



# Competition-Coaching Introduction L2T

## Step 4:

# Technique Development - Skating



**Reference Material  
for On Snow Workshop**



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This section on teaching skating technique complements the information provided in sections 4 and 9 of the NCCP Community Coaching Reference Material, and is directed primarily at supporting you in your role as a coach working with children in the Learning to Train (L2T) stage of development.

## 4.1 Teaching Skating Technique

### General Considerations for Teaching Technique (Both Skating and Classic)

One of the most important goals of the L2T stage of development is for athletes to refine all of the cross-country skiing techniques, becoming proficient in each of them. Following are some key considerations for coaches to keep in mind to help athletes achieve this.

- ❑ It is essential to have a good understanding of the elements of proper technique in order to teach and evaluate technique effectively.
- ❑ It is essential to have frequent, regular and properly structured opportunities to teach technique to your athletes.
- ❑ Skiing fast must not be the initial objective. Coaches should focus on teaching proper body positioning, body movements and timing – which, when executed correctly and together, produce rhythm. They should ensure that their athletes have acquired the characteristic rhythm of a technique before emphasizing the generation of power and speed.
- ❑ In order to truly perfect technique, athletes must develop an accurate kinaesthetic sense – an instinctive feeling for what is efficient – so that they are able to continuously and reflexively adapt their movements to be optimal, even when fatigued or in the pressure of competition. Developing this acute kinaesthetic sense is best achieved by exposing athletes to a variety of stimuli. The following approaches to learning and training are applicable to this process:
  - ✓ Techniques should be practised on a variety of snow and track conditions. Once the mechanics of technique have been learned in a teaching situation, athletes should be required to practise in wet and mild conditions, on hard tracks and in soft powder snow so that they can learn how to adjust their technique to the different situations. Moreover, skiing in less than ideal conditions (e.g. on tracks that weren't set following a light snowfall) will help them develop balance and agility.
  - ✓ As well as practising technique in a variety of snow and track conditions, athletes should practise technique on different types of ski trails. For example, modern ski trails and competition courses are often built like “super highways”, but skiing on less manicured trails that twist and turn is important in order for athletes to improve their agility on skis and learn to change techniques reflexively as the trail requires.
  - ✓ Participating in year-round activities that require relevant technical abilities (balance, coordination, rhythm, etc.) will also contribute to the development of the desired kinaesthetic sense.
- ❑ Athletes should do some of their technique practice without their poles. This will help

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them refine their balance skills and the timing of their leg actions and weight shift. This is especially important early in the season, when athletes first get on snow. However, skiing without poles also serves to remind athletes of some of the underlying fundamentals of sound technique and should therefore be included in practices periodically throughout the season.

- ❑ The balance and agility drills provided in the Community Coaching Reference Material (section 4) should be a part of every practice session.
- ❑ Most athletes require frequent and consistent feedback on their performance in order to ensure technique improvement occurs. To assist with this, coaches are strongly encouraged to use video cameras to provide on-snow analysis and feedback (section 3.3) and to develop good observation, intervention and feedback skills to maximize teaching effectiveness (section 5.4).
- ❑ It is important for athletes to see examples of good technique put into practice so they can create a mental picture of what they are aiming to achieve. To this end coaches should work on upgrading their own technique, as they are important role models for their athletes.
- ❑ When competing, athletes need to use the techniques that will give them optimal speed in the given terrain and snow conditions. Fitness obviously affects when and where a specific technique is used, but adapting the technique to the terrain is very important as well. Competitive skiers must therefore learn to analyse both the course profile and the prevailing snow and track conditions in order to determine how to best ski the trail. In addition they need to learn how to maintain momentum when switching from one technique to another. Choosing the best technique for a given situation means using the one that is optimal for a certain speed.

### **Characteristics of the “Best” Skiers**

- ❑ The “big three” characteristics are the following:
  - ✓ Good balance.
  - ✓ Good weight shift.
  - ✓ Good rhythm (i.e. correct body positioning, body movements and timing).
- ❑ Other important characteristics are as follows:
  - ✓ Good forward movement – “gains lots of ground”.
  - ✓ Generates and maintains momentum – “keeps the wheels turning”.
  - ✓ Good at creating force in the direction of travel – not up, down or sideways.
  - ✓ Good at changing technique to match terrain, snow and track conditions.
  - ✓ Good physical condition.
  - ✓ Good kinaesthetic feel.

### **Key Considerations Specific to Teaching Skating Technique**

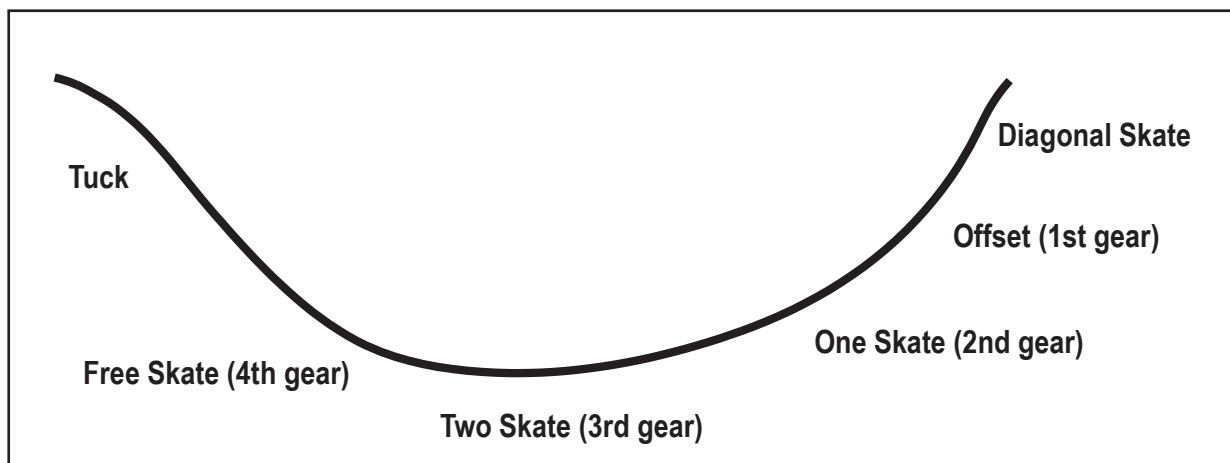
- ❑ The Teaching Points provided later in this section outline the key elements that make up each skating technique. It is recommended that coaches analyse the skating technique skills of the athletes in their group at the beginning of the season and, based on this evaluation, develop an individualized “skating technique plan” for each. These plans will be useful in determining the focus of the technique sessions for the whole group, as well as in guiding your advice to individual athletes throughout the season.
- ❑ All the skating techniques have common features. Small differences in timing and body movements – and through them the generation of power - make the different skating techniques suitable to different terrain and snow conditions.
- ❑ Emphasize the importance of spending equal time initiating pole plants on the left and right sides when using the Offset and Two Skate techniques. This will prevent potential muscle imbalances from developing and will allow the muscles on one side of an athlete’s body (e.g. arms, shoulders, abdomen) to rest while he/she is working on the other side. It will also ensure that athletes can adapt their technique smoothly to the constantly changing profile of the trail, thus optimizing efficiency.

## 4.2 Skating Techniques

This section provides comprehensive descriptions and teaching methodologies for the several skating techniques that are essential for a cross-country skier: Offset, One Skate, Two Skate and Free Skate. Some general information is also provided on Diagonal Skate, but this technique is not treated in depth as it is seldom used in a racing context.

For the purpose of better understanding the roles and relationships between the various skating techniques, the techniques are equated to “gears” (analogous to gears in a vehicle). This is illustrated in Figure 4.1.

Figure 4.1: Skating Technique “Gears”



The gear analogy gives an indication of the relative speed of a skier when using them. Thus, skating techniques are described as follows:

- ❑ **Diagonal Skate** – a sub-gear (or “Granny gear”, in a cycling context).
  - ✓ Diagonal Skate is a useful technique for recreational skiers, as an energy-efficient means to climb steeper hills.
  - ✓ In a racing context in which ski trails are properly designed, a competent and fit skier should not need to resort to using Diagonal Skate to climb hills. While this approach is correct in principle, practicality dictates that there are situations where Diagonal Skate will still be used. Such situations include use by younger skiers where fitness may not permit a hill to be climbed using Offset, as well as use by more proficient skiers when faced by a particularly steep grade on a race course that does not meet homologation standards. Ultimately, when the situation dictates (i.e. continuing to execute Offset technique correctly is impossible), it is better to maintain forward and upward momentum with Diagonal Skate than to resort to walking or a Herringbone-type shuffle.
  - ✓ Apart from the racing scenario, many or most skiers will find the Diagonal Skate to be of value when training. When training in the lower zones/intensities, skiers should attempt to use Offset technique for hill-climbing to the extent possible. However, they will sometimes find it expedient to climb steeper sections of the course using Diagonal Skate in order to keep their heart rates within the specified

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parameters for the zone in which the training is taking place.

- ✓ As noted previously, this manual will not provide details on the Diagonal Skate, as it is not a technique that warrants critical analysis beyond that provided in the Community Coaching Reference Material. Nevertheless, coaches should ensure that when Diagonal Skate is being used by their athletes, the technique is being executed correctly, observing the essential fundamentals of good skate skiing – e.g. good weight shift, forward hips, step up the hill.
- ❑ **Offset** – 1st gear. See section 4.2.1.
- ❑ **One Skate** – 2nd gear. See section 4.2.2.
- ❑ **Two Skate** – 3rd gear. See section 4.2.3.
- ❑ **Free Skate** – 4th gear. See section 4.2.4.

The material provided in the following sections will provide you with comprehensive information on the various skating techniques, together with recommendations on how to teach them. Skating Technique Checklists are summarized in section 4.2.5.

The technique descriptions in this manual are appropriate for distance races and for recreational skiing. Note that experienced ski racers may make minor modifications to skating techniques for sprint competitions in order to be more dynamic and explosive. These modifications can be executed for relatively short distances and/or races of short duration only.

Ski technique and our understanding of it are constantly evolving – sometimes quickly. This material articulates the most current doctrine and will be updated periodically as changes occur.

#### 4.2.1 Offset Technique (1<sup>st</sup> Gear)

##### **Purpose**

This technique is used primarily to ascend hills (i.e. for climbing). Depending on the track conditions, Offset may be used in situations that range from slight uphill to very steep uphill. As they develop, skiers with good technique and power will be able to use One Skate and Two Skate techniques more on uphill, thus reducing the amount of Offset (1<sup>st</sup> gear) used.

##### **Mechanics**

The Offset technique is relatively easy to learn at a basic level. The reason for this is that it places fewer initial demands on a skier's balance. This is because: 1) the body positioning and movements of the technique involve a weight shift from side to side and forward that amounts to "falling up the hill" (which can be accomplished even in an off-balance body position); and 2) the shorter glide that is generated in the uphill conditions in which Offset is used requires the skier to spend less time balanced on each ski.

Figure 4.2 - Complete Cycle of Offset Technique (lead side is left)



Figure 4.2.1



Figure 4.2.2



Figure 4.2.3



Figure 4.2.4



Figure 4.2.5



That being said, Offset is also one of the more difficult techniques to master, due to the nuances implicit in it, and good balance is ultimately a key to executing the technique well. Coaches must strive to have their athletes become particularly proficient and efficient in this technique, as hill-climbing frequently determines the outcome of a competition.

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Offset (1<sup>st</sup> gear) involves skating alternately on each leg, utilizing a slightly staggered Double Pole-type motion on every second skate. The poling side is referred to as the lead side. The photo sequence at Figure 4.2 depicts a complete cycle of Offset technique with the skier's left side leading.

The detailed mechanics of the technique are described below; the text focuses on right side leading:

- ❑ When the skier Offsets to the right (i.e. the lead side), the skier begins by pushing to the side and back off the left ski (see Figure 4.3), stepping up the hill with the right ski and subsequently executing a Double-Pole-type action. Note that the stepping action must not be exaggerated, as this will cause the skier's hip (and centre of gravity) to be left behind. The aim is to project the hip and weight forward and up the slope, not simply to extend the foot forward. In practice, "stepping up the hill" should feel more like "falling up the hill" if the skier's hip and weight are appropriately positioned.

Figure 4.3



Figure 4.4



- ❑ In the poling motion, the right hand is placed slightly forward of the head and at a more vertical angle than the left pole (i.e. the "offset" positioning that gives the technique its name). See Figure 4.4. Conversely, the left ski and hand lead when the skier is Offsetting to the left.
- ❑ As the poling motion of Offset takes place on every second stride and the poles are not aligned with one another on planting, the technique is distinctly asymmetrical in appearance. Nevertheless, whether Offsetting to the right or left, force is applied smoothly and equally through both legs. The overall force applied in Offset comes relatively equally from the upper body (core muscle contraction and poling) and the pushing leg.
- ❑ The critical timing in Offset is in the sequencing of planting poles and placing skis. The essence is a "three point-one point" sequence. To initiate Offset, the two poles and the ski on the lead side (i.e. three points) come in contact with the snow **at the same time**. See Figure 4.5. The non-lead side ski (i.e. one point) is placed on the snow by itself as the Offset cycle is completed.

Figure 4.5



- ❑ In the poling action, both pole baskets are planted close to the ski bindings.
- ❑ Ideally (to the degree the slope permits) skis are placed flat on the snow so that gliding is optimized; they are then edged as gliding ends, the leg begins its extension and the kick takes place.
- ❑ The combination of the pole thrust and the lead side ski pushing moves the body up the hill and over to the non-lead side ski. See Figure 4.6.

Figure 4.6



- ❑ As soon as the skier's weight is shifted onto the non-lead side, the arms begin to swing back up and forward as the skier begins the push back onto the lead side. This begins the next cycle, with the skier again shifting weight to the lead side as the poles and lead side ski contact the snow simultaneously.
- ❑ There is a complete weight shift from ski to ski. The whole body works together to shift the skier's weight from ski to ski and up the track, with very little time spent gliding inactively. The skier must keep the weight shifting from one ski to the other continuously to ensure that forward momentum is being maintained. If there is a pause in the technique, the skier will slow down and lose momentum.

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- ❑ The upper body is dynamic, with a relatively shallow compression during the poling action. The upper body remains somewhat flexed forward as the weight is shifted over to the non-lead ski and then extends as the arms quickly recover and the leg pushes off to the side to prepare the body to repeat the cycle.
- ❑ As the slope of the hill increases, so should the tempo, in order to prevent loss of momentum as glide decreases. The slope of the hill will also dictate how wide a stance the athlete will take while performing the Offset technique - the steeper the hill, the wider the stance. A skier's feet should be under the hips at the time of the ski and pole planting, which will result in the skier "falling" up the hill versus "stepping" up the hill (which would have a tendency to leave the hips behind and impede upward momentum).
- ❑ The direction of the fall line on a hill should generally dictate which side of the body becomes the lead side. The lead side should be on the uphill side of the trail.

## Body Positioning

- ❑ **Hips.** The positioning and motion of the hips are of vital importance, as the shifting of weight is directly tied to them:
  - ✓ The hips must be moved over the lead side ski at the time the ski is placed on the snow, so that the skier steps onto a ski that is gliding as it hits the snow. Throughout this action the hips should remain forward and high. In a "high" hip position, the body weight is supported by the femur bone in a nearly vertical position (allowing the skeletal structure rather than muscles to support the weight). If the hips are behind and low, an effective and properly timed weight shift cannot take place. While it is important to focus on hip positioning over the lead ski, it is equally important to think in terms of placing the lead ski under the hips.
  - ✓ The hips are oriented generally down the trail, rather than swinging to face the direction in which the ski is travelling. The hips, however, are not locked or blocked in a single forward orientation.
  - ✓ A good indicator of proper hip positioning is for the skier to feel weight distribution evenly on the whole of the lead-side foot.
- ❑ **Core.** The core muscles must be engaged to allow this muscle group to support the overall body position and action, as well as to assist in the generation of power through the poling motion. This takes the form of shallow crunches as the poling action is executed. The back and upper body will be slightly rounded during the Offset motion. Note that too much bend at the waist during Offset (jackknifing at the waist) pushes the hips back and doesn't allow for the use of the ankles.
- ❑ **Ankles and Knees**
  - ✓ A pronounced bend at the ankles and knees during Offset is critical for the skier to be able to generate force, with the degree of flex constantly changing throughout the technique. See Figure 4.7. The flex at the ankles and knees also contributes to balance, allows the skier to maintain more constant speed and prevents loss of momentum. The flex in these joints becomes more pronounced as

the slope increases.

Figure 4.7



- ✓ It is important that the skier thinks about driving the knees forward up the hill, which will also keep the speed more constant.
  - ✓ Ideally the lead side knee tracks directly over the foot, as this is important for balance and effective gliding. Some athletes will find this more difficult; this is generally because of poor leg strength and/or body positioning.
- ❑ **Arms and Shoulders**
- ✓ The movement of the arms and shoulders should be smooth and have good rhythm.
  - ✓ Despite the offset (or staggered) positioning at pole plant, the poling action remains as close as possible to that of Double Poling. The elbow on the lead side should be bent (90 degrees or less), with the hands just forward of the head at pole plant. The other hand will be slightly lower at pole plant. The lead side pole is planted at a more vertical angle than the opposite pole. Figure 4.7 above illustrates correct arm positioning at pole plant.
  - ✓ The follow-through of the arms and hands is short and generally stops just past the hips, with the actual amount of follow-through being determined by such factors as the skier's tempo and the length of glide being produced. This permits momentum to be maintained and allows the quick return of the arms to their initial position.
  - ✓ The shoulders should be level, rather than one being raised and one lower.
- ❑ **Feet.** The skier's weight is centered across the whole foot, with slightly more than half of the weight forward on the ball of the foot. The skier's weight will shift toward the forefoot as the ski is set down and then to the whole foot as the push phase of the skate is initiated. The push progresses from the whole foot to the inside of the foot, with final extension coming from the ball of the foot. If the weight is too far forward onto the toes it will cause the front of the ski to plow into the snow. If the weight is too far back, it will force the skier's hips back, causing the quadriceps to be used more and preventing the skier from "falling" up the hill.

## Progression

Athletes will generally be predisposed to Offset to either the right or the left. Coaches should allow individuals to favour the “natural” lead side when teaching the technique. However, skiers must learn to Offset to both sides with confidence and competence, so practice drills must be designed from an early stage to ensure that this occurs. This will allow skiers to develop a balanced muscular structure, will reduce fatigue by enabling both sides of the body to be used equally and will decrease the possibility of overuse injuries. It will also enable skiers to adjust their technique in accordance with which side of the track is uphill, thus optimizing the technique’s effectiveness.

## Teaching Points

Offset technique should be taught on a gradual uphill on packed trail. In the description below, the skier is Offsetting to the right. The skier starts in a static position.

- ❑ The skier begins with skis in a “V” shape and is in the general athletic stance. The arms are at the side; the poles are planted slightly forward of the bindings. The lower leg (knee to ankle) segment and the trunk (shoulder to hip) should be parallel (inclined forward on the same plane).
- ❑ The skier pushes off the left ski, stepping forward up the hill with the right (lead) leg (see Figure 4.8); at the same time the poles are brought forward and planted again (see Figure 4.9):

Figure 4.8



Figure 4.9



- ✓ The left leg push off (kick) is from an edged ski. The push is primarily to the side but inevitably incorporates also a backward component. The push begins at the hips and progresses through the large muscle groups and lower leg joints (knee and ankle). The final push is from the ball of the foot.
- ✓ The poles and right ski touch the snow at the same time – a three point contact.
- ✓ A full weight shift occurs through the action of stepping (falling) forward.
- ✓ The right ski lands flat (to the degree possible, depending on the steepness of the hill) and should be in motion (gliding) forward as it lands. See Figure 4.10.



Figure 4.10



- ✓ On landing, the right shoulder and hip should be aligned over the right foot, in a balanced position. See Figure 4.10 above. The knee is directly over the foot and is driven up the hill.
- ✓ The poles are planted in an “offset” position. The right pole is planted with the tip beside the right binding and the hand slightly ahead of the head. The left pole tip is also planted close to the binding, except that the arm will be lower at pole plant and the hand will be slightly more forward.
- ❑ With the pole plant, the skier initiates a Double Pole-type action.
  - ✓ The right (lead) ski is continuing to glide as the Double Pole action takes place.
  - ✓ The upper body flex (contraction) is shallow, with the actual degree of flex depending on the slope of the hill.
  - ✓ Arm action is similar to the Double Pole in Classic Technique, but the hands finish just past the hips. The amount of follow through is dependent on the skier’s speed, but recovery must be initiated quickly enough to initiate the next cycle of the technique without a loss of momentum.
- ❑ As glide diminishes, the right ski is edged and the skier pushes off onto the left ski. See Figure 4.11.

Figure 4.11



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- ✓ During the leg push motion, the skier initiates and completes weight transfer onto the left ski.
- ✓ The right leg push off is the same as for the left leg.
- ✓ The ski and foot action on the left side on landing are the same as for the right side.
- ❑ The skier balances briefly with the left hip and shoulder aligned over the left ski. See Figure 4.12. The ski is then edged and the skier pushes off the left leg and steps and shifts the weight onto the right ski, to start the cycle again.

Figure 4.12



If you are coaching children in the L2T stage of development, this information will go hand-in-hand with the Skating Technique Checklists (section 4.2.1) and Track Attack Skill Criteria and corresponding Track Attack Skill Checklists (section 3.4).

Common Errors and Solutions – Offset Technique	
Errors	Solutions
<b>Incomplete weight shift.</b> The skier rides a “centre line” between the two skis, rather than committing the weight fully to each side. This increases fatigue, as the body’s weight is supported by muscle rather than bone, and limits momentum.	<ul style="list-style-type: none"><li>✓ The skier’s knee and hips should be aligned over the foot.</li><li>✓ Balance drills must be emphasized and practised. The skier will not execute a complete weight shift if unable to assume a balanced position on landing on the gliding ski.</li></ul>



<p><b>Hips too far back.</b> A very common mistake is having the hips behind the feet, causing the skier to “sit back”, which impedes forward momentum. This results from poor balance and weight shift.</p>	<ul style="list-style-type: none"> <li>✓ Encourage the skier to maintain the general athletic stance for skating and the forward hip position over the lead ski (thinking about “falling up the hill” and “driving the knee and hip up the hill”).</li> <li>✓ Encourage the skier to complete a full and positive weight shift on each side.</li> <li>✓ Keep hips oriented down the track.</li> </ul>
<p><b>The upper body is too rigid.</b> This prevents the skier from involving the core muscles in the technique.</p>	<ul style="list-style-type: none"> <li>✓ Encourage the skier to replicate the “crunching” action of the normal Double Pole, but with less compression.</li> </ul>
<p><b>The lead shoulder is dropped.</b> Some athletes do not push equally with the poles, which causes a drop of the shoulder on the lead side and interferes with proper weight transfer.</p>	<ul style="list-style-type: none"> <li>✓ Ensure the athlete poles equally with both arms and keeps their shoulders in the same horizontal plane.</li> <li>✓ Check the position of the baskets at the pole plant. They should be close to the binding.</li> </ul>
<p><b>Loss of momentum.</b> The skier needs to transfer weight from ski to ski without a loss of ski glide and momentum. Skis should not grind to a halt in each glide phase of Offset.</p>	<ul style="list-style-type: none"> <li>✓ The skier should maintain the “three point-one point” sequence in a smooth thym; the steeper the hill, the quicker the tempo.</li> <li>✓ The skier should as much as possible step onto a gliding ski.</li> <li>✓ Encourage the skier to maintain the general athletic stance for skating and the forward hip position over the lead ski (thinking about “falling up the hill” and “driving the knee and hip up the hill”).</li> <li>✓ Again, stress the need for a full weight shift.</li> </ul>

#### 4.2.2 One Skate Technique (2<sup>nd</sup> Gear)

##### Purpose

One Skate, or 2nd gear, is the technique used on flat, gentle downhill or gentle uphill terrain. The skier’s technical ability, fitness and strength will dictate the particular terrain in which One Skate will be used. The firmness and speed of the track, as well as the evenness of the terrain, will determine where a transition to another technique becomes necessary.

One Skate (2nd gear) is used when Offset (1st gear) becomes inefficient (i.e. the skier is moving too quickly to continue using Offset). In competitive skiing, the One Skate technique is usually used to accelerate (for instance, at the finish of a race) or to maintain a high

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speed in situations that permit this powerful technique to be used effectively and efficiently. Good force application, weight shift and balance are essential if the skier is to perform this technique effectively.

### **Mechanics**

One Skate (2<sup>nd</sup> gear) is the most powerful skating technique. Unlike Offset, it is a symmetrical technique, involving a Double Pole-type motion for every skate push. A complete cycle of the technique involves two Double Poles and two skate pushes – a Double Pole for each skate. Arm and leg actions are the same on both sides of the body, with the upper and lower body working together effectively. The skis track forward in a narrow “V”. A complete cycle of One Skate is illustrated at Figure 4.13.

The One Skate technique is more challenging to learn than Offset, as it places greater demands on a skier’s balance. The skier must balance on the gliding ski during each leg push, and must be able to hold that position comfortably in order to obtain the maximum efficiency from the technique.

Figure 4.13 – Complete Cycle of One Skate Technique

Figure 4.13.1



Figure 4.13.2



Figure 4.13.3



Figure 4.13.4



Figure 4.13.5



Figure 4.13.6



Figure 4.13.7



Figure 4.13.8



The salient points of the mechanics of One Skate are as follows:

- ❑ The skier starts the movement in the general athletic stance for skating, fully in balance on the glide ski with a bent ankle. The hips and knee are over the foot, with a forward leaning trunk and with the arms at the side, poles trailing behind. The other foot is unweighted, in a recovery position.
- ❑ With the skier remaining balanced on the glide ski, the arms swing forward into a Double Pole position; the upper body rises on a fairly straight leg and is "loaded" for the first Double Pole. See Figure 4.14.

Figure 4.14



Figure 4.15



- ❑ The Double Pole motion is initiated, with poles being planted and upper body compression taking place. See Figure 4.15. At the same time the leg flexes then pushes explosively. The skier skates onto the new glide ski with a full weight shift.
- ❑ The skier begins to move over onto the new glide ski just before the arms reach the level of the hips. See Figure 4.16. The Double Pole motion and the skating push are complete as the new gliding ski hits the snow and the skier's weight shift to that ski is completed. While the skier is gliding, the arms and trunk recover to the starting high position to initiate another Double Pole and skate that will take the skier back onto the first glide ski and finish the full One Skate cycle. See Figure 4.17.

Figure 4.16



Figure 4.17



- ❑ The Double Poling push initiated by the upper body must be energetic and powerful, and the amount of trunk compression will vary depending on terrain. The skate push with the legs is also dynamic and the bend at the ankle is pronounced. The skier forcefully extends at the hip, knee and ankle of the pushing leg to create a quick push off and weight transfer forward and sideways to glide on the new ski.
- ❑ The timing of the arm, body and leg movements is one of the most important features of the One Skate technique. The key to timing is in the planting of the poles (two points) when the legs are closest together and just **before** stepping onto the new gliding ski (one point). See Figure 4.18.



Figure 4.18



- ❑ Precise transfer of the skier's weight from the glide ski over to the new glide ski is also a key component of effective One Skate technique.
- ❑ It is critical that the upper body crunch and pole thrust be initiated together.
- ❑ Balance is critical in this technique, as the skier must be totally committed to and balanced over a single gliding ski. When the poles and pushing ski are being recovered, the skier has only the gliding ski in contact with the snow. The skier's weight – centred in the hips – is carried over the gliding ski foot, allowing the skier's weight to be borne by bones rather than muscle. See Figure 4.19. The hips are not blocked, but remain oriented generally down the track.

Figure 4.19



- ❑ Although the Double Pole motion is powerful, the majority of the force in One Skate comes from the leg muscles; this technique permits a strong kick that produces more force than the “falling” push permitted in the Offset technique.

### Body Positioning

- ❑ **Hips.** The positioning and motion of the hips are of vital importance, as the shifting of weight is directly tied to them:
  - ✓ The hips are in a “high” position just prior to the beginning of the Double Pole, the

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body weight being supported by the femur bone in a nearly vertical position (allowing the skeletal structure rather than muscles to support the weight). See Figure 4.14 above.

- ✓ As the Double Pole begins, the weight shift is initiated, the leg compresses and the hips are lowered slightly in order to load the leg and permit power to be generated when the leg extends. See Figure 4.15 above.
  - ✓ The shifting of the hips (and body weight) over to the new glide ski occurs throughout the Double Pole motion and the extension of the kicking leg, all to be completed simultaneously. Throughout this action the hips should remain forward over the foot. If the hips are behind and low, an effective and properly timed weight shift cannot take place.
  - ✓ The hips are oriented generally down the trail, rather than swinging to face the direction in which the ski is travelling. The hips, however, are not locked or blocked in a single forward orientation.
  - ✓ A good indicator of proper hip positioning is for the skier to feel weight distribution evenly on the entire gliding foot.
- ❑ **Core.** The core muscles must be engaged to allow this muscle group to support the overall body position and action, as well as to assist in the generation of force through the poling motion. This takes the form of shallow crunches as the poling motion is executed. The back and upper body will be slightly rounded during the One Skate motion. See Figure 4.20 below. Note that too much bend at the waist (jackknifing at the waist) pushes the hips back and doesn't allow for the use of the ankles.

Figure 4.20



❑ **Ankles and Knees**

- ✓ A pronounced bend at the ankles and knees during One Skate is critical for the skier to be able to generate force, with the degree of flex constantly changing throughout the technique. See Figure 4.20. The flex at the ankles and knees also contributes to balance, allows the skier to maintain more constant speed and prevents loss of momentum.
- ✓ It is important that the skier thinks about driving the knees forward, while still

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maintaining a high and forward hip position.

- ✓ The gliding side knee tracks directly over the foot, as this is important for balance and effective gliding. See Figure 4.21. Some athletes will find this more difficult; this is generally because of poor leg strength and/or body positioning.

Figure 4.21



#### ❑ Arms and Shoulders

- ✓ The movement of the arms and shoulders should be smooth and rhythmic.
- ✓ The arm positioning throughout the motion is very similar to that in Double Poling in Classic technique.
- ✓ At the time of pole plant, the elbows are the lowest point in the arm position. They are positioned neither out like wings nor in tight to the body; the precise positioning is difficult to state, but some amount of outward orientation is necessary to engage the lats (the latissimus dorsi). See Figure 4.22.

Figure 4.22



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- ✓ The follow-through of the arms and hands is short and stops just past the hips. This permits momentum to be maintained and allows the quick return of the arms to their initial position.
- ✓ The rapid and timely recovery of the arms is critical to the timing of this technique.
- ❑ **Feet.** On the gliding ski the skier's weight is centered across the whole foot, with slightly more than half of the weight forward on the ball of the foot. In the kicking phase, the push progresses from the whole foot to the inside of the foot, with final extension coming from the ball of the foot. If the weight is too far forward onto the toes it will cause the front of the ski to plow into the snow. If the weight is too far back, it will force the skier's hips back, causing the quadriceps to be used more and compromising balance.

## Progression

Teaching should take place on flat or slightly uphill terrain. Start with the general athletic stance for skating. Practise the One Skate without poles, but with the arm and trunk executing the Double Poling motion. Emphasize timing, good balance and weight shift. Downplay glide length and speed until the skier has learned the proper rhythm (body positioning, body movements and timing) of the technique.

## Teaching Points

The One Skate technique requires a shallow Double Pole-type motion with each leg push. This technique should be practiced and assessed on easy terrain (flat or slightly uphill to start) and packed snow.

Practicing in an uphill setting may seem counter-intuitive. However, it serves to make balance easier by removing the additional challenges of extra speed and glide that exist in a downhill scenario. In addition, the reduced glide implicit in an uphill setting requires the skier to execute the technique in a slightly faster tempo in order to maintain forward momentum, thus necessitating more frequent pole plants which serve to offset balance difficulties.

In the following illustration, the first stride in the One Skate cycle is to the left, and the skier begins in a static position.

- ❑ The skier is in the general athletic stance for skating, with the skis in a narrow "V" shape (ski tips are about 50 cm apart). The trunk is fairly upright, the arms at the side of the body with the poles trailing behind. The skier is balanced on the right ski (i.e. the glide ski) and the left ski (i.e. the recovery ski) is unweighted.
- ❑ The skier then loads the right side of the body in preparation for the first Double Pole and leg push:
  - ✓ The arms are swung forward into the Double Pole position (though the poles are not planted immediately). See Figure 4.23 below.
  - ✓ The weight is shifted onto the right ski, with the hips sitting forward and high over the right foot but oriented down the track.
  - ✓ The left ski is raised slightly off the snow (as it would be in recovery after the completion of the previous kick). See Figure 4.24 below.



Figure 4.23



Figure 4.24



- ❑ The skier executes a coordinated Double Pole motion and push off from the right ski:

Figure 4.25



Figure 4.26



- ✓ Importantly, pole plant (two point contact) occurs just briefly before the left ski is placed on the snow (one point contact). See Figure 4.25.
- ✓ The poles are planted slightly ahead of the binding and a strong Double Pole action incorporating simultaneous upper body compression (crunch) and pole push are executed. The follow-through of the arms is short (just past the hips is enough) and is synchronized with the completion of the weight transfer to the left ski.
- ✓ At the same time, the skier flexes the right leg and then extends and pushes off the right ski. See Figure 4.26. The right leg push off (kick) is from an edged ski. The push is primarily to the side, but inevitably incorporates also a backward component as the leg is behind the body. It begins at the hips and progresses through the large muscle groups and lower leg joints (knee and ankle). The final phase of the push is from the ball of the foot. The tip and tail of the ski leave the snow at the same time (if the binding is mounted in the correct position on the ski).
- ✓ As the Double Pole takes place, the weight shift is initiated and the right leg is extended simultaneously. As the weight shift takes place, the left ski is placed on the snow. See Figure 4.27. The ski is pointed forward down the trail as much as the

skier's speed and the gradient of the track permit. A narrower "V" is faster than a wider one, as more terrain will be covered with each stride.

Figure 4.27



- ❑ The skier completes the poling motion, then loads the left side and completes an identical Double Pole and push sequence on that side:
  - ✓ Recovery of the arms after the completion of the Double Pole must be rapid in order to position the arms forward to key the timing of the next side of the cycle.
  - ✓ The glide on the left and right skis is the same.
  
- ❑ During the recovery of each leg, the foot passes underneath the hip of that side (feet come fairly close together).

If you are coaching children in the L2T stage of development, this information will go hand-in-hand with the Skating Technique Checklists (section 4.2.1) and Track Attack Skill Criteria and corresponding Track Attack Skill Checklists (section 3.4).

<b>Common Errors and Solutions – One Skate</b>	
<b>Errors</b>	<b>Solutions</b>
<p><b>Employing Offset timing with One Skate.</b> The skier uses a 3-point plant to initiate the technique, which leads to weight shift occurring too soon and a weakened poling action.</p>	<ul style="list-style-type: none"> <li>✓ Ensure that the skier fully loads the gliding side, with a high body position.</li> <li>✓ Ensure pole plant occurs while the recovery ski is still in the air (the “two point-one point” sequence). This permits the ski to be launched onto the snow with the full power of the Double Pole and leg push behind it.</li> <li>✓ Practice skiing without poles to develop a feel for the rhythm of the technique.</li> </ul>

<p><b>Late kick.</b> The leg push is back, rather than to the side and the body weight remains back.</p>	<ul style="list-style-type: none"> <li>✓ Encourage the skier to bring hips forward over the gliding foot.</li> <li>✓ Encourage the skier to push to the side - off the full foot - in the skating action.</li> <li>✓ Keep hips oriented down the track.</li> </ul>
<p><b>The upper body is too rigid.</b> This prevents the skier from involving the core muscles in the technique.</p>	<ul style="list-style-type: none"> <li>✓ Encourage the skier to replicate the “crunching” action of the normal Double Pole, but with less compression.</li> </ul>
<p><b>Poor balance.</b></p>	<ul style="list-style-type: none"> <li>✓ Good balance starts with proper body positioning, incorporating flexed hips, knees and ankles.</li> <li>✓ The skier must learn the rhythm of One Skate (body position, body movements and timing) before balance problems can be mastered. De-emphasize speed and length of glide until the proper rhythm is achieved. To help get the feel for rhythm, the skier should practice skiing utilizing relatively short rhythmic strides with a very shallow Double Pole and rapid arm recovery. Skating without poles can also be helpful, as the correct arm recovery timing may be easier to learn without the encumbrance of poles.</li> <li>✓ With rhythm solved, the emphasis can turn to maintaining balance during a longer glide. Drills that incorporate “lingering” over the glide ski should be introduced.</li> <li>✓ Avoid practicing on downhill segments of trail until balance is reasonable. However, practicing on downhill stretches will eventually be essential, as the skier must have the balance necessary to ride a long glide and derive full speed and efficiency from the One Skate technique.</li> <li>✓ Balance can also be practiced in the off-season, using exercises and roller skis.</li> </ul>

<p><b>Too much side to side movement.</b></p>	<p>✓ Ski tips are kept fairly close together in this technique, as force is directed down the track. Encourage the skier to keep the head and trunk facing mainly down the track, while ensuring good weight transfer. The same-side shoulder hip and knee should align over the ski during the first part of the gliding action.</p>
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### 4.2.3 Two Skate Technique (3<sup>rd</sup> Gear)

#### Purpose

Two Skate, or 3<sup>rd</sup> gear, is the technique used when the slope of the track varies from flat to slightly downhill and the skier has already generated speed. It is a technique that is commonly used when the skier is interested in maintaining speed as opposed to accelerating. The skier's technical ability, fitness and strength will dictate exactly in which terrain it will be used. The firmness and speed of the track and the evenness of the terrain will dictate where a transition to another technique is necessary.

#### Mechanics

The Two Skate (3rd gear) is different from the One Skate (2nd gear) in that it is asymmetrical. A complete cycle of the technique requires one Double Pole-type motion with every second leg push. A complete cycle of Two Skate technique is depicted on the next page in Figure 4.28.

Two Skate is a powerful skating technique. However, as the upper body is applying force in only one phase of a cycle, it is not generally as powerful as One Skate. Nevertheless, Two Skate is a particularly efficient technique, and proficient skiers can use the weight shifts inherent in it to sustain and occasionally exceed the speeds generated in One Skate, though with less effort.

As with One Skate, the upper and lower bodies must work closely together and rhythm is critical. The skis track forward in to a narrow "V".

For some skiers the Two Skate technique is more challenging to learn than the One Skate. This is because it challenges the skier's balance – for while a significant glide is required on each ski, the balance-assisting planting of poles occurs only once in each cycle.

However, once skiers have a feel for the rhythm of Two Skate, they find that the strong weight shift in the recovery to the non-poling side results in good forward momentum that serves to reduce balance problems. Females typically find the Two Skate a comfortable technique, both because it requires less force from the upper body and because they possess a slightly lower centre of gravity that contributes to good balance.

The salient points of the mechanics of Two Skate are as follows:

- ❑ When using Two Skate, the method of propulsion on the poling side is identical to that of

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One Skate. The upper body and lower body work together to transfer weight to each gliding ski.

- ❑ Timing is the same as for One Skate, with poles being planted when the legs are closest together and slightly before the recovery ski is placed on the snow.

Figure 4.28 – Complete Cycle of Two Skate Technique

Figure 4.28.1



Figure 4.28.2



Figure 4.28.3



Figure 4.28.4



Figure 4.28.5



Figure 4.28.6





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- ❑ In Two Skate the skier assumes a high position for the initiation of the Double Pole on the poling side, (see Figure 4.29) and body compression results in a slight lowering of the body by the end of the poling motion.

Figure 4.29



Figure 4.30



- ❑ The return to the poling side is accomplished from the lower position with a skating push aided by the momentum of the arms swinging up, forward and over to the poling side. See Figure 4.30. The synchronization of this dynamic forward arm swing and skate push is integral to the effectiveness of the Two Skate technique. The arm recovery from follow-through to new pole plant must be uninterrupted; any pause mid-recovery serves to compromise rhythm and forward momentum.
- ❑ There should be good rhythm as the skier moves from the Double Pole motion to the skate push. Precise transfer of the skier's weight from the glide ski over to the new glide ski is also a key component of effective Two Skate technique. Two Skate is the skating technique where smooth rhythm is essential; one should have a feeling akin to ballroom dancing - smooth and rhythmic, fast and snappy.
- ❑ Even more so than in One Skate, the majority of power comes from the legs. Force is generated by the legs equally on each side. It is important to maintain power down the track even during the swing from the non-poling side to the poling side.

### Body Positioning

Note: Body positioning for Two Skate is in most respects the same as for One Skate. Accordingly, the following text, with some exceptions, is the same as for One Skate and refers to the same Figures that were used to illustrate One Skate technique.

- ❑ **Hips.** The positioning and motion of the hips are of vital importance, as the shifting of weight is directly tied to them:
  - ✓ The hips are in a "high" position just prior to the beginning of the Double Pole, the body weight being supported by the femur bone in a nearly vertical position (allowing the skeletal structure rather than muscles to support the weight). Refer back to Figure 4.14.
  - ✓ As the Double Pole begins, the weight shift is initiated, the leg compresses and the hips are lowered slightly in order to load the leg and permit power to be generated

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when the leg extends. Refer back to Figure 4.15.

- ✓ The shifting of the hips (and body weight) over to the new glide ski occurs throughout the Double Pole motion and the extension of the kicking leg, all to be completed simultaneously. Throughout this action the hips should remain forward over the foot. If the hips are behind and low, an effective and properly timed weight shift cannot take place.
  - ✓ The hips are oriented generally down the trail on both sides, rather than swinging to face the direction in which the ski is travelling. The hips, however, are not locked or blocked in a single forward orientation.
  - ✓ A good indicator of proper hip positioning is for the skier to feel weight distribution evenly on the entire gliding foot.
- ❑ **Core.** The core muscles must be engaged to allow this muscle group to support the overall body position and movement, as well as to assist in the generation of power through the poling motion. This takes the form of shallow upper body crunches as the poling motion is executed. The back and upper body will be slightly rounded. Refer back to Figure 4.20. Note that too much bend at the waist (jackknifing at the waist) pushes the hips back and doesn't allow for the use of the ankles.
- ❑ **Ankles and Knees**
- ✓ A pronounced bend at the ankles and knees during Two Skate is critical for the skier to be able to produce force, with the degree of flex constantly changing throughout the technique. Refer back to Figure 4.20. The flex at the ankles and knees also contributes to balance, allows the skier to maintain more constant speed and prevents loss of momentum.
  - ✓ It is important that the skier thinks about driving the knees forward, while still maintaining a high and forward hip position.
  - ✓ The gliding side knee tracks directly over the foot, as this is important for balance and effective gliding. Refer back to Figure 4.21. Some athletes will find this more difficult; this is generally because of poor leg strength and/or body positioning.
- ❑ **Arms and Shoulders**
- ✓ The movement of the arms and shoulders should be smooth and rhythmic.
  - ✓ The arm positioning throughout the Double Pole-type motion is very similar to that in Double Poling in Classic technique.
  - ✓ At pole plant, the elbows are the lowest point in the arm position. They are positioned neither out like wings nor in tight to the body; the precise positioning is difficult to state, but some amount of outward orientation is necessary to engage the lats (the latissimus dorsi). Refer back to Figure 4.22.
  - ✓ The follow-through of the arms and hands is longer than in One Skate.
  - ✓ The rapid and timely recovery of the arms is critical to the timing of this technique. An uninterrupted and properly timed swing forward and upward of the arms reinforces weight shift and contributes significantly to momentum. This is a distinctive feature of the Two Skate technique.

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- ❑ **Feet.** When weight is shifted to the Double Pole side, the weight initially moves to the forward part of the foot. In the leg push phase, the push progresses from the whole foot to the inside of the foot, with final extension coming from the ball of the foot. On the gliding ski the skier's weight is centered across the whole foot, with slightly more than half of the weight forward on the ball of the foot. Generally, if the weight is too far forward onto the toes it will cause the front of the ski to plow into the snow. If the weight is too far back, it will force the skier's hips back, causing the quadriceps to be used more and compromising balance.

### Progression

Introduce on an even or slightly uphill track. Start by reviewing the power phase of the Double Pole action while balancing on one foot. Emphasize the rhythm and symmetry of each of the leg pushes. Point out the difference between the "high" position of the trunk prior to the Double Pole on the poling side and the compressed body position that results after poling. The skier should practise and become proficient with the Two Skate on both sides of the body.

### Teaching Points

The Two Skate technique requires a shallow Double Pole-type motion with each second leg push. This technique should be practised and assessed on easy terrain (flat or slightly uphill to start) and packed snow.

For the example below, the right side is the poling side, and the skier starts in a static position.

- ❑ The skier is in the general athletic stance for skating, with the skis in a narrow "V" shape (ski tips are about 50 cm apart). The trunk is fairly upright, the arms at the side of the body with the poles trailing behind. The skier is balanced on the left ski (the glide ski) and the right ski (the recovery ski) is unweighted.
- ❑ The skier then loads the right (poling) side of the body in preparation for the Double Pole and leg push. See Figure 4.31.

Figure 4.31



- ✓ The arms swing forward into the Double Pole position (though the poles are not planted immediately).



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- ✓ The skier pushes off the left foot and steps onto the right foot (the new glide foot). With the push, the weight is shifted onto the right ski, with the hips sitting forward and high over the right foot but oriented down the track.
  - ✓ At the completion of the leg push, the left ski is raised slightly off the snow (as it would be in recovery after the completion of the previous kick). The tip and tail of the ski leave the snow at the same time (if the binding is mounted in the correct position on the ski).
- ❑ The skier executes a coordinated Double Pole-type motion on the right side and pushes off from the right ski, stepping forward onto the left ski (the new gliding ski). See Figure 4.32.

Figure 4.32



- ✓ Importantly, pole plant (two point contact) occurs just briefly before the left ski is placed on the snow (one point contact).
  - ✓ The poles are planted slightly ahead of the binding and a strong Double Pole motion incorporating simultaneous upper body compression (crunch) and pole push are executed. The follow through of the arms should be longer than for One Skate and is synchronized with completing the weight transfer to the left ski.
  - ✓ At the same time, the skier flexes the right leg and then extends and pushes off the right ski. The right leg push off (kick) is from an edged ski. The push is primarily to the side but inevitably incorporates also a backward component. It begins at the hips and progresses through the large muscle groups and lower leg joints (knee and ankle). The final phase of the push is from the ball of the foot. The tip and tail of the ski leave the snow at the same time.
  - ✓ As the Double Pole takes place and the right leg is extended, the left ski is placed on the snow with the weight shift being initiated simultaneously. The ski is pointed forward down the trail as much as the skier's speed and the gradient of the track permit. A narrower "V" is faster than a wider one, as more terrain will be covered with each stride.
- ❑ As the skier completes the Double Poling motion, the left leg is loaded in preparation for the push back to the right (poling) side. See Figure 4.33.

Figure 4.33



- ✓ The positioning of hips and knee over the left ski are the same as for the right ski. The skier must be fully committed to and balanced on this ski when gliding (a single point of contact).
- ✓ Recovery of the arms back to the right side after the completion of the Double Pole must be uninterrupted so that the smooth and rhythmic nature of the technique is maintained and in order to position the arms forward to key the timing of the next cycle.
- ✓ The glide on the left and right skis should be consistent.

❑ During the recovery of each leg, the foot passes underneath the hip of that side (feet come fairly close together)

If you are coaching children in the L2T stage of development, this information will go hand-in-hand with the Skating Technique Checklists (section 4.2.1) and Track Attack Skill Criteria and corresponding Track Attack Skill Checklists (section 3.4).

<b>Common Errors and Solutions – Two Skate</b>	
Most of the errors highlighted in the previous skating techniques also apply to the Two Skate technique.	
<b>Errors</b>	<b>Solutions</b>
<b>Lazy leg push.</b> The skier does not flex the leg joints sufficiently, especially when skiing at lower speeds.	<ul style="list-style-type: none"> <li>✓ Encourage a good bend at the ankle and snappy leg action.</li> <li>✓ Skiing with Two Skate movements without poles creates an effective and snappy leg action as the “lazy leg” has to activate in order for the technique to become successful.</li> </ul>

<p><b>Timing.</b> Often novices will have difficulty combining the arm and leg action fluidly.</p>	<ul style="list-style-type: none"> <li>✓ Have the skier practice by mimicking the proper sequencing of actions without skis on.</li> <li>✓ Rehearse the technique in a static situation. Have the skier stand on a stationary glide ski and initiate the Double Pole motion, while flexing and extending the push leg. Finish the Double Pole with the weight transfer to the new glide ski. Once that is achieved, have the skier complete the entire Two Skate action at slow speed and then full speed.</li> <li>✓ Emphasize the planting of the poles BEFORE the new glide ski is placed on the snow.</li> </ul>
<p><b>Hips too far back.</b> A very common mistake for skiers is having their hips behind the feet causing them to “sit back”. This is often the cause of a late kick as well.</p>	<ul style="list-style-type: none"> <li>✓ Emphasize the use of the general athletic stance as the baseline for body positioning.</li> <li>✓ Emphasize feeling the weight on the ball of the foot.</li> <li>✓ Hips and knee must be positioned over the foot on the glide ski.</li> </ul>
<p><b>The upper body is too rigid.</b> This prevents the skier from involving the core muscles in the technique.</p>	<ul style="list-style-type: none"> <li>✓ Encourage the skier to replicate the “crunching” action of the normal Double Pole, but with less compression.</li> </ul>
<p><b>Poor balance.</b> The weight is shifted too early to the non-poling side. In addition, the skier’s weight shift is incomplete and the body positioning over the glide ski is incorrect. The latter error is particularly problematic on the non-poling side, where the skier’s weight must be balanced on a single point of contact (the gliding ski) without the assistance of an accompanying pole plant.</p>	<ul style="list-style-type: none"> <li>✓ Emphasize the timing of the movement onto the ski on the non-gliding side. As the Double Pole takes place and the right leg is extended, the left ski is placed on the snow with the weight shift being initiated simultaneously.</li> <li>✓ The positioning of hips and knee over the ski on the non-poling side is the same as for the poling side. The skier must be fully committed to and balanced on this ski when gliding (a single point of contact).</li> </ul>

<p><b>Relaxing on the non-poling side.</b>                  Skiers tend to use the non-poling side for a break. This is particularly marked in a tendency for the hands to pause briefly behind the hips during recovery. This action not only reduces the skier's momentum but also does not enable the arms or leg to work together in shifting weight back to the poling side.</p>	<ul style="list-style-type: none"> <li>✓ Emphasize an uninterrupted and smooth swing forward of the arms during recovery.</li> <li>✓ Emphasize having a strong leg push from both sides.</li> </ul>
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#### 4.2.4 Free Skate Technique (4<sup>th</sup> Gear)

##### Purpose

Free Skate, or 4<sup>th</sup> gear, is the technique used when Two Skate, or 3<sup>rd</sup> gear, can no longer be sustained due to higher speed. This technique is used on downhills and flats.

The Free Skate involves alternate leg pushes with no pole action. At high speeds such as on downhill slopes or very fast level tracks the Free Skate is a very efficient way to maintain momentum.

##### Mechanics

The key body movements and positioning related to the skier's leg push and weight shift are similar to those of Two Skate. The unique features of Free Skate are the arm movement and the tuck position of the upper body.

A complete cycle of Free Skate (being executed on roller skis) is depicted in Figure 4.34. The salient points of the mechanics of the technique are as follows:

- ❑ As the push phase begins, the skier is balanced on a single supporting/gliding ski, in a high tuck position and with the arms swinging past the side of the body. The push leg from the previous cycle is in the air in recovery.

Figure 4.34 – Complete Cycle of Free Skate Technique

Figure 4.34.1



Figure 4.34.2



Figure 4.34.5



Figure 4.34.6



Figure 4.34.5



Figure 4.34.6



- ❑ The skier pre-loads the support leg, then flexes it at the hip, knee and ankle to load the leg muscles for the leg push. The function of the supporting/gliding leg changes to pushing.
- ❑ The skier then extends the push leg at the hip, knees and ankles, pushing off quickly to the side. As this occurs, the skier swings the recovery foot past the pushing foot, places the ski on the snow and drives the leg forward down the track.
- ❑ The body weight is transferred from the pushing foot to the new glide leg as the push is completed.
- ❑ In the glide phase, the skier's weight is balanced over the gliding ski, with the shoulder, hip and knee on the glide leg side being aligned over the ski.
- ❑ As glide begins to diminish, the skier loads the gliding leg again and repeats the push phase movements on the other side of the body. Both leg pushes are equal.
- ❑ The arms swing alternately forward and down the track without planting the poles and are used for maintaining rhythm and momentum. The arms swing opposite to the legs, as in Diagonal Stride in classic technique. For instance, with the left leg gliding, the right arm is extended forward, forearm over the gliding ski, while the left forearm is extended to the rear. The arms pass close to the body during the arm movements.



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Another variation of Free Skate is to keep the hands together in front of the body, as in a Tuck Position. See Figure 4.35. As the skier transfers his/her weight from ski to ski, the hands also move to be on top of the ski. This technique is frequently used when skiing at a high speed.

Figure 4.35



### Body Positioning

- ❑ **Core.** The core muscles must be engaged to allow this muscle group to support the overall body position and action, as well as to assist in the generation of power through the legs. The back and upper body will be slightly rounded, based on the skier's ability to maintain the varying degrees of tuck.
- ❑ **Ankles and Knees**
  - ✓ A pronounced bend at the ankles and the knees is critical to allow the skier to use all of his/her power and to maintain a balanced body position.
  - ✓ Skiers should focus on driving the knee forward down the track in order to optimize forward speed.
  - ✓ A good bend at the ankles and knees is also a way to lower the base of support and the centre of gravity in order to have a more effective tucking position.
  - ✓ The gliding side knee tracks directly over the foot, as this is important for balance and effective gliding.
- ❑ **Hips**
  - ✓ It is crucial that the hips be directly over the feet. A good indicator of proper hip positioning is for the skier to feel weight distribution evenly on the entire gliding foot.
  - ✓ The hips are oriented generally down the trail, rather than swinging to face the direction in which the ski is travelling. The hips, however, are not locked or blocked in a single forward orientation.
- ❑ **Arms and Shoulders.** The movement of the arms and shoulders should be smooth and have good rhythm. The arms should be bent at the elbows and swing from side to side helping the skier to shift the weight from ski to ski and forward (or stay together in

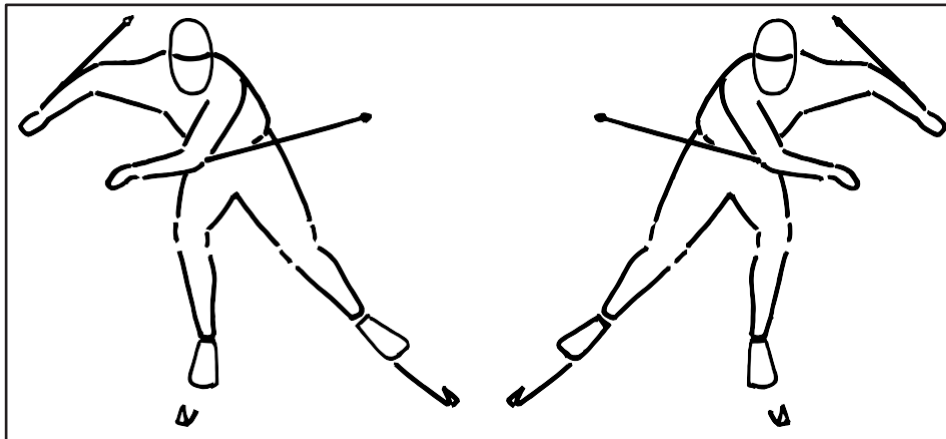
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a Tuck Position if the speed is very high). The Free Skate provides an opportunity for the arms to be relaxed.

- ❑ **Feet.** The skier's weight is centered across the whole foot, with slightly more than half of the weight forward on the ball of the foot. The skier's weight will shift toward the forefoot as the ski is set down and will quickly shift back across the whole foot for the majority of the push phase of the skate. If the weight is too far forward onto the toes it will cause the front of the ski to plow into the snow.

Figure 4.36 illustrates the critical positioning of body weight over the gliding foot during the glide phase of Free Skate, together with correct arm positioning.

Figure 4.36



### Progression

Start with the general skating drills, emphasizing proper body positioning, good balance and weight shift. Practice at lower speed and with no poles. Once a skier is proficient at skating without poles on flat terrain, skiers can progress to Free Skating on gentle downhill slopes and then higher speed downhill slopes. The latter is the most challenging because of the longer glide on each ski which comes with skiing downhill and the related challenges of balancing on a single point of contact.

### Teaching Points

The Free Skate involves alternate leg pushes with no pole thrust. At high speeds such as on downhill slopes or very fast level tracks, the Free Skate is an efficient technique for maintaining momentum. This technique should be practiced and assessed on a gentle downhill slope first.

- ❑ The skier is in the general athletic stance for skating, with the skis positioned in a "V" shape.
- ❑ The upper body is inclined slightly forward and compressed, with arms at the skier's side and the poles pointing backwards.
- ❑ The skier bends the left knee and ankle, pushing off with the left leg and transferring the weight onto the right ski.
- ❑ The right shoulder, hip and knee are aligned over the right ski. As the glide ski slows, the

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skier flexes the right knee and ankle and pushes off the right ski and shifts the weight to the left ski.

- ❑ The skier's left shoulder, hip and knee then align over the left ski.
- ❑ The push and the glide on the left and right skis are consistent.
- ❑ During the recovery of each leg, the feet pass underneath the hip of that side (feet come fairly close together).
- ❑ The skier swings the arms in front of the body (rotation movement).
- ❑ Poles are held with the tips pointing backwards, not touching the snow.
- ❑ For evaluation purposes, there should be an obvious and complete weight transfer from ski to ski (the skier glides on one ski and then the other).

If you are coaching children in the L2T stage of development, this information will go hand-in-hand with the Skating Technique Checklists (section 4.2.1) and Track Attack Skill Criteria and corresponding Track Attack Skill Checklists (section 3.4).

Common Errors and Solutions – Free Skate	
Errors	Solutions
<b>Lack of balance.</b> As with all of the skating techniques, the skier must be able to properly balance on the glide leg and have a quick weight transfer.	<ul style="list-style-type: none"><li>✓ A useful drill is to encourage the skier to line up the shoulder, hip, knee and ankle over the glide ski. Work on balancing on one ski while standing still, and then progress to balancing on one ski while moving with a long glide on each ski. This can be done on slight downhills with one ski on solely to focus on balance. Then progress to having the second ski on and maintaining the same balance.</li><li>✓ Practice skating without poles for extended periods of time to work on balance.</li></ul>



<p><b>Incomplete weight transfer.</b> This is usually due to a lack of balance. Review the FUNdamental skills and early parts of the progression.</p>	<ul style="list-style-type: none"> <li>✓ The touch-your-knees drill (see section 4.3) is a good method of improving weight transfer.</li> <li>✓ Another method of promoting good weight transfer is to put small obstacles on the trail in front of the skier. A small cone or other object could be placed in front of the skier in an alternating fashion so the skier must lift alternate skis over the object. As the skier glides on the left foot, he/she steps over an object on the right side with the right ski. The skier then has to step over an object on the left side while gliding on the right side.</li> <li>✓ Skiing in softer snow will also require better weight transfer as the skier will catch an edge if he/she doesn't fully transfer the weight.</li> </ul>
<p><b>Twisting.</b> In the skating stride there should be minimal twisting of the upper body. The upper body, the hips and shoulders should remain quite horizontal with the snow and the trunk remains reasonably centered, facing down the track.</p>	<ul style="list-style-type: none"> <li>✓ The amount of twisting that occurs can be observed and monitored with the use of a ski pole. The ski pole can be held by the skier on their lower back. The skier should be able to keep the pole in a fairly horizontal position while completing a skating action.</li> <li>✓ Holding a pole on the belly button and nose perpendicular to the skis can also help in providing feedback as to what the upper body is doing. The pole should be travelling in a upright fashion from side to side, and tilting of the pole one way or the other will indicate an improper weight transfer, shoulder drop, hip twist etc.</li> </ul>
<p><b>Lazy leg push.</b> The skier does not flex the leg joints sufficiently, especially when skiing at lower speeds.</p>	<ul style="list-style-type: none"> <li>✓ Encourage a good bend at the ankle and snappy leg action.</li> <li>✓ There should be equal leg push with both legs.</li> </ul>
<p><b>Hips too far back.</b> A very common mistake is having the hips behind the feet, causing the skier to "sit back", which works against the generation of forward momentum. This is often the cause of a late kick as well.</p>	<ul style="list-style-type: none"> <li>✓ Emphasize the use of the general athletic stance as the baseline for body positioning.</li> <li>✓ Emphasize feeling the weight on the ball of the foot.</li> <li>✓ Hips and knee must be positioned over the foot on the glide ski.</li> </ul>

## 4.2.5 Skating Technique Checklists

*To simplify the detection and correction of technique errors when you are out on the snow, a series of checklists has been developed.*

### Common Checkpoints

The following checkpoints are common to all skating techniques:

#### ❑ Overall

- ✓ All techniques originate with the general athletic stance, modified for the specific technique being learned.
- ✓ Weight shifts fully from ski to ski.
- ✓ The skier is balanced on the gliding ski.
- ✓ Power is generated equally from both sides of the body.
- ✓ Motion of arms and legs is snappy and forceful.
- ✓ Hips and upper body stay generally oriented down the track.

#### ❑ Lower Body

- ✓ The skier drives knee and hip forward allowing body to be vertically aligned over ski.
- ✓ The leg pushes to the side and slightly back.
- ✓ The gliding ski is flat for as long as possible before edging for push off.
- ✓ Pushes come from flexed hip, knee and ankle.
- ✓ Hips are forward over the glide foot.

#### ❑ Upper Body

- ✓ Poles are planted close to skis.
- ✓ The skier reaches high and forward with bent arms (elbows down and pointing slightly outwards).
- ✓ Shoulders are parallel to the ground.
- ✓ Compression occurs during the Double Pole-type motion.
- ✓ There is a slight forward body lean from the ankles.

### Specific Checkpoints

The following checkpoints list the characteristics that are unique to each skating technique:

#### ❑ Offset

- ✓ Timing is keyed by a three-point landing (two poles are planted and new gliding ski touches snow at the same time).
- ✓ There is a Double Pole-type motion on the lead side, with staggered pole placement.
- ✓ The skier “falls” up the hill on the lead side, stepping onto a moving ski.

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- ✓ Knee and hip are driven up the hill, and are aligned over the ski on both sides.
- ✓ The centre of gravity is constantly moving; there is no “lingering over glide ski” as in One Skate and Two Skate.
- ✓ The ankle, knee and hip joints are flexed as required by terrain.
- ✓ The skier executes a maximum leg push on each side, as with the other techniques.
- ✓ Leg push off (kick) is from an edged ski.
- ✓ At the completion of the leg push, the ski is raised slightly off the snow. The tip and tail of the ski leave the snow at the same time.
- ✓ Power comes relatively equally from the upper body and the pushing (kicking) leg.
- ✓ The upper body is dynamic, with a relatively shallow compression during the poling action.
- ✓ The follow-through of the arms and hands is short, and generally stops at or just past the hips (depending on slope of trail and skier speed).
- ✓ The upper body remains somewhat flexed forward, with back and upper body slightly rounded.
- ✓ Tempo increases as the slope of the hill increases.
- ✓ The slope of the hill dictates how wide a stance the athlete will take.

#### ❑ **One Skate**

- ✓ The skier executes a shallow Double Pole-type motion with each leg push.
- ✓ Arm and leg movements are the same on both sides of the body,
- ✓ The timing of the arm, body and leg movements is one of the most important features; the skier plants the poles (two points) when the legs are closest and just **before** stepping onto the new gliding ski (one point).
- ✓ The skier assumes a “high” position for the initiation of each Double Pole – hips are high, legs relatively straight, upper body is erect with slight forward lean.
- ✓ The upper body crunch and pole thrust are initiated together.
- ✓ Core muscles are engaged in the form of shallow upper body crunch.
- ✓ The skier begins to move over onto the new glide ski just before the arms reach the level of the hips.
- ✓ The Double Pole action and the skating push are complete as the new gliding ski hits the snow and the skier’s weight shift to that ski is completed.
- ✓ While the skier is gliding, the arms and trunk recover to the starting high position to initiate another Double Pole and skate.
- ✓ The Double Poling push initiated by the upper-body is energetic and powerful; the amount of trunk compression depends on terrain.
- ✓ The arm positioning throughout the poling motion is very similar to that in Double Poling in Classic technique.
- ✓ The follow-through of the arms and hands is short and stops just past the hips.

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- ✓ Recovery of the arms after the completion of the Double Pole is rapid in order to position the arms forward to key the timing of the next side of the cycle.
- ✓ The recovery ski is raised only slightly off the snow.
- ✓ During the recovery of each leg, the foot passes underneath the hip of that side (feet come fairly close together).
- ✓ When placed on the snow, the gliding ski is pointed forward down the trail as much as the skier's speed and the gradient of the track permit.

#### ❑ **Two Skate**

- ✓ The skier executes a shallow Double Pole-type motion with each second leg push.
- ✓ Timing is the same as for One Skate, with poles being planted slightly before the recovery ski is placed on the snow.
- ✓ The technique is smooth and very rhythmic – akin to ballroom dancing.
- ✓ The method of propulsion on the poling side is identical to that of One Skate.
- ✓ The skier assumes a “high” position for the initiation of the Double Pole on the poling side – hips are high, legs relatively straight, upper body is erect with slight forward lean.
- ✓ As the Double Pole begins, the leg compresses and the hips are lowered slightly in order to load the leg and permit power to be generated as the leg extends.
- ✓ Core muscles are engaged in the form of shallow upper body crunches as the poling action is executed.
- ✓ Body compression results in a slight lowering of the body by the end of the poling motion.
- ✓ The return to the poling side is accomplished from the lower position with a skating push aided by the momentum of the arms swinging up, forward and over to the poling side.
- ✓ The arm recovery from follow-through to new pole plant is uninterrupted.
- ✓ The arm positioning throughout the Double Pole-type motion is very similar to that in Double Poling in Classic technique.
- ✓ The follow-through of the arms and hands is longer than in One Skate – past the hips or further, depending on speed, glide length and the skier's tempo.
- ✓ At the completion of the leg push, the left ski is raised slightly off the snow; the tip and tail of the ski leave the snow at the same time (if the binding is mounted in the correct position on the ski).
- ✓ During the recovery of each leg, the foot passes underneath the hip of that side (feet come fairly close together).
- ✓ The glide on the left and right skis is consistent.

#### ❑ **Free Skate**

- ✓ The skier remains low with pronounced flexion at knees and ankles.

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- ✓ Upper body remains low similar to the Tuck Position.
- ✓ The skier maintains good balance and makes a complete weight shift from ski to ski.
- ✓ The arms swing from side to side (or are in front of face depending on speed).

### 4.3 Skating Technique Drills

The purpose of skating drills is to reinforce components of good skating technique. It is essential that all drills involve actions and timing that are actually used in skating. Drills involving different timing of a technique should be avoided.

- ❑ **Tin Soldier.** The skiers are in a stationary position on skis. Their tips are spread apart about shoulder width. Skiers rock from ski to ski like a Tin Soldier but generally keep their skis on the snow. The skiers should next be encouraged to lift one ski off the snow as they move their weight onto the other ski. They can be encouraged to balance for a few seconds on each ski. As they rock back and forth they should be encouraged to remain quite upright and gradually move their skis forward a little to start the skating action.

Care should be taken to ensure they are in a Forward Lean position with good ankle and knee flexion, so that the hips are over the feet. If they are in this forward leaning position, gliding will naturally occur. Once the basic positioning is good, encourage the skiers to maximize their glide on each ski.

- ❑ **Touch-Your-Knees.** This is a good drill to get skiers to improve their timing when free skating. Skiers practice skating, and when they are gliding on their left ski they touch their right hand to their left knee and vice versa when gliding on the other side.
- ❑ **Skating With a Partner.** Pair the skiers up with a more experienced skater. The skiers stand one next to the other, holding on to the opposite ends of the same ski pole (or other type of pole). The pole should be held firmly about their waist and held horizontally. The experienced skier should start skating slowly with the other skier working on copying the balance and rhythm of the more experienced skier.
- ❑ **No Twisting drill.** For this drill, poles are used as a guide to see if the skiers are twisting their upper body or dropping one or both of their shoulders. The skiers skate without poles (in a ready position) with the poles held either on their lower back or on the front of their shoulders. The skiers should be able to skate while keeping the poles horizontal. A small degree of movement in the poles is acceptable (five degrees). This drill reinforces the proper upper body position during skating in order to maximize the power generated from the poling actions. After the skiers have mastered this drill on flat terrain, they can progress to practicing it on an uphill.
- ❑ **Abdominal Crunch Drill.** This drill will teach the proper application of force, the role of the core and the importance of the body falling forward from the ankles. From the high starting position (hands high, hips lined up over the feet), the skiers fall onto their poles with a strong abdominal crunch to initiate the force. At the same time, the skiers initiate a leg kick. The “falling” motion combined with the synchronicity of the arm and leg pushes will produce optimal power. This drill should focus on the initiation of the movement, not on the follow through.
- ❑ **One Pole Two Skate.** Use only one pole on the poling side using the Two Skate technique. By dropping one pole, the skiers must initiate a very forceful push phase with the leg on the pole less side in order for an effective weight shift back to the initial side. This drill also helps skiers develop better fluidity, as the leg on the pole less side has to work more effectively with the upper body.



#### 4.4 Games for Teaching Skating Technique

- ❑ **Push Your Partner.** Skiers face each other, each holding one end of a pair of poles. One skier pushes the other skier along a packed surface using the poles while the second skier provides a little resistance. This exercise will force the pushing skier to lean their body forward to provide an appropriate push.

When the skiers are able to do the basic skating movement, there are some aspects of the technique that should be reinforced: 1) Skiers should glide on a flat ski. The ski is only edged as the skiers prepare for a push off. 2) Skiers should push at an angle to the side with their ski, not back. 3) During the recovery phase of each leg, the feet pass underneath the hip of that side.

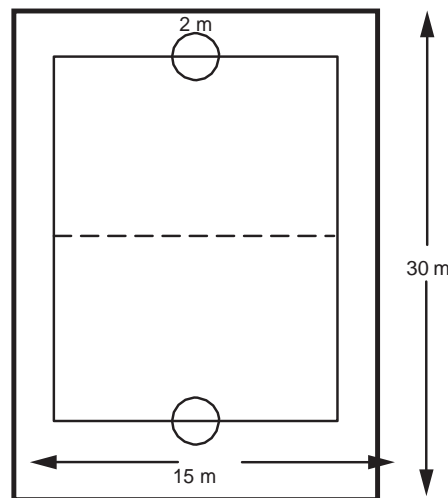
- ❑ **Longest Glide.** Hold a longest glide contest and see which skier can skate a set distance, (e.g. ten meters) with the fewest skate pushes and without using poles. As the game progresses, have the skiers try to reduce the number of skate pushes they take to ski the same distance.
- ❑ **Dribbling.** Slowly dribble a soccer ball down the track alternating small kicks forward with each foot. Once some basic skating skill has been developed, a group game of soccer or Frisbee on skis can help the skiers develop their balance and confidence in skating without the skiers worrying about technique details.
- ❑ **Passing a Ball.** Have two or more skiers skating in a line and have them pass a ball from skier to skier. This helps them change their focus away from the details of the technique and necessitates wider ranges of dynamic balance. This can also be done on a slight downhill.
- ❑ **Figure Eight.** Once the skiers become relatively advanced, have them skate a figure of eight around two ski poles planted in the snow.
- ❑ **Fox and Rabbit Chase.** This game is played within a square. The square should be as big as the skills of the skiers allow. Markers are required to establish the boundaries. One skier is a fox, and one is the “chase” rabbit. The other skiers are also rabbits, but they are hidden in the forest (the forest is made of ski poles set up in an area within the square). If the chase rabbit becomes tired, he/she may at any time tag one of the other rabbits hiding in the trees, and that rabbit will become the chase rabbit. If the fox catches the chase rabbit, the two exchange roles so that the rabbit becomes the fox. If you have enough skiers, you can have two foxes and two chase rabbits. The coach may or may not choose to have the skiers use poles depending on the space available to play the game.
- ❑ **Dodge Ball.** For this game, you require a soft, air-filled ball (e.g. volleyball). Divide the group into two teams, the “Ins” and the “Outs”. The “Outs” form a large circle within which the “Ins” can move freely. The size of the perimeter of the circle is determined by the throwing ability of the participants. The ball is handed to one of the “Outs” to begin the game. The object is for the “Outs” to knock the “Ins” out of the circle. No hits are allowed above the shoulder. If the ball does not make it back to the outside edge of the circle, an “Out” may enter the circle to retrieve it, but cannot throw until back in position. Each “In” that is hit by the ball has to leave the circle. Once the “Ins” have been removed from the circle, the “Ins” and “Outs” exchange roles. The coach may choose

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to time each group to see which one can eliminate the other the fastest. No poles.

- ❑ **Schmerltz Rugger.** A Schmerltz is a tube sock with a tennis ball dropped in the toe and a knot tied in the sock. Two goal lines and a field goal ring (about two metres in diameter) are created. A touchdown (six points) is scored by carrying the Schmerltz across the opposition's goal line; a field goal (three points) is scored by throwing the Schmerltz into the circle. The idea is to pass the Schmerltz. If a skier is tagged while holding it, the tagging team gets a free throw. Each team should have a goalie to protect the circle. If the Schmerltz is being carried for too long by the skiers, use the three stride rule (three strides and pass). No poles. See Figure 4.37.

Figure 4.37



- ❑ **Frostbite Tag.** This game is played within a six metre ski pole circle. One person is "It", and another is "Hot Spot". When "It" tags skiers, they must remain frozen with their hand touching the tagged part of their body. They remain frozen until "Hot Spot" touches them on the frozen spot. Change "It" and "Hot Spot" frequently. Also, you can have more than one "It". This works well when the "girls" are on one side and the "boys" are on the other side. No poles.
- ❑ **Chain Tag.** The skiers play this game within a marked circle. One skier is "It". When "It" tags another skier they hold hands, and try and tag other skiers. Each skier that is tagged joins the chain by holding hands with the skier at the end of the chain. The game continues until every skier is part of the chain. A variation is to have two "Its" forming chains, and the chain with the most skiers at the end is the winner. No poles.
- ❑ **Relays**
  - ✓ **Soccer Relay.** Each team has a balloon and a turn-around pole. The skier must kick his/ her balloon to the pole, around it and back. The first team finished is the winner. Keep the distance short. Make sure you have many extra balloons.
  - ✓ **Ball Relay.** Skiers hold a ball in front of them and ski to a turn-around point. They return holding the ball behind their backs and tag the next team member. Keep the distances short and the teams small so that skiers are not inactive for very long periods of time.

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