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**SKI &
SNOWBOARD**
SkillsQuest - Fitness

Ages 10 and Up

Introduction

The development of general physical fitness is a necessary component for elite ski and snowboard athletes. Establishing efficient fundamental movement patterns, learning motor control in a variety of situations and positions, and developing general strength, power, and capacity is critical for young skiers and snowboarders. These variables can contribute directly to long-term sporting success, and the assessment and quantification of these qualities by using SkillsQuest-Fitness can help to identify potential performance deficits, as well as track long term performance trends. As USSA builds normative data for each gender, sport, and phase of development, SkillsQuest-Fitness will help to identify target areas for later success and development as elite athletes.

The U.S. Ski and Snowboard Association Model of Athlete Development focuses on the appropriate application of stage-specific variables along the Long-Term Athlete Development continuum. The focus early in an athlete's lifecycle should be to assist young athletes in building the fundamental qualities and skills that will be necessary at and for higher levels of ski and snowboard competition. Without adequate levels of general fitness and fundamental skills, later "sport- specialized" or "high performance" training will be limited in effect, as there will be a limited foundation upon which to stack any sports-performance components.

The purpose of SkillsQuest-Fitness is to provide information for determining the current status of the ski or snowboard athlete across multiple physical domains -

- Aerobic Capacity
- Anaerobic Endurance
- Lower Extremity Strength, Power, Coordination, and Single Leg Strength
- Lower Extremity Balance, Coordination, and Skill
- Acceleration and Speed
- Upper Body Strength, Strength Endurance and Control relative to trunk and lower body

A coach can use the data gathered from SkillsQuest-Fitness to more accurately determine an athlete's "starting point" along the developmental continuum and track subsequent progress through re-evaluation. This will allow the construction of an appropriate training program that matches the needs of the athlete, both in the context of their sport or event as well as within the athlete's capabilities.

The effective administration of each test is detailed within this manual. A coach/administrator should consider the rationale, equipment needed and calibration/maintenance required for accuracy, methodology/execution protocols, preparation (warm-up), scoring, and recovery time for each test. Through the consistent administration of the tests and the consideration of their components, both validity and reliability of SkillsQuest-Fitness will be improved.

When implemented and interpreted correctly, SkillsQuest-Fitness will be an important part of the overall process of athlete development. By identifying an athlete's existing abilities in the following tests, the appropriate foundations can be built upon. This, in-turn, will promote a higher effectiveness of the sport-specific and high performance strategies to come, that will subsequently support and enhance performance throughout the athlete's career.

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SkillsQuest - Fitness General Warm-Up

Rationale for Inclusion

To ensure consistency across the preparation of all athletes participating in SkillsQuest Fitness and limit the risk of injury to those athletes performing the tests.

Equipment

Flat non-slip surface, recommended minimum 30m long, width is determined by how many athletes are warming up at the same time. Use the same surface as testing if possible.

- Ensure athlete is wearing proper/appropriate testing footwear (athletic shoes)
- Cyclical/low-impact cardiovascular training piece (stationary bike, rower, treadmill, track, gym, or turf-space)
- Appx. 4 cones to mark off warm-up area
- Stopwatch

Methodology

Begin athlete preparation with General Warm-Up; 5-15 min rest between tests is recommended.

1. 5 minutes of low intensity active movement; walking, riding, rowing or other low-impact exercise
2. Trunk Circuit:
 - 30s Plank on forearms - Isometric Hold
 - 30s Lateral Plank - Isometric Hold - each side
 - 30s Hip Bridge - Isometric Hold
3. Dynamic Flexibility/Mobility:
 - Deep Forward Lunge Stretch - 4 each leg
 - Hand Walk/Inch Worm - 4 reps
 - Lateral Lunge Stretch - 4 each leg
 - Crossover Lunge Stretch - 4 each leg
 - Standing Leg Cradle - 4 each leg
 - Bodyweight Deep Squat - Hands behind Head - 8 reps
 - Plank with Shoulder Tap - 8 reps each arm
4. Movement Initiation:
 - High Knees March to Run - Forward - 10m
 - High Knees March to Run - Backward - 10m
 - Lateral Shuffle - High - 10m each way
 - Lateral Shuffle - Low - 10m each way
 - Grapevine - 10m each way
 - Forward A-Skip - 10m
 - Forward B-Skip - 10m
 - Lateral A-Skip - 10m each way
 - Forward Power Skip - 20m

1. Australian Institute of Sport 20m Shuttle-Run

Rationale for Inclusion

The 20m shuttle-run is a test of aerobic capacity.

Equipment

Flat non-slip surface, recommended minimum 30m long, width is determined by how many athletes are running at the same time. Use the same surface from test to test if possible.

- Shuttle-run app or audio file
- Smart phone or MP3 player
- Speakers (loud enough to hear the audio the full length of the test)
- Marker or tape to clearly mark the turning points
- Tape measure 20m or longer to determine the turning points

Calibration/Maintenance

Follow the calibration instructions prior to every test and modify the running distance according to the table provided.

Methodology

Follow the audio directions for the correct protocol.

- Mark out two lines, 20m apart on a non-slip surface – preferably an indoor court surface.
- Check that the athlete has good footwear. If the floor surface is slippery, spray some sports drink on their shoes – it works!
- The test starts with a countdown beep. The athlete runs along the 20m track and gets to the line in time with the beep. The athlete then turns and runs back, getting back to the start line in time with the next beep. The beeps get closer together as the test progresses, so the athlete has to run faster to stay in time. The test is a maximal test and the athlete is encouraged to run in time with the beeps for as long as possible.
- When the athlete can no longer keep in time with the beep and falls behind the beep by more than 1 meter, a verbal warning is given. If they do not make it back in time with the beep on the next lap, the athlete is asked to stop and the score for the stage/level is recorded. The score is the last level that the athlete successfully achieved in time with the beep.
- The athlete may miss the beep multiple times as long as they are back to the other line on the next beep. Missing two consecutive beeps ends the test.
- It is important that the athletes run in time with the beep and do not run ahead of it. This will cause additional fatigue.

Specific Warm-up

- Athlete should perform 5-10 shuttles of the first level in order to gain familiarity with procedure and timing of the MP3 audio.

Scoring

- Record the shuttle and level achieved.



2. Standing Long Jump & Standing Triple Jump

(Coaches may use discretion for completing both SLJ and STJ with younger athletes)

Rationale for Inclusion

Test lower extremity power and coordination utilizing a simple, safe, and common movement pattern (13). The standing triple jump is included to assess strength-speed, agility, balance, and skill (8, 9, 13-15).

Equipment

A tape measure or other measuring device as well as a safe jumping and landing surface of approximately 3m for Levels 1 and 2 and 10m for Levels 3-6.

Standing Long Jump Protocol – All Ages

- Start by taping or otherwise securing a tape measure or similar tool to the ground for ease of testing.
- Line up with the feet under the hips, toes forward, heels at 0cm, and hands in a self-selected position.
- Jump as far forward as possible.
- Mark the distance at the heel. If the feet land staggered, measure at the heel that traveled the shorter distance. Only measure a repetition that displays a safe and efficient landing.
- Athletes get three trials, with all trials recorded, and the best of the three reported to the athlete and used for further analyses.

Scoring

- The longest safe and efficiently-landed jump will be recorded in centimeters
- Recorded to the nearest centimeter.

Warm-up

This test has a potential for injury and thereby requires a thorough and focused warm-up. Athletes should perform approximately 5-10 minutes of vigorous exercise including running, skipping, hopping, arm and leg swings, etc. Pre-test trials should be encouraged with each athlete performing from one to three practice jumps.

Standing Triple Jump Protocol (coach discretion)

- Start by taping or otherwise securing a tape measure or similar object to the ground for ease of testing.
- Line up with the feet under the hips, toes forward, heels at 0cm, and hands in a self-selected position.
- Jump as far forward as possible.
- As soon as the feet simultaneously land, rebound straight into a second broad jump, followed immediately by a third, sticking the final landing.
- Mark the distance at the heel. Only measure a repetition that displays a safe and efficient landing.
- Athletes get three trials, with the best of three being officially recorded.

Scoring

- The longest safe and efficiently-landed jump will be recorded in centimeters



Warm-up:

This test has a potential for injury and thereby requires a thorough and focused warm-up. Athletes should perform approximately 5-10 minutes of vigorous exercise including running, skipping, hopping, arm and leg swings, etc. Pre-test trials should be encouraged with each athlete performing from one to three practice jumps.



3. 20m Sprint

Rationale for Inclusion

The 20m sprint test is an assessment of the athlete's acceleration and speed.

Equipment

Flat non-slip surface, recommended minimum 30m long. Use the same surface from test to test if possible.

- Tape measure 20m or longer
- Electronic timing gates
- Marker or tape to clearly mark the start & end points

Protocol

- Mark out two lines, 20m apart on a non-slip surface – preferably an indoor court surface, starting close but not against one wall (minimum 2m).
- Mark an additional start line 50cm before the 20m start line (this will ensure the timing gates aren't broken by mistake)
- Align electronic timing gates at the 20m start and end lines at a height of 1m
- Check that the athlete has good footwear. If the floor surface is slippery, spray some sports drink on their shoes – it works!
- Ensure the athlete has fully warmed up including practice attempts at ~50% and 75% of maximal effort
- Starting at the line 50cm before the 20m start line, from a standing start when ready the athlete accelerates as fast as they can through the 20m sprint (remember to tell the athlete to continue sprinting all the way through the finish line).
- Athletes get three trials, with the best of three being officially recorded

Scoring

- The fastest of two attempts is recorded in to the nearest hundredth of a second (example 3.41s).



4. Strict Pull-Up

Rationale for Inclusion

Upper body coordination and bodyweight management in the context of arm and back pulling strength in addition to torso and lower extremity control.

Equipment

A pull-up bar high enough for the tallest athletes to hang from without touching the ground with their feet pulled behind them.

Strict Pull-Up Protocol

- Grasp the bar just outside of shoulder width with an overhand grip.
- Begin test from a dead hang – body motionless, arms completely extended, and shoulders, hips, knees and ankles in a line.
- Keeping the shoulders, hips, knees and ankles in line, pull the body up until the height of the chin exceeds the height of the bar.
- Lower the body down to full extension between each rep.
- A “No-Rep” will be given if:
 - Any break in the shoulder/hip/knee/ankle line occurs.
 - The athlete fails to return to full extension and pause briefly between reps.
 - The athlete fails to pull to proper height.
 - The athlete utilizes a swinging motion to complete the rep.
- Athletes will continue performing pull-ups until they can no longer complete reps within the criteria or until they drop from the pull-up bar.

Scoring

Record the total number of pull-ups completed within the criteria prior to the athlete failing and/or dropping from the bar.

If the athlete cannot perform a single pull-up, he or she will switch to the bar-hang protocol.

Bar-Hang Protocol – Used if Unable to Complete 1 Pull Up

- Grasp the bar just outside of shoulder width with an overhand grip.
- Using a box, bench, or other means, jump or be assisted to get the chin over the bar.
- Keeping the lower body motionless, hold the chin over the bar for as long as possible.
- The test concludes when the athletes chin drops below the bar.

Scoring

Record the total time the athlete holds his or her chin over the bar.



5. Single Leg Squat

Rationale for Inclusion

Total body coordination and bodyweight management in the context of single leg strength and control.

Equipment

Tall stable box or platform

Single Leg Squat Protocol

- Start by standing on the top of a tall box. Adjust and balance so that one foot is on the edge of the box and the other foot is hanging off the box.
- Complete a single leg squat to maximum depth, at least 90 degrees in the knee joint, while keeping the other leg off the box and off the ground.
- Complete as many reps as possible (up to 15 per leg) while maintaining proper technique.
- The foot not squatting may not touch the box or the ground at any time. If it does touch, the rep will not count but the test may continue.

Scoring

The total number of satisfactory reps will be recorded for each leg. If the athlete reaches 15 reps, he or she has maxed the test out and no further reps will need to be recorded



6. 90 Degrees Push Up

Rationale for Inclusion

The push-up test is designed to assess the strength endurance of the athlete's upper body muscles.

Equipment

- Audio recording of correct cadence: 1 push-up every 3 seconds
- Smart phone or MP3 player to play the audio file
- Speakers
- Flat non-slip surface
- Assistant

Push Up Protocol

- The athlete starts in a push-up position, hands under shoulders, arms straight, fingers pointed forward, and legs straight, parallel and slightly apart (2-4inches) with toes support the feet.
- Keeping the back and knees straight, the athlete then lowers the body until there is a 90-degree angles formed at the elbow with the upper arms parallel to the floor.
- The push-ups are done to a metronome (see audio file), with one push-up completed every three seconds (1.5s on the way down and 1.5s on the way up), and are continued until the athlete can do no more reps at the required pace.
- The athlete should remain in motion during the entire three second interval (no pausing at top or bottom).
- The assistant counts and records the number of correctly completed 90 degree push-ups.
 - A "No-Rep" will be given if:
 - Athlete fails to maintain the cadence
 - Athlete fails to maintain a straight line between the shoulders, hips, and heels
 - Athlete fails to achieve a 90-degree angle with the elbows
 - Athlete fails to extend the arms fully
- Athlete is stopped after the second failed rep

Scoring

The total number of satisfactory reps will be recorded.



7. Repeated Jumps

(Coaches may use discretion for completing either Box or Hurdle jumps with younger athletes)

Hurdle Jumps

Rationale for Inclusion

This test is a measure of muscular strength and anaerobic endurance specific to skiing.

Equipment

- Flat non-slip surface, preferably same surface and conditions from test to test
- 2 Hurdles: 6x18 in (6 inches (15cm) high, 18 inches long)
- Tape measure 1m or longer to determine the width between hurdles
- Stopwatch
- Scoring sheet
- A minimum of 2 spotters

Calibration/Maintenance

- Check the integrity of the hurdles prior to each test day.

Methodology

- The test is performed as 60 seconds of maximum jumping.

Hurdle Jump Protocol

- The two 6x18 inch hurdles are placed parallel to one another 24 inches apart
- One spotter stands behind each hurdle (two in total) to ensure they remain upright and in place through the test.
- To start, the athlete stands in the middle of the hurdles, waiting for a count down from 3 to 1.
- The timer shouts “go” and starts the stopwatch simultaneously.
- The athlete jumps over one hurdle, and then laterally back and forth over both hurdles in each direction.
- The athlete lands in the middle of the hurdles each time and faces the same way for the entire duration of the test.
- Each time the athlete lands in the middle, between the two hurdles, one jump is recorded.
- If the athlete does not clear the hurdle cleanly, the jump does not count.
- If the hurdle is knocked over or moved by the jumper the spotters should replace the hurdle as soon as possible before the athlete attempts to clear again

Scoring

- The number of jumps are counted and recorded for 60 seconds.

Box Jumps (Coach discretion)

Rationale for Inclusion

This test is a measure of muscular strength and anaerobic endurance specific to skiing.

Equipment

- Flat non-slip surface, preferably same surface and conditions from test to test
- Box: 40cm high – 50cm long – 40cm wide
- Box: 30cm high – 50cm long – 40cm wide
- Stopwatch
- Scoring sheet
- A minimum of 2 spotters

Calibration/Maintenance

Check the integrity of the boxes prior to each test day.

Methodology

The test is performed as 60 seconds of maximum jumping.

Box Jump Protocol

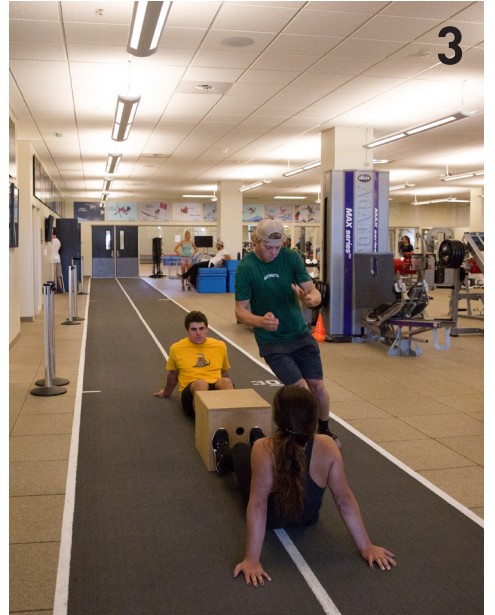
- A 30 or 40cm box is chosen, depending upon which is closer to the athlete's kneecap without being above it.
- Two spotters sit on the floor with feet against the box to ensure stability of the box during the test.
- To start, the athlete stands on top of the box, waiting for a count down from 3 to 1.
- The timer shouts "go" and starts the stopwatch simultaneously
- The athlete jumps to one side of the box and on to the ground
The athlete jumps laterally back and forth over the box, landing on the middle of the box and facing the same way for the entire duration of the test.
- Each time the athlete lands on top of the box, one jump is recorded.
- Athletes feet should be facing forward and in line with the box upon landing

Specific Warm-up

Athlete should perform 2-3 trials at increasing intensity prior to performing this test, doing 3-4 jumps each time.

Scoring

The number of jumps are counted and recorded for 60 seconds, including the total for every twenty seconds including the last top touch on the box of each jump period.



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Tester: _____ **Date:** ____/____/____ **MM/DD/YY**

[illegible]

Level	Shuttle	VO2 Max
4	2	26.8
4	4	27.6
4	6	28.3
4	9	29.5

Level	Shuttle	VO2 Max
5	2	30.2
5	4	31
5	6	31.8
5	9	32.9

Level	Shuttle	VO2 Max
6	2	33.6
6	4	34.3
6	6	35
6	8	35.7
6	10	36.4

Level	Shuttle	VO2 Max
7	2	37.1
7	4	37.8
7	6	38.5
7	8	39.2
7	10	39.9

Level	Shuttle	VO2 Max
8	2	40.5
8	4	41.1
8	6	41.8
8	8	42.4
8	11	43.3

Level	Shuttle	VO2 Max
9	2	43.9
9	4	44.5
9	6	45.2
9	8	45.8
9	11	46.8

Level	Shuttle	VO2 Max
10	2	47.4
10	4	48
10	6	48.7
10	8	49.3
10	11	50.2

Level	Shuttle	VO2 Max
11	2	50.8
11	4	51.4
11	6	51.9
11	8	52.5
11	10	53.1
11	12	53.7

Level	Shuttle	VO2 Max
12	2	54.3
12	4	54.8
12	6	55.4
12	8	56
12	10	56.5
12	12	57.1

Level	Shuttle	VO2 Max
13	2	57.6
13	4	58.2
13	6	58.7
13	8	59.3
13	10	59.8
13	13	60.6

Level	Shuttle	VO2 Max
14	2	61.1
14	4	61.7
14	6	62.2
14	8	62.7
14	10	63.2
14	13	64

Level	Shuttle	VO2 Max
15	2	64.6
15	4	65.1
15	6	65.6
15	8	66.2
15	10	66.7
15	13	67.5

Level	Shuttle	VO2 Max
16	2	68
16	4	68.5
16	6	69
16	8	69.5
16	10	69.9
16	12	70.5
16	14	70.9

Level	Shuttle	VO2 Max
17	2	71.4
17	4	71.9
17	6	72.4
17	8	72.9
17	10	73.4
17	12	73.9
17	14	74.4

Level	Shuttle	VO2 Max
18	2	74.8
18	4	75.3
18	6	75.8
18	8	76.2
18	10	76.7
18	12	77.2
18	15	77.9

Level	Shuttle	VO2 Max
19	2	78.3
19	4	78.8
19	6	79.2
19	8	79.7
19	10	80.2
19	12	80.6
19	15	81.3

Level	Shuttle	VO2 Max
20	2	81.8
20	4	82.2
20	6	82.6
20	8	83
20	10	83.5
20	12	83.9
20	14	84.3
20	16	84.8

Level	Shuttle	VO2 Max
21	2	85.2
21	4	85.6
21	6	86.1
21	8	86.5
21	10	86.9
21	12	87.4
21	14	87.8
21	16	88.2

Standing Long Jump and Standing Triple Jump Score Sheet

Tester: _____ Date: _____/_____/_____ MM/DD/YY

Athlete	DOB	Single/Triple	Trial 1(cm)	Trial 2(cm)	Trial 3(cm)	Comments
		S T				
		S T				
		S T				
		S T				
		S T				
		S T				
		S T				
		S T				
		S T				
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		S T				
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		S T				
		S T				
		S T				

20m Sprint Score Sheet

Tester: _____ Date: ____/____/____ MM/DD/YY

Athlete	DOB	Trial 1(s)	Trial 2(s)	Comments

Score Sheet

Tester: _____ **Date:** ____/____/____ **MM/DD/YY**

[illegible]

Single Leg Squat

Score Sheet

Tester: _____ Date: ____/____/____ MM/DD/YY

Athlete	DOB	Right (reps)	Left (reps)	Comments

1-Minute 90 degree Push Up Test

Score Sheet

Tester: _____ Date: ____/____/____ MM/DD/YY

Athlete	DOB	Total reps	Comments

Repeated Jumps Test Score Sheet

Tester: _____ Date: ____/____/____ MM/DD/YY

Athlete	DOB	Level	Total Jumps
		Hurdle Box	
		Hurdle Box	
		Hurdle Box	
		Hurdle Box	
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