record the temperature of each bottle. Then, retrieve the jello containers. Look at the jello container while you are still outside. If some of the jello can not be poured out of the container, that "animal" got too cold and "died."

Lead a discussion about the results. Discuss other spots where it may have been warmer. Discuss the results from the containers. Ask the students to explain why the jars had different temperatures. Talk about how the wet sock compared to the dry sock as an insulator.

Pass out the wind chill charts and discuss what wind chill is. Imagine being an animal at the School Forest during the winter. In summary, animals and humans need to stay warm and dry in winter to survive. Animals are adapted to live in cold but humans are not. That means we need to take extra precautions, such as dressing appropriately, to survive in winter.

IX. Conclusion

Review what was discussed during the day at the School Forest. Ask a student to explain the lives of different forest creatures during winter. Imagine going on a winter camping trip. What should people be careful of in winter conditions? How can we identify trees in the winter? Explain how to use a dichotomous key. Explore the use of wind chill measurements in weather reports.

X. Clean-up

- Return supplies to building
- Take garbage out to dumpster
- Close windows, shut off all lights, make sure all faucets are turned off, lock doors, shut driveway gate
- Give the School Forest Coordinator feedback on how to make this trip better in the future.

Safety

While at the School Forest, teachers should carry first aid kits. You can bring these from your school or use the ones at the School Forest. The first aid stations can be found in the Ehlert Lodge office, ELC classroom, and the upstairs of the Krejcarek Building. Please report any safety issues to the School Forest Coordinator.

Students should be supervised at all times. If you decide to go off trail, go in a clear area where branches cannot swing back and hit someone. Be aware of the plants you are traveling around so as not to pass by thorn covered plants.

Optional Activities - These activities can be done is the weather is poor or if there is extra time during an activity. Please notify the School Forest Coordinator if you plan to teach any of these activities. ***You may want to teach these activities at school after your School Forest trip as a follow-up.***

Whachamacallit Weirdo – worksheet attached to the back of this lesson plan

Adaptation Artistry – worksheet attached to the back of this lesson plan

Evaporation 1 – Materials: thermometers, paper, pencils, cotton balls, rubbing alcohol

- Ask students to define what normal body temperature should be (98.6°F or 37°C).
- Identify why the temperature of the body is important (the body does not function properly if it is too hot or too cold, extreme cold or heat will physically damage tissues and organs, etc.). Remind students of what it feels like to have a fever.
- The temperature does not have to be below freezing for there to be a risk of hypothermia. It is common when the temperature is between 30°F and 50°F.
- Hypothermia is also common when it is windy or the body is wet because the body becomes more susceptible to heat loss.
- The wind actually removes more heat from the surface of the body, which causes the body to cool faster.
- When the body or clothes are wet, by rain or from a body of water, the risk of hypothermia is greater because the evaporation of the water removes more heat.
- Remind students that they were told that when the body is wet, it is more susceptible to heat loss because of evaporation. Write "evaporation" on the board.
- Divide students into groups to investigate the role of evaporation in increasing the risk of hypothermia by performing the following experiments.

Evaporation 2

- Allow a thermometer that measures air temperature enough time to display the room temperature (a few minutes). Have each group record this temperature.
- Have one student blow warm air across the bulb of the thermometer while the group records the results (The temperature reading should rise because the breath is warmer (98.6°F) than the room temperature). This may take some time to bring the temperature up.
- Next, one student will dip a cotton ball in rubbing alcohol and pull it apart until it is a sheet of cotton. The cotton should be wrapped around the bulb of the thermometer in a thin layer. Tell students that alcohol is used because it evaporates faster than water. However, water has the same effect as the alcohol, it would just take longer.
- Have one student blow across the bulb wrapped in cotton. The group should record what happens (The temperature reading should drop because the evaporation of the alcohol causes heat to be removed).
- The groups should discuss their results with one another.

Evaporation 3

- This experiment is qualitative. The students will record the comparative feeling.
- Each student makes a paper fan.
- The student moves the fan back and forth above the back of the opposite hand. Record how the back of the hand feels (feel the air moving, the temperature feels cool).
- Next, each student places a small amount of water on the back of one hand. The student fans this hand and, switching the fan from hand to hand, compares it to the dry hand. The students record the differences (the wet hand should feel noticeably cooler).
- ALTERNATIVE: Have students work in pairs and perform the fanning exercise on one another.

Post activity

Winter Survival Kit

Supplies:

- Empty coffee can
- A large candle (tall and fat)
- Wooden, waterproof matches
- Brightly colored flag
- Dried soup, candy bars, other nonperishable foods
- Gloves, socks, hats
- Cup, knife, spoon

- Sweater, jacket, sweatshirt, etc.
- Paper and pencil

Additional Information

See following pages

Animal adaptation information:

Deer – eat cedar leaves and grow a fur made of hollow hairs in the winter. Why would hollow hairs be warmer than solid hairs? Due to air's insulating properties. Deer also use their hooves to dig through shallow snow to find food like grass or apples. Do you think deer have good feet and legs for walking through very deep snow? No, their long, thin legs are not good for walking through deep snow and they can starve if they become trapped.

Rabbits – have warm fur and eat soft bark, twigs, and tree buds. Rabbits take shelter in dens under trees that have been tipped over or under spruce trees. Rabbits are in the middle of the food pyramid. They convert plant energy to meat energy for carnivores. Another adaptation that rabbits have is that they multiply rapidly. Predators such as foxes and owls reduce their populations. Ask the students to discuss how rabbit size populations, which vary greatly, effect fox and owl populations. Do rabbits travel well in snow? Yes, their large feet allow them to walk/run on top of the snow.

Mice – white-footed mice live under the snow. By making tunnels in the grass under the snow, they have more protection from predators and can find food more easily. Foxes can hear a mouse squeak under the snow, pounce on it and eat it. Owls use their keen sight and hearing to find mice when they are on top of the snow. Mice dig ventilation shafts through the snow to get fresh air and allow carbon dioxide to leave. Mice are very important to the food chain. What would happen to the fox and owl populations if there was very little snow? How about when the snow is very deep?

Foxes – Foxes grow a thick fur coat and a long, fluffy tail that they can lay across the top of them. Foxes eat mice, rabbits, and grouse.

Grouse – Grouse do something very interesting in winter. They will fly headlong into snow and cover themselves to keep warmer than if they were to roost in a tree. The grouse will fluff up its feathers to create millions of tiny air pockets to insulate them from the cold. Grouse eat seed and tree buds. If there was a thick crust on the top of the snow, what would happen to the grouse? Then they must roost in an evergreen tree to try to stay out of the wind.

Squirrels – Squirrels have a very fluffy tail that helps them keep their balance while leaping from branch to branch and it is used as a warm blanket. Squirrels hide nuts in the fall for winter food. To find their hidden food, squirrels have to smell for it, they cannot remember. When the squirrels don't find their hidden nuts, the seeds are "planted" there. How do squirrels and trees help each other?

Small birds – Chickadees, nuthatches, and juncos have feathers to insulate them. Birds find protection in evergreen trees because of the dense foliage. Feeding the birds provides food for them to live and so their body can create heat. That's why it is important to feed them regularly.

Hypothermia information:

Mild hypothermia (between 97 and 95 degrees Fahrenheit)

With mild hypothermia, a person experiences light, constant, and uncontrollable shivering. Their skin is cool to the touch with goose bumps. Most importantly, a person's ability to make adequate decisions and good judgement is impaired because their protective and survival instincts begin to fade. They are confused, apathetic, and lose perspective of the situation that they are in. This is because people in mild hypothermia tend to focus on one object (getting to camp, traveling another 3 miles, etc.) rather than their condition.

The initial symptoms often pass unnoticed, but if they are detected the person must prevent further heat loss and/or generate more heat. Eating simple carbohydrates (like sugar in hot water), drinking hot liquids, performing simple but sustained exercises, building a fire, and removing any wet clothing and dressing warmer can increase the core temperature. Often, just removing the person from the cold environment soon enough can reverse the effects.

Moderate hypothermia (approximately 94 to 91 degrees Fahrenheit)

A person in moderate hypothermia will stumble, trip, and fall when walking. Many people are exhausted and will not attempt to get up after falling. Shivering increases to very intense and uncontrollable. Simple coordination skills are impaired; for example, a person would have a difficult time zipping up a coat. The person's skin is obviously cold, and their speech becomes even more garbled and slurred. Their ability to think and reason continues to deteriorate and they become withdrawn and depressed. Hallucinations may occur. (A common hallucination is when they believe that they are too hot instead of too cold, causing them to remove clothing.)

A person in this stage of hypothermia should be taken to a warmer environment to prevent further heat loss. A thermal wrap works well and the person can be placed between two fires. Apply warm water bottles to his or her hands, feet, and torso. Be patient, re-warming takes time. If the patient does not warm-up they will need to go to a hospital.

Severe hypothermia (90 degrees Fahrenheit and colder)

When a person reaches 90 degrees or less, death is likely if action is not immediate. A person in this stage cannot walk and their skin is blue. Shivering is convulsive and comes in waves, eventually stopping. Speech is extremely garbled and will soon stop. Many victims will get into the fetal position. Soon they will become unconscious, their body literally frozen except for the inner core. The person's pulse and respiration will be extremely slow, and blood flow is limited to only the heart and brain, in a type of hibernation state. Eventually the cardiac and respiratory contrail centers in the brain fail and the person dies.

A person in the severe stage of hypothermia should be taken to a hospital as soon as possible. You should also take active steps to prevent further heat loss. Assistance may be necessary, as they will not be able to do this for themselves.

Frostbite

Another threat to humans during winter is frostbite. The hands, feet, and face are the parts of the body furthest from the heart. When it is cold, the body will conserve energy by reducing the extent to which the blood is circulated. When the circulation is reduced, the hands, feet, and face are not kept properly warm. You will see grayish or yellow-white spots forming on the skin before you will feel it. Keep yourself covered to prevent frostbite. Warm frostbitten body parts with your own body heat or body-temperature water. (Never rub snow on frostbite.)

Tree I.D. hike map – see following pages of this lesson plan

Resources

Eagle Bluff Environmental Learning Center. Winter Survival lesson plan. October 2001.

Hunken, Jorie. Botany for all ages. The Globe Pequot Press. Old Saybrook, Connecticut. 1993

Lingelbach, Jenepher and Lisa Purcell. Hands-On Nature. Vermont Institute of Natural Science, Vermont. 1999.

Project WILD. Bethesda, MD. 1992

EEK! Website

VanCleave, Janice. Chemistry for Every Kid. John Wiley & Sons, Inc, 1989.

Lesson plan written by Curt Kittleson
Revised by Patty Brodeen Maher, School Forest Coordinator, Manitowoc Public School District. July 2008.

Mild Hypothermia Symptoms

(Body temperature between 95 and 97° Fahrenheit)

- Goose bumps
- Bad at making decisions, confused
- Ignores condition, thinks they are fine

Moderate Hypothermia Symptoms

(Body temperature between 91 to 94° Fahrenheit)

- Stumbles, trips, falls down when walking
- Mumbles when talking
- Lots of shivering
- Has a hard time zipping coat or tying shoe
- Hallucinations may occur

Severe Hypothermia

(Body temperature that is 90° F or less)

- Skin is a blue color
- Shivering more than ever and then no shivering
- Really bad speech and then no talking
- Lies in a ball on the ground

Hypothermia Treatment

1st Step: What are the symptoms?

2nd Step: What stage of hypothermia is the victim in?

3rd Step: Follow these guidelines:

Mild Hypothermia

- Eat sugar
- Retain heat
- Make more heat (Exercise)

Moderate Hypothermia

- Take to a warmer place
- Thermal wrap
- Apply warm water bottles to hands, feet, and torso

Severe Hypothermia

- Bring them to a hospital

WINTER DAY EXPERIMENTS

Names _____

_____

For each of the experiments, you will need to make a prediction, record results, and then make conclusions based on your findings.

EXPERIMENT 1: PUT A LID ON IT?

Have you ever had someone say to you, "Put on a hat. It's cold outside." Is there a reason why they say that? For this experiment, we will be testing if wearing a hat really keeps us warmer. What is your hypothesis?

Hypothesis: _____

The test:

- Put equal amounts of hot water into both containers. Quickly, take the start temperature of each. Record.
- Put the lid on one of the containers and leave them for about 10 – 15 minutes.
- Remove the lid. Take the end temperature of the two containers. Record results. Record the temperature difference between the start and end temperatures of each bowl.

Results:

	Start temperature	End temperature	Difference
Bowl without lid			
Bowl with a lid			

Conclusions: _____

_____

EXPERIMENT 2: WHERE TO SIT?

When you are out hiking in the winter and need a rest, where is the best place to sit? On the ground? In this experiment, we will be testing if a layer of Styrofoam between the ground and an object affects the temperature of that object. Write your hypothesis below.

Hypothesis: _____

The test:

- Fill two containers with equal amounts of hot water. Quickly, take the start temperature of the water. Record.
- Go outside and place one container directly on the ground and the other on a Styrofoam sheet on top of the earth. Put a cover over the containers so that wind and snow do not affect your results.
- Wait about 10 minutes and then measure the temperature of the water in the containers. Record results. Record the temperature difference between the start and end temperatures of each container.

Results:

	Start temperature	End temperature	Difference
Container on ground			
Container on foam			

Conclusions: _____
_____

Additional Notes: _____
_____
_____
_____
_____
_____
_____
_____
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_____

Winter Scenarios

Monarch butterflies: We fly to Mexico, away from all the cold and snow. There we gather together in clusters and hang from trees while we bask in the warm sun.

Canada geese: Listen for our honking in the fall and look up to see us flying in V-formation, winging our way south in winter near the seacoast.

Honeybees: In winter we cluster around our queen inside the hive. Those of us outside of the cluster warm the hive by vibrating our wings at high speeds. Then we trade places with other bees in the center and eat the honey we have stored to feed us all winter.

Beavers: We keep busy, cutting trees down and storing branches underwater near our lodge. Once the pond freezes over, we stay warm and dry inside our lodge, munching on the stored branches.

Woodchucks: We eat our fill all summer long and then dig a cozy burrow in which to spend the winter. We curl up in a tight ball, tail over nose, and take it slow, hibernating the winter away.

Wood frogs: We hop about in the leaf litter catching insects to eat. When it gets cold, we burrow under the leaf layer to spend the winter in the deep freeze, waiting for spring rains to thaw us out.

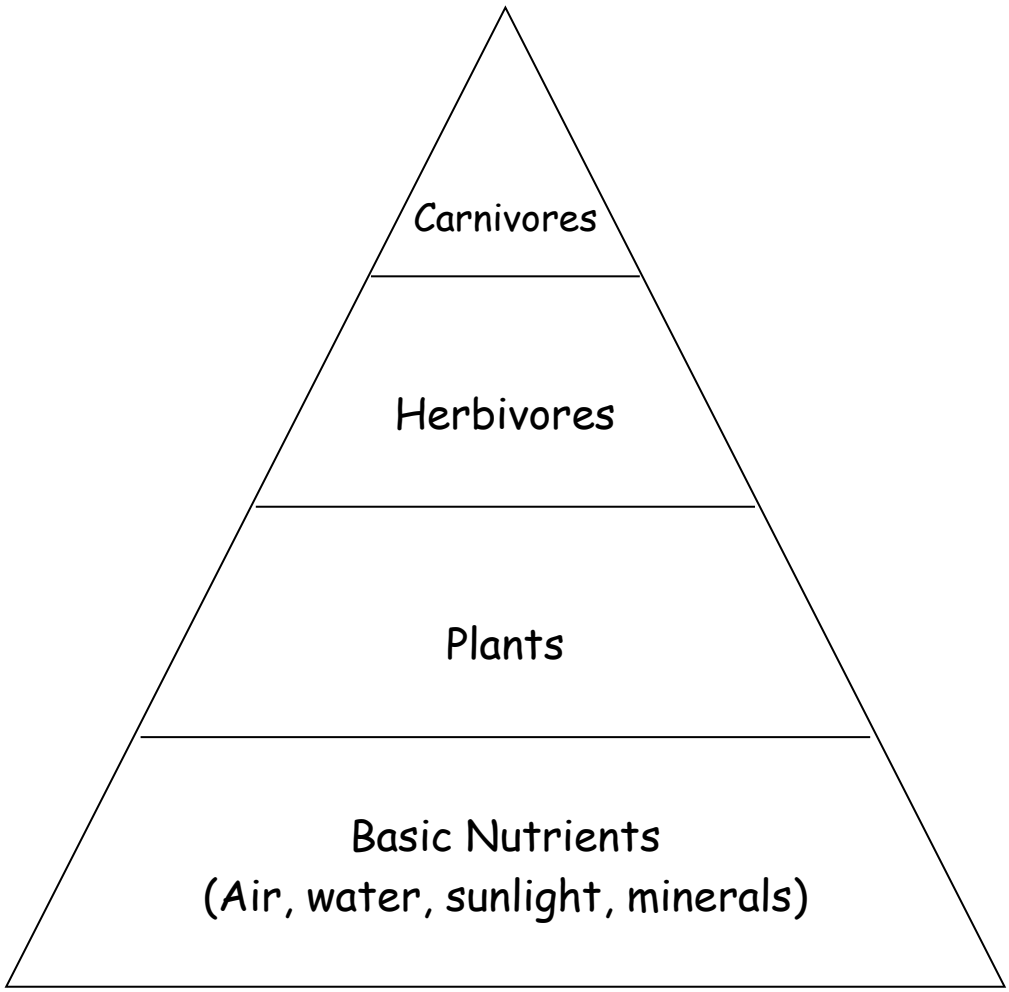
Ermine: We bound across the snow and dive into tunnels to catch mice, a favorite winter meal.

Woodpeckers: Finding our favorite meal is the same, fall, winter, spring, and summer. Listen for us tapping on tree trunks and dining on any insects that we find under the bark.

Snowshoe hares: The winter snow doesn't keep us inside. In our white coats we are hard to see except for our wiggly noses. With our big furry feet we can hop on top of the snow, nibbling on evergreens and buds.

Bears: We're fond of sweets, especially honey fresh from the hive, but we'll eat almost anything as we lumber through the woods preparing for our winter rest. Snuggled warm in a cozy den we sleep soundly, living off our plentiful stored fat.

Food Pyramid



Animal Signs Scavenger Hunt

- Tracks of at least three different animals. Draw them:
- Five potential food sources. Who might eat them?
- Three signs of animals having eaten. Draw each:
- Homes or shelters for three different animals.
- Stop, look, and listen – what other signs of animals do you notice?
- Find a good place to take shelter from a storm.

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