ALPINE CANADA

ACA SKILLS COMBINE

ALPINE CANADA ALPIN
U16 SKILLS COMBINE

2022

ACA U16 SKILLS COMBINE
U16 NATIONAL CHAMPIONSHIPS

MARCH 28 – APRIL 3, 2022

TABLE OF CONTENTS

CREDITS

The ACA Skills Combine is produced by Alpine Canada Alpin in partnership with the provincial and territorial technical coaching leads.

ACA U16 Skills Combine working group: Jennifer Stielow, Josh Benge, Johnny Crichton, Kip Harrington, Eric Prefontaine, and Jeff Thompson.

Translation: Josée Rochon

Cover Photo Image: GEPA

PURPOSE

To reemphasize the importance of executing fundamental skiing and physical fitness skills at this age level, as identified within the new athlete development matrix (ADM), by including a Skills Combine competition at the U16 National Championship program inclusive of awards. The identified skills for the Combine do not include all the skills listed within the ADM, just a select few. The introduction of a Skill Combine emphasizes the skill proficiencies required at elite-levels of ski racing while increasing awareness of the necessary physical fitness attributes that significantly contribute to long-term ski racing success.

PROPOSED SCHEDULE*

Date	Event
March 28, 2022	Teams Arrive
March 29, 2022	AM – Super G Training PM – Skiing Skill Combine
March 30, 2022	AM – Super G Race PM – Physical Fitness Combine
March 31, 2022	Team Event
April 1, 2022	Weather or Rest Day (TBD)
April 2, 2022	Giant Slalom
April 3, 2022	Slalom Race & Awards

*Schedule subject to change, to be confirmed at Team Captains Meeting(s)

SCORING AND CALCULATIONS

Overall results to determine the overall U16 National winners will be based on performance in competition using World Cup points. The overall ACA Combine winners will be based on placement in the fitness and skiing skills combine.

The U16 National Championship title holders will be calculated utilizing race performance only. This follows historical methods as it relates to the SG, GS, and SL performance.

The U16 National Combine winners will be calculated by combining the world cup points earned from the skiing skills and fitness combines only. Example presented in Appendix D.

- Top 3 each gender
- Top 3 provinces

ACA SKILLS COMBINE PART A
SKIING SKILL COMBINE

The ACA Skills Combine intends to evaluate and reward a skier's skill development separate from the traditional U16 Championship racing events. There will be five skiing skill exercises that make up the ACA Skill Combine, and no skiing skill exercise is ranked more important than another. Therefore, clubs and coaches should be setting aside time to practice the skills identified below and other skiing skill-based activities before attending the U16 Nationals.

Skiing Exercise	Skiing Skill Component	Maximum Points Possible
Timed Skating Starts	Start technique with skating: all joints working sequentially: ankle, knee, hip	200
Outside Ski Turns	Edging, platform, balance w/poles or w/o poles	200
Speiss (Hop Turns)	Edging, rotary, pole plant, timing, coordination, all joints working sequentially	200
Timed Turns in Wave Track	Movement over terrain while maintaining dynamic balance to carve turns	200
Timed Skating without poles	All joints working sequentially: ankle, knee, hip	200

*Skills can be subject to change due to weather or unforeseen circumstances, final skills will be confirmed at Team Captain Meeting(s)

PROCEDURE

Athletes will be placed into manageable groups with assigned leaders, no larger than ten (10) athletes per group. Each group will start at a different station using a shotgun start format (like a golf tournament). Leaders will be provided a start time for each station to reduce congestion. Videos will be taken for future reference and personal coach review with their athletes.

Athletes will wear bibs during the skills assessment like a regular race event. Their score is recorded on a scoring sheet that lists their bib number only, no names.

SCORING

In collaboration with the PTSO, ACA will assign a leader at each station to lead the individual skill stations with multiple PTSO club coach representatives.

Scoring for the quantitative events (timed) will use a WC point ranking system with the fastest time gaining the greatest number of points possible, up to 200 points.

Scoring for the qualitative event, outside ski turns, will be calculated using this grading rubric. At the qualitative evaluation stations a minimum of 3 coaches will be scoring at each station with different viewpoints required to evaluate skill execution (front, back, side views).

Athletes are graded on the execution of the essential elements in each skill. The three observation judges will mark a score down based on the grading scale after evaluating the appearance of the essential elements listed in the skiing skill procedure. Scores from the three (3) judges will be combined to calculate an average score.

For more information related to the scoring rubric associated with skill assessment, review Appendix A.

Stages of Skill Acquisition	Presence of Essential Skill Elements	Raw Score	Qualitative Points
Cognitive	Elements were not observed or are not present	1	33
	Elements are beginning to appear	2	67
Associative	Elements appear, but not with necessary consistency	3	100
	Elements appear regularly at a satisfactory level	4	133
Autonomous	Elements frequently appear above required level	5	167
	Elements continuously appear at a superior level	6	200

COMPOSITE SCORE CALCULATION

The scores from all five (5) skiing skill events will be combined to calculate an overall skiing skill composite score. The information provided by the five (5) skiing skills individually can provide valuable information on an athlete's ability to execute the specific skill component. This information can drive specific training program interventions resulting in a more informed training prescription from their coach.

SKILL DESCRIPTIONS

TIMED SKATING STARTS

Skating on skis reinforces dynamic balance, ankle engagement, independent leg action, edging movements, and triple flexion and extension movements, joints working sequentially. We can skate to warm up, to propel ourselves out of the start, to propel ourselves from one point to another and ultimately to gain speed.

Goal

On groomed, mild terrain with a start ramp and timing start gate, double pole pushes off and move all weight to one ski. Flex ankle and knee, pressuring the front of the ski, and engage inside ski edge. Push off onto new ski, using lateral and forward extension. Bring trailing ski back underneath body and glide. Repeat until timing eye has been crossed.

Equipment Required

- Start ramp with a proper start gate with wand
- Brushes or gates 2-3 turns and to mark finish
- Timing system(s)

Scoring

The athletes' time will be used to establish the athletes overall ranking in this event. A world cup point ranking system with the fastest time gaining the greatest number of points possible, up to 200 points will generate the number of points the athletes score in this event. Their point result will be added to the other scores in the other skiing skills events to calculate an overall skiing skill composite score. If an athlete DNF's or DSQ's they will not receive a score.

Essential elements for perfect execution

- During initiation,100% of the weight is transferred to one ski, dynamic flexion and edging originating from the ankle and knee, plants poles at the same time.
- During transition, push off the weighted ski via dynamic extension in coordination with double pole push, move the centre of mass forward and laterally to new ski.
- During completion, balanced athletic position over new ski facilitates gliding, the trailing ski is lifted off snow and brought parallel, then repeat the sequence as required.
- Create a balanced platform on one ski prior to engaging the skis edge
- Control pressure on skis through flexion and extension of the ankles, knees, and hip
- Increase or decrease edge angle as needed by rolling of ankles and knees
- Coordination of double pole push with drive to new forward ski is critical element of the drill
- Actively re-centre to a balanced athletic position over new forward ski, allowing ski to glide.

Coaches Eye

- Dynamic Balance/Platform Does the athlete have a solid platform to extend off, is the centre of mass over the base of support/platform?
- Glide Does the athlete move their centre of mass forward onto a flat ski and glide forward in a balanced position?
- Timing Are the legs and poles moving in a coordinated fashion (flex, plant, extend and push)?
- Forward propulsion Are these movements being done in a coordinated and fluid fashion?

OUTSIDE SKI TURNS

The ability to ski on the outside ski is essential to optimally maintain balance against extreme external forces created by a tight turn radius and/or high speeds. Without an inside ski to assist with lateral balance and regulate pressure the ski racer is limited to their options with regards to what they can do with the ski.

Goal

To ski solely on the outside ski prior to, during and after the ski turn during eight (8) medium radius highly carved turns connected with a traverse on one ski.

Equipment

- 4 GS panels to establish a start and finish
- 20 brushes to outline the evaluation corridor

Scoring

The scoring rubric will be used in coordination with the essential elements of perfect execution checklist to establish the athlete's score.

Slope

Easy intermediate groomed terrain.

Description

- Athlete makes eight carved medium radius turns with weight entirely on the outside ski
- The inside/uphill ski is kept entirely off the snow during the turn
- Athlete concludes turn by remaining on the old outside ski for two ski lengths
- Athlete will make an identifiable weight transfer to the new outside ski
- Athlete will initiate the new turn after a traverse of two ski lengths on the uphill (new outside) ski
- Pole may only be used to swing and touch the snow, not for balance support against the snow

Essential elements for perfect execution

- Inside/uphill ski carried off the snow 100% of the time
- A deliberate weight transfer can be identified when the athlete transfers pressure to the new outside ski
- Prior to the turn, the new outside ski is skied for two ski lengths to indicate balance is solely on the new outside ski
- After turn completion the outside ski is skied for two ski lengths to indicate balance is still 100% outside ski dominant
- Turns are mainly carved
- Speed is consistent throughout entire maneuver
- Turn shape is relatively round
- Ski poles are kept off the snow except if used for a pole plant

Coaches Eye

- Dynamic Balance Is dynamic balance demonstrated by keeping the uphill/inside ski entirely off the snow during turn initiation through completion?

- Initiation Are the athletes' hands forward and always remain in the athlete's visual path? Are the ankles and knees flexed and do the ankle and knee move sequentially to roll the outside ski on edge?
    - Outside ski performance: ski is rolled onto edge, ski tip flexes, edge engages and begins to carve.

- Turning Does the inside/uphill ski remain lifted throughout the turn?
    - Outside ski performance: ski's turning edge is engaged, ski is bent and carving

- Completion Edge angulation is decreased, upper body remains squared and in the direction of travel, wrist moves to enable pole touch.
    - Outside ski performance: ski's edge is released

- Transition Does the athlete demonstrate a deliberate and smooth weight transfer when the skier transfers pressure to the new outside ski?

Athlete Instructions

- Ski eight round, carved turns with all your weight on your outside ski
- Lift the inside ski off the snow for the whole turn
- Between turns, step onto the uphill ski and lift the old outside ski as you traverse before you start into the turn
- Your poles are only used for pole plants, do not drag them, or use them for balance
- Your speed is the same for all the turns

SPIESS (HOP TURNS)

Spiess turns performed correctly reinforce strength, and when performed poorly they can indicate weakness.

Performing a proper Spiess turn requires the athlete to maintain:

- dynamic balance along with proper fore/aft positioning on the skis
- lower leg and ankle engagement
- move the joints sequentially using triple flexion and extension during the jump phase
- maintain a quiet upper body, core stability and vigorous pole plant

Goal

Athletes link 15 rhythmic, Spiess turns landing on and hopping off clean edges without skidding on intermediate groomed terrain. The athlete performs a series of small jumps (hops) and turns the skis perpendicular to the line of travel while keeping hips and shoulders facing down the fall line. The athlete uses a pole plant on each jump helps stabilize the upper body while maintaining timing and coordination between reps.

Equipment Required

- 3 GS panels to establish a start and finish
- 20 brushes to outline the evaluation corridor(s)

Scoring

The scoring rubric will be used in coordination with the essential elements of perfect execution checklist to establish the athlete's score.

Slope

Intermediate groomed terrain

Description

- Athlete starts from a traverse stance with skis perpendicular to the line of travel
- Athlete jumps with both skis pivoting the skis under the body in the opposite perpendicular direction for 15 jumps
- Upon landing the athlete jumps in the opposite direction
- The track left in the snow resembles a series of "Z's" with the tip of the previous track almost coinciding with the tail of the next track
- A distinct pole plant is present with each jump or change of direction
- The drill concludes with an edge set that coincides with a pole plant that the athlete holds motionless for 3 seconds.

Essential elements for perfect execution

- The skis are always parallel to snow surface in the air (no tips or tails up in the air)
- Equal distance, parallel position, is maintained between the skis
- Skis must come perpendicular to the line of travel
- Skis land on edge lightly and take off immediately from same position
- Athlete maintains balance and core stability with upper body facing down the fall line
- Skis are not displaced laterally (do not skid)
- Spiess turns are performed with continuous flow and rhythm with no pauses or stops
- The last Spiess concludes with an edge set that coincides with a pole plant that the athlete holds motionless for 3 seconds.

Coaches Eye

- Dynamic Balance/Platform Does the athlete use all joints when jumping? Are the skis always equal distance between the left and right ski? Does the athlete maintain core stability and a quiet upper body with a distinct pole plant?

- Timing Does the athlete maintain continuous flow and rhythm while performing Spiess? Do both skis land, take off and rotate simultaneously?

- Lower Body Does the athlete maintain lower leg and ankle engagement? Does the athlete move joint sequentially during the jump phase of the turn? Do the skis remain equally parallel to the snow surface (no tips up/tails up)?

- Edging Does the athlete land and take off on the edges of ski without skidding? Does the athlete complete the exercise with an edge set and pole plant lasting up to 3 seconds?

CARVED TURNS THROUGH WAVE TRACK

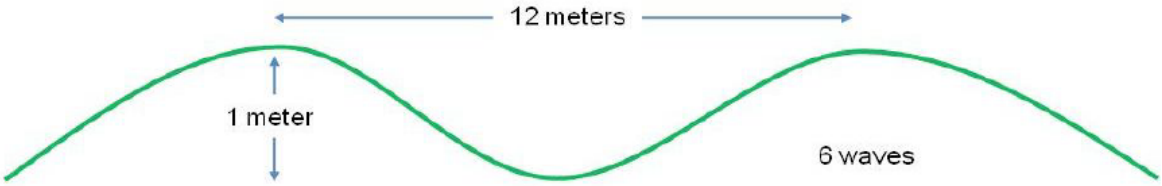
Athletes will use flexion and extension of the lower body to manage pressure against the snow over undulating terrain while making linked medium radius turns though a course. Ski racers must consonantly adjust to terrain changes and focus on building speed.

Goal

Athletes maintain ski/snow contact throughout the entire run while carving medium radius turns through a course set in wave track consisting of 8-10 waves. Athletes must develop the ability to manage terrain changes while having the ability to manage ski/snow pressure to build speed while turning.

Slope

Beginner to intermediate slope



Equipment needed

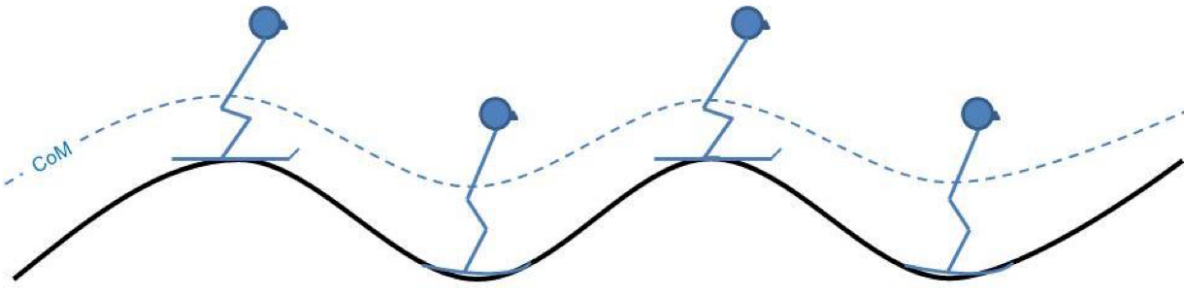
- 6-10 waves constructed by a snow cat that are one meter high when measured from the bottom of the trough to the apex of the roll. Waves are perpendicular to the fall-line and spaced 12m apart from crest to crest. The width is two (2) to three (3) cat grooming widths or about 10m – 15m.
- Timing system

Scoring

The athletes' time will be used to establish the athletes overall ranking in this event. A world cup point ranking system with the fastest time gaining the greatest number of points possible, up to 200 points will generate the number of points the athletes score in this event. Their point result will be added to the other scores in the other skiing skills events to calculate an overall skiing skill composite score. If an athlete DNF's or DSQ's they will not receive a score.

Description

- The athlete enters the wave track at GS speed, so the start with timing wand should be placed well in advance of the first turn in the wave track. The athlete then makes carved turn, round linked turns around the gates.
- The athlete flexes the lower body on the upside of the bump to absorb and extends the lower body into the trough between the rolls. The dashed line seen in the graphic below indicates the path of the skier's centre of mass.
- The turn apex is randomly placed on each wave, the turn apex can be on the backside, upslope, top or trough of the wave.



Essential elements

- The athletes upper body remains at same relative elevation above horizon that is consistent with the pitch of the hill.
- Lower body absorbs the rolls and increases pressure on the downside of the rolls
- Skis always maintain snow contact
- Athlete demonstrates carved turns while navigating the placement of the gate relative to the rolls
- Athlete adjusts fore/aft pressure to generate speed.

Coaches Eye

- Platform Does the athlete have a solid platform to extend off, is the centre of mass over the base of support/platform? Does the athletes upper body remain at the same

- Pressure Control Does the athlete absorb the rolls with their lower body and increase pressure on the downside of the rolls? Does the athlete maintain snow contact?

- Turning Does the athlete carve their turns while navigating the placement of the gate relative to the rolls to generate speed?

TIMED SKATING WITHOUT POLES

Skating on skis reinforces dynamic balance, ankle engagement, independent leg action, edging movements, and triple flexion and extension movements, joints working sequentially. We can skate to warm up, to propel ourselves out of the start, to propel ourselves from one point to another and ultimately to gain speed.

Goal
On groomed, flat terrain, athletes will be timed to determine how long it takes them to skate without poles from point A to point B by flexing the ankles and knees to pressure the front of the ski to engage the inside ski edge. This action is followed by a push off onto new ski, using lateral and forward extension. Bring trailing ski back underneath body and glide. Repeat until timing eye has been crossed.

Equipment Required

- Brushes or gates for 2-3 turns and to mark finish
- Timing system

Course Set

Skiers should not be able to rely on gravity alone to help them complete the course. The course can be as simple as skating from a start area in a straight line to a designated finish line, or it can include varying turn shapes using GS panels to create short chicanes to 180 turns and figure 8 patterns to skate around the GS panels. This is a timed event.

Scoring

The athletes' time will be used to establish the athletes overall ranking in this event. A world cup point ranking system with the fastest time gaining the greatest number of points possible, up to 200 points will generate the number of points the athletes score in this event. Their point result will be added to the other scores in the other skiing skills events to calculate an overall skiing skill composite score. If an athlete DNF's or DSQ's they will not receive a score.

Essential elements for perfect execution

- During initiation,100% of the weight is transferred to one ski, dynamic flexion and edging originating from the ankle and knee.
- During transition, push off the weighted ski via dynamic extension to move the centre of mass forward and laterally to new ski.
- During completion, balanced athletic position over new ski facilitates gliding, the trailing ski is lifted off snow and brought parallel, then repeat the sequence as required.
- Create a balanced platform on one ski prior to engaging the skis edge
- Control pressure on skis through flexion and extension of the ankles, knees, and hip
- Increase or decrease edge angle as needed by rolling of ankles and knees
- Coordination of skating action while actively re-centering to a balanced athletic position over new forward ski, allowing ski to glide.

Coaches Eye

- Stance and Balance Does the athlete have a solid platform to extend off, is the centre of mass over the base of support/platform?

- Glide Does the athlete move their centre of mass forward onto a flat ski and glide forward in a balanced position?
- Timing Are the legs moving in a coordinated fashion (flex, extend and push)?
- Forward propulsion Are these movements being done in a coordinated and fluid fashion?

ACA SKILLS COMBINE PART B
PHYSICAL FITNESS COMBINE

The development of general physical fitness is a necessary component for elite ski racers. Physical literacy, the establishment of efficient fundamental movement patterns in coordination in various situations, and the development of general strength, power, and endurance are critical neuromuscular and physiological capacities required of elite-level ski racers.

Analysis and research have shown that the following physical fitness factors are characteristic of the top outside ski racer:

1. Good aerobic work capacity (high maximal oxygen uptake/ VO_2 Max)
2. Great muscular strength, in terms dynamic muscle function
3. Greatly prolonged muscular endurance, in terms of dynamic muscle function in given submaximal work
4. Well-developed muscular coordination

The U16 Nationals skills combine physical fitness components mirror evaluations used in ACA's primary fitness combine, but with fewer exercises. For the U16 National fitness skills combine, athletes will be executing the following exercises for a score:

Exercise	Physical Fitness Component	Maximum Points Possible
Penta Jump	Lower Body Strength, Power, Coordination	125
Max Push Ups (Tempo Imposed)	Upper body strength, core stabilization, endurance, and coordination	125
90 sec Box Jump Test	Anaerobic endurance	325

COMPOSITE SCORE

The information provided by the three (3) exercises individually can provide valuable information on an athlete's current fitness status in that specific capacity. This can be used to drive specific training program interventions resulting in a more informed training prescription from their coach.

For each of the exercises, scoring tables have been developed which are used in the calculation of the total score for each athlete. This enables each "absolute" test score to render a specific points total. The points total for each individual test will then be combined to create an overall fitness combine score.

SKILL DESCRIPTIONS

LOWER BODY STRENGTH, POWER, COORDINATION

Penta Jump

Equipment

- Tape measure
- non-slip floor
- masking tape
- clearly marked takeoff line

Warm Up

Perform 1-3 submaximal jumps in a consecutive manner. The test consists of 3 maximal effort trials of 5 continuous jumps.

Protocol

- Place tape measure on flat ground on a non-slip surface. Note markers every 8m along the measuring tape on the ground.
- Place line of masking tape starting at 0 cm.
- The athlete starts with the toes lined up with masking tape line.
- The tester will issue the command “Jump”.
- Using a two-foot takeoff, the athlete will perform a five consecutive maximal effort jumps in a continuous manner.
- The goal is to maximize the horizontal jump distance.
- The athlete must land on two feet.
- Measure the jump distance from the masking tape to the heel that is closest to the takeoff line.
- In the event the athlete loses balance on landing, discard the result, and repeat the test.

Contraindications: Lower body injury that impairs vertical jump performance.

Video Link

Penta Jump Video

Scoring

The best total jump distance out of the 3 trials will be recorded.

Penta Jump Benchmarks – meters (m)

Age (Women)	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Target Goal	9.0	10.5	10.5	10.8	11.0	11.2	11.3	11.6	12.2	12.3	12.5	12.6	12.7	12.9	13.1
Good	8.0	9.6	9.6	9.6	10.2	10.5	11.0	11.3	11.6	12.0	12.1	12.2	12.4	12.7	12.9
Needs Training	7.5	8.8	8.8	9.0	9.0	9.8	10.3	10.5	11.3	11.6	11.8	12.0	12.1	12.2	12.4

Age (Men)	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Target Goal	9.5	11.0	11.0	12.5	12.5	13.2	13.7	13.9	14.3	14.9	15.1	15.3	15.7	15.7	16.1
Good	8.0	10.0	10.0	11.7	11.7	12.0	12.5	12.9	13.3	13.5	14.9	15.1	15.3	15.3	15.7
Needs Training	7.5	9.0	9.0	11.0	11.0	11.3	11.8	12.1	12.3	12.5	12.8	13.2	13.5	13.9	14.3

UPPER BODY STRENGTH, CORE STABILIZATION, ENDURANCE, COORDINATION

Max Push Ups (Tempo Imposed)

Equipment

- Push-up audio file
- Speakers and device to play the audio file
- Flat surface

Warm up

Athlete must demonstrate the ability to stabilize the entire body while in the starting push-up position - plank (i.e., shoulder girdle, low back, and hips). Warm up exercises should include stretching of the wrist, elbows along with shoulder activation (i.e., I's, Y's, T's) and a couple of plank holds.

Protocol

- The athlete starts in a prone plank position, at the top of a push up, with their hands on the ground in a self-selected position (recommended hands underneath or just outside of shoulder width), arms straight, fingers pointed forward, and legs straight, parallel, and slightly apart (2-4 inches) with toes positioned underneath the heel.
    - For injury considerations, an athlete may choose to perform the test on knuckles/fist.
- The push-up is completed in sync with the audio file, one push-up every 3 seconds (1.5s on the way down and 1.5s on the way up) and are continued until the athlete cannot continue at the required pace.
    - At the top, the athlete must begin the downward movement on the "down" command (push-up audio file).
    - At the bottom, the athlete must begin the upward movement on the "up" command (push-up audio file).
- The athlete must lower the body until the inside edges of the upper arm and forearm create a 90-degree angle of the elbow
    - Deeper than 90-degrees is acceptable if no other part of the body contacts the floor.
- The body should remain straight (shoulders, hips and knees aligned) during every rep, and the elbows must fully lock straight at the top.
- Continue push-ups on tempo, waiting for the command (up or down) until failure.
- The coach counts and records the number of satisfactorily completed 90-degree push-ups.
- The athlete completes as many satisfactory reps as possible.
- If an athlete misses three (3) consecutive reps in a row due to the lack of depth, alignment criteria, or missing tempo, the test is ended and the number of satisfactory reps up to that point are recorded.
- If an athlete purposefully skips a rep to rest, the test is ended.

Contraindications: Upper body, shoulder, wrists, and back injury that impairs the ability to stabilize and support the body.

Video Link

Push Up Test Video

Audio Link

Push Up Test Audio

Scoring

- Tally the total number of satisfactory push-ups completed within the criteria, prior to the athlete failing and/or being stopped.
- Subtract any reps where the athlete:
    - Fails to match/maintain cadence
    - Fails to maintain a straight line between the shoulders, hips, and heels
    - Fails to achieve a 90-degree angle of the elbows in the bottom position
    - Touches any part of the body to the floor other than hands or toes
    - Fails to extend arms fully at the top

Push Up Benchmarks

Age	12	13	14	15	16
Target Goal	34	41	41	46	50
Good	27	37	37	42	48
Needs Training	22	28	28	30	30

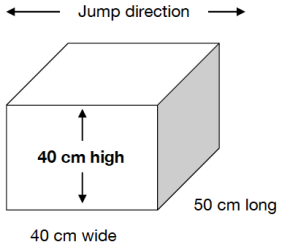
RÉFÉRENCES

Audio Track Max Push Up Imposed Tempo. US Ski and Snowboard Association, SkillsQuest Fitness Testing Battery. 2020.

ANAEROBIC CAPACITY
90 Second Box Jump

Equipment

Box Height Age and Development Dependent. A wood 40cm box built to the specifications below. There should be no sharp edges on the box.



Warm Up

The athlete should perform 3-5 jumps each side with increasing intensity. Technical feedback should be provided during the warmup.

Protocol

This test consists of 1 attempt.

- The test is performed as 90 seconds of maximum jumping for U16 and above athletes and 60 seconds of maximum jumping for U14 and below athletes.
- Two spotters sit on the floor with feet against the box to ensure stability of the box.
- To start, the athlete stands on top of the box, waiting for a count-down from 3-1.
- The timer shouts “go” and starts the stopwatch simultaneously.
- The athlete jumps down to the ground on one side of the box, keeping the feet within the box footprint.
- The athlete jumps laterally back and forth over the box, landing in the middle of the box and facing the same direction for the duration of the test.
- Each time the athlete lands on the top of the box, one jump is counted.
- Feet should stay side-by-side during the test, not splitting apart or offset
- Any excessive turning the of the feet, knees, or torso will invalidate the rep
    - Reps will not be counted when the athlete faults by:
        - Landing with the balls of the feet behind (on in front) of the box footprint.
        - Turning the feet, hips, or body more than 45 degrees
        - Offsetting the feet, splitting them from a side-by-side position to a stagger
        - Landing on the box with only one foot or “gallops” upon landing on the box, with one foot landing striking at a different time than the other.
        - Double contacting the ground between box reps

Contraindications: Lower body injury that limits jumping performance.

Video Link

90 Seconds Box Jump Video

Scoring

- The coaches will count while the athlete jumps.
- Each jump to the top of the box counts as a repetition.
- Record the maximal number of correctly performed repetitions.

60/90 Second Box Jump Test Benchmarks

Target number of jumps for 90 second box jump

Age (Women)	14	15	16	17	18	19	20	21	22	23	24	25	26+
Target Goal	84	87	89	91	92	93	94	95	95	95	95	95	95
Good	67	71	75	78	81	84	86	87	88	89	90	90	90
Needs Training	50	55	60	65	70	74	77	80	81	82	83	84	85

Age (Men)	14	15	16	17	18	19	20	21	22	23	24	25	26+
Target Goal	93	97	100	103	106	108	110	111	112	113	114	115	115
Good	85	90	94	97	100	102	103	104	105	105	105	105	105
Needs Training	62	67	73	78	83	86	90	92	94	95	95	95	95

APPENDIX A
STAGES OF SKILL ACQUISTION

To understand the three different stages of skill acquisition it is necessary to examine the processes involved in learning a new skill, like juggling or kicking with the non-dominant foot.

Stage	Process	Characteristics	Another name
COGNITIVE	Gathering information, known as the thinking stage, athletes need feedback from coaches and visual demonstrations	Large gains, inconsistent performance (mechanical)	Verbal-motor stage Thinking stage
ASSOCIATIVE	Putting actions together, athletes will need time to practice during this stage, athletes begin to learn what errors they are making, can be the longest and most frustrating stage before beginning to master a skill	Small gains, disjointed performance, conscious effort (can perform with flow on occasion)	Motor Stage Practice stage
AUTONOMOUS	Occurs after much time and practice (time on task), skills are recalled when needed, athletes can recognize when the skill is performed incorrect and adapt the execution on demand	Performance seems unconscious, automatic, and smooth (performs with flow)	Automatic stage Athletes can focus on the task and recall the skill when needed

COGNITIVE STAGE

The cognitive stage is the beginner's level of skill acquisition. This stage is appropriately named as the focus is on mental concentration and the thought processed involved in understanding and processing new information, before a new skill can even be attempted.

Something as simple as catching a ball must be clearly explained, broken down and demonstrated; simply throwing the ball at an individual and hoping they will catch it is not an effective strategy.

During the cognitive stage, an athlete might also rely on their prior experience, transferring their knowledge of other sports to the process of understanding and learning new skills. People at this stage are likely to perform poorly; they require regular encouragement and feedback to ensure they progress and learn from their mistakes.

At this stage the execution of the skill will be uncoordinated and inconsistent. Individuals may lack confidence and many people find learning a new skill to be very frustrating. It is important that coaches or trainers give regular, positive, and constructive feedback when the learner does something correctly. Comments must be as specific as possible to help the learner understand what they have done correctly and where they need to improve.

Cognitive learners cannot self-assess what they are doing wrong and rely on external feedback to correct errors. The aim of a cognitive learner is to execute the skill to a basic level and to have a rough idea of the proper technique. Depending on the complexity, some skills will take longer to learn than others.

ASSOCIATIVE STAGE

Once an individual can execute a skill to a basic level and understand proper technique, instruction can progress to the associative stage.

The focus here is on refining the skill through repetition and rehearsal. During this process, errors will still occur, although they should not be as significant or as frequent as those in the cognitive stage. With increased practice, errors will become less common.

When individuals practice, they develop their ability to identify and self-correct errors as they refine their kinesthetic sense or awareness of their body parts in relation to their environment.

When execution of the skill becomes highly successful in a closed environment (where the learner is in full control), coaches and trainers will encourage the learner to perform the skill in an open-ended environment. This involves applying the skill within a specific sporting context, like a drill or mock game.

Progressing from a closed setting to an open one can be difficult because instead of being in control, the individual is exposed unpredictable environment and must focus on many more variables, like opposition players, positional play and timing whilst also executing the skill accurately. As the individual becomes more confident and successful, the difficulty of the training drills should increase to further challenge and refine the learner's ability and adaptability.

However, if a learner struggles in an open skilled environment, they may need to go back down to the cognitive stage again before they can progress further.
Some learners may take weeks, months, or years to progress from the associative stage. It is not uncommon for individuals to plateau, due to the high difficulty of the skill or the lack of frequency with which they practice.

AUTONOMOUS STAGE

The autonomous stage is achieved when the learner has mastered all sub parts of a skill and are able to combine them to perform the whole sequence automatically with precision. This means they can perform with full kinesthetic awareness while also identifying and correcting any errors quickly and independently. They can also easily process and adapt to external feedback.

A person at the autonomous stage can confidently execute a skill whilst focusing on multiple factors at the same time. A rugby player passing the ball in gameplay is a prime example. Not only do they have to receive the ball, they need to also be spatially aware of the location of opposition players trying to tackle them, their own support players and decide who to pass to, while still throwing the ball with accuracy, perfect timing, and optimal tactical advantage. This scenario may take place in just 2 to 3 seconds. When a sportsperson can execute a skill effortlessly without stress, they are most likely at the autonomous stage.

While elite athletes at the autonomous stage can perform skills automatically, they will still need to practice these skills indirectly. Practice during this stage is usually comprises of a real time competition-based scenario drill which challenges the individual by forcing them to multi-task. If the drill becomes too easy, the coach can increase the difficulty by adding more speed, increase slope difficultly, snow surface or having the individual to perform the skills in the drill under greater fatigue.

One potential issue for individuals who have reached the autonomous stage is that it can be very difficult to alter their technique if it occurs automatically. This will require the individual to breakdown the technique adjustment and practice it until it once again becomes autonomous. For example, the rule change in professional golf has forced Adam Scott to alter his now banned technique of pressing his long putter against his body for extra support in the putting motion.

REFERENCES

- Stages of Skill Acquisition http://www.improvingpdhpe.com/hsc-notes/stages-of-skill-acquisition-2/
- Understanding Motor Learning Stages improves skill instruction https://us.humankinetics.com/blogs/excerpt/understanding-motor-learning-stages-improves-skill-instruction

APPENDIX B
PHYSICAL FITNESS COMBINE SCORING TABLES

PENTA JUMP SCORING TABLES

U14 Women to U21+ Penta Jump		
Distance (m)	Points	
7.5	2	
7.6	4	
7.7	6	
7.8	9	
7.9	11	
8.0	**13**	**10th**
8.1	15	
8.2	17	
8.3	19	
8.4	21	
8.5	23	
8.6	**25**	**20th**
8.7	27	
8.8	29	
8.9	31	
9.0	33	
9.1	36	
9.2	**38**	**30th**
9.3	40	
9.4	42	
9.5	44	
9.6	46	
9.7	48	
9.8	**50**	**40th**
9.9	52	
10.0	54	
10.1	56	
10.2	58	
10.3	60	
10.4	**62**	**50th**
10.5	65	
10.6	67	
10.7	69	
10.8	71	
10.9	73	
11.0	**75**	**60th**
11.1	77	
11.2	79	
11.3	81	
11.4	83	
11.5	85	
11.6	**87**	**70th**
11.7	89	
11.8	92	
11.9	94	
12.0	96	
12.1	98	
12.2	**100**	**80th**
12.3	102	
12.4	104	
12.5	106	
12.6	108	
12.7	110	
12.8	**112**	**90th**
12.9	114	
13.0	116	
13.1	118	
13.2	120	
13.3	121	
13.4	123	
13.5	**125**	**100th**

U16 Men and older Penta Jump		
Distance (m)	Points	
9.1	2	
9.2	4	
9.3	6	
9.4	8	
9.5	9	
9.6	11	
9.7	**13**	**10th**
9.8	15	
9.9	16	
10.0	18	
10.1	20	
10.2	22	
10.3	24	
10.4	**25**	**20th**
10.5	27	
10.6	29	
10.7	31	
10.8	32	
10.9	34	
11.0	36	
11.1	**38**	**30th**
11.2	40	
11.3	41	
11.4	43	
11.5	45	
11.6	47	
11.7	48	
11.8	**50**	**40th**
11.9	52	
12.0	54	
12.1	55	
12.2	57	
12.3	59	
12.4	61	
12.5	**63**	**50th**
12.6	64	
12.7	66	
12.8	68	
12.9	70	
13.0	71	
13.1	73	
13.2	**75**	**60th**
13.3	77	
13.4	79	
13.5	80	
13.6	82	
13.7	84	
13.8	86	
13.9	**87**	**70th**
14.0	89	
14.1	91	
14.2	93	
14.3	95	
14.4	96	
14.5	98	
14.6	**100**	**80th**
14.7	102	
14.8	103	
14.9	105	
15.0	107	
15.1	109	
15.2	111	
15.3	**112**	**90th**
15.4	114	
15.5	116	
15.6	117	
15.7	119	
15.8	120	
15.9	122	
16.0	123	
16.1	**125**	**100th**

MAX PUSH UPS (Imposed Tempo)

Push Up Test		
# Reps	Points	
0	2	
1	4	
2	6	
3	9	
4	11	
5	13	10th
6	15	
7	17	
8	19	
9	21	
10	23	
11	25	20th
12	27	
13	29	
14	31	
15	33	
16	36	
17	38	30th
18	40	
19	42	
20	44	
21	46	
22	48	
23	50	40th
24	52	
25	54	
26	56	
27	58	
28	60	
29	62	50th
30	65	
31	67	
32	69	
33	71	
34	73	
35	75	60th
36	77	
37	79	
38	81	
39	83	
40	85	
41	87	70th
42	89	
43	92	
44	94	
45	96	
46	98	
47	100	80th
48	102	
49	104	
50	106	
51	108	
52	110	
53	112	90th
54	114	
55	116	
56	118	
57	120	
58	121	
59	123	
60	125	100th

90 SECOND BOX JUMP TEST (MEN)

U16 and Older Men's 90 sec Box Jump		
# Jumps	Points	
61	0	
62	7	
63	13	
64	20	
65	26	
66	**33**	**10th**
67	38	
68	43	
69	49	
70	54	
71	60	
72	**65**	**20th**
73	71	
74	76	
75	81	
76	87	
77	92	
78	**98**	**30th**
79	103	
80	108	
81	114	
82	119	
83	124	
84	**130**	**40th**
85	136	
86	140	
87	146	
88	152	
89	157	
90	**163**	**50th**
91	168	
92	173	
93	179	
94	184	
95	190	
96	**195**	**60th**
97	200	
98	206	
99	211	
100	217	
101	222	
102	**228**	**70th**
103	233	
104	238	
105	244	
106	249	
107	255	
108	**260**	**80th**
109	266	
110	271	
111	276	
112	282	
113	287	
114	**293**	**90th**
115	298	
116	304	
117	**309**	**Travis Dawson Record**
118	314	
119	320	
120	**325**	**100th**

90 SECOND BOX JUMP TEST (WOMEN)

Scoring Table Women -90 sec Box Jump		
# Jumps	Points	
39	0	
40	7	
41	13	
42	20	
43	26	
44	**33**	**10th**
45	38	
46	43	
47	49	
48	54	
49	60	
50	**65**	**20th**
51	71	
52	76	
53	81	
54	87	
55	92	
56	**98**	**30th**
57	103	
58	108	
59	114	
60	119	
61	124	
62	**130**	**40th**
63	136	
64	140	
65	146	
66	152	
67	157	
68	**163**	**50th**
69	168	
70	173	
71	179	
72	184	
73	190	
74	**195**	**60th**
75	200	
76	206	
77	211	
78	217	
79	222	
80	**228**	**70th**
81	233	
82	**238**	
83	244	
84	249	
85	255	
86	**260**	**80th**
87	266	
88	271	
89	276	
90	282	
91	287	
92	**293**	**90th**
93	298	
94	**304**	**Kelsey Serwa Record**
95	309	
96	314	
97	320	
98	**325**	**100th**

APPENDIX C
WORLD CUP POINT DISTRIBUTION

WC Point Distribution	
Place	Points
1	200
2	180
3	160
4	150
5	140
6	136
7	130
8	120
9	110
10	100
11	90
12	89
13	88
14	87
15	86
16	85
17	84
18	83
19	82
20	81
21	80
22	79
23	78
24	77
25	76

WC Point Distribution	
Place	Points
26	75
27	74
28	73
29	72
30	71
31	70
32	69
33	68
34	67
35	66
36	65
37	64
38	63
39	62
40	61
41	60
42	59
43	58
44	57
45	56
46	55
47	54
48	53
49	52
50	51

WC Point Distribution	
Place	Points
51	50
52	49
53	48
54	47
55	46
56	45
57	44
58	43
59	42
60	41
61	40
62	39
63	38
64	37
65	36
66	35
67	34
68	33
69	32
70	31
71	30
72	29
73	28
74	27
75	26

WC Point Distribution	
Place	Points
76	25
77	24
78	23
79	22
80	21
81	20
82	19
83	18
84	17
85	16
86	15
87	14
88	13
89	12
90	11
91	10
92	9
93	8
94	7
95	6
96	5
97	4
98	3
99	2
100	1

APPENDIX D
EXAMPLE SCORE CALCULATION

	Athlete A				Athlete B				Athlete C				Athlete D			
Skiing Skill Combine	Average Raw Score or Time (s)	Qualtitative Event Points Earned	Overall Event Rank	WC Points	Average Raw Score or Time (s)	Qualtitative Event Points Earned	Overall Event Rank	WC Points*	Average Raw Score or Time (s)	Qualtitative Event Points Earned	Overall Event Rank	WC Points*	Average Raw Score or Time (s)	Qualtitative Event Points Earned	Overall Event Rank	WC Points*
Outside Ski Turns*	2.67	88.67	10	100	2.67	88.67	34	67	2.00	66.67	67	34	3.00	100.00	8	120
Timed Skating Starts	5.68		24	77	6.78		64	37	4.57		10	100	77		24	77
Spiess (Hop turns)*	4.00	133.33	9	110	2.33	78.00	10	100	1.67	55.67	50	51	2.67	88.67	30	71
Timed Turns in Wave Track	25.67		40	61	23.46		25	76	26.58		59	42	40		61	40
Timed Skating without Poles	35.87		35	66	29.75		12	89	32.73		32	69	57		44	57
Composite Skiing Skill Score & WC Points Earned				414				369				296				365

	Athlete A				Athlete B				Athlete C				Athlete D			
Physical Fitness Combine	Raw Fitness Score	Fitness Points (scoring table)	Overall Event Rank	WC Points	Raw Fitness Score	Fitness Points (scoring table)	Overall Event Rank	WC points Earned	Raw Fitness Score	Fitness Points (scoring table)	Overall Event Rank	WC points Earned	Raw Fitness Score	Fitness Points (scoring table)	Overall Event Rank	WC points Earned
Penta Jump	12.5	63	15	86	13.2	75	10	100	11.2	79	54	47	14	89	5	140
Push Ups	35	75	35	66	22	48	67	34	37	79	26	75	21	79	69	32
90 Second Box Jump	67	38	28	73	77	92	24	77	70	173	26	75	90	282	1	200
Composite Physical Fitness Score & WC Points Earned		176		225		215		211		331		197		450		372

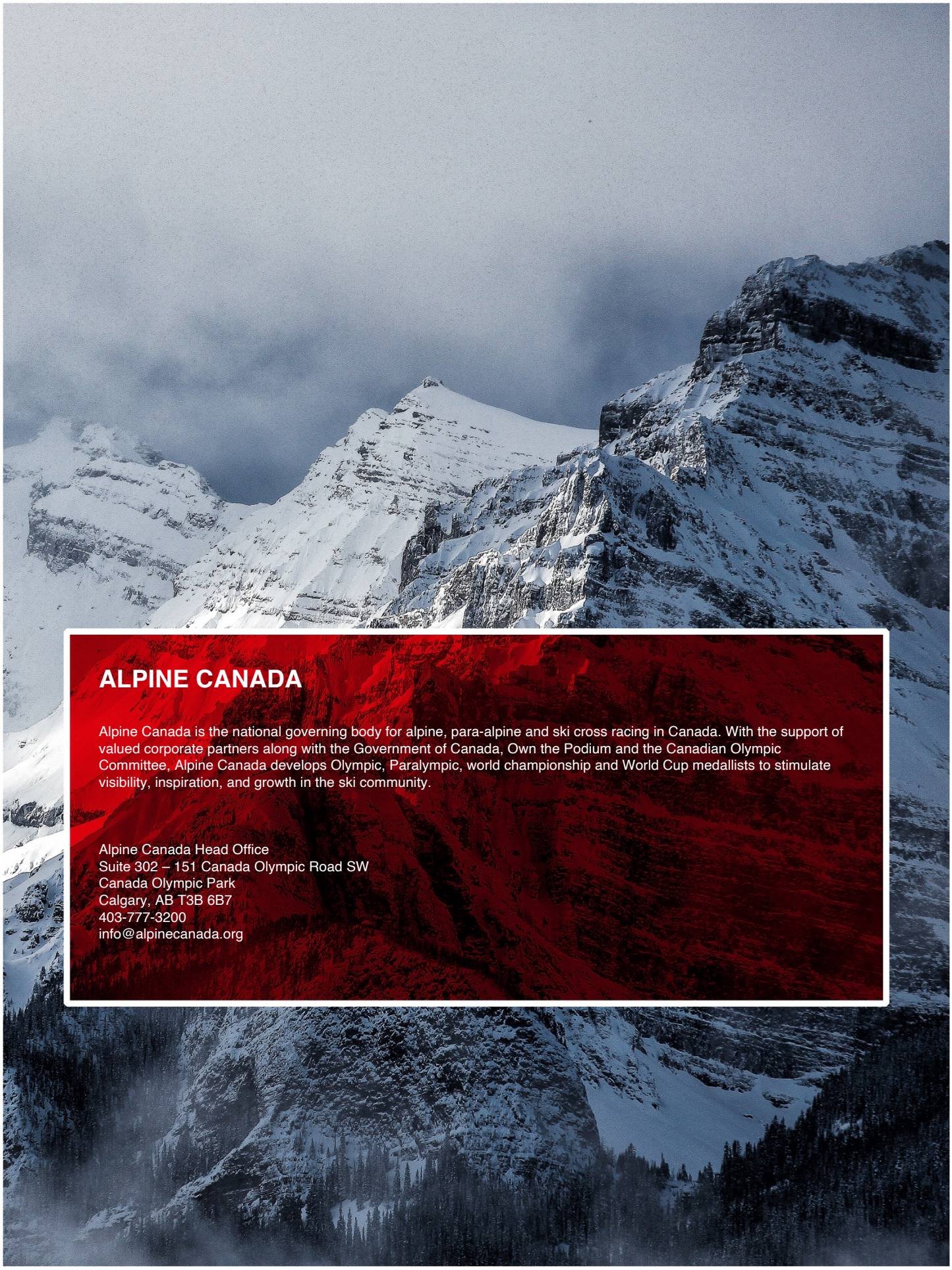
	Athlete A			Athlete B			Athlete C			Athlete D		
	Fitness Combine WC Points Earned	Skiing Skill Combine WC Points Earned	Total World Cup Points Earned	Fitness Combine WC Points Earned	Skiing Skill Combine WC Points Earned	Total World Cup Points Earned	Fitness Combine WC Points Earned	Skiing Skill Combine WC Points Earned	Total World Cup Points Earned	Fitness Combine WC Points Earned	Skiing Skill Combine WC Points Earned	Total World Cup Points Earned
Total Overall Score	225	414	639	211	369	580	197	296	493	372	365	737
Event Ranking	2nd	1st	2nd	3rd	2nd	3rd	4th	4th	4th	1st	3rd	1st

*The outside ski turns and spiess turn evaluation scores are calculated by summing the three (3) judging scores using the qualitative points earned for each raw score and calculating the average. The athletes are then ranked and earn WC points based on their overall event ranking.

The physical fitness combine composite score is calculated by combining the points earned in each exercise based on the athlete's performance as seen in the individual test scoring tables in Appendix B. The athletes are then ranked and earn WC points based on their overall event ranking.

Determination of the overall combine winners will combine the world cup points earned in skiing skill combine with the world cup points earned in physical fitness combine.

The athletes with the highest number of WC points will be the winner of the event.



ALPINE CANADA

Alpine Canada is the national governing body for alpine, para-alpine and ski cross racing in Canada. With the support of valued corporate partners along with the Government of Canada, Own the Podium and the Canadian Olympic Committee, Alpine Canada develops Olympic, Paralympic, world championship and World Cup medallists to stimulate visibility, inspiration, and growth in the ski community.

Alpine Canada Head Office
Suite 302 – 151 Canada Olympic Road SW
Canada Olympic Park
Calgary, AB T3B 6B7
403-777-3200
info@alpinecanada.org