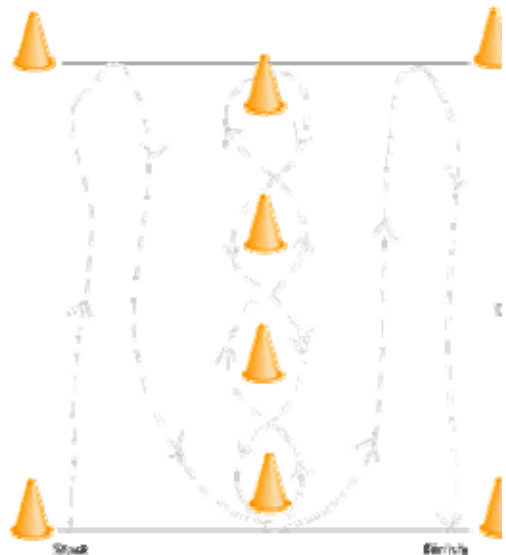


# NATIONAL JUNIOR PROGRAM

## FITNESS TESTING PROTOCOLS



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**Badminton Australia would like to acknowledge Andrew Perks for his contribution towards this fitness testing document.**

# Introduction

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A key part of spending hours training is being able to **measure your improvements**. Badminton Australia has a range of tests designed for badminton players and coaches to measure Badminton fitness. They have been chosen because they are:-

- easily repeatable
- easy to conduct
- quite accurate for field testing protocols.

These tests will be familiar to most young players under the age of sixteen as most school physical education programs use them. The tests are important to us as coaches in identifying strengths and weaknesses in our players. Some basic assessment of the player can be made and targets, goals set for the year. Broadly speaking badminton training is similar to conditioning for the other racket sports such as tennis and squash. But assessment of fitness and simple movement reveals a few key differences that Badminton has a unique movement style and specific fitness demands. One of the key things to remember is the size of a badminton court. It has a smaller area compared to Tennis, Football, Rugby, Hockey and Netball. This smaller area means that players do not have a chance to build up their maximum speed. Because of this, explosive movements such as jumping, turning, speed off the mark, lateral movements and agility, are extremely important.

Other differences are many shots in badminton are played **overhead** – more so than tennis or squash. Badminton players rely much more on the **forearm rotation** and **wrist flexors** for generating power compared to tennis players. While this may not lead to a vastly different training program, exercise selection and the percentage of time dedicated to some exercises over others will change.

Finally, strength and explosive power conditioning should form a fundamental part of a badminton training program – necessary to maximize speed about the court and powerful overhead smashes.

## Research on physical demands

There has been very little research on the physiological demands of the new scoring system on the body but clearly in the small amount that has been done, a **well-developed aerobic endurance capacity** seems necessary for fast recovery between rallies.

The results of analysis of the characteristics of competitive badminton by D Cabello Manrique, J J González-Badillo (3) in 2003 with the old 3 x 15 scoring (*Br J Sports Med* 2003;**37**:62-66) confirmed the high demands of badminton, with a maximum heart rate of 190.5 beats/min and an average of 173.5 beats/min during matches. The average rally length at an elite badminton level is 6-8 seconds and is interspersed with rest periods of about 15 seconds. Individual rallies placed a high demand on the anaerobic, alactic energy system with several back-to-back rallies relying on recovery of the creatine phosphate pool.

In more recent research data of elite Malaysian badminton players (4) it shows that they have moderately high aerobic power, explosive strength and agility in court specific movements.

The most recent study using the new scoring system (5) (Faude, Meyer, Rosenberger, Fries, Markus; Huber, Kindermann, 2007) examined the physiological characteristics and metabolic demands of singles match play. Twelve internationally ranked badminton players (eight women and four men) performed an incremental treadmill test. On a different day, they played a simulated badminton match of two 15 min with simultaneous gas exchange (breath-by-breath) and heart rate measurements. Additionally, blood lactate concentrations were determined before, after 15 min and at the end of the match. Furthermore, the duration of rallies and rests in between, the score as well as the number of shots per rally were recorded. A total of 630 rallies were analysed. Rallies lasted between 4 and 5 seconds. Duration of rests between 6 to 11 seconds. An average 3 to 5 shots played per rally.

These three studies show that high average intensities of badminton match play demonstrate the importance of **anaerobic alactacid and aerobic energy production** in competitive badminton.

There are several standard tests available to measure different aspects of badminton fitness which we are recommending but along with more sport specific badminton tests developed and designed by the AIS from the Badminton England tests.

The information delivered by these tests will be vital for a player and or coach in designing training programs. The tests included in this booklet will be used by the Australian National Squads. (Senior and Junior).

**There is a results table at the back of these protocols that can be used to record the fitness data. Please read the protocols and instructions carefully.**

**Corinne Barnard**

## **Bench Mark Testing**

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Bench mark testing assesses fitness at the start of training or start of the year. This testing provides the coaches VITAL benchmark information about the athletes starting fitness capabilities.

It is not important that the athletes start in a trained competition ready state, in fact it is better that the athlete starts this fitness test in a preseason state. Therefore an accurate performance profile can be generated and the first training phase can be quantified.

## **Adaptation Testing**

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This should be performed every six to twelve weeks through the training cycle/period. These tests will record how the training load is affecting the athlete's body. The goal is not always to see huge improvements, especially with junior athletes, but to make an assessment on how the training loads are being coped with and adapted to by the young athletes. For example if little or no improvement is made and the athlete is doing the training program accurately it may be that the athlete is too fatigued and the load is too heavy. This may also be reflected in low Heart rate (HR) during training sessions. If a huge improvement is made then it shows that the training load is being handled well and an increase in load may be required.

## **Performance Tests**

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These tests are ideally performed 3 – 4 weeks out from a major championship e.g. World Junior Championship. These results will affect how you prepare your taper and give direction in the final preparations before the 'big event'.

This test must be done in a rested state to simulate the taper. Elevated HR may result during these tests as the body is rested and HR tends to climb quickly in this state. This is important to note if the athlete uses HR as a training and competition tool.

## **Prior to Testing**

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Some of these tests are exhaustive and maximal. Players should be in good physical health before they undertake the tests. It is important that players are given permission to take these tests by a parent/guardian and or medical practitioner.

## **Preparation**

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Players should not have trained at all in the four hours prior to the testing, but should be warmed up and stretched as they would normally before an on court session. Players should be well fed and hydrated. Players should have their drink bottles with them during the test. Strenuous training should not have been performed in the last 24 hours.

# Anthropometrical Measures

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Tests of anthropometry include measurements of body size, structure, and composition. For badminton body size is important.

## Standing Height

**description / procedure:** measurement the maximum distance from the floor to the highest point on the head, when the subject is facing directly ahead. Shoes should be off, feet together, and arms by the sides. Heels, buttocks and upper back should also be in contact with the wall.

**equipment required:** stadiometer or ruler placed against a wall

**reliability:** Height measurement can vary throughout the day, being higher in the morning, so it should be measured at the same time of day each time.

**advantages:** low costs, quick test



## Weight

**purpose:** measuring body mass can be valuable for monitoring body fat or muscle mass changes, or for monitoring hydration levels.

**equipment required:** Scales which should be calibrated for accuracy.

**description / procedure:** the person stands with minimal movement with hands by their side. Shoes and excess clothing should be removed. Generally the body mass in minimal clothing is sufficiently accurate.

Body weight can be affected by fluid in the bladder



## Skinfold Measurement

### Description / procedure:

Estimation of body fat by skinfold thickness measurement. Measurement can use from 3 to 9 different standard anatomical sites around the body.

**Badminton Australia recommends the sum of 7 sites.**

The tester pinches the skin at the appropriate site to raise a double layer of skin and the underlying adipose tissue, but not the muscle. The calipers are then applied 1 cm below and at right angles to the pinch, and a reading taken two seconds later. The mean of two measurements should be taken. If the two measurements differ greatly, a third should then be done, then



the median value taken.

the sites: there are many common sites at which the skinfold pinch can be taken.

results: Because of the increased errors involved, it is usually not appropriate to convert skinfold measures to percentage body fat (%BF). It is best to use the sum of several sites to monitor and compare body fat measures. In order to satisfy those who want to calculate a percentage body fat measure. Below is a table of general guidelines for using total sum of the seven main skinfold sites (tricep, bicep, subscap, suprspinale, abdominal, thigh, calf)

		excellent	good	average	below average	poor
Normal	Male	60-80	81-90	91-110	111-150	150+
	Female	70-90	91-100	101-120	121-150	150+
Athletic	Male	40-60	61-80	81-100	101-130	130+
	Female	50-70	71-85	86-110	111-130	130+

equipment required: skin fold callipers (e.g. Harpenden, Holtain, Slimslide, Lange). These should be calibrated for correct jaw tension and gap width.

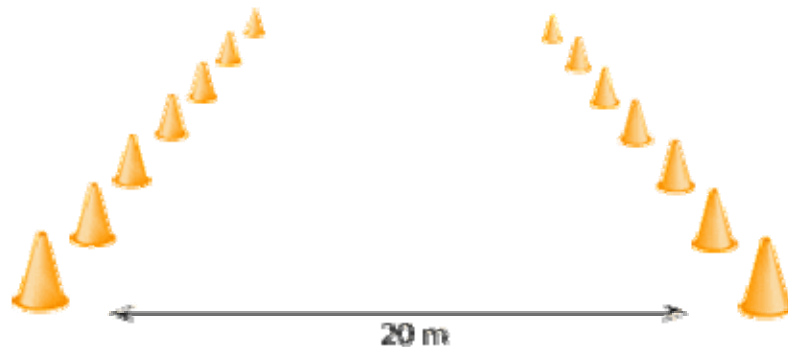
other considerations: some subjects may feel uncomfortable stripping down in front of the tester, therefore every effort should be made to make them feel comfortable. For legal reasons, it is wise to have another person present, and to have female testers for female subjects. The right side measurement is standard, though in some situations you may need to test someone on the left side. If so, you must record this and endeavor to always test on the same side for that person. Reasons for testing on the left side may include injuries, amputation, deformities, or other medical conditions.

**Badminton Australia recommends qualified personnel facilitate the skin fold testing not local coaches.**

# 20 meter Shuttle Run Test

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The multistage fitness test, also known as the 20 meter shuttle run test, beep or bleep test among others, is nowadays a very common test of aerobic fitness.



## **Description:**

This test involves continuous running between two lines 20m apart in time to recorded beeps. For this reason the test is also often called the 'beep' or 'bleep' test. The time between recorded beeps decrease each minute (level). There are several versions of the test, but one commonly used version has an initial running velocity of 8.5 km/hr, which increases by 0.5 km/hr each minute (more on test variations).

## **Scoring:**

The athletes score is the level and number of shuttles reached before they were unable to keep up with the tape recording. This score can be converted to a VO<sub>2</sub>max equivalent score using the table at the back in the Appendix.

## **Equipment required:**

Flat, non-slip surface, marking cones, 20m measuring tape, shuttle run CD, CD player and recording sheets.

## **Advantages:**

Large groups can perform this test all at once for minimal costs. Also, the test continues to maximum effort unlike many other tests of endurance capacity.

## **Disadvantages:**

Practice and motivation levels can influence the score attained, and the scoring can be subjective. As the test can be conducted outside, the environmental conditions can be often affect the results.

## **Other considerations:**

As the audio-tapes may stretch over time, the tapes need to be calibrated which involves timing a one-minute interval and making adjustment to the distance between markers. The recording is also available on compact disc, which does not require such a stringent calibration, but should also be checked occasionally. The CD can be ordered from the Australian Sports Commission.

This test goes by many names, though you need to be careful as the different names also may signify that these are different versions of the test. Therefore you need to be wary when comparing results or comparing to norms.

This test is a maximal test, which requires a reasonable level of fitness. It is not recommended for recreational athletes or people with health problems, injuries or low fitness levels.

# Sit and Reach Test

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This test measures the flexibility of the lower back and hamstring muscles.

## **Description / procedure:**

This test involves sitting on the floor with legs out straight ahead. Feet (shoes off) are placed with the soles flat against the box, shoulder-width apart. Both knees are held flat against the floor by the tester. With hands on top of each other and palms facing down, the subject reaches forward along the measuring line as far as possible. After three practice reaches, the fourth reach is held for at least two seconds while the distance is recorded. Make sure there is no jerky movements, and that the fingertips remain level and the legs flat.



scoring: The score is recorded to the nearest centimeter as the distance before (negative) or beyond (positive) the toes. The table below gives you a guide for expected scores (in cm) for adults using zero at the level of the feet (add 23 if using the other method).

	men	women
super	> +27	> +30
excellent	+17 to +27	+21 to +30
good	+6 to +16	+11 to +20
average	0 to +5	+1 to +10
fair	-8 to -1	-7 to 0
poor	-19 to -9	-14 to -8
very poor	< -20	< -15

## **Equipment required:**

sit and reach box (or alternatively a ruler can be used, and held between the feet)

## **Validity:**

This tests only measures the flexibility of the lower back and hamstrings, and is a valid measure of this.

## **Reliability:**

The reliability will depend on the amount of warm-up allowed, and whether the same procedures are followed each time. Most norms are based on no previous warm-up, though the best results will be achieved after a warm up or if the test is preceded by a test such as the endurance test.

## **Advantages:**

This is the most commonly used test of flexibility, so there is lots of data for comparison. Also, it is an easy and quick test to perform.

## **Disadvantages:**

Variations in arm, leg and trunk length can make comparisons between individuals misleading. The best measures are made with a measurement box specifically made for this test, which is not readily available. This test is specific to the range of motion and muscles and joints of the lower back and hamstrings.

## **Other comments:**

Lower back flexibility is important because tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain.



# Shoulder flexibility test

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The objective of this test is to monitor the development of the athlete's shoulder and wrist flexibility

## Starting position

- Lay prone on the floor with the arms fully extended holding a stick

## Movement

- Raise the stick as high as possible, keeping the nose on the ground
- Measure the vertical distance the stick rises from the floor to the nearest centimeter
- Repeat the test 3 times and record the best distance



Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement.

# Handgrip strength test

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**purpose:** strength is defined as the ability to carry out work against a resistance. Handgrip strength is important for any sport in which the hands are used for catching, throwing or lifting.

**equipment required:** handgrip dynamometer

**description / procedure:** The subject to be tested holds the dynamometer in one hand in line with the forearm and hanging by the thigh. Maximum grip strength is then determined without swinging the arm



**scoring:** The best of two trials for each hand is recorded. The values listed below (in kilograms) give a guide to expected scores for adults. They are the average of the best scores of each hand.

rating*	males (kg)	females (kg)
excellent	> 64	> 38
very good	56-64	34-38
above average	52-56	30-34
average	48-52	26-30
below average	44-48	22-26
poor	40-44	20-22
very poor	< 40	< 20

\* source and population group unknown

**validity:** The validity of this test as a measure of general strength has been questioned, as the strength of the forearm muscles does not necessarily represent the strength of other muscle groups.

**advantages:** This is a simple and commonly used test of general strength level.

disadvantages: The dynamometer must be adjusted for hand size, how successfully this is done will affect the accuracy of the measurement.

comments: It is also useful to record whether the athlete is left or right handed, as this may help in the interpretation of results. The non-dominant hand usually scores about 10% lower.

## Vertical Jump Test (Sargent Jump)

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This procedure describes the method used for directly measuring the height jumped.

equipment required: measuring tape or marked wall, chalk for marking wall. Or Vertec equipment is preferred for this test.

description / procedure (see also variations below): the athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach. The athlete then stands away from the wall, and jumps vertically as high as possible using both arms and legs to assist in projecting the body upwards. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded.



scoring: The jump height Jump is usually recorded as the score in distance. The table below provides a ranking scale for adult athletes and will give a general idea of what is a good score.

rating	males (cm)	females (cm)
excellent	> 70	> 60
very good	61-70	51-60
above average	51-60	41-50
average	41-50	31-40
below average	31-40	21-30
poor	21-30	11-20
very poor	< 21	< 11

There is also a calculation to convert jump height into a power or work score. Here are several formulae

Power = 2.21 x weight x root of jump distance.

Power = body mass (kg) x (4.9 x height jumped in meters)<sup>2</sup>

Peak Anaerobic Power output (Watts)

PAPw = (60.7 x jump height) + (45.3 x body mass (kg)) - 2055 (ref: Sayers et al.)

Advantages: this test is simple and quick to perform.

**Disadvantages:** technique plays a part in maximizing your score, as the subject must time the jump so that the wall is marked at the peak of the jump.

**Comments:** The jump height can be affected by how much you bend your knees before you jump, and the effective use of the arms.

## Standing Long Jump Test (Broad Jump)

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**purpose:** to measure the explosive power of the legs

**equipment required:** tape measure to measure distance jumped, non-slip floor for takeoff, and soft landing area preferred. The take off line should be clearly marked.

**description / procedure:** The athlete stands behind a line marked on the ground with feet slightly apart. A two foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive. The subject attempts to jump as far as possible, landing may be on one or both feet. Three attempts are allowed.



**scoring:** The measurement is taken from take-off line to the nearest point of contact on the landing (**back of the heels**). Record the longest distance jumped, the best of three attempts. The table below gives a rating scale for the standing long jump test, for Adults.

rating	males (cm)	females (cm)
excellent	> 250	> 200
very good	241-250	191-200
above average	231-240	181-190
average	221-230	171-180
below average	211-220	161-170
poor	191-210	141-160
very poor	< 191	< 141

**advantages:** this test is simple and quick to perform, requiring minimal equipment.

**disadvantages:** there is some skill component in this test.

**comments:** Falling or stepping backward after the landing will result in measurement to that point of contact rather than where the feet first touched. Some subjects will try to use a step at take-off, which is not allowed.

# Push-Up Test

---

This test measures upper body strength and endurance.

equipment required: floor mat

description / procedure: Start in the push up position - with the hands and toes touching the floor, the body and legs are in a straight line, feet slightly apart, and the arms at shoulder width apart, extended and at right angles to the body. Keeping the back and knees straight, the subject lowers the body until there is a 90-degree angle at the elbows, with the upper arms parallel to the floor. A partner holds their hand at the point of the 90-degree angle so that the subject being tested goes down only until their shoulder touches the partner's hand, then back up.



modifications: Modifications of this test to make it easier, includes having the knees on the ground or to have the hands resting on a chair. Such modifications may be required when testing people with very weak upper body strength or females. Another modification is just to record the total number of push ups completed in a set time period or at any tempo.



scoring: Record the number of correctly completed push-ups that were performed in rhythm.



advantages: this test is easy and quick to perform.

comments: The subjects should be instructed to spend as little time in the starting position beforehand in order to reduce fatigue and increase the number of repetitions. The test is also sometimes called the press up test.



# Core Muscle Strength Test

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## How to assess your core strength

There are many exercises available for developing strong abs and building core strength, but few methods offered for evaluating that strength. This test is provided as a way to determine the player's current core strength and then gauge their progress over time.

### Introduction

Testing and measurement are the means of collecting information upon which subsequent performance evaluations and decisions are made but in the analysis we need to bear in mind the factors that may influence the results.

### Objective

The objective of the Core Muscle Strength & Stability Test is to monitor the development of the athlete's abdominal and lower back muscles.

### Equipment needed

To undertake this test you will need: Flat surface, Mat, Watch

### Conducting the Test

The Core Muscle Strength & Stability Test is conducted as follows:

- Position the watch on the ground where you can easily see it
- Assume the basic plank position (elbows on the ground)
- Hold this position for 60 seconds
- Lift your right arm off the ground
- Hold this position for 15 seconds
- Return your right arm to the ground and lift the left arm off the ground
- Hold this position for 15 seconds
- Return your left arm to the ground and lift the right leg off the ground
- Hold this position for 15 seconds
- Return your right leg to the ground and lift the left leg off the ground
- Hold this position for 15 seconds
- Lift your left leg and right arm off the ground
- Hold this position for 15 seconds
- Return you left leg and right arm to the ground
- Lift your right leg and left arm off the ground
- Hold this position for 15 seconds
- Return to the basic press up position (elbows on the ground) – see picture
- Hold this position for 30 seconds



### Analysis

Analysis of the result is by comparing it with the results of previous tests. It is expected that, with appropriate training between each test, the analysis would indicate an improvement.

If you were able to complete this test then it indicates you have good core strength. If you are unable to complete the test then repeat the routine 3 or 4 times a week until you can.

If core strength is poor then the torso will move unnecessarily during motion and waste energy. Good core strength indicates that the athlete can move with high efficiency

# Specific Speed Test / On Court Agility Test

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This test is very sport specific in terms of movement and physiological demands. This test has been adapted from Badminton England's Agility test by the AIS but shortened in duration to be more speed specific and more representative of average rally duration (6 sec approx.).

The Badminton England test takes 13-16s. So has been adapted to reduce duration of test

This has been accomplished by reducing the number of circuits of the agility test to one rather than two per trial.

Racquet may be replaced with another device if greater accuracy is required when touching shuttles/markers

## **Equipment required**

Requires badminton court (net removed), badminton racquet, masking tape, tape measure, 2 sets x timing gates (preferred) **or stop watch**, ten shuttle tubes and six shuttlecocks.

## **Set up**

To prepare the court, mark the following onto a *singles* court (**see Figure 3.**)

- Shuttlecock '1' – Three shuttlecock tubes (taped end-to-end) are located on the right singles sideline 50cm from the net-line (labelled '1').
- Shuttlecock '2' – The shuttlecock (feathers down) is placed on the ground inline with the right singles sideline 150cm from the front service line (labelled '2').
- Shuttlecock '3' – The shuttlecock (feathers down) is placed on two shuttlecock tubes (taped end-to-end) located on the right singles sideline 50cm from the back boundary line (labelled '3').
- Shuttlecock '4' – Three shuttlecock tubes (taped end-to-end) are located on the left singles sideline 50cm from the net-line (labelled '4').
- Shuttlecock '5' – The shuttlecock (feathers down) is placed on the ground inline with the left singles sideline 150cm from the front service line (labelled '5').
- Shuttlecock '6' – The shuttlecock (feathers down) is placed on two shuttlecock tubes (taped end-to-end) located on the left singles sideline 50cm from the back boundary line (labelled '6').
- The starting gate is positioned along the back boundary line and is intersected by the centreline of the court.
- The finish gate is positioned along the net-line and is intersected by an imaginary extension of the court centreline.

## **Protocol**

Subjects must move through the start line and then to a central transition box before moving to each of the six shuttle locations. The subject must return to the transition box before moving to the next location and before moving to the finish after reaching the final shuttlecock location. The protocol involves badminton specific movements and shot simulations at set positions (see below). Approx. 10sec duration. Repeat 3 times. At least 2min rest. Single best time is recorded. Subjects stand with their leading foot immediately behind the line of the starting gate and the test begins as they break the timing beam (or as body crosses line of starting gate if using a stopwatch). The test ceases when the subject breaks the beam of the finishing gate (or as body crosses line of finishing gate if using a stopwatch)

### **Location 1**

Subject must touch the top of the tubes with the racquet strings and return to the transition box.

### **Location 2**

The player must knock the shuttle off its position on the ground with a forehand shot and return to the transition box.

### **Location 3**

The player must play a forehand shot, removing the shuttle from the top of the shuttle tubes and return to the transition box.

### **Location 4**

Subject must touch the top of the tubes with the racquet strings and return to the transition box.

### **Location 5**

The player must knock the shuttle off its position on the ground with a backhand shot and return to the transition box.

### Location 6

The player must play a backhand shot, removing the shuttle from the top of the shuttle tubes and return to the transition box before ending the test by moving through the finish gate.

A run is considered invalid if a subject gains an advantage by not placing a foot in the transition box.

The court set-up (Figure 3.) is for a right-handed subject. A left-handed subject will perform the same movements beginning with the shuttlecocks located on the left sideline rather than the right.

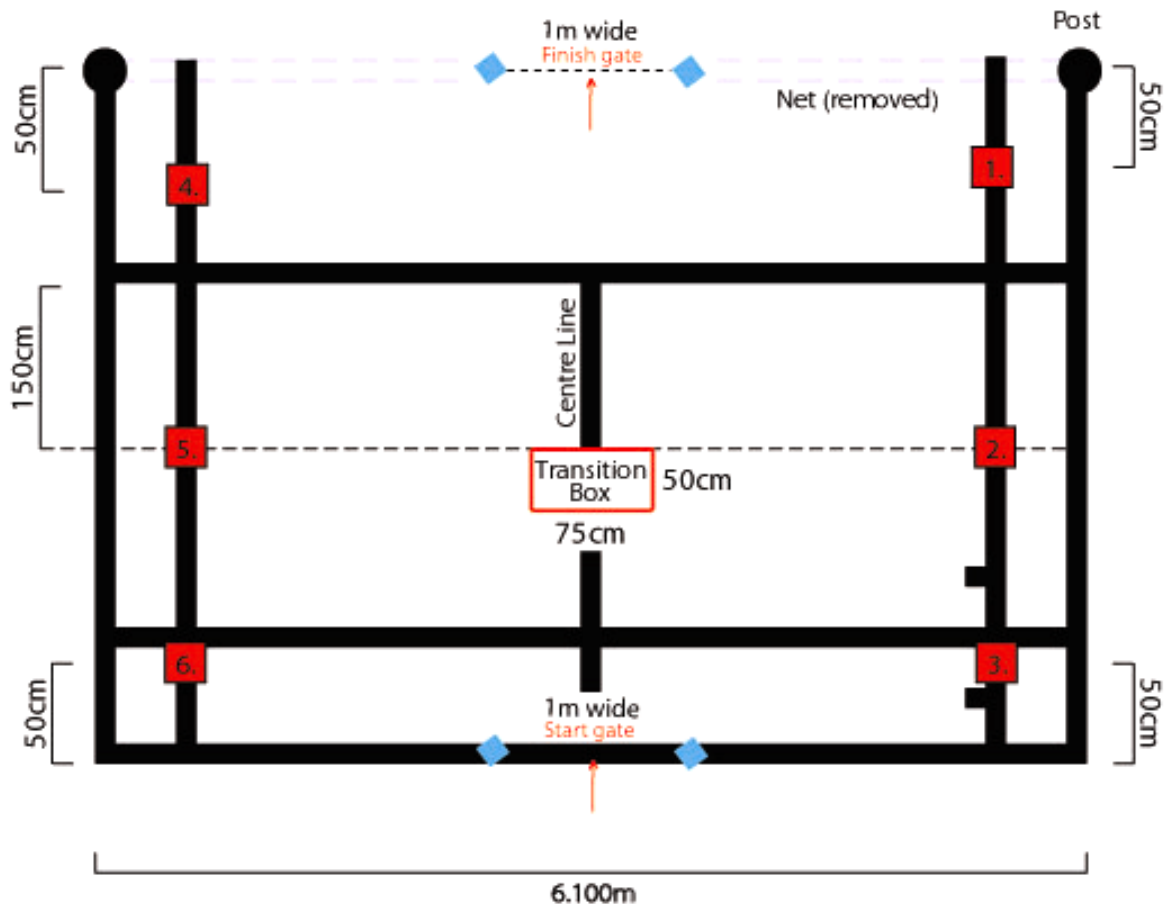
The test administrator must observe:

Movement and/or dislodgement of the shuttle for the run to be deemed valid.

Touching of the tube top with racquet strings

Dislodgement of shuttle tubes in the performance of a stroke/shot is allowed as long as contact is made with the shuttle or tube tops initially.

## Badminton - Specific Speed test (Figure 3.)



- Notes:
- a) Individuals may choose to start in either direction. The set up above is designed for a right-handed individual.
  - c) \*\* - Optional testing marks (for shuttle speed determination)

# VARK Test

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Developed by Neil Fleming VARK is a learning preference **questionnaire** which helps people find their best possible way to learn. The four ways of learning are visually, aurally, by reading/writing and kinaesthetically, which is by experience.

These preferences are about the ways that they want to take-in and give-out information.

VARK is about **preferences** which are a part of the Myers-Briggs Personality Type Indicator and VARK is structured specifically to improve learning and teaching.

The questionnaire indicates the variety of different approaches to learning. It also supports those who have been having difficulties with their learning. Coaches who would like to understand their students more can also benefit from using VARK. It can be used with a group or class, but it does require some explanation to avoid leaping to inappropriate conclusions. Coaches need to visit the Copyright page before using VARK.

If you do not wish to use the online version of the questionnaire with your athletes you can download a printable (PDF) version:

[VARK website](#)

To download the printable VARK questionnaire for people aged 12-18  
<http://www.vark-learn.com/documents/younger.pdf>

To complete the online version for all other athletes go to  
<http://vark-learn.com/english/page.asp?p=athletes>

## Administering the VARK questionnaire

Say as little as possible before others answer the questionnaire as it may bias their answers. They should be advised to make a selection (a, b, c or d) for each question, but they may omit a question or they may choose more than one option if they want to. They should be told to answer each question for themselves not thinking about others. Empathy may be a wonderful quality but it will provide wrong answers in VARK.

Some may contest the meaning of words in the questionnaire and others may ask for additional contextual or situational information before they choose their answers. Avoid giving that information, as it may bias responses to the questions. Encourage them to choose more than one response if they think the context is not clear. Some may want to discuss the purpose of the questionnaire or its validity or reliability. Ask them to hold such questions till later when they can be more appropriately answered.

Please emphasize, in whatever ways you can, that the results indicate their **preferences** but are not necessarily their **strengths**. This reduces the anxiety for respondents who may express the view that the questionnaire **says** they are not good readers or not visually strong.

Work and life experiences may blur differences between preferences as people learn to use aural, visual, read/write and kinaesthetic modes in new situations. Preferences may also be **masked** by experiences.



No one mode is superior and there is no superior profile of VARK scores. Although our academic institutions may be strongly Read/write, life is much more varied. And you can be successful with almost any combination. *"You may be different but you are not dumb."* People can reflect on the results of the questionnaire and explore their own views about whether the preference fits them. For example, a student with a strong visual (V) preference could be asked: *"How important is colour in your life?" "Do you consider yourself a visual person?" "Are there aspects of your life where your visual preference is obvious?" "Do you think you have a strong sense of space or shape or position or location?" "Do the study strategies fit with what you do now?" "As an athlete do you "read" the patterns in front of you?"*

## Example of a VARK Questionnaire Results

Your scores were:

Visual: 11  
Aural: 7  
Read/Write: 2  
Kinaesthetic: 7

You have a mild Visual learning preference

## Analysing the VARK results

If your participants are not using the online version of the questionnaire, ask them to total the number of responses they have selected on the questionnaire. An Excel spreadsheet can be purchased from the website if you want to calculate their preferences from the totals.

# Appendix

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## Normative data for VO2max

Female (values in ml/kg/min)

Age	Very Poor	Poor	Fair	Good	Excellent	Superior
13-19	<25.0	25.0 - 30.9	31.0 - 34.9	35.0 - 38.9	39.0 - 41.9	>41.9
20-29	<23.6	23.6 - 28.9	29.0 - 32.9	33.0 - 36.9	37.0 - 41.0	>41.0
30-39	<22.8	22.8 - 26.9	27.0 - 31.4	31.5 - 35.6	35.7 - 40.0	>40.0
40-49	<21.0	21.0 - 24.4	24.5 - 28.9	29.0 - 32.8	32.9 - 36.9	>36.9
50-59	<20.2	20.2 - 22.7	22.8 - 26.9	27.0 - 31.4	31.5 - 35.7	>35.7
60+	<17.5	17.5 - 20.1	20.2 - 24.4	24.5 - 30.2	30.3 - 31.4	>31.4

Male (values in ml/kg/min)

Age	Very Poor	Poor	Fair	Good	Excellent	Superior
13-19	<35.0	35.0 - 38.3	38.4 - 45.1	45.2 - 50.9	51.0 - 55.9	>55.9
20-29	<33.0	33.0 - 36.4	36.5 - 42.4	42.5 - 46.4	46.5 - 52.4	>52.4
30-39	<31.5	31.5 - 35.4	35.5 - 40.9	41.0 - 44.9	45.0 - 49.4	>49.4
40-49	<30.2	30.2 - 33.5	33.6 - 38.9	39.0 - 43.7	43.8 - 48.0	>48.0
50-59	<26.1	26.1 - 30.9	31.0 - 35.7	35.8 - 40.9	41.0 - 45.3	>45.3
60+	<20.5	20.5 - 26.0	26.1 - 32.2	32.3 - 36.4	36.5 - 44.2	>44.2

## Vo2 max Tables

In the table below locate the Level and Shuttle you achieved in the test to find your VO2 max value.

4	2	26.8		5	2	30.2
4	4	27.6		5	4	31.0
4	6	28.3		5	6	31.8
4	9	29.5		5	9	32.9
<b>Level</b>	<b>Shuttle</b>	<b>VO2 Max</b>		<b>Level</b>	<b>Shuttle</b>	<b>VO2 Max</b>
6	2	33.6		7	2	37.1
6	4	34.3		7	4	37.8
6	6	35.0		7	6	38.5
6	8	35.7		7	8	39.2
6	10	36.4		7	10	39.9

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Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
8	2	40.5		9	2	43.9
8	4	41.1		9	4	44.5
8	6	41.8		9	6	45.2
8	8	42.4		9	8	45.8
8	11	43.3		9	11	46.8
Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
10	2	47.4		11	2	50.8
10	4	48.0		11	4	51.4
10	6	48.7		11	6	51.9
10	8	49.3		11	8	52.5
10	11	50.2		11	10	53.1
				11	12	53.7
Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
12	2	54.3		13	2	57.6
12	4	54.8		13	4	58.2
12	6	55.4		13	6	58.7
12	8	56.0		13	8	59.3
12	10	56.5		13	10	59.8
12	12	57.1		13	13	60.6
Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
14	2	61.1		15	2	64.6
14	4	61.7		15	4	65.1
14	6	62.2		15	6	65.6
14	8	62.7		15	8	66.2
14	10	63.2		15	10	66.7
14	13	64.0		15	13	67.5
Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
16	2	68.0		17	2	71.4
16	4	68.5		17	4	71.9
16	6	69.0		17	6	72.4
16	8	69.5		17	8	72.9
16	10	69.9		17	10	73.4
16	12	70.5		17	12	73.9
16	14	70.9		17	14	74.4

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Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
18	2	74.8		19	2	78.3
18	4	75.3		19	4	78.8
18	6	75.8		19	6	79.2
18	8	76.2		19	8	79.7
18	10	76.7		19	10	80.2
18	12	77.2		19	12	80.6
18	15	77.9		19	15	81.3
Level	Shuttle	VO2 Max		Level	Shuttle	VO2 Max
20	2	81.8		21	2	85.2
20	4	82.2		21	4	85.6
20	6	82.6		21	6	86.1
20	8	83.0		21	8	86.5
20	10	83.5		21	10	86.9
20	12	83.9		21	12	87.4
20	14	84.3		21	14	87.8
20	16	84.8		21	16	88.2

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# Fitness Assessment – Results Table

TEAM:		ANTHROPOMETRICAL				FLEXIBILITY		STRENGTH					VARK				SPEED	Aerobic Stamina			
NAME	Age	Height	Weight	Skin Fold		Shoulder	Sit & Reach	Core Muscle	Handgrip	Push Up	St. Long Jump	Vertical Jump	Learning style				On court agility / Speed	Multistage Test (Bleep)			
	Yrs.	Cms	Kgs	mm	%	cms	cms	secs	kg	no	cms	cms	V	A	R	K		secs	20 m Shuttle		VO2 Max
				Total														Level	Laps		
1																					
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					



