

2017

Karate Athlete Fitness Test (KAFT)

Level 2: Field Test



KARATE CANADA

This test battery was produced for Karate Canada

By:

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Background: In 2016, ViaSport BC and Karate BC conducted a complete review of karate and it highlighted the need to establish both fitness testing and athlete evaluation of karate athletes. The athlete data will be part of a multi-year longitudinal study piloted by Karate BC in conjunction with the University of Victoria's School of Exercise Science, Physical and Health Education program. Kalan Anglos will conduct this pilot project as part of his MSc. Kinesiology thesis research under the guidance of Dr. Lynne Stuart-Hill and Dr. Kathy Gaul. The Level 2: Field Test allows Karate BC and Karate Canada to gather data on athletes of all levels across the country to help determine fitness norms and create athlete profiles. All data collected from the fitness test battery will remain anonymous to everyone except the provincial coaches, Karate Canada executives, and Kalan Anglos - the primary investigator.

Reasons for Testing: To date there is no valid and reliable fitness testing battery of a karate athlete's physiological parameters. Therefore, the goal of the field fitness test is threefold: (1) to establish a valid and reliable fitness test that can be implemented to karate athletes, (2) to determine talent identification systems based on the fitness testing outcomes (i.e. create "athlete profiles"), and (3) to establish normative data on karate athletes.

Tiered System of Fitness Tests: There are three (3) increasingly advanced levels of the Karate Athlete Fitness Test (KAFT) that will be implemented to specific populations of karate athletes. The **Level 1: Club Test** assessment is to be used for athletes at the club level by a local or regional coach who has been trained in the administration of the test battery. This preliminary test is easy to administer, requires minimal equipment, and allows coaches to evaluate their athletes in their own clubs. The **Level 2: Field Test** is to be used for athletes who are training or trying out for their respective provincial team, and requires a specific set of testing equipment. The test battery is to be administered by a trained individual who has knowledge of each of the tests and how to properly conduct them. Finally, the **Level 3: Lab Test** will be used for elite level athletes on the Canadian National team who compete in both National and International tournaments. It will be conducted by a Certified Strength & Conditioning Specialist (CSCS), or an exercise professional who has experience in fitness testing in a lab setting.

Test	Level 1: Club Test	Level 2: Field Test	Level 3: Lab Test
Intended For	Club level athletes	Provincial level athletes	National level athletes
Equipment Needs	Minimal	Specific	Laboratory
Administered By	Club or Regional coach	Karate Canada approved Coach	Karate Canada approved CSCS

A *fitness test* evaluates an athlete's physiological parameters. This is different from a *skill assessment* which tests proprioceptive & sport specific skills. A karate athlete *skill assessment* will be developed at a later date.

Manual Instructions: This manual is equipped with embedded hyperlinks that, when selected, take the reader to the appropriate section of the manual or to applicable video explanations (via YouTube) of the respective fitness tests. When text is highlighted red, this indicates an embedded hyperlink. (Not available for this edition)



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Introduction

Level 2: Field Test

Purpose: The Level 2: Field Test is the second stage of the KAFT program and should be used to test and monitor karate athlete's fitness levels at the provincial level. It is important to help determine an athlete's individual fitness levels, where improvements can be made, and how they compare to athletes in similar stages of development. Additionally, because the Level 2: Field Test is intended for athletes on the respective provincial teams, the results of the testing can be evaluated to other provinces as a whole.

The KAFT has been established under the guidance of Karate Canada's High Performance Committee, and has been implemented to the Canadian National team in 2017.

Equipment	Safety Considerations
<ul style="list-style-type: none"> - Measuring AND Anthropometric Tape - Cones/Pylons (x20) - Stopwatch (x3) - Scale and stadiometer (height measurement tool) - Medicine Balls (4, 6, & 9kg) - Adjustable workout bench - Vertec vertical jump apparatus (including pole) - Athletic Tape 2.54cm (1") in width - Speaker System - Mobile Device with Beep Test app downloaded (free) - HR monitors (optional) 	<ul style="list-style-type: none"> - Athlete's adequately warmed up prior to testing - Athlete's inexperience in testing protocols - Athlete fatigue - Spatial awareness - cool down following the test battery <p>Because of the nature of a fitness test battery, and the possibility for fatigue, a first-aid attendant and safety kit including carbohydrate drinks should be present and available</p>

How to Administer: A provincial or Karate Canada approved coach will oversee the administration of the **Level 2: Field Test** battery. The order of each athlete being tested will be randomly assigned. All athlete's will complete each test in the order they are described and presented in this manual. The results of the tests for each athlete should be recorded using the data collection sheet (Page 7), and provided to Kalan Anglos for inclusion in to the country-wide data. Additionally, the results of the test battery should remain anonymous to everyone except the provincial coaches, Karate Canada executives, and the primary investigator of the fitness testing (Kalan Anglos)

A 10-15 minute warm up (see below) administered by a provincial coach should precede any testing protocols and athletes should be given a familiarization period for each specific test before official scores are obtained and recorded.

Considerations

Warm Up: Prior to performing the test battery, an adequate warm up should be administered to all athletes led by the provincial or Karate Canada approved coach. The warm up should progress from **general** (jogging, lunges, arm swings etc.) to **specific** (squat jumps, short sprints, pushups etc.). Additionally, dynamic stretches (leg swings, external/internal hip rotations etc.) should be performed while static stretches (sit-and-reach, standing quadriceps stretch etc.) should be avoided. The entire warm up should take between 10-15 minutes to complete, and athletes should be given an additional 5 minutes afterwards to stretch/warm up any additional body region they feel necessary.

Cool down: After each athlete has completed the Level 2: Field Test battery, they should be instructed to perform a 5-10 minute cool down period which should include such things as light jogging, static stretching, myofascial release (i.e. foam rolling), and heart rate recovery.

Physiological Parameters to be Measured:

Through an extended task analysis of karate by a fitness testing panel, the following physiological parameters were determined as relevant to performance in karate competition:

1. **Flexibility:** is the range of motion about a joint. This can be measured in a variety of different ways, and is important for karate athletes to ensure they have adequate flexibility to execute certain karate techniques. Through the extended task analysis of karate, it was found that hip/groin flexibility (leg abduction) is important for kicking techniques (in both kata and kumite), as well as for proper execution of certain stances.

Test: Split test

2. **Balance:** Balance is the ability to maintain the center of gravity (COG) over the base of support (BOS). This is especially important for karate athlete's, who require sudden movements while maintaining their balance.

Test: Modified Bass test

3. **Anaerobic Capacity:** is the maximal rate of energy production and the ability to maintain a high energy output over an extended period of time. These tests typically last from 1 – 2 minutes, and measure the ability to maintain the usage of the anaerobic energy systems. This is especially important for competitive athletes, who have to maintain a high amount of energy output over several matches, or performances.

Test: Modified 300 metre shuttle

4. **Agility:** is the ability to stop, start, and change directions as rapidly as possible and in a controlled manner. Athletes who are performing agility tests typically change direction, and are timed on their ability to do so. For karate athletes, agility is important to maneuver around the ring in a kumite match, as well as to perform sudden changes of direction in kata performance.

Test: T -test.

5. **Anaerobic Power:** Also known as “high-speed muscular strength”, this parameter measures the ability of a muscle to exert high force while contracting at a high speed. These tests are short in duration, and performed at maximal movement speeds. In karate, it was found that both lower body and upper body power are important for performance in both kata and kumite. Thus, tests of both upper and lower body power will be performed.

Tests: Medicine Ball Put, Vertical Jump

6. **Aerobic Power/Capacity:** is the ability for an athlete to maintain performance primarily using the aerobic energy system. These tests are generally done by determining an athlete's endurance, and there are a variety of tests that can be used, many of which give a score of oxygen consumption (measured in ml.kg.min). For provincial level athletes, the ability to maintain the aerobic system is important for both the recovery of anaerobic performance, as well as to sustain output over a 2-3 day period (i.e. elite tournament)

Test: Leger 20m run ("beep" test)

7. **Anthropometric Measurements:** is the scientific study of the measurements and proportions of the human body. These measurements are important to gather complete athlete profiles. **See page 6 for more information**
8. **Laterality:** Laterality refers to the preference of one side of the body. It is often referred to as "right/left-side dominant" or ambidextrous when both sides are used equally well. For the purposes of this assessment, the dominant side should refer to the side in which the athlete feels most comfortable in a fighting stance.

Test Protocols

1. Flexibility – Split Test

Procedure: Prior to the test, athlete's leg length is determined by measuring from their heel to the hip protrusion (iliac spine) with a straight leg. A measuring tape is also placed (and anchored) along the floor in a straight line.

1. On a marked area, the athlete stands and places their heels in **front** of the measuring line, with the inside of their left heel placed at the start of the measuring tape on the floor.

2. The athlete performs a split stretch as far as they can by abducting their right leg as far as possible along the line on the floor, while the torso remains **upright**.

3. The distance between the **inside** of their heels is determined.

Scoring: The stretch distance (hip abduction) is then subtracted by their leg length and this is the score on the test (*example: 160cm stretch - 110cm leg length = 50cm difference*). Positive or negative scored may be obtained.

Attempts: Two (2) attempts are given and the best of the two should be recorded.



2. Balance - Modified Bass Test

Procedure: 2.5cm (1 inch) tape squares are laid out in a course as shown in the figure (right). For ease of administration, and because karate mats are 1 square meter, the distance between each marker should remain the same for all adolescents (13-18 years) and adults (18+ years) at **1.0m** in lateral distance between markers, and **0.5m** in anterior distance (see figure).

The athlete stands over the square that is labeled ("start").

1. The athlete jumps from square to square, in numbered sequence, using only one leg (landing on the right leg for all odd numbers - 1, 3, 5, 7, & 9 - and landing on the left leg for all even numbers - 2, 4, 6, 8, & 10).

2. On landing at each square, the athlete remains facing forward, doesn't move the support leg, and holds for **five** (5) seconds before jumping to the next square. *The tester should count aloud the 5 seconds the athlete is required to stay at each marker.*

Types of Errors: There are two different types of "errors" that occur during the test:

Landing errors: occurs if the athlete's foot does not cover the tape square, if the foot does not remain facing forward, if the athlete stumbles on landing, or if the athlete takes the hands off the hips

Balance errors: if the athlete takes the hands off the hips, or if the non-support leg (i.e. the foot in the air) touches down or moves into excessive (>30°) flexion, extension, or abduction.

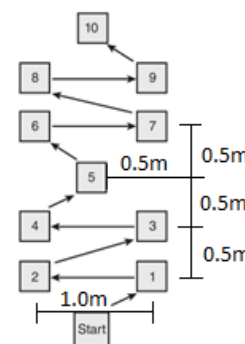
Scoring: 2 types of errors are collected & points are given to the athlete for each as follows:

ten (10) points are given for each period in which there was a **landing error**.

three (3) points are given for each period in which there was a **balance error**.

The sum of the two (landing and balance errors) is the **score** on the test.

Attempts: Two trials are given and the best of the two is recorded



3. Anaerobic Capacity - 300 metre shuttle

Procedure: Marker cones or lines are placed 10 metres apart to indicate the shuttle distance. Start with a foot on or behind the start line.

1. When instructed, the athlete runs to the opposite 10m line, touching it with their foot.

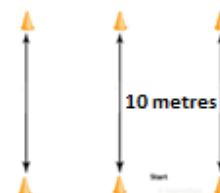
2. The athlete then turns and runs back to the start line (10 metre's apart)

This is repeated 15 times without stopping (20 metres X 15 laps = 300 metres total).

Scoring: The time it takes to complete the 300metre shuttle is the score on the test.

Attempts: Two trials are given and the best of the two is recorded

Reasons to redo test: The athlete doesn't cover the full 10 metre's in any of the shuttles, or fails to finish the entire 300 metre's.



4. Agility - T - Test

Procedure: Set out four cones as illustrated in the diagram. The athlete starts at cone A.

1. On the command of the timer, the athlete sprints to cone B and touches the base of the cone with their **right** hand.

2. They then shuffle sideways to cone C (remaining facing forwards, and shuffling feet heel-to-heel, and also touches its base, this time with their **left** hand.

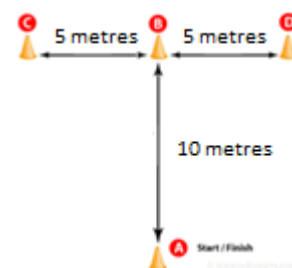
3. Then shuffling sideways to the right to cone D and touching the base with the **right** hand.

4. They then shuffle back (still facing forward) to cone B touching with the left hand, and run backwards to cone A.

Scoring: Time is stopped and recorded as they pass cone A.

Attempts: Two (2) trials are given and the best of the two should be recorded

Reasons to redo test: feet cross at any point, or the athlete discontinues to face forwards throughout the test.



5. Anaerobic Power (Lower Body) – Vertical Jump using Vertec

Procedure: The subjects reach height is measured and recorded by adjusting the height of the Vertec so that the lowest vane is touching the tip of the hand when the athlete is standing directly below the vanes with heels on the floor.

Note: Each vane represents 2.54cm (1 inch), and each red vane represents an increment of 15.24cm (6 inches).

1. When ready, the athlete performs a countermovement jump by quickly descending into a squat followed by a maximal jump straight up.

2. Using the dominant hand, the athlete hits & "swipes" the highest vane possible.

Scoring: Vertical jump height is recorded as the difference between the highest jump and the athletes reach height.

Attempts: Three attempts are given and the best of the three trials is recorded

Reasons to redo test: athlete fails to remain below the Vertec.



6. Anaerobic Power (Upper Body) – Seated Medicine Ball Put

Procedure: The bench should be set to 45° and the athlete should be seated comfortably with their feet flat on the floor.

1. Start with the ball grasped with both hands at the chest.
2. Without any additional bodily movements, the athlete propels ("puts") the medicine ball as far as possible (optimum trajectory = 45°)

Scoring: Where the ball lands is the score of the test

Attempts: 2 trials are given and the best of the two is recorded

Reasons to redo test: favouring one arm or rotating about the spine. Feet Leave the ground.



Photo via ©NSCA

Medicine Ball Weight Guidelines

Junior Females: 4kg **Senior Males:** 9kg

Junior Males: 6kg **Senior Females:** 6kg

7. Aerobic Power/Capacity – Leger 20m run test ("beep" test)

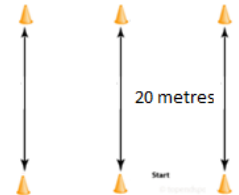
Procedure: Marker cones are placed 20m apart to indicate shuttle distance. Start with a foot on or behind the start line.

Note: Leger 20m shuttle test audio track and speaker system is required for the test

1. When instructed from the audio track, the athlete runs to the opposites 20m line and touches it with their foot.
2. The athlete continues the 20m shuttle back-and-forth to the tempo of the "beeps" on the audio track. The "beeps" start out slow, and become faster (i.e. closer together) as the test goes on through each stage. The athlete must maintain the 20m shuttle within consecutive "beeps" until they are unable to do so. A trial run for familiarization is recommended.

Scoring: The athlete's score is the level and number of shuttles (20m) reached before they are unable to keep up with the recording. Record the last level completed (i.e. not the level stopped at).

Reasons to redo test: The athlete doesn't cover the full 20 metres.



Anthropometric Measurement Protocols

Description: Anthropometric measurements are used to provide information on the proportions of each individual athlete, and are important for developing a complete athlete profile. For all measurements, the International Society for the Advancement of Kinanthropometry (ISAK) guidelines were followed. For the **Level 2: Field Test** battery, the following anthropometric measurements will be taken:

1. Body Mass

Equipment required: calibrated weighing scale

Procedure: With the weight distributed evenly on both feet, have the athlete stand on the centre of the scale in minimal clothing (i.e. light t-shirt, shorts) and shoes off. Record mass (in kilograms) to the nearest .1 kilogram (example: 65.3kg). Repeat to ensure accuracy.

2. Standing Height

Equipment required: Stadiometer or alternative method using measuring tape attached to the wall.

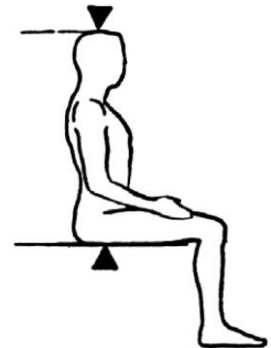
Procedure: Have the athlete stand straight up with their head held high, chin lifted and eyes forward. Instruct the athlete to stand as up-right as possible. Record height (in cm) to the nearest whole centimetre (example: 163cm).

3. Sitting Height

Equipment required: Stadiometer or measuring tape for alternative method.

Box or bench adjusted to a height where, when seated, the athlete's feet do not touch the ground, and their legs are hanging at a 90 degrees angle between their upper and lower leg.

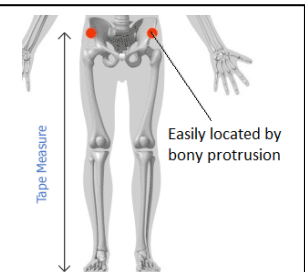
Procedure: Have the athlete sit on the appropriate box or level platform with their back against the stadiometer or wall, and hands rested on thighs. Instruct the athlete to stand as up-right as possible while sitting on the box while maintaining a straight spine. Using either the stadiometer or alternative method, record athlete's height (in cm) to the nearest whole centimetre.



4. Leg Length

Equipment required: Anthropometric Tape

Procedure: Have the athlete assume a standing position with the feet together and arms positioned outwards. Measure the athlete's leg length from their hip protrusion (iliac spine) to the floor. The hip protrusion can be found by feeling for the bony protrusion (see picture). Record the athlete's leg length to the nearest whole centimetre. Repeat to ensure accuracy.



5. Arm Span

Equipment needed: Anthropometric Tape

Procedure: Have the athlete stand up against a wall, facing forward, with their chin tucked to the side so that their body is pressed right up against the wall. Arms should be raised parallel to the floor, palms against the wall, stretched as far apart as possible. In a straight line, measure the distance from the tip of the longest finger on one hand, to the longest finger on the other hand. Record the athlete's arm span to the nearest whole centimetre. Repeat to ensure accuracy.



Score Sheet

Athlete's name _____

Body mass _____ kg

Date _____ Time _____

Standing Height _____ cm

Location _____

Sitting Height _____ cm

Birthdate _____ Age _____ Years

Leg Length _____ cm

Laterality: R / L (circle one) Resting HR _____ bpm

Arm Span _____ cm

Division(s): Kata / Kumite

Test	First Trial	Second Trial*
Flexibility (split/leg length diff.)	cm [†]	cm
Modified Bass Test	score	score
300 metre Shuttle	seconds [‡]	seconds
T- Test	seconds	seconds
Vertical Jump	cm	cm
Seated Medicine Ball Put	cm	cm
Leger 20 metre run "beep" test	stage (completed)	predicted VO2max

* On test days, at least 3 minutes should be given between first and second trials (where applicable)

† For tests that measure distance (centimetres), round scores to the nearest whole cm (*example: 164cm*)

‡ For tests that measure time, round scores to the nearest 0.1 seconds (*example: 24.3 seconds*).

Implementing the Test:

If entire test battery is being done on the same day, the order of assessment should follow the way it is presented on the score sheet (above). If only individual tests are being done, or tests are being done on separate days, then order of assessment should be done in this order: (day 1) **flexibility test, seated medicine ball put, 300m shuttle**, and (day 2) **T-Test, Vertical Jump, Leger 20m run, Modified Bass Test**. In these cases, subsequent testing days should be separated by at least 48 hours and no longer than 1 week.

If anthropometric measurements are being taken during the implementation of the test battery, they should be performed first, before continuing on to the rest of the fitness battery. See page 6 for more detail.

*Average time to complete entire test battery in a group setting (20-50 athletes): **90 minutes***