Cross Country Skiing
Michigan State University Cooperative Extension Service
4-H Club Bulletin
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CROSS · COUNTRY SKIING

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Cross-Country Skiing

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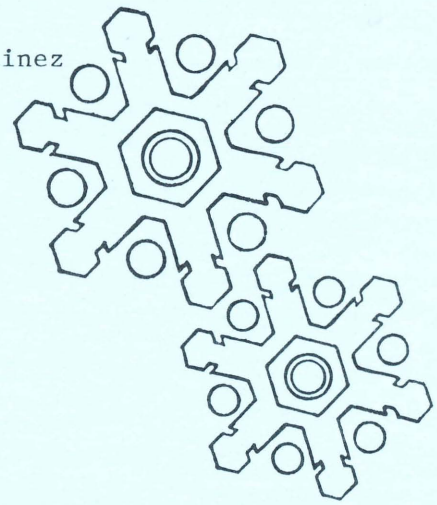

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Introduction to 4-H Cross-Country Skiing

WHY CROSS-COUNTRY SKIING?

Cross-country skiing is an excellent winter activity to maintain a strong, healthy body. The costs are minimal when compared to other snow activities such as downhill skiing and snowmobiling. Cross-country skiing is a fun activity for any size group and a wide variety of age ranges. You can practically go skiing in your own backyard, since most parks are open to cross-country skiing. It is healthy and inexpensive, and you don't have to travel very far to go skiing.

SKIING AS A CLUB PROJECT

Cross-country skiing can make an excellent 4-H project. Members can learn about topics such as selection of equipment and clothing, waxes, maintenance of equipment, and skills and techniques of skiing. Club meetings should ideally include actual skiing practice. Topics for demonstrations could include waxing, clothing, skiing techniques, and safety.

SKIING AS A CLUB ACTIVITY

Every 4-H club needs to have a variety of fun activities. A cross-country skiing outing can be a fun and safe winter activity. If members do not have equipment available to them, you might consider renting equipment for your group. Another alternative may be for your club or another organization to purchase equipment to rent other clubs. If the equipment is rented often enough, it can be paid for in one or two seasons.

SKIING AS A FAMILY OR INDIVIDUAL ACTIVITY

Cross-country skiing can be enjoyed by people of a wide variety of ages and is an excellent lifetime leisure activity. It offers an individual the opportunity to observe nature, travel the back trails, and keep physically fit.

Have fun skiing!

Background

Cross-country skiing is the swiftest method of traveling from place to place on foot, over snow-covered countryside, with few restrictions. Consequently, this 4000-year-old activity is one of the fastest growing participant sports in the country.

Carvings on cave walls in Arctic Norway are the earliest known records about skiing, which began and spread out from the Nordic countries. Nordic skiing, which is another name for cross-country skiing, was introduced to the United States and Central Europe during the last half of the 19th century. Europeans and Americans were already downhill skiing for sport and recreation on steep Alpine slopes.

Nordic or cross-country skiing and Alpine or downhill skiing are considerably different in purpose, technique, and equipment. Nordic skiing facilitates traveling from point to point wherever there is snow; the skier uses simple techniques and inexpensive, lightweight equipment. Alpine skiing provides recreation within a specific area and demands training for safe use of relatively heavy, expensive equipment.

The rewards of Nordic skiing are evident in the sparkling crispness of white snowy mornings. The enjoyment of sharing companionship with friends and family while sitting on a log beside a trail and drinking hot chocolate is unforgettable.

Since cross-country skiing does not require a great amount of snowfall, it eliminates the need for people to travel long distances for a chance to enjoy the sport. The opportunity to ski exists in any location with snow and room to ski. Paths, abandoned railroad beds, orchards, pastures, logging roads, unplowed country lanes, parks in cities, university campuses, and golf courses provide excellent resources for cross-country skiing.

Equipment

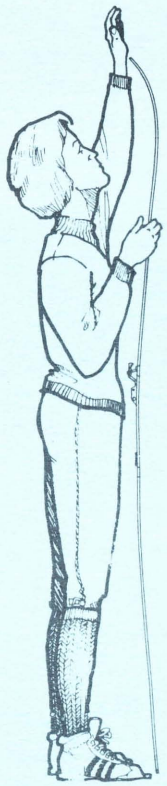
SKIS

Cross-country skis are designed for traveling over flat, snow-covered countryside. They differ from downhill skis in that they are lighter, narrower, far less expensive, and do not have metal edges (with the exception of mountaineering skis).

For the beginning cross-country skier, the general touring ski and the light touring ski are recommended over the racing ski. The general touring ski is tough and will take a lot of punishment; this is the widest ski and is well suited to the general touring conditions a beginning skier will most likely encounter. Light touring skis are narrower and faster than general touring skis. Beginners with a good athletic background might consider investing in this type of ski.

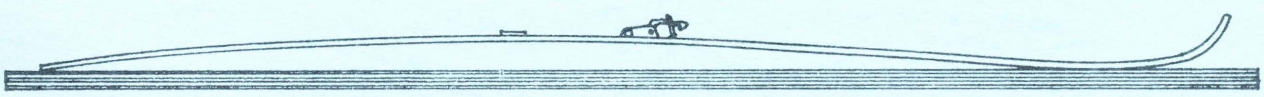
If possible, you should rent different types of skis before making a purchase to determine which type best fits your initial needs. If this is not possible, have an experienced skier help you make your selection.

The length of the cross-country skis should measure the distance from the floor to your wrist when you extend your arm above your head. If you are stout, you may want a slightly longer ski; if you are slim, choose a slightly shorter



ski. This will enable you to select the spring of the skis so that your weight will be evenly distributed throughout their length. The curve or camber of the ski should be selected so that the tips of the skis vary slightly more than the center. When you stand on the skis, the camber disappears as the skis flatten. This flexibility helps the skier achieve a smooth forward glide.

Skis are made from a variety of materials. Less than 10 years ago, most skis were made of laminated wood (hickory, ash, beech or fir) with edges made from lignastone or



compressed wood. However, most skis manufactured today are made of synthetics or fiberglass. Not only are these skis more durable than wood skis, they have become much more competitive in price. In fact, as wood skis become rarer, they seem to be getting more expensive than their synthetic counterparts.

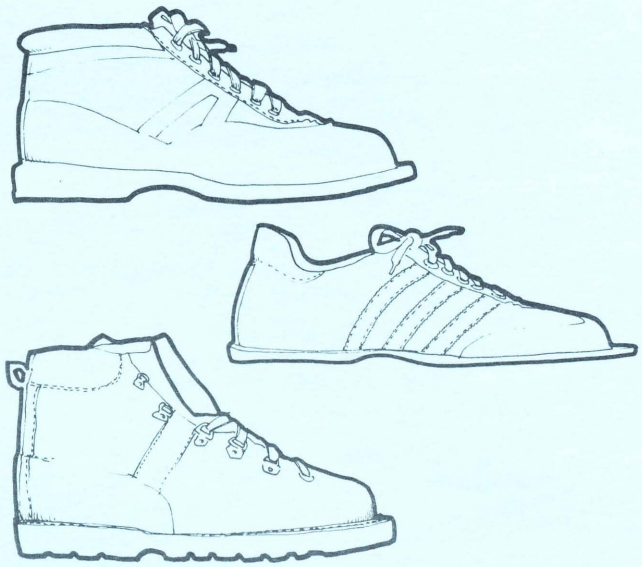
When choosing skis, consider the potential maintenance of the different kinds. Two types of skis are available--skis that need to be waxed and no-wax skis. Both wood and synthetic skis are available with waxable or no-wax bases. Many experts agree that to achieve the most consistently satisfying performance on skis, it is necessary to wax the bottoms using the various waxes available for all snow conditions. During a single outing, a skier may need to change waxes and rewax several times.

If you don't like the idea of waxing, consider buying a pair of no-wax skis. The bottoms of these skis grip the snow to prevent backward sliding. Different types of surfaces include fish scales (slightly elevated curved grooves) and strips of mohair. Although there are some conditions under which this type of ski cannot be used (such as very wet snow), people who don't like the thought of waxing will enjoy the advantages.

Skis generally cost from $50 to $100. The best buys occur during pre- and post-season sales. When shopping for skis, remember that not all salespeople are "experts" on cross-country gear.

BOOTS

Cross-country ski boots, like all equipment in this sport, are lighter and less expensive than downhill ski boots. They are especially adapted to provide flexibility and comfort. Boots are available in synthetic material or leather, lined or unlined.



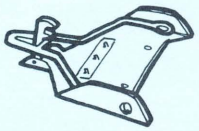
Different types of boots

Be sure to buy boots that fit well; when trying on boots, wear the socks you will wear when skiing. When you see the lightweight design of cross-country ski boots, don't be afraid that your feet will get cold. The techniques used in this sport will make your feet generate enough heat to stay warm if you wear a good pair of socks.

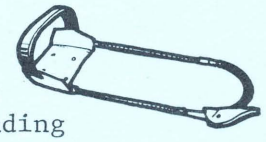
BINDINGS

You will also need bindings for your skis. Cross-country bindings are very different from downhill bindings in that the boots are connected to the skis by means of toe clamps. The most common type of toe binding has three small pegs and a clamp. Three equally spaced holes in the toe end of the sole (standard on most boots) fit over these pegs, and the boot is clamped in that position. These bindings can often be adjusted for looser or tighter clamping. The skier's heels are free to lift off the skis to accommodate cross-country skiing

techniques and allow for greater flexibility.



Toe clamp binding



Cable binding

The toe clamp binding is recommended for many reasons, including ease of use, light weight, and low cost. However, skiers carrying heavy loads on rough terrain often prefer to use a cable binding. This type holds the toe of the boot in the binding by pressure from a cable around the heel of the boot.

POLES

Ski poles play an important role in cross-country skiing. The important differences between cross-country and downhill ski poles are the length, handle straps, and points. Poles should measure as far as the distance from the ground to your armpit when your arm is stretched straight out from your body. Poles are made from bamboo, fiberglass and aluminum. These materials provide the flex necessary to develop a good cross-country technique.

Most poles have round webbed baskets 5 to 6 inches above the pointed metal tips. Make sure the points are bent so that the poles will pull out of the snow with little drag. Check to make sure the straps on the poles can be adjusted to fit the different hand gear you will wear for different weather conditions.

DAYPACK OR WAIST PACK

Either a daypack or waist pack (fanny pack) is recommended for carrying the miscellaneous and necessary items such as ski wax, cork, and first-aid kit. Although these packs are not a necessary part of skiing equipment, they also come in handy for carrying a camera or lunch.

WAXING KIT

There is no satisfactory substitute for wax. Waxes are designed to give a good kick and glide and enough adhesion for climbing hills. A waxing kit should contain the waxes essential for any conditions the skier might encounter. It should also include a cork for applying wax and a scraper for removing wax.

The application of wax is discussed on pages 11 through 13.

MISCELLANEOUS EQUIPMENT

Besides carrying waxes in your daypack or waist pack, it's a good

idea to include a small first-aid kit for potential injuries. A space brand rescue blanket can provide excellent insulation in case an injury occurs; these blankets are very lightweight, inexpensive, waterproof, and windproof.

Other additions to your pack can include a whistle, matches, a combination tool (e.g., Swiss army knife), a plastic ski tip in case a tip is broken off, food, and water. If you plan on skiing in an area that is at all unfamiliar to you, be sure to include a compass and a map of the area. When assembling these materials, try to keep the pack light.

CARE AND MAINTENANCE

Skis and boots deserve proper care and maintenance. The skis should have an application of base wax to prevent moisture from damaging the ski laminations and causing warpage. When the skis are temporarily not in use, they should be wiped free of excessive snow and ice and stored vertically with the shovel (tips) on the floor. Storing skis in this manner will keep them from standing in a pool of water, thus saving the ski heels from cracking and splitting. When storing skis permanently, put them in a dry place, without obstructing the natural bow of the skis. Avoid storing them in conditions of extreme temperatures and humidity.

The boots should be treated with a waterproofing material to keep them dry and soft. To ensure the longest wear of your boots, apply a light coat of waterproofing material before each outing.

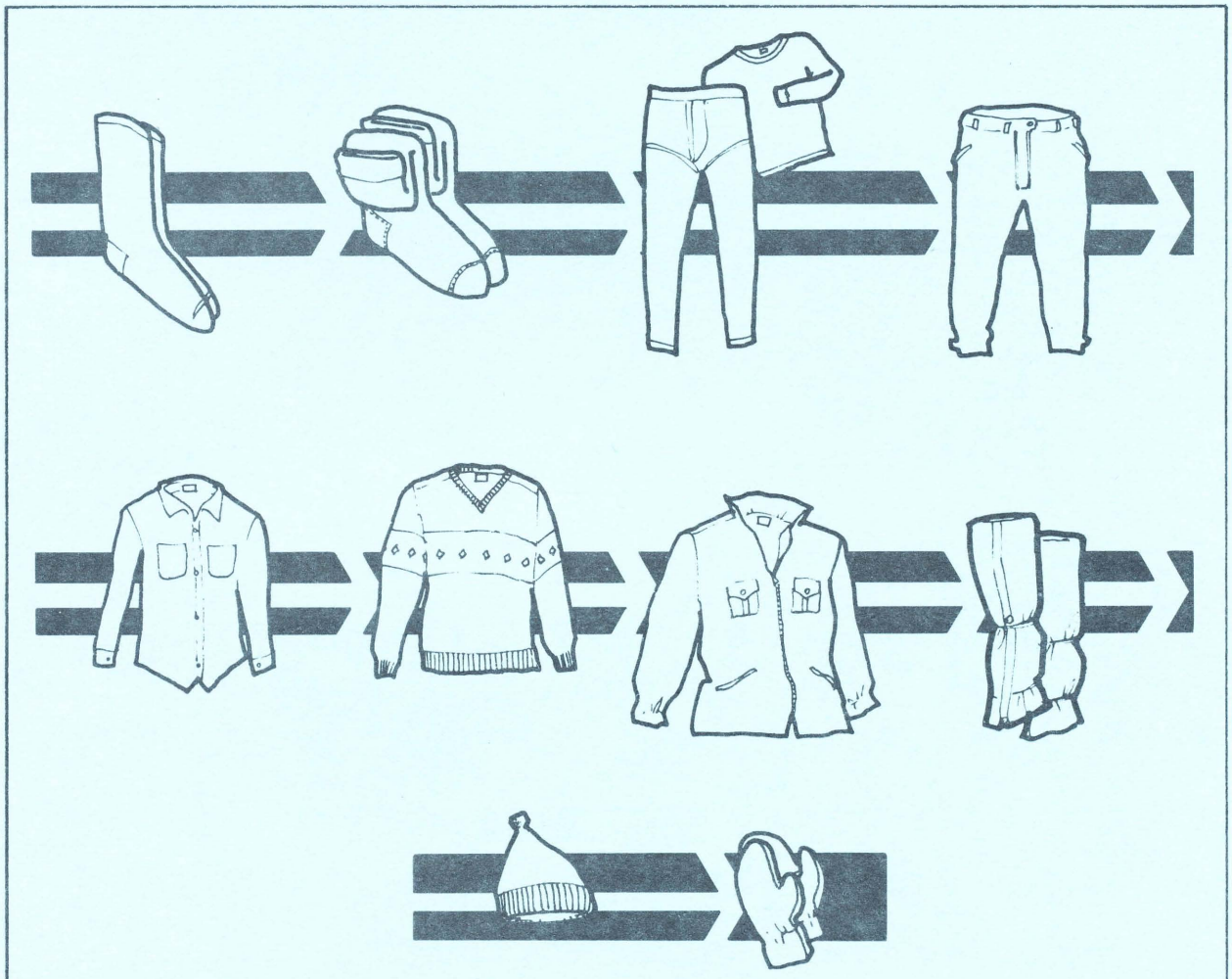
Getting Ready

Involvement in ski touring starts long before the actual tour. You must become thoroughly familiar with: (1) your equipment, (2) the kind of clothing that you'll wear, (3) the weather conditions that will determine how you must prepare your skis, and (4) a compass and map of the area in which you intend to ski.

CLOTHING

Weather conditions must be determined before you can enjoy an unforgettable ski touring experience. You alone must analyze the weather and determine what clothing you will need to remain comfortable throughout the tour. Your clothing should be chosen to provide warmth and unrestricted movement. A good rule of thumb is to dress in layers. This way you can stay warm and comfortable by adding or subtracting layers of light garments.

When the weather is warm and still, you probably won't need long underwear. However, high winds and lower temperatures often make long



Use the layering principle to achieve maximum comfort.

underwear a necessity. On milder days, a cotton knit shirt can be worn; the colder days will call for a wool shirt or sweater. Wool garments are very durable and will keep you warm even when it's snowing or raining. Windbreakers or lightweight vests will give added protection from wind and cold. During really cold weather, you might like to take along a lightweight down or synthetic fiber-filled coat.

Leg wear should be selected to provide the flexibility demanded by this sport. Many skiers prefer to wear knickers, but most any style of pants will suffice as long as you are comfortable.

KEEPING YOUR FEET WARM

Although the very nature of ski touring keeps your feet warm, you must use the proper combination of stocking material to ensure comfort. It is recommended that the inner stocking be made of wicking cotton material and the outer stocking be made of heavy wool. It's unnecessary to wear more than two layers of stockings in the right combination, since the flexibility and circulation of the foot is reduced when wearing more than two pairs of stockings.

Many skiers prefer to wear a pair of gaiters while touring. Gaiters are leggings made from waterproof fabric; they cover up the tops of boots so snow doesn't get inside them. Gaiters are available in various sizes (from ankle-high to knee-high). If you choose gaiters with zippers, look for nylon instead of metal to avoid freeze-ups.

HEAD, HAND, AND EYE GEAR

More heat is lost from the head than from any other single part of the body, and a hat is necessary to help regulate body temperature while skiing. If you feel you're getting too warm while skiing, you can remove your hat for a while, thus allowing heat and moisture to escape. Wool is the best material for head gear, and the hat should be designed to both cover the ears and roll up above them.

Mittens or gloves can also be removed and put on as often as the conditions demand. Both can provide the warmth needed during cold, windy weather, and they come in a variety of materials including wool, leather, and synthetics. A waterproof outer mitten provides good protection during windy, wet conditions.

Eye gear is necessary to shield your eyes against the glare of winter snow and sun. Gray and green lenses are best for overall usage, and amber or yellow lenses are recommended for overcast days. Many skiers prefer to wear the goggles used for downhill skiing; these work well except for the occasional fogging.

Waxing

BASE WAX

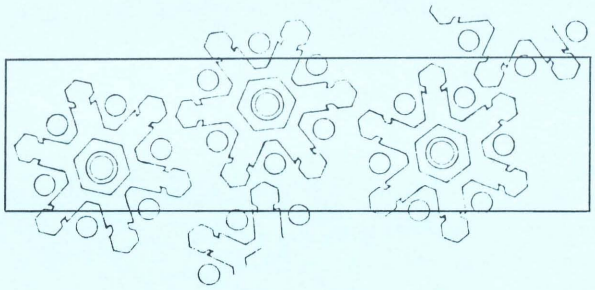
At least once a season, a base wax should be applied to the bottoms of waxable skis to act as an adhesive for surface waxes, waterproof the bottoms, and protect the bottoms of the skis against wear. A pine tar derivative is applied to wooden skis, and the bottoms of fiberglass skis are covered with a paraffin-type wax. Most sporting good stores have waxing services and will provide a good "burned-in" base wax for a small fee.

SNOW AND WAXING

Waxing skis for a tour is very simple--all it requires is an analysis of existing weather conditions. You can appreciate this analysis if you understand snow and how it reacts to the wax on the ski. Falling snow consists of crystals that range in size from 1 to 4 mm in diameter. Snow is simply clusters of these small crystals.

Skis slide on a thin film of water between the surface of the ski and the snow. This film of water is always present when the ski is moving over the snow. The friction that is generated between the ski surface and the snow generates enough heat to melt the snow and produce the thin film of water that glides your ski along.

Once the skis stop, however, the film of water is no longer present, and your skis and the snow stick together. By the very nature of their design, snow crystals stick into the rough edges of the wax on the running surface of your skis. Once you release your body weight from the ski and begin to move forward, friction is produced again,



melting the "barbs" on the snow crystals and producing the thin layer of water necessary for your glide.

Crystals of new snow stick to wax easier because the barbs are longer; therefore, a harder wax can be used. The crystals of old snow do not have the long barbs that can penetrate and cling to the wax surface, so a soft wax is necessary for the snow to cling to the skis. Remember to always apply waxes in layers so that softer waxes are applied on top of the hard waxes.

SNOW CONDITIONS

Before waxing, consider the variety of snow conditions that you may encounter while touring. Check the air temperature, the moisture content of the snow, and the type of snow.

If the air temperature is below 32^{o} F, then the type of snow and the temperature are all you need to consider; the moisture content of the snow will not be a problem. However, if the temperature is above freezing, you should test the moisture content of the snow by handling it and seeing how easily it sticks together.

There are three types of snow you should consider for waxing. New or fine grained snow is characterized by fine crystals with sharp edges. Coarse-grained snow con-

sists of crystals that are two or more days old. Crusted or corn snow is snow that has been exposed to temperatures over 32° F and then refrozen.

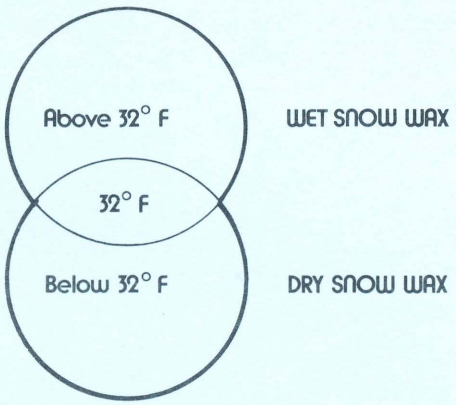
Another way to identify snow conditions for waxing is to use the following four categories: (1) new, dry snow; (2) new, wet snow; (3) old, dry snow, and (4) old, wet snow. Wax manufacturers have designed special waxes for all these types of snow conditions.

CHOOSING AND APPLYING THE RIGHT WAX

Be sure to choose the right wax for outdoor conditions. Consider the hardest snow conditions and the coldest temperatures you expect to encounter on your tour. Wax for maximum glide and add wax as needed for a good kick. A good rule of thumb for selecting a wax is "the harder the snow, the harder the wax; the softer the snow, the softer the wax." You can use either a two-wax system or a multiwax system when applying wax.

Two-Wax System

Many beginning skiers like to experiment with the two-wax system. In this system, a dry snow wax is used for temperatures below 32° F, and a wet snow wax is used for temperatures above 32° F. These waxes are applied to the kick zone of the ski, which is the middle third of the ski bottom. If the temperature is 32° F and the snow is melting, apply a thick layer of the dry wax and add a layer of the wet wax directly under the foot. If you start out with the wet wax and the temperature begins to fall, you must remove the wet wax before rewaxing with the dry. The need for rewaxing will depend on the snow texture and flex of the ski.

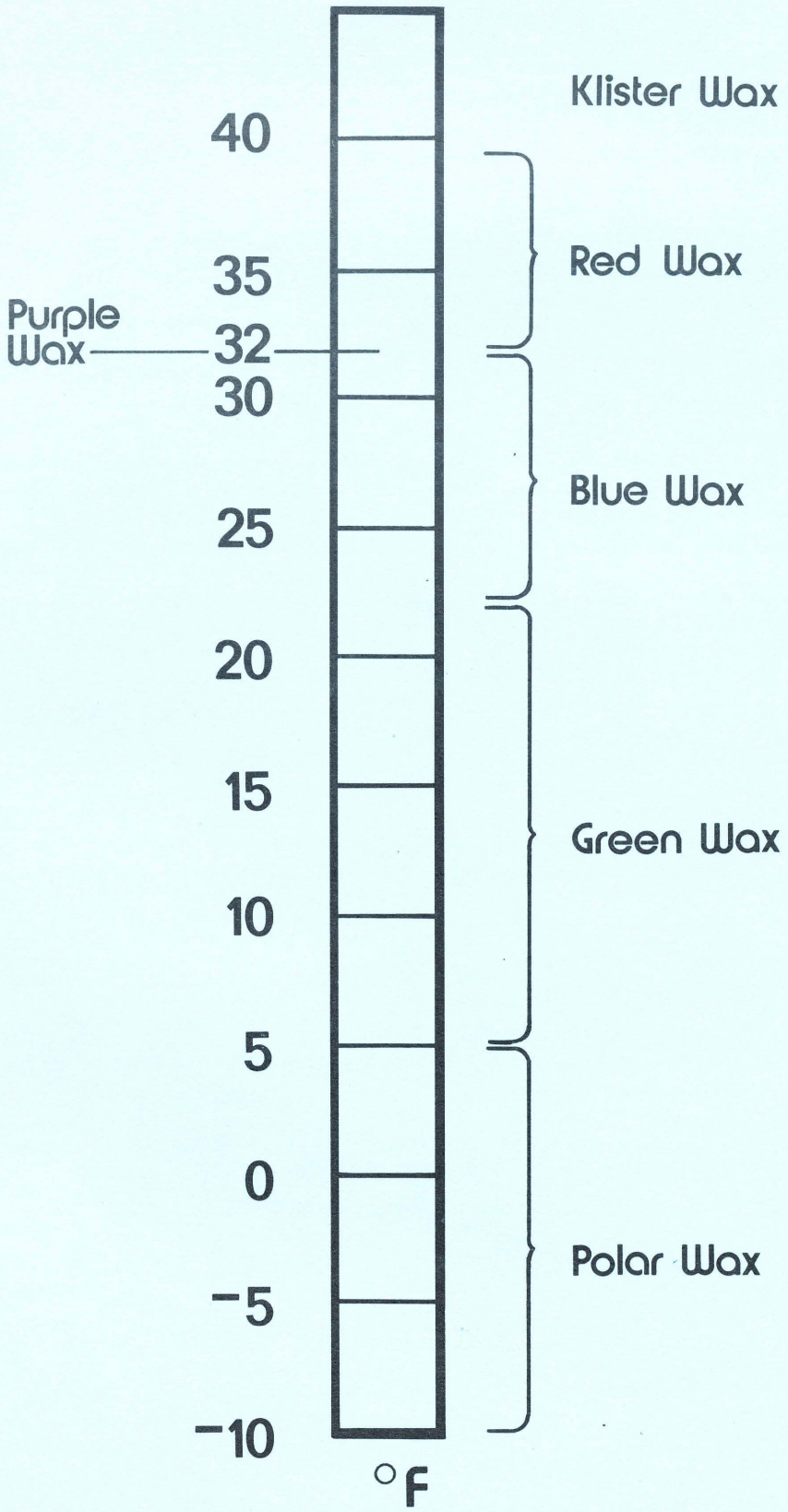


TWO-WAX SYSTEM

Multiwax System

Skiers who want the best performance out of their skis use the multiwax system. Waxes in this system are also applied to the kick zone of the ski. Remember that colder temperatures require thinner layers of wax. Apply the wax evenly and rub it out with a cork. If your skis slip, try applying more layers of the same wax and a short length of the next softest wax directly under your feet.

During extremely cold conditions (5° F to -22° F), a special polar wax is used. Green wax is used for temperatures ranging from 5° F to 23° F in dry, fine-grained fresh snow and in fine-grained old snow. For temperatures ranging from 23° F to 32° F and for dry new or old fine-grained snow, blue wax is applied. Purple wax is commonly used for temperatures near the freezing mark on wet or dry snow, whether it is fresh or old. Red wax is applied for warm temperatures and wet, clogging snow. Klister, a very soft wax, is applied to skis for touring on old, crusted or corn snow and wet, slushy conditions. For best results with the multiwax system, stay with one brand of wax. For example, the blue wax of one brand is often the green wax of another brand.



General guidelines for using the multiwax system

The Art of Skiing

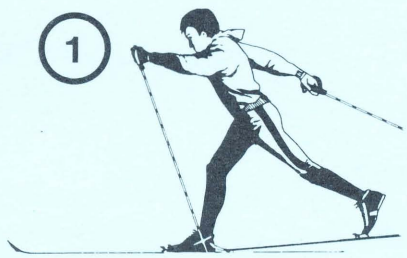
Now you are ready to ski, and this is where the fun begins. There are several important techniques that are necessary to know before you can whisk across the countryside.

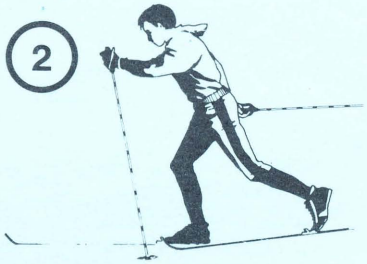
FORWARD GLIDE AND DIAGONAL STRIDE

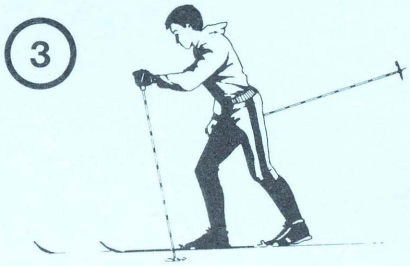
The touring technique of gliding can be compared to walking with slippers across a highly polished floor. To develop a good touring technique, you should allow yourself to walk naturally with your skis. The obvious difference from walking is that when you plant a ski ahead, it doesn't stop there. It glides forward.

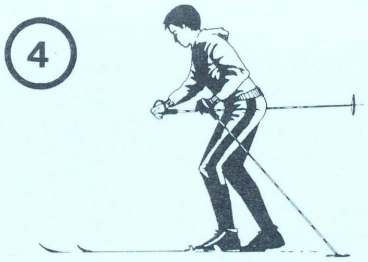
Once the sliding motion stops, put all of your weight on the lead leg; then swing your other leg into the lead position. This swinging forward motion of the trail leg into the lead leg position gives your body the kick and momentum necessary for the touring glide. You should strive for a nice touring glide; speed will come naturally as you develop a good kick. A proficient waxing technique with waxable skis will also help your speed.

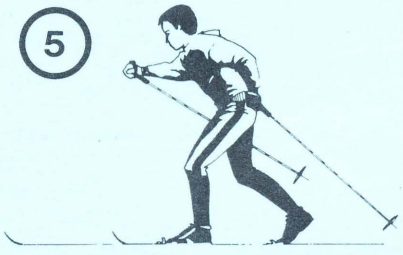
In a diagonal stride movement, the opposite arm and leg work together. Begin with the right leg and left arm forward and the left pole firmly gripped and planted in the snow across from the right leg. When the left ski swings forward, the left arm is pushed backward, pushing on the pole. At the same time, the right pole swings forward and is planted in the snow just as the right leg starts to swing ahead. The push with the pole happens <u>just</u> before the start of the leg thrust. Pole movements that are correctly coordinated to the forward glide give an extra push that adds speed.

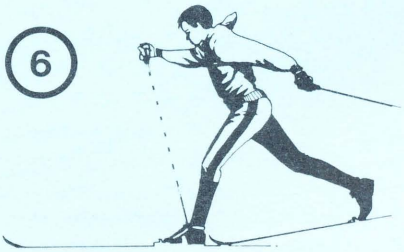












THE 180-DEGREE TURN

There undoubtedly will be times when you would like to reverse your direction. Steps to follow when executing a stationary 180-degree turn are listed below. For purposes of explanation, this turn is to the right. Turning to the left covers the same principles.

1. Start with your skis parallel.

2. Plant your left pole close to ski tips and your right pole close to heels of the skis. Support yourself on the poles.

3. Raise the right ski, pivot the ski 180 degrees and place it on the ground parallel with the left ski (but in the opposite direction).

4. Raise and swing the left ski around and place it parallel to and in the same direction as the right ski.

GENTLE TURNS

While touring you'll find yourself executing relatively gentle turns. Turning on a level or gentle slope is like side-stepping while walking. For purposes of explanation, the following turn is to the right. Turning to the left covers the same principles.

1. When turning to the right, the lead leg should be the right leg. As you kick your lead leg forward, slightly turn the ski so that the tip points to the right.

2. Once the lead (right) leg is on the ground and pointed in the new direction, immediately place the weight of your body on this leg. Slightly raise the trailing left leg, and swing it into a parallel position slightly in front of the right leg.

3. The shuffling of your skis, as described in step 2, is all done while you are moving forward and gliding.

4. Once the left leg is brought into position (parallel and slightly ahead of the right leg), then shift your body weight to the left leg.

5. The lead leg--still your right leg--can now be raised slightly and turned more to the right as it is kicked forward again.

6. Repeat this shuffling action of your skis until you have successfully completed your turn.

FALLING AND RECOVERING FROM FALLS

Now that you can glide about on your skis, the next topic is the fall--something you undoubtedly have experienced or will experience very quickly. The incidence of falling while touring on skis should not be considered as bad; in fact it should be welcomed in times of emergency as a good stopping technique or speed reducer. Even the best, most experienced skiers fall either by design or unexpectedly during a tour. If you anticipate a fall, try to make it as gentle as possible. Keep your feet close together and use the fleshy part of your hips to cushion your fall.

Keep in mind that the deeper and softer the snow, the more cushioned your fall will be--and the harder it will be to get back up. Consider the following principles when recovering from a fall.

1. Both skis should be placed parallel to each other and perpendicular to the direction of slope. Your body should be higher than your skis.

2. Your legs should be tucked in as close to your body as possible.

3. Both ski poles should be used in combination to form one single pole that your hands can easily grasp.

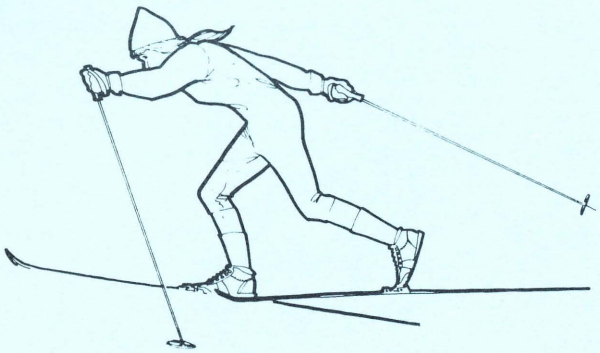
4. The points of the poles should be placed above your body on the uphill slope. With both poles combined and their tips on the uphill side of your body, you can now bounce upward and away from the ground.

5. Remember to keep your skis close together while recovering from the fall. Once you've regained your balance, resume skiing.

GOING UPHILL

During ski touring, you are bound to encounter some degree of upward slope. Depending on the degree of incline, there are four techniques you can use to make the going easier.

1. Diagonal stride. When you ski up an incline, your strides will automatically become shorter. As long as the incline doesn't get too steep, you can continue to glide forward using the diagonal stride. Bend your ankles, knees and hips so that your body's center of gravity is thrust forward, thus allowing you to achieve the greatest leverage during push-off.



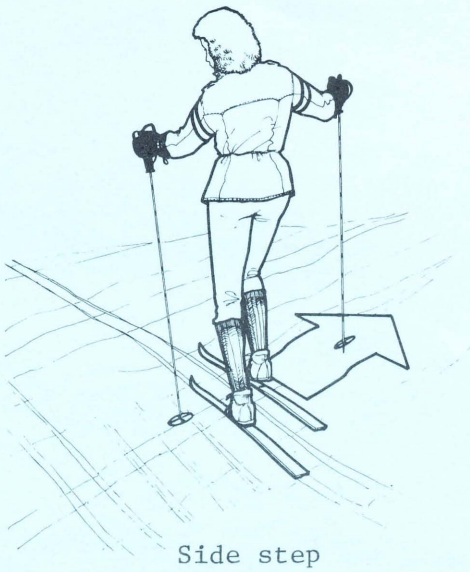
Diagonal stride on an incline

2. Ski step. Ski stepping is the same as the diagonal stride except there is no forward glide up the slope. You are, in effect, simply walking up the slope while wearing skis. If you experience backward sliding, you can turn slightly to one side and walk up using a route diagonal to the slope. Regardless of whether you are going straight up or diagonally, a forward body lean will help your progress.

3. Herringbone. Another way to proceed upward is to use the herringbone step. In this method, you walk uphill with your skis placed alternately ahead of each other at a 90-degree angle. Your trail will consist of V-shaped tracks. Use your poles to prevent any backward sliding.

Herringbone

4. Side step. This method is often the easiest way to negotiate a steep incline. Approach the incline with your skis parallel to it and side step your way up. Lift the uphill ski first and plant it; then bring the lower ski up and plant it. Repeat this process until you reach your destination. Use your poles to maintain stability.



Side step

GOING DOWNHILL

Whatever goes up must eventually come down, and that includes cross-country skiers. When you do encounter a downward slope, go down with your knees and ankles sightly bent to act as shock absorbers. Keep your feet slightly further apart than normal, and have one ski just ahead of the other. If a hill looks too steep, find a diagonal route to take you to the bottom.

BRAKING

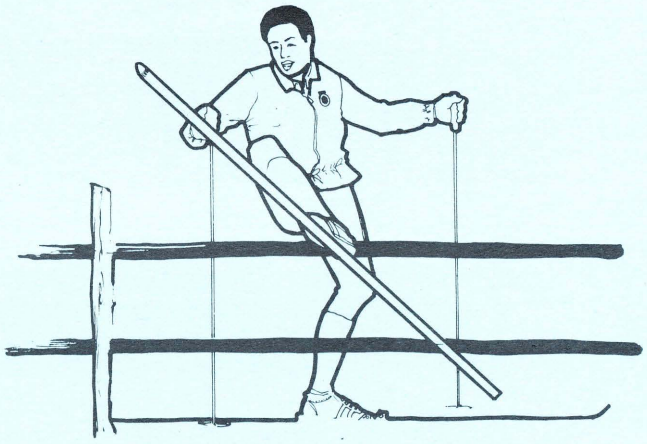
The most efficient method for braking while going downhill or while doing a fast glide is the snowplow. This method calls for the skier to be moving along with knees and ankles slightly bent and weight evenly distributed over both skis. You should press your heels outward until your skis form a V position; your skis will "plow up" the snow and slow you to a stop. Keep your poles pointing backward; never point them into the snow ahead of you. Practice this technique on a slightly rolling hill before attempting to use it on a steep hill.

You can also slow down and come to a stop by dragging your poles along the side or by dragging them between your legs.

OBSTACLES AND SAFETY

Once you get out and enjoy the fresh air and successfully tour the countryside, you will find that many manufactured as well as natural obstacles will limit your tour unless you can safely cross them.

Always beware of fences; they can be easily hidden by snow. Skis caught in fences can result in falls. You can cross a fence using the 180-degree turn, or you can remove your skis to get over it.



Use the 180-degree turn for getting over low fences.

If you encounter standing water or streams that have to be crossed, look for ways to avoid getting your skis wet. Once your skis get wet, they can ice up; and removing this ice while on a tour can be difficult.

If you have to cross any roads that aren't snow-covered, remove your skis. The asphalt or gravel can not only strip the wax off skis, it can damage the bottoms of the skis.

Whenever you encounter any type of obstacle (e.g., ditch, rocks, barbed wire), stop and evaluate the situation before going any further on your skis.

Remove your skis to cross asphalt or gravel.

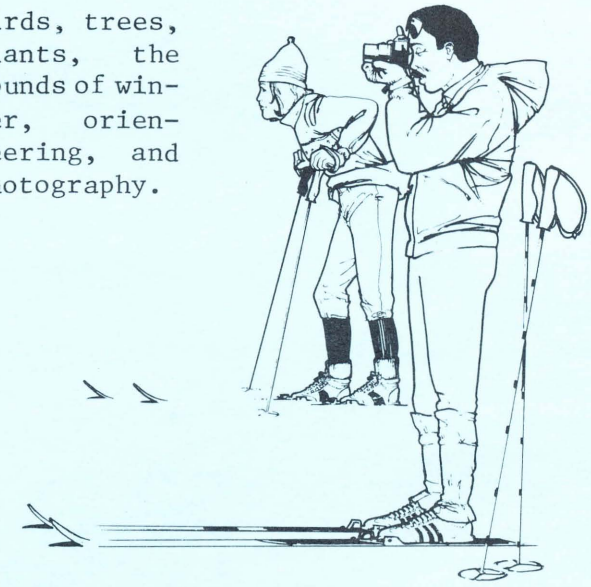
Adding to the Fun

In cross-country skiing, people from grandparents to grandchildren can perform as equals, regulating their involvement as each sees fit. Whether you ski alone or with companions, a variety of activities can be added to the fun.

Short tours are always best for people first learning to ski. As you become confident and experienced, you will learn what distances you can cover within a given period of time. Remember to always plan your tours and let an adult know where you're going and how long you expect to be gone. Learn to define a short, medium, or long tour according to your own capabilities. A long tour can be a series of short tours that always bring you back to the warmth of hot cocoa and a fireplace. Your starting point can be your home or clubhouse, or it can be a clearly defined spot in the woods.

Cross-country skiing can be a great vehicle for backpacking enthusiasts. In this case, planning is most important for full enjoyment. Complete consideration should be given to your clothing, shelter, sleeping gear, and first-aid needs. Most overnight outings will require very little backpacking of food; however, it is always best to pack more food than you anticipate you will need. Again, be sure to tell an adult where you're going and when you expect to return.

Whether you go skiing on a short or overnight tour, you can add to the fun by marking your trail with colorful flags. Draw a rough map as you go along on your journey and indicate prominent terrain features, such as hill masses, valleys, streams, buildings, and tree lines. Other skiing activities include the study of animal tracks, birds, trees, plants, the sounds of winter, orienteering, and photography.



HANDICAPPERS AND SKIING

A large number of people who have characteristis of blindness, partial sight, deafness, paralysis, arthritis, and amputation participate successfully in cross-country skiing.

Pulk skiing is a growing sport for people with mobility impairments. Pulks are cargo sleds which have been used in Norway for over 100 years; more recently, fiberglass pulks have been used to transport equipment on mountaineering expeditions. In pulk skiing, the skier sits in the sled and propels it with shortened ski poles. Not only are pulks used in recreational skiing, they are being used by handicappers to provide increased mobility and other fitness activities during the winter months when transportation is often hazardous.

HEALTHsports, Inc. sponsors cross-country skiing programs for handicappers throughout North America. For more information on this organization, write Vinland National Center, 3675 Ihduhapi Road, Loretto, MN 55357.