

Team Canada 2015

Special Olympics
Olympiques spéciaux
Canada



Special Olympics Canada - Fitness Testing Workbook

TABLE OF CONTENTS

Introduction.....	4
Table of Tests Used and Recommended Sports	5
Table of Equipment Used for tests	6
Body Measurements	9
Fitness Tests.....	10
AGILITY TESTS	10
BALANCE TEST	13
COORDINATION TESTS	14
FLEXIBILITY TEST	16
ANAEROBIC POWER TESTS	18
ENDURANCE TESTS.....	21
STRENGTH TESTS.....	24
STRENGTH ENDURANCE TESTS	26
SPEED AND ACCELERATION TESTS.....	29
Appendix A – Recording Sheets	31
Appendix B – Norms for Fitness Tests	32
Males.....	34
Females	35
Maximal oxygen uptake norms for men (ml/kg/min)	36
Maximal oxygen uptake norms for women (ml/kg/min)	37

INTRODUCTION

This manual is one of the tools that will be used by our coaches in order to conduct the fitness testing properly and consistently for the athletes. This workbook, in combination with the other tools that will be provided by Special Olympics Canada, will ensure that the fitness levels of our National Team Athletes can be accurately measured and tracked.

We appreciate that coaches and athletes are very busy with training and these tests will allow us to track the progress and improvements of our athletes and their coaches.

It is important for the fitness testing protocols to be administered in a consistent manner for the data collection and reporting. Each test measures a different fitness component and used together will give an overall assessment of the athletes' abilities. The testing protocols selected are based on the demands of all the sports within the Special Olympics system. Some are very relevant to all sports or certain sports while others may mainly be used to assess the overall fitness of the individual athlete.

According to the Canadian Sport for Life Athlete Development Model, the ABC's of athletic movement are acknowledged as **A**gility, **B**alance and **C**ontrol which are necessary components for participation and success in all sports. The 4 S's of sport performance are **S**uppleness (Flexibility), **S**peed, **S**trength and **S**tamina. This manual includes testing protocols to encompass all of these athletic abilities for assessment.

It is also important to record basic body measurements to track growth and overall health of the athlete.

Height - It is important to measure the height of the athlete because height and limb length impacts the mechanical advantages that an athlete may have with specific tests.

Weight - This base measure will indicate whether or not athletes are in a healthy zone. It will also indicate when athletes move into or out of the desired zone.

Body Circumference - In combination with weight, this measurement is the most efficient way for novice fitness testers to track athletes' relative body fat percentage.

Resting Seated Heart Rate – This is an overall measure of health that may indicate medical issues if irregular measurements are recorded. Also an improvement in overall fitness is typically results in a reduced resting seated heart rate.

The fitness tests that will be administered are the following:

TABLE OF TESTS USED AND RECOMMENDED SPORTS

ATHLETIC ABILITY	TEST	SPORT (needed for)
Agility	Pro agility Hexagon test – both directions T-test	ALL
Balance	1 leg stork stand (each leg)	ALL
Control	Alternate hand wall test, 2 leg bound test	ALL
Flexibility	Seated Reach Groin flexibility Shoulder reach	ALL
Anaerobic Power/	Vertical jump Broad jump Seated medicine ball throw	ALL
Aerobic Endurance	Beep Test Cooper 12 minute run	Not needed for precision sports
Strength	Hand grip Plank test 1RM in gym	ALL - especially power sports
Strength Endurance	Wall sit Push ups Sit ups	ALL
Speed	40 metre sprint	Not needed for precision sports
Acceleration	20 metre Dash	Not needed for precision sports

TABLE OF EQUIPMENT USED FOR TESTS

TEST	EQUIPMENT NEEDED
AGILITY <ul style="list-style-type: none"> • Pro agility • Hexagon test – both directions • T-test 	<ul style="list-style-type: none"> • Marker Cones • Measuring Tape • Stop Watch • Marker Tape or Chalk
BALANCE <ul style="list-style-type: none"> • 1 leg stork stand (each leg) 	<ul style="list-style-type: none"> • Stop Watch
COORDINATION <ul style="list-style-type: none"> • Alternate hand wall test, • 2 leg bound test 	<ul style="list-style-type: none"> • Measuring Tape • Ball • Marker Tape
FLEXIBILITY <ul style="list-style-type: none"> • Seated Reach • Groin flexibility • Shoulder reach 	<ul style="list-style-type: none"> • Marker Tape • Measuring Tape
ANAEROBIC POWER <ul style="list-style-type: none"> • Vertical jump • Broad jump • Seated medicine ball throw 	<ul style="list-style-type: none"> • Medicine Ball • Marker Tape • Tape Measurer

TEST	EQUIPMENT NEEDED
ENDURANCE <ul style="list-style-type: none"> • Beep Test • Cooper 12 minute run 	<ul style="list-style-type: none"> • Marker Cones • Stop watch • Beep CD and CD Player
STRENGTH <ul style="list-style-type: none"> • Hand grip, plank test, • 1RM in gym 	<ul style="list-style-type: none"> • Hand grip dynamometer • Stop watch • Optional yoga mat for lying on
STRENGTH ENDURANCE <ul style="list-style-type: none"> • Wall sit • Push ups • Sit ups 	<ul style="list-style-type: none"> • Stop watch • Optional yoga mat for lying on
SPEED <ul style="list-style-type: none"> • 40 m Sprint 	<ul style="list-style-type: none"> • Stop watch • Marker cones • Measuring tape
ACCELERATION <ul style="list-style-type: none"> • 20 m Dash 	<ul style="list-style-type: none"> • Stop watch • Marker cones • Measuring tape

You will also need pens or pencils, clipboards and copies of the recording sheets provided in Appendix A.

The equipment needed to conduct body measurements includes a scale, tape measure and a stop watch.

Although different sports require different physical demands from athletes, the general testing that we have outlined has proven to be sufficient for data collection across a broad range of sports. Below is a table that outlines specific abilities and their importance to certain families of sports.

	Physical Abilities and indication of importance						
Sport	Speed	Speed-Endurance	Maximum Strength	Speed Strength	Strength Endurance	Flexibility	Aerobic Endurance
Precision Sports <ul style="list-style-type: none"> • 10 pin Bowling • Curling • Bocce 	Low to Moderate	Low to Moderate	Moderate	Low to Moderate	Moderate	Moderate	Low
Team Sports <ul style="list-style-type: none"> • Floor Hockey • Soccer • Basketball • Softball 	High	Moderate to High	Moderate to High	High	Moderate	Moderate	High Softball - Moderate
Duration Sports <ul style="list-style-type: none"> • Cross Country Skiing > 5 km • Swimming >100 m • Speed Skating 	Moderate	High	Moderate	Moderate	High	Moderate	Very High
Short Duration Sports <ul style="list-style-type: none"> • Swimming • Short Track Speed Skating 	Very High	Very High	High to Very High	High to Very High	High	Moderate to High	Moderate
Artistic Sports <ul style="list-style-type: none"> • Rhythmic Gymnastics • Figure Skating 	Moderate to High	Moderate to High	High (Relative Strength)	High to Very High	High	High	Moderate
<ul style="list-style-type: none"> • Alpine Skiing • Snowshoeing 	Moderate to High	High	High	High to Very High	Very High	High	Moderate
<ul style="list-style-type: none"> • Golf 	High (upper body)	Low to Moderate	Moderate	High (upper body)	Moderate	High (upper body)	Low

Athletics – depends on event							
---------------------------------	--	--	--	--	--	--	--

Please Note: Testers’ level of encouragement during tests does not skew results. This allows for a more comfortable testing environment in which the coach or tester can conduct the session in their typical manner without worrying about affecting the test results.

BODY MEASUREMENTS



Height

- 1 - Stick the measuring tape to the wall using adhesive tape
- 2 - Have the athlete stand next to the tape without shoes on
- 3 - Record the value in centimeters.



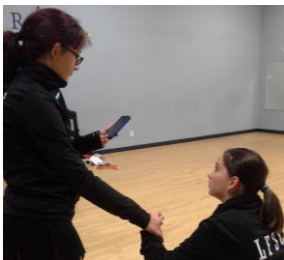
Weight

- 1 - Have the athlete stand on the scale without shoes on
- 2 - Record the value in kilograms.



Body Circumference

- 1 – Find the largest girth in the athlete's abdominal area
- 2 – Wrap the measuring tape around the identified area
- 3 – Record value in centimeters.



Resting Seated Heart Rate

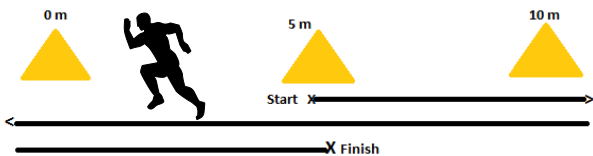
- 1 – Have the athlete sit in a relaxed position with arms on legs
- 2 – Find the athlete's pulse
- 3 – Use the stop watch to time 15 seconds while counting the athlete's pulse
- 4 – Multiply that number by 4 and record the value in beats per minute.

**The resting seated heart rate should be measured BEFORE fitness testing to ensure the most accurate results.*

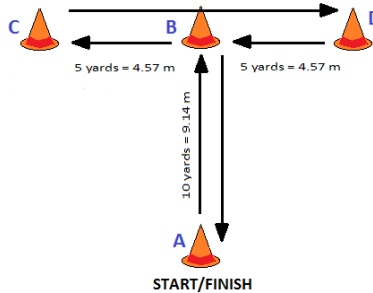


FITNESS TESTS

AGILITY TESTS


Agility is the ability to rapidly change body position or direction. It is difficult to test because different sports have different demands of agility. Therefore, all agility tests should be taken together in account with balance and coordination measurements.

DIRECTIONAL AGILITY – STOP, TURNING AND ACCELERATION	PRO AGILITY	ALL SPORTS
<p><u>Objective:</u> To complete the agility pattern as quickly as possible.</p> <p>Procedures:</p> <p>PRIOR TO TEST: Use the measuring tape to measure 10m and place a cone at each end of the 10m. Place another cone in the middle of the two ends at the 5m mark.</p>  <ol style="list-style-type: none"> 1. Have the athlete stand at the middle cone, say "Go" and press start on the stop watch. 2. The athlete runs to one end cone then to the other end cone and then back to the middle as fast as possible. 3. Stop the stop watch the second time the athlete passes the middle cone. 4. Record the best time of two trials. 		<p>Equipment:</p> <p>Stop Watch</p> <p>Tape Measure</p> <p>Marker Cones</p>
<p>Notes: *Allow athletes to walk or jog through the test prior to being timed to ensure they understand the sequence.</p>		

DIRECTIONAL AGILITY - ROTATIONAL	HEXAGON TEST	ALL SPORTS
<p><u>Objective:</u> to complete the hexagon pattern as quickly as possible.</p> <p>Procedures:</p> <p>PRIOR TO TEST: Mark a hexagon (six sided shape) on the floor. The length of each side should be 60.5 cm (24 inches), and each angle should work out to be 120 degrees.</p> <div data-bbox="711 611 1096 989"> </div> <p>Have the athlete stands comfortably on both feet with their hands on their hips.</p> <ol style="list-style-type: none"> 1. Athlete and stopwatch begin on command 'go'. 2. Athletes jump ahead across the line, then back over the same line into the middle of the hexagon. Then jump over the next side and back into the hexagon. Continuing to face forward with feet together. 3. Stop time after completion of 3 revolutions. 4. Record the best time of two trials. <p><i>Perform the test both clockwise and anti-clockwise.</i></p>		<p>Equipment:</p> <p>Stop Watch</p> <p>Tape Measure</p> <p>Chalk or Marking Tape to map out Hexagon</p>
<p>Notes: Comparison of the anti-clockwise and clockwise directions will show if any imbalances exist between left and right movement skills.</p> <p>If athlete jumps on the wrong line or lands on a line then the test needs to be restarted.</p>		


AGILITY – FORWARD, LATERAL AND BACKWARD	T- TEST	ALL SPORTS
<p>Objective: To complete the agility “T” pattern as quickly as possible.</p> <p>Procedures:</p> <p>PRIOR TO TEST: Set out four cones in a shape of a T using the distances of 10 yards for each direction. (5 yards = 4.57 m, 10 yards = 9.14 m)</p>  <ol style="list-style-type: none"> 1. Starting at cone A, the athlete must sprint to cone B (touch the base of the cone with their right hand), then turn left and shuffle sideways to cone C, (touches its base with left hand), then shuffle sideways to the right to cone D (touch the base with right hand), then shuffle back to cone B (touch base with left hand), and run backwards to cone A. 2. The stopwatch is stopped as they pass cone A. 3. Record the best time of three successful trials.  		<p>Equipment:</p> <p>Stop Watch</p> <p>Tape Measure</p> <p>Marker Cones</p>
<p>Notes: <i>The trial will not be counted if the subject crosses a foot in front of the other while shuffling, fails to touch the base of the cones, or fails to face forward throughout the test</i></p>		

Balance is the athlete's body awareness and ability to maintain balance. This test also measures core strength as needed in order to maintain balance on one foot.

BALANCE	STORK STAND	ALL SPORTS
	<p>Objective: The athlete is to hold this position for as long as possible.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. Have the athlete stands comfortably on both feet with their hands on their hips. 2. The athlete lifts the right leg and places the sole of the right foot against the side of the left kneecap. 3. Starts the stopwatch when the athlete raises the heel of the left foot to stand on their toes. 4. Stops the stopwatch when the athlete's left heel touches the ground or the right foot moves away from the left knee. 5. Record the time. <p><i>Let the athlete rests for 3 minutes</i></p> <ol style="list-style-type: none"> 6. Repeat for other leg. 	<p>Equipment:</p> <p>Stop Watch</p>
<p>Notes: *Athletes must remain still throughout this test, they will be allowed one warning if their base foot (left) moves after the test administrator indicates that the test has started.</p>		

COORDINATION TESTS

Coordination is the ability to move two or more body parts under control, smoothly and efficiently. Coordination is a complex skill that requires good levels of other fitness components such as balance, strength and agility.

COORDINATION – UPPER BODY	ALTERNATE HAND WALL TOSS	ALL SPORTS
<p>Objective: To measure hand eye coordination as the number of successful catches in 30 seconds</p> <p>Procedures:</p> <p>PRIOR TO TEST: Mark a line 2 meters from a wall.</p> <ol style="list-style-type: none">1. The athlete stands behind the facing the wall. The ball is thrown from one hand in an underarm action against the wall, and attempted to be caught with the opposite hand. The ball is then thrown back against the wall and caught with the initial hand.2. The test continues for 30 seconds.3. Record the number of successful catches.		<p>Equipment:</p> <p>Stop Watch</p> <p>Tennis Ball</p> <p>Marker Tape</p> <p>Measuring Tape</p>
<p>Notes: It is acceptable to repeat the test a few times because the ability to catch the ball can be affected by how hard and straight the ball is thrown to the wall.</p>		




COORDINATION-LOWER BODY	2 LEG BOUND	ALL SPORTS
<p><u>Objective:</u> To measure the coordination of lower body by measuring the maximum distance of two consecutive double-leg hops.</p> <p>Procedures:</p> <p>PRIOR TO TEST: Mark a starting line.</p> <ol style="list-style-type: none"> 1. The athlete starts with toes behind the starting line with feet shoulder width apart and toes to the line in a crouched position. 2. When ready, the athlete leaps forward off both feet, performing two consecutive broad jumps with no pause. 3. Upon landing the second broad jump, the athlete should remain standing with feet stationary to permit accurate measurement. 4. Record the distance the tip of the toes travelled in cm. Best of two trials is recorded. 		<p>Equipment:</p> <p>Marker Tape</p> <p>Measuring Tape</p>
<p>Notes: Athletes are able to use their arms to assist the explosive movement and for balance.</p> <p>The test needs to be redone if there are errors such as, if the athlete starts with their toes over the take-off line, steps into either hop instead of performing a 2-footed hop, pauses at least a full second upon landing the 1st hop, fails to land the 1st hop cleanly or performs a stutter step prior to the 2nd take-off, or fails to land the 2nd hop in such a way that allows clear marking of the landing spot.</p>		



FLEXIBILITY TEST

Flexibility is the range of motion through a joint. There is no one test that can give a score for overall flexibility. Each flexibility test is specific to a particular movement or joints.

FLEXIBILITY – UPPER TO LOWER BODY	SEATED REACH	ALL SPORTS
<p><u>Objective:</u> To measure the flexibility of the hamstrings and lower back.</p> <p>Procedures:</p> <p><i>NOTE: Use the level of the feet as zero, so that any measure that does not reach the toes is negative and any reach past the toes is positive.</i></p> <ol style="list-style-type: none"> 1. Athlete sits on the floor with legs stretched forward. A baseline will be made by connecting both heels along the ground as shown. Upon taking a deep breath, the athlete should will be instructed to reach forward along the ground with both hands between the legs and past the feet as far as possible on the exhale. 2. Holds the position for at least two seconds while the distance is recorded to a tenth of a cm. 		<p>Equipment:</p> <p>Tape</p> <p>Tape Measurer</p>
<p>Notes: Both knees should be locked and pressed flat to the floor - the tester may assist by holding them down. Ensure that the hands remain at the same level, not one reaching further forward than the other.</p>		

FLEXIBILITY –LOWER BODY	GROIN FLEXIBILITY	ALL SPORTS
<p><u>Objective:</u> To measure the flexibility in the adductor muscles in the groin.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. Athlete sits on the floor with knees bent and the soles of their feet together and facing each other. 2. Athlete lets knees drop sideways as far as possible keeping your feet together and while holding their feet with both hands, and pulling their ankles as close to their body as possible. 3. Measure the distance from your heels to your groin. 		<p>Equipment:</p> <p>Tape Measure or Rule</p>
Notes:		




FLEXIBILITY –UPPER BODY	SHOULDER REACH	ALL SPORTS
<p><u>Objective:</u> To measure the upper arm and shoulder flexibility.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. Place one hand behind the head and back over the shoulder, and reach as far as possible down the middle of your back. Place the other arm behind your back, reaching up as far as possible attempting to touch the fingers of each hand together. 2. Repeat for the other hand. 		<p>Equipment:</p> <p>Tape Measure or Ruler</p>
Notes:		




ANAEROBIC POWER TESTS

Explosive power is an important component of success in many sports and relies on anaerobic energy.

EXPLOSIVE POWER – LOWER BODY	VERTICAL JUMP	ALL TEAM SPORTS EXCEPT PRECISION SPORTS
	<p>Objective: to measure the explosive power relative to body weight of the athlete</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. PRIOR TO TEST: It is easier for measurement if the distance on the wall can be premarked. 2. The athlete stands aside a wall and reaches up with the hand closest to the wall, while keeping the feet flat on the ground. 3. Record the highest point of the fingertips as “standing reach height” (SJH). 4. <i>Place a coloured mark using chalk or marker on the athletes hands for easier use to measure the height.</i> 5. The athlete then moves slightly away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. 6. At the peak of the jump, the athlete marks the wall with their hand and this is recorded as “peak jump height” (PJH). 7. The vertical jump height (VJH) is calculated by : $VJH = PJH - SJH$ 8. The best of three attempts should be recorded. 	<p>Equipment:</p> <p>Measuring tape</p> <p>Chalk or felt marker to mark hands</p>
<p>Notes: Make sure the athlete marks the wall at the ‘peak’ of their jump. There should also be no counter movements.</p>		

EXPLOSIVE POWER – LOWER BODY	BROAD JUMP (STANDING LONG JUMP)	ALL TEAM SPORTS EXCEPT PRECISION SPORTS
<p><u>Objective:</u> to measure the explosive power relative to body weight of the athlete</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. PRIOR TO TEST: Mark out a starting line. It may easier for measurement if the tape measure can be secured to the ground. 2. The athlete stands with toes behind a line marked on the ground with feet slightly apart. 3. The athlete jumps as far as they can using a two foot take-off and landing. Swinging of the arms and bending of the knees is allowed to provide forward drive. 4. Measure the tip of the toes at landing. 5. The best of three attempts should be recorded. 		<p>Equipment:</p> <p>Measuring tape</p> <p>Marker tape</p>
<p>Notes: Taking a step at take off will require a retest. Athlete must be able to maintain balance at the end of the jump to be successful.</p>		


EXPLOSIVE POWER – UPPER BODY	SEATED MEDICINE BALL THROW	ALL TEAM SPORTS
<p><u>Objective:</u> To measure the upper body strength and explosive power.</p> <p>Procedures:</p> <p>PRIOR TO TEST: It is easier for measurement if the distance on the wall can be pre-marked.</p>  <ol style="list-style-type: none"> 1. The athlete sits on the floor with his/her legs extended, feet should width apart, and back against the wall. 2. The athlete throws the medicine ball as far forward as he/she can in a straight line while maintaining their back against the wall. 3. The best score of two attempts should be recorded. 		<p>Equipment:</p> <p>Measuring tape</p> <p>Medicine Ball</p>
<p>Notes: The angle the ball is thrown is important. You may want to explain to the subject about the optimal angle for maximal distance, and to allow some practice attempts. You may aid in the ease of measurement for this test by extending a tape measure out along the expected path in front of the subject. When recording the distance, you can either move the tape to where the ball landed, or less accurately align where the ball landed to the approximate distance on the tape.</p>		

ENDURANCE TESTS

An athlete's aerobic fitness level is dependent upon the amount of oxygen that can be transported by the body to the working muscles, and the efficiency of the muscles to use that oxygen.

The criterion test for aerobic fitness is the maximal oxygen uptake (VO₂max) test and it can be tested in a variety of ways. The most accurate is in a lab using sophisticated equipment to measure the amount of oxygen and carbon dioxide in the breath but, it is not feasible for the average athlete or tester. The following simpler tests are designed to *predict* a VO₂ max score.

ENDURANCE	COOPER 12 MINUTE RUN	ALL SPORTS
<p><u>Objective:</u> The athlete is to cover as much distance as possible in 12 minutes.</p> <p>Procedures:</p> <p>PRIOR TO TEST: The distance may have to be preset or organized in a manner to determine the distance covered as accurately as possible for athletes.</p> <ol style="list-style-type: none">1. Using the stop watch, have the athletes run for 12 minutes and record the distance covered upon completion.2. Calculation of VO₂max $VO_{2\max} = (35.97 \times \text{miles}) - 11.29$ $VO_{2\max} = (22.35 \times \text{kilometers}) - 11.29$		<p>Equipment:</p> <p>Stop Watch</p> <p>Measureable distance such as an indoor or outdoor track.</p> <p>*Cones can be placed as markers in order to more accurately determine the distance covered.</p>
<p>Notes: Walking is allowed, however, it is best to encourage the athletes to push themselves as hard as they can go to ensure a maximum distance covered.</p>		

ENDURANCE	BEEP TEST	ALL SPORTS
<p>Objective: to test the amount of aerobic endurance involving continuous running between two lines 20m apart in time to recorded beeps.</p>  <p>Procedures:</p> <p>PRIOR TO TEST: Measure a distance of 20 m for a start line and end line to cross and use marker cones to mark the lines.</p> <ol style="list-style-type: none"> 1. Athletes start behind one line and run according to the pace of the 'beeps' in the CD. 2. Athletes may have only one warning if they are not keeping up to the pace of 'beeps'. 3. If the athlete falls behind the beeps two times consecutively, the test ends by recording the final distance (level/# of shuttles) covered before falling behind. 		<p>Equipment:</p> <p>Music Player with "Beep Test CD"</p> <p>20 m Measuring Tape</p> <p>Marker Cones</p>
<p>Notes: Testing reliability depends on how strictly the test is run, levels of encouragement and perseverance of the athlete. To truly determine if the athlete is giving maximum effort, a heart rate monitor can be worn to determine if the athlete reaches their maxim heart rate.</p>		

Beep test calculation of VO2 Max

To get a calculation for predicted VO2 max from beep test results, enter the level and number of shuttles into this website that will convert the distance to Volume of oxygen uptake per ml per kg per minute.

<http://www.topendsports.com/testing/beepcalc.htm>

Beep Test Levels and Shuttles


Level	Shuttles	Cumulative Shuttles	Speed (km/h)	Shuttle Time (seconds)	Total level time (s)	Distance (m)	Cumulative Distance (m)	Cumulative Time (min and seconds)
1	7	7	8.0	9.00	63.00	140	140	1:03
2	8	15	9.0	8.00	64.00	160	300	2:07
3	8	23	9.5	7.58	60.63	160	460	3:08
4	9	32	10.0	7.20	64.80	180	640	4:12
5	9	41	10.5	6.86	61.71	180	820	5:14
6	10	51	11.0	6.55	65.50	200	1020	6:20
7	10	61	11.5	6.26	62.61	200	1220	7:22
8	11	72	12.0	6.00	66.00	220	1440	8:28
9	11	83	12.5	5.76	63.36	220	1660	9:31
10	11	94	13.0	5.54	60.92	220	1880	10:32
11	12	106	13.5	5.33	64.00	240	2120	11:36
12	12	118	14.0	5.14	61.71	240	2360	12:38
13	13	131	14.5	4.97	64.55	260	2620	13:43
14	13	144	15.0	4.80	62.40	260	2880	14:45
15	13	157	15.5	4.65	60.39	260	3140	15:46
16	14	171	16.0	4.50	63.00	280	3420	16:49
17	14	185	16.5	4.36	61.09	280	3700	17:50
18	15	200	17.0	4.24	63.53	300	4000	18:54
19	15	215	17.5	4.11	61.71	300	4300	19:56
20	16	231	18.0	4.00	64.00	320	4620	21:00
21	16	247	18.5	3.89	62.27	320	4940	22:03

STRENGTH TESTS

Strength is the ability to carry out work against a resistance. The strength depends on the size and number of muscles involved, the proportion and type of muscle fibers, the coordination of the muscle groups, and the physical condition of the muscles. There is no one test for strength and each strength test is specific to the action and muscle groups being tested. Strength and endurance in the muscles of the upper body, lower body and core is a good indication of overall fitness.

CORE STRENGTH	PLANK TEST	ALL SPORTS
<p>Objective: To hold an elevated position for as long as possible to test the strength and endurance of the core muscles.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. The athlete must position themselves with the upper body supported off the ground by both elbows and forearm. The legs are straight, with the left foot on top of the right foot. The hips are lifted off the floor so that the elbows and feet support the body, creating a straight line from head to toe. 2. Begin the stop watch when the athlete is in the correct position. 3. The test is over when the subject is unable to hold the back straight and/or the hips are lowered. 4. Record the time in seconds. 		<p>Equipment:</p> <p>Stop watch</p> <p>Yoga mat or soft surface for elbows to lie on in support of body</p>
<p>Notes:</p>		



UPPER BODY STRENGTH	HAND GRIP	PRECISION SPORTS, TEAM SPORTS
<p>Objective: To squeeze the dynamometer with maximum strength.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. The subject holds the dynamometer in the hand to be tested (arm at right angle and the elbow beside the body. The base of the dynamometer should rest on the heel of palm, while the handle should rest on middle of four fingers. 2. When ready the subject squeezes the dynamometer with maximum effort, which can be maintained for 5 seconds. 3. Record the reading on the dynamometer. 		<p>Equipment:</p> <p>Handgrip Dynamometer</p>
<p>Notes: No other body movement is allowed.</p>		

1 Maximum Repetition (1RM) Testing

For sports where overall strength in the limbs is crucial to performance, it is recommended that 1-RM testing be done to track progress and comparison. However, this needs to be done at a gym with proper equipment and should be done with the help of a certified trainer.

1-RM is highly recommended for team sports (baseball, basketball, hockey, etc.), artistic sports for relative strength, skiing sports, short duration sports and certain athletic sports from track and field.

STRENGTH ENDURANCE TESTS


Muscular strength endurance is the ability to repeat a series of muscle contractions without fatiguing. It is different from cardiovascular endurance because it involves the muscle fatiguing rather than a limitation in the amount of oxygen being supplied or utilized by the muscles.

STRENGTH ENDURANCE – UPPER BODY	TIMED ONE MINUTE PUSH-UPS	ALL SPORTS EXCEPT PRECISION SPORTS
<p>Objective: To perform as many push-ups as possible in one minute to measure upper body strength endurance.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. Starting position is with the arms straight, elbows locked, body straight, hands placed slightly wider than shoulder-width apart with fingers pointing forward and both feet on the floor. 2. From the starting position, on the command 'go,' start the timer and the athlete does as many push-ups as they can by bending the elbows and lowering the body until the shoulders drop below the level of the elbows, then returning to the starting position. 3. There can be no pausing to rest. 4. Record the number of complete push-ups in one minute. 		<p>Equipment:</p> <p>Stop watch</p> <p>* Optional Yoga Mat to perform push-ups on.</p>
<p>Notes: For the push up to be counted, the body must remain rigid in a generally straight line, and move as a unit while performing each rep, and the technique as described must be adhered to. If you rest on the ground or raise either hand or foot from the ground, the test will be terminated.</p>		



STRENGTH ENDURANCE – LOWER BODY	TIMED ONE MINUTE SIT-UPS	ALL SPORTS EXCEPT PRECISION SPORTS
<p><u>Objective:</u> To perform as many sit ups as possible one minute to measure core abdominal strength endurance.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. Starting position is lying on the ground knees bent at ~ 90 degrees, hands flat on floor. 2. From the starting position, on the command 'go,' start the timer and the athlete does as many sit-ups as they can by rising until their hands touch the tops of their knees. 3. There can be no pausing to rest. 4. Record the number of complete sit-ups in one minute. 		<p>Equipment:</p> <p>Stop watch</p> <p>* Optional Yoga Mat to perform sit-ups on.</p>
<p>Notes: There are many variations for the curl up (sit up, v-ups) but the testing procedure remains the same. Variations are due to stress caused in the neck or lower back so whichever method you choose to use, make sure you are consistent.</p>		



STRENGTH ENDURANCE – UPPER BODY	WALL SIT	ALL SPORTS EXCEPT PRECISION SPORTS
<p><u>Objective:</u> To hold a sitting position while using the wall for support for as long as possible while on one leg.</p> <p>Procedures:</p> <ol style="list-style-type: none"> 1. Athlete stands with feet shoulder width apart, and back against a wall in a sitting position with knees and hips at a 90° angle. 2. Start timing when one foot is lifted off the ground. 3. Stop timing when the athlete cannot maintain the position and the foot is returned to the ground. 4. Record the time. 5. After 3 minutes, test the other leg. 		<p>Equipment:</p> <p>Stop watch</p> <p>Wall</p>
Notes:		

SPEED AND ACCELERATION TESTS

Speed is the fastest rate at which a person is able to move their body over a certain distance. Acceleration is the fastest at which a person can get to that speed from zero. Speed and Acceleration are very important to most sports.

SPEED	40 M SPRINT	ALL SPORTS EXCEPT PRECISION SPORTS
<p><u>Objective:</u> To test speed and acceleration by a single sprint over 40m.</p> <p>Procedures:</p> <p>PRIOR TO TESTING: Mark out a starting line and a finish line with marking tape. Have timer at finish line.</p> <ol style="list-style-type: none"> 1. To minimize reaction time when calling, "go", the athlete will start on the hand signal from the timer. Timer holds arm up high and as their arm sweeps down, the tester should start the stopwatch as the athlete begins to sprint. 2. Athlete must begin with foot on starting line and be still for at least 2 seconds. 3. Stop timing when the chest of the athlete passes the finish line 4. Record the best time of three trials. 		<p>Equipment:</p> <p>Stop watch</p> <p>Marking Tape or Cones</p> <p>Tape Measure</p>
Notes:		

ACCELERATION	20 M DASH	ALL SPORTS EXCEPT PRECISION SPORTS
<p><u>Objective:</u> To test speed and acceleration by a single sprint over 20m.</p> <p>Procedures: (same as 40 m sprint)</p> <p>PRIOR TO TESTING: Mark out a starting line and a finish line with marking tape. Have timer at finish line.</p> <ol style="list-style-type: none"> 1. To minimize reaction time to calling. "go", the athlete will start on the hand signal from the timer. Timer holds arm up high and as their arm sweeps down, the tester should start the stopwatch as athlete begins to sprint. 2. Athlete must begin with foot on starting line and be still for at least 2 seconds. 3. Stop timing when stopped when the chest of the athlete passes the finish line 4. Record the best time of three trials. 		<p>Equipment:</p> <p>Stop watch</p> <p>Marking Tape or Cones</p> <p>Tape Measure</p>
Notes:		



APPENDIX A – RECORDING SHEETS

INDIVIDUAL ATHLETE FITNESS TEST RECORD SHEET

DATE		TIME		SIGNED WAIVER: Yes <input type="checkbox"/>		<input type="checkbox"/>	
ATHLETE				AGE			
SPORT(S)				COACH/EVALUATOR			
BODY MEASUREMENTS: HEIGHT (cm) _____ WEIGHT (kg) _____ RESTING HEART RATE (bpm) _____ BODY CIRCUMFERENCE (cm) _____				AGILITY TESTS: <i>Measure to tenth of a second.</i> HEXAGON TEST CCW: _____s HEXAGON TEST CW: _____s T-TEST: _____s PRO AGILITY: _____s			
BALANCE: STORK STAND Left: _____s Right: _____s				FLEXIBILITY TESTS: SIT AND REACH: _____cm GROIN FLEXIBILITY: _____cm SHOULDER REACH: Right arm: _____cm Left arm: _____cm			
COORDINATION: _____ # OF CATCHES: _____				ENDURANCE TESTS: VO2 MAX: _____ Cooper Test (distance) : _____ Or Beep Test (level npleted): _____			
ANAEROBIC POWER TESTS: VERTICAL JUMP HEIGHT: _____cm SEATED MEDICINE BALL THROW: _____cm STANDING BROAD JUMP DISTANCE: _____cm				STRENGTH: PLANK (Right): _____s PLANK (Left): _____s GRIP STRENGTH (Right): _____s GRIP STRENGTH (Left): _____s			
SPEED AND ACCELERATION TESTS: 20 M DASH: _____s 40 M DASH: _____s				STRENGTH ENDURANCE: ONE MINUTE PUSH-UPS: _____ WALL SIT (Right): _____s ONE MINUTE SIT-UPS: _____ WALL SIT (Left): _____s			
OVERALL ASSESSMENT:							

APPENDIX B – NORMS FOR FITNESS TESTS

Please note that norms are not available for every test and are based on an average adult population.

The testing norms included in the manual were obtained from: topendsports.com¹

¹ (Wood, 2001)

COORDINATION TESTING NORMS	
Rating	Score (in 30 seconds)
Excellent	> 35
Good	30 - 35
Average	20- 29
Fair	15 - 19
Poor	< 15

GROIN FLEXIBILITY	
Ratings	Score
Excellent	5 cm
Good	10 cm
Very Good	15 cm
Fair	20 cm
Poor	25 cm

SIT AND REACH (SIMILAR BUT NOT IDENTICAL TO SEATED REACH)				
	men		women	
	cm	inches	cm	inches
super	> +27	> +10.5	> +30	> +11.5
excellent	+17 to +27	+6.5 to +10.5	+21 to +30	+8.0 to +11.5
good	+6 to +16	+2.5 to +6.0	+11 to +20	+4.5 to +7.5
average	0 to +5	0 to +2.0	+1 to +10	+0.5 to +4.0
fair	-8 to -1	-3.0 to -0.5	-7 to 0	-2.5 to 0
poor	-20 to -9	-7.5 to -3.5	-15 to -8	-6.0 to -3.0
very poor	< -20	-8.0	< -15	< -6.0

STANDING LONG JUMP				
rating	males		females	
	(cm)	(feet, inches)	(cm)	(feet, inches)
excellent	> 250	> 8' 2.5"	> 200	> 6' 6.5'
very good	241-250	7' 11" — 8' 2.5"	191-200	6' 3" — 6' 6.5'
above average	231-240	7' 7" — 7' 10.5"	181-190	5' 11.5" — 6' 2.5"
average	221-230	7' 3" — 7' 6.5"	171-180	5' 7.5" — 5' 11"
below average	211-220	6' 11" — 7' 2.5"	161-170	5' 3.5" — 5' 7"
poor	191-210	6' 3" — 6' 10.5"	141-160	4' 7.5" — 5' 2.5"
very poor	< 191	6' 3"	< 141	< 4' 7.5"

BEEP TEST

MALES

	very poor	poor	fair	average	good	very good	excellent
12 - 13 yrs	< 3/3	3/4 - 5/1	5/2 - 6/4	6/5 - 7/5	7/6 - 8/8	8/9 - 10/9	> 10/9
14 - 15 yrs	< 4/7	4/7 - 6/1	6/2 - 7/4	7/5 - 8/9	8/10 - 9/8	9/9 - 12/2	> 12/2
16 - 17 yrs	< 5/1	5/1 - 6/8	6/9 - 8/2	8/3 - 9/9	9/10 - 11/3	11/4 - 13/7	> 13/7
18 - 25 yrs	< 5/2	5/2 - 7/1	7/2 - 8/5	8/6 - 10/1	10/2 - 11/5	11/6 - 13/10	> 13/10
26 - 35 yrs	< 5/2	5/2 - 6/5	6/6 - 7/9	7/10 - 8/9	8/10 - 10/6	10/7 - 12/9	> 12/9
36 - 45 yrs	< 3/8	3/8 - 5/3	5/4 - 6/4	6/5 - 7/7	7/8 - 8/9	8/10 - 11/3	> 11/3
46 - 55 yrs	< 3/6	3/6 - 4/6	4/7 - 5/5	5/6 - 6/6	6/7 - 7/7	7/8 - 9/5	> 9/5
56 - 65 yrs	< 2/7	2/7 - 3/6	3/7 - 4/8	4/9 - 5/6	5/7 - 6/8	6/9 - 8/4	> 8/4
> 65 yrs	< 2/2	2/2 - 2/5	2/6 - 3/7	3/8 - 4/8	4/9 - 6/1	6/2 - 7/2	> 7/2

FEMALES							
	very poor	poor	fair	average	good	very good	excellent
12 - 13 yrs	< 2/6	2/6-3/5	3/6-5/1	5/2 - 6/1	6/2 - 7/4	7/5 - 9/3	> 9/3
14 - 15 yrs	< 3/3	3/4 - 5/2	5/3 - 6/4	6/5 - 7/5	7/6 - 8/7	8/8 - 10/7	> 10/7
16 - 17 yrs	< 4/2	4/2 - 5/6	5/7 - 7/1	7/2 - 8/4	8/5 - 9/7	9/8 - 11/10	> 11/11
18 - 25 yrs	< 4/5	4/5 - 5/7	5/8 - 7/2	7/3 - 8/6	8/7 - 10/1	10/2 - 12/7	> 12/7
26 - 35 yrs	< 3/8	3/8 - 5/2	5/3 - 6/5	6/6 - 7/7	7/8 - 9/4	9/5 - 11/5	> 11/5
36 - 45 yrs	< 2/7	2/7-3/7	3/8-5/3	5/4 - 6/2	6/3 - 7/4	7/5 - 9/5	> 9/5
46 - 55 yrs	< 2/5	2/5 - 3/5	3/6 - 4/4	4/5 - 5/3	5/4 - 6/2	6/3 - 8/1	> 8/1
56 - 65 yrs	< 2/2	2/2 - 2/6	2/7 - 3/5	3/6 - 4/4	4/5 - 5/6	5/7 - 7/2	> 7/2
> 65 yrs	< 1/5	1/5 - 2/1	2/2 - 2/6	2/7 - 3/4	3/5 - 4/3	4/4 - 5/7	> 5/7

The scores are listed as the number of levels / number of shuttles completed. These tables were created by Topend Sports

MAXIMAL OXYGEN UPTAKE NORMS FOR MEN (ML/KG/MIN)						
Age (years)						
rating	18-25	26-35	36-45	46-55	56-65	65+
excellent	> 60	> 56	> 51	> 45	> 41	> 37
good	52-60	49-56	43-51	39-45	36-41	33-37
above average	47-51	43-48	39-42	36-38	32-35	29-32
average	42-46	40-42	35-38	32-35	30-31	26-28
below average	37-41	35-39	31-34	29-31	26-29	22-25
poor	30-36	30-34	26-30	25-28	22-25	20-21
very poor	< 30	< 30	< 26	< 25	< 22	< 20

MAXIMAL OXYGEN UPTAKE NORMS FOR WOMEN (ML/KG/MIN)						
Age (years)						
rating	18-25	26-35	36-45	46-55	56-65	65+
excellent	> 56	> 52	> 45	> 40	> 37	> 32
good	47-56	45-52	38-45	34-40	32-37	28-32
above average	42-46	39-44	34-37	31-33	28-31	25-27
average	38-41	35-38	31-33	28-30	25-27	22-24
below average	33-37	31-34	27-30	25-27	22-24	19-21
poor	28-32	26-30	22-26	20-24	18-21	17-18
very poor	< 28	< 26	< 22	< 20	< 18	< 17

SOURCE: THESE NORMS HAVE BEEN DERIVED FROM SEVERAL AND NOW UNKNOWN SOURCES.

PLANK TEST	
Rating	Time (seconds)
Excellent	> 90
Good	75 to 90
Average	60 to 75
Poor	< 60

WALL SIT		
rating	males (seconds)	females (seconds)
excellent	>100	> 60
good	75-100	45-60
average	50-75	35-45
below average	25-50	20-35
very poor	< 25	< 20

HAND GRIP				
		MALES		FEMALES
rating*		(lbs)	(kg)	(lbs) (kg)
excellent		> 141	> 64	> 84 > 38
very good		123-141	56-64	75-84 34-38
above average		114-122	52-55	66-74 30-33
average		105-113	48-51	57-65 26-29
below average		96-104	44-47	49-56 23-25
poor		88-95	40-43	44-48 20-22
very poor		< 88	< 40	< 44 < 20

* norms for adults source and population group unknown

PUSH UP TEST NORMS FOR MEN						
Age	17-19	20-29	30-39	40-49	50-59	60-65
Excellent	> 56	> 47	> 41	> 34	> 31	> 30
Good	47-56	39-47	34-41	28-34	25-31	24-30
Above average	35-46	30-39	25-33	21-28	18-24	17-23
Average	19-34	17-29	13-24	11-20	9-17	6-16
Below average	11-18	10-16	8-12	6-10	5-8	3-5
Poor	4-10	4-9	2-7	1-5	1-4	1-2
Very Poor	< 4	< 4	< 2	0	0	0

PUSH UP TEST NORMS FOR WOMEN						
Age	17-19	20-29	30-39	40-49	50-59	60-65
Excellent	> 35	> 36	> 37	> 31	> 25	> 23
Good	27-35	30-36	30-37	25-31	21-25	19-23
Above Average	21-27	23-29	22-30	18-24	15-20	13-18
Average	11-20	12-22	10-21	8-17	7-14	5-12
Below average	6-10	7-11	5-9	4-7	3-6	2-4
Poor	2-5	2-6	1-4	1-3	1-2	1
Very Poor	0-1	0-1	0	0	0	0

* Source: adapted from Golding, et al. (1986). The Y's way to physical fitness (3rd ed.)

1 MINUTE SIT UP TEST (MEN)						
Age	18-25	26-35	36-45	46-55	56-65	65+
Excellent	>49	>45	>41	>35	>31	>28
Good	44-49	40-45	35-41	29-35	25-31	22-28
Above average	39-43	35-39	30-34	25-28	21-24	19-21
Average	35-38	31-34	27-29	22-24	17-20	15-18
Below Average	31-34	29-30	23-26	18-21	13-16	11-14
Poor	25-30	22-28	17-22	13-17	9-12	7-10
Very Poor	<25	<22	<17	<13	<9	<7

1 MINUTE SIT UP TEST (WOMEN)						
Age	18-25	26-35	36-45	46-55	56-65	65+
Excellent	>43	>39	>33	>27	>24	>23
Good	37-43	33-39	27-33	22-27	18-24	17-23
Above average	33-36	29-32	23-26	18-21	13-17	14-16
Average	29-32	25-28	19-22	14-17	10-12	11-13
Below Average	25-28	21-24	15-18	10-13	7-9	5-10
Poor	18-24	13-20	7-14	5-9	3-6	2-4
Very Poor	<18	<13	<7	<5	<3	<2

VERTICAL JUMP				
rating	males (inches)	males (cm)	females (inches)	females (cm)
excellent	> 28	> 70	> 24	> 60
very good	24 - 28	61-70	20 - 24	51-60
above average	20 - 24	51-60	16 - 20	41-50
average	16 - 20	41-50	12 - 16	31-40
below average	12 - 16	31-40	8 - 12	21-30
poor	< 12	< 30	< 8	< 20

COOPER TEST RESULTS FOR MALES (IN METERS)					
Age	Excellent	Above Ave	Average	Below Ave	Poor
Male 20-29	> 2800m	2400 - 2800m	2200 - 2399m	1600 - 2199m	< 1600m
Males 30-39	> 2700m	2300 - 2700m	1900 - 2299m	1500 - 1999m	< 1500m
Males 40-49	> 2500m	2100 - 2500m	1700 - 2099m	1400 - 1699m	< 1400m
Males 50+	> 2400m	2000 - 2400m	1600 - 1999m	1300 - 1599m	< 1300m

COOPER TEST RESULTS FOR FEMALES (IN METERS)					
Age	Excellent	Above Ave	Average	Below Ave	Poor
Females 20-29	> 2700m	2200 - 2700m	1800 - 2199m	1500 - 1799m	< 1500m
Females 30-39	> 2500m	2000 - 2500m	1700 - 1999m	1400 - 1699m	< 1400m
Females 40-49	> 2300m	1900 - 2300m	1500 - 1899m	1200 - 1499m	< 1200m
Females 50+	> 2200m	1700 - 2200m	1400 - 1699m	1100 - 1399m	< 1100m

STORK STAND

Rating	Score (seconds)
Excellent	> 50
Good	40 - 50
Average	25- 39
Fair	10 - 24
Poor	< 10

T- TEST

	Males (seconds)	Females (seconds)
Excellent	< 9.5	< 10.5
Good	9.5 to 10.5	10.5 to 11.5
Average	10.5 to 11.5	11.5 to 12.5
Poor	> 11.5	> 12.5

References:

Wood, R. (2001). Topend Sports: The Sport and Science Resource. Retrieved July 22, 2014, from <http://www.topendsports.com/>