Figure Skating Jumps Checklist
Axel

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Double Axel

- The axel jump named for its originator Axel Paulsen, is an edge jump launched on the forward outside edge and landed on the back outside edge of the opposite foot. Because it has a forward takeoff but lands backwards, a single axel actually has 1.5 rotations; a double axel has 2.5 rotations; etc.

Approach/Preparation

- The athlete will approach the takeoff with a linear velocity of approximately 5 m/sec, however, less skilled athletes have a tendency to enter their jumps with less horizontal velocity.
- As the athlete makes their approach they will turn their body from facing backwards to facing forwards as they enter the preparation phase of the jump.
- The athlete will approach the jump with a slightly curved entry.
- As the athlete makes the turn, they will push off the rear skate and move into the gliding phase of the take off (see Figure 1)

Figure 1: Entry into the glide portion of the takeoff phase

Take Off Phase

<u>Glide</u>

- The glide phase of the jump occurs from the point where the athlete no longer has the rear skate touching the ice.
- The athlete will increase their knee flexion to between 60 and 80 degrees, with more knee flexion occurring during triple axels in an effort to increase the vertical velocity and therefore the height of the athletes jump (see Figure 2)

- The athlete will also increase their knee flexion in their rear (or non support skate) to approximately 90 degrees prior to driving the leg forward during the take off.
- All the weight should be firmly placed on top of the skating foot with the body leaning slightly sideways over the supporting foot.

Figure 2: Both athletes are entering the middle of their glide as they prepare for takeoff with between 60-80 degrees of knee flexion.

- During the glide, the athletes' shoulders will move into a hyper extended position which results in both shoulders being in 50-60 degrees of extension (see Figure 3)
- The athlete's shoulders will also be rotated slightly ahead of her hips resulting in slight shoulder hip separation.

Figure 3: Note the athlete has a high degree of shoulder hyperextension resulting in a good position to initiate the forward arm drive.

- From this position, the athlete will extend her knee and flex her hip forward into a position where the support leg moves ahead of her body. At the same time, the athlete must also flex her shoulders forwards and in front of her body.

Skid

- The skid begins as the athlete rotates her hips ahead of her shoulders resulting in the angle of the skate blade no longer being parallel to the running surface (hence the athlete enters a skid along the ice) (see Figure 4)

Figure 4: The athlete enters a skid where the skate blade is perpendicular to the direction of travel.

- During the skid, the athlete will decrease their horizontal velocity in an effort to focus on maximizing the vertical velocity for takeoff. This skid also allows the athlete to take off from a fixed point of contact on the ice.
- Note that the athlete has extended the knee of the non support leg during the glide (this allows more of the mass to be further from the axis of rotation). The athlete's hip and shoulders will continue to flex forwards and the athlete will begin extending at the knee of the support skate in an effort to get all of the limbs moving upwards immediately before takeoff.
- The angular momentum for the spin is generated by the swinging forward and upward of the arms and free leg, and the rotation of the skater in the direction of the rotation during takeoff

Pivot

- The final stage during the takeoff is the pivot. This occurs as the athlete makes the final rotation causing the support skate to be almost parallel to their direction of travel.
- The pivot is the final ankle plantarflexion which results in the athlete entering the airborne portion of the jump (see Figure 5).

Figure 5: Athlete exits the pivot with their ankle in 45 degrees of plantarflexion.

Airborne Phase

- At takeoff the athlete has constant angular momentum, which canot be altered while the skater is airborne
- During the airborne phase of the jump, the athlete must focus on altering their moment of inertia in order to maximize their angular velocity (or rate of spin) in order to complete the required revolutions.
- The athlete can alter their rate of spin by moving more of their mass closer to their axis of rotation (thus increasing their rate of spin) or by moving more of their mass further from their axis of rotation (thus decreasing their rate of spin)
- As the athlete begins the airborne portion of their jump they will enter a position with their tibia of their non support skate close to parallel with the ice surface (see Figure 6-A). This position is a result of the athlete attempting to maximize the ground reaction forces which they can apply to the ice in order to increase their jump height.
- Next, the athlete will begin extending at the knee and hip in order to bring the limb closer to their axis of rotation (in order to increase their angular velocity). The athlete wants to emphasize a nice tight wrap (or have their arms and legs very close to their body in order to maximize their rate of spin). (see Figure 6-B). Note that the athlete demonstrates slight backwards lean while in the air. This angle of lean has been recommended to be between 10-15 degrees.
- The athlete will perform the spin in this tight position, but then must begin to flex and abduct at both shoulders in order to decrease the body's angular velocity in preparation for the landing (see Figure 6-C). At the same time, the athlete will begin to flex at the hip and knee of the takeoff leg in order to alter its moment of inertia prior to and during landing (see Figure 6-D).

Figure 6: Airborne portion of the double axel. Note the athlete begins moving her limbs away from her body prior to landing, however, it is difficult to observe in this sequence.

Landing

- During landing, the athlete must accomplish the goal of decreasing the angular velocity in order to not continue to rotate as the skate contacts the ground. This continued or over rotation may cause athlete to lose an edge and fall.
- As the athlete lands they will continue to increase the moment of inertia of the upper limbs by having them flexed and abducted to 90 degrees at the shoulder with the elbows in near complete extension. Similarly the athlete will move the non support skate (which was originally the take off foot) into complete hip hyperextension and complete knee extension to a position where the non support leg is parallel to the ice surface.
- During landing, the athlete must emphasize an increased amount of hip, knee and ankle dorsiflexion in order to increase the length and distance over which to absorb the force of landing. As a result, the athlete will enter a position of approximately 60 degrees of flexion at the knee and hip as well as close to 30 degrees of trunk flexion relative to the horizontal.
- The landing in the axel must result in the athlete landing on the back outside edge of the opposite foot.

Figure 7: Note how the athlete is able to slow down rotation be re positioning his limb segments and absorb the landing by increasing his knee flexion upon landing.

Common Errors:

1. Over rotation of skating blade while on the ice – correct by swinging arms and leg through earlier in the skill
2. Not enough lift on takeoff – athlete must make better use of free leg and arms by keeping them close to the body in order to increase their power during the jump
3. Too loose a position while airborne, with the arms and leg sticking too far out to the side, increasing the resistance to rotation and decreasing the rate of spinning.
4. Not transferring weight onto other foot at landing – non takeoff leg must move down and below the takeoff leg during the airborne flight in order to have the skate in the proper position for landing (as the weight must be transferred to the opposite foot for landing)