

Height Protocol

Equipment:

1. Standard portable stadiometer.

Set-up:

1. Set up stadiometer on a level, flat, hard surface, with the stabilizing bar against a vertical surface (e.g. wall or door).

Instructions to participant:

1. Remove shoes.
2. If the hairstyle affects their height, ask them to adjust it for the test.
3. Stand with heels and toes together on the base plate.
4. Arms loosely by their side.
5. Back straight against the vertical measuring rods.
6. Look straight ahead.
7. Take a deep breath and stand as straight as possible without their heels lifting off the ground.
8. Take this recording **once**.

Note: These can be difficult instruction for children to follow – make sure **the head is not tilted or the shoulders raised** and continue to **breathe normally**. Check posture before measuring.

Record in centimetres to nearest 0.01cm

Body Mass Protocol

Equipment:

1. Standard portable calibrated scales (mechanical).

Set-up:

1. Ensure scales are pre-calibrated with a known weight. This can be done using a range of known weights that span the range of the target participants (e.g. 20 - 60 kg), or using one known weight (as per the Student Activity and Sports Study Ireland).
2. Place scales on a hard, level surface.

Instructions to participant:

1. Wear only light garments
2. Remove items such as keys and money from pockets
3. Remove shoes.
4. Stand on the scales, with both feet fully on the weighing platform, heels towards the back edge, and their arms loosely by their side.
5. Remain as still as possible with their head facing forward.
6. Step down from the scale.
7. Take this recording **once**.

Record in kilograms to nearest 0.5kg

Height and weight will be used to calculate Body Mass Index (BMI).

$$\text{BMI} = \text{Weight (kg)} / \text{Height (m)}^2$$

BMI measurements help classify the weight of an individual as underweight, normal, overweight or obese.

References:

- American College of Sports Medicine. (2013). ACSM's guidelines for exercise testing and prescription. Lippincott Williams & Wilkins.
- Canadian Society for Exercise Physiology (1996), Ch1. D Docherty.
- Measurement in Pediatric Exercise Science. (pp18-55) Canada. Human Kinetics

Grip - Strength Protocol

Equipment:

1. Grip-strength dynamometer.

Set-up:

1. Ensure dynamometer is zeroed before each trial.
2. Ensure participant has removed their shoes and is standing on a level surface.

Instructions to participant:

1. Hold dynamometer in **dominant hand**, with hand by side.
2. Adjust handle of dynamometer if required – base should rest on first metacarpal and handle should rest on middle four fingers.
3. When ready squeeze the dynamometer with maximal isometric force, maintain squeeze for approximately five seconds.
4. Encourage maximal effort and no other body movement.
5. Take the recording **twice**. Allow the participant sufficient rest between each trial.

Record grip strength to the nearest 0.5kg

Blood Pressure Protocol (Automated)

Equipment:

1. Automated blood pressure monitor (use appropriate cuff size).

Set-up:

1. Chair.
2. Table facing chair.

Instructions to participant:

1. Sit down with back against chair and with feet flat on the floor.
2. Relax and breathe normally.
3. Expose your upper left arm and do not clench your fist.
4. I will place the cuff on your arm and inflate it, so you will feel it getting tighter.
5. Then using the monitor I will read your blood pressure.
6. Standardize sitting time.

Procedure:

1. Place the cuff on the left upper arm with the tube facing out.
2. Locate the pulsation of the brachial artery at the inner side of the upper arm, approximately 1 inch above the bend in the elbow.
3. Support the participants arm at the elbow with the arm in a horizontal position at heart level.
4. Turn the monitor on, the cuff will inflate and then deflate.
5. The systolic and diastolic blood pressures will be displayed on the screen. Record both.
6. Take the recording **twice**. A minute interval should be given between measurements.
7. If the blood pressure reading is greater than 135/85, another measurement should be taken (with a longer rest). Blood pressure readings can be compared against the below reference ranges.

Record both systolic and diastolic blood pressure in mmHg

Systolic and diastolic blood pressure ranges

Systolic	Diastolic	Category
120 – 129	80 – 84	Normal
130 – 139	85 – 89	High Normal
>139	>89	Hypertensive

***European Society of Hypertension and the European Society of Cardiology (2013)**

Waist Circumference Protocol

Equipment:

1. Standard anatomical measuring tape

Set-up:

1. The measurements will be taken in an enclosed place so the participant feels comfortable.

Instructions to participant:

1. Stand comfortably up straight facing tester.
2. Pull up and tuck their jumpers or t-shirts so that you can see the naval/bellybutton.
3. Hands by side.
4. Breathe normally.
5. They should not contract abdominal muscles.

Procedure:

1. Pull a length of the measuring tape, holding both ends in left hand, and bring it around the participant.
2. Stretch tape out. Unite both ends at the front by inserting catch. Take slack out of tape by pressing button. (Skin should not be compressed, and there should not be space between skin and tape).
3. Measure the narrowest point of the abdomen, ensuring the tape is level.
4. If no one point is evident, measure an inch above the belly button.
5. Take this recording **twice**.

Record in centimetres to the nearest 0.1cm

Reference:

- ACSM Guidelines for Exercise Testing and Prescription, 2013

20-Meter Shuttle Test (20MST)

Description:

The 20-Meter Shuttle Run (20MST) is a progressive running test that gives an estimate of maximum oxygen carrying capacity (VO₂ max) (Ramsbottom *et al.*, 1988). It is a validated field measure of aerobic fitness with a correlation of 0.92 between lab measured VO₂ max and shuttle level achieved (Ramsbottom *et al.*, 1988). Low levels of cardiorespiratory fitness can result in premature death from cardiovascular diseases.

The 'shuttle' runs are done in time to pre-recorded 'bleep' sounds. The test usually consists of 23 levels. **A level is a series of 20-meter 'shuttle runs'. Each level lasts 60 seconds** and the time between the recorded 'beeps' decreases for each new level. The **starting speed is normally 8.5 km/hr and then increases by 0.5km/hr with each new level.**

The testing protocol of the 20MST has been widely used internationally. Though initially designed for adults, it is a common choice of aerobic capacity assessment among children and adolescents (Leder *et al.*, 1984; Tomkinson *et al.*, 2003)

References:

- Leger, L.A. and Lambert, J., 1982, 'A maximal multistage 20m shuttle run test to predict VO₂max', *European Journal of Applied Physiology*, Vol 49, p1-5.
- Ramsbottom et al. (1988) A progressive shuttle run test to estimate maximal oxygen uptake. *British Journal of Sports Medicine* 22: 141-5.
- Leger, L. and Gadoury, C, 1989 'Validity of the 20m shuttle run test with 1 minute stages to predict VO₂max in adults. *Canadian Journal of Sport Science*, 14:1 21-26.
- Tomkinson GR, Leger LA, Olds TS, Cazorla G., 'Secular trends in the performance of children and adolescents (1980-2000): an analysis of 55 studies of the 20m shuttle run test in 11 countries', *Sports Med* 2003; 33(4)285-300.

Equipment:

- Tape measure.
- Flat, non-slippery surface of at least 20m in length.
- Markers, cones, or lines.
- 20MST CD and a CD-player. Have a second CD for back up. Alternatively, have an MP3 of the test, which can be played through a laptop or speakers.
- Recording sheets.
- Bibs (Coloured & numbered).

Procedure:

1. Measure a 20m area and mark out with cones at each end.
2. Measure the width of the hall and determine number of participants (Guide: one student/m, with adequate clearance of obstacles at each side).
3. Place CD in CD player and start at Track 1 (or, start Track 1 on laptop or speakers). If consecutive tests are to be run, there should be more than one CD.
4. Track 1 is a calibration track. It consists of two beeps that are 60 seconds apart. This is to ensure that the speed of the CD player is accurate. Accuracy is sufficient within 0.5

seconds either way. This track can be played once a week to ensure that the test is calibrated.

5. Hand out bibs and note bib number and colour on the relevant sheet.
6. Warm-up: consists of 5-10 minutes of moderate intensity aerobic activity (light jogging) followed by activity specific stretches for neck, shoulders, hamstrings, quadriceps, groin, calf and ankles.
7. Cool-down: consists of 5 minutes of moderate intensity aerobic activity (light jogging) followed by activity specific stretches as described above.

Instructions to participant:

1. Before beginning the test, play Track 2 (participant instructions).
2. This tells them:
 - a) The test commences with a **five-second** countdown to the start.
 - b) Following this and for the duration of the test, **single bleeps** are released at regular intervals.
 - c) Try to reach the opposite end to the start before the next bleep is heard.
 - d) If you get there before the bleep is emitted, wait there until the bleep is heard before running back to the opposite end. This is important in the first level, as the speed is very slow.
 - e) After each level, the time between bleeps will decrease so you need to run faster.
 - f) Each level lasts one minute; changing levels is marked by a **triple bleep** and from instruction on the tape.
 - g) Place one foot on or before the line at the end of each shuttle run.
 - h) Give your maximum effort at the end of the test and to attempt to reach the highest possible level that you can.
 - i) You can drop out from the test at any stage but you should try to keep going as long as possible

Procedure for withdrawing students:

1. If participants are not complying with the instructions, they should be given **two warnings** before being withdrawn from the test (e.g. not making it to the line, leaving early, etc.).
2. Two people will be watching the lines and motivating students. If you see that someone has missed the line, call out his or her number (e.g. "yellow number 1, make the next line") loud enough so the other tester can hear. The second tester watches the second line. If the student misses the second line, the second tester must pull them out (e.g. "yellow number 1, stop running"). Follow through with this; if they continue to run, stop them.

Precautions:

1. In order for the test results to be accurate and reproducible, as well as comparable with scores obtained elsewhere, it is essential that the test procedure be carried out properly. This includes exact measurements of the 20m distance, as well as standardization of the running surface, pretest preparations and environmental conditions.

2. The 20MST requires maximal effort if the test results are to be valid. Anyone with any doubts over his or her ability to take part in the test should seek medical advice beforehand. Individuals with any injury or illness are advised not to take the test.
3. Since the test starts very slowly, there is a gentle warm-up as the test progresses. However, it is advisable to have some very light jogging and gentle stretching before starting
4. The width of the indoor/outdoor facility will determine how many students can participate in the test at one time (e.g. one student/m of space).
5. There should be at least four individuals looking after the 20MST at any given time (one at each line and one on either side).

Recording Results:

1. The researchers on sides of the 20m area are responsible for recording the results (not the researchers standing at the cones). The number of participants will be divided between both researchers (depending on numbers, more researchers can be used).
2. Participants will be given a bib (colour and number noted) that will correspond with their ID number.
3. On the recording sheet, the researchers will note the group number (how many groups are doing the 20MST) and the number of participants in that particular group.
4. As the participant progress through the 20MST, mark off the shuttle and level they reach. **Researchers need to be sure of the particular level that the participants are at.**
5. Researchers document the shuttle that the participant **did not reach** (with the bib number and colour).
6. The shuttle number before that is the one that is recorded (along with the level) in the 20MST Final Results Sheet. The other number is used to determine the participant's VO₂ max.

Activity Monitor (activPAL3 Micro) – A select number of students may be asked to wear this monitor

Equipment:

1. Pre-assigned fully charged activPAL accelerometers (activPAL record sheet).
2. Laptop with activPAL software, spare activPALs and a docking station (in case of emergency).
3. activPAL pack – zip lock bag with instructions, wear diary and attachment materials.

The activPAL (also known as an activity monitor) is able to determine activity levels through detecting changes in posture and sensing motion through an internal accelerometer.

Prior to arriving at a school, the activPALs will be fully charged and initialised. All activPALs will be initialised for **seven days**. The activPAL monitors should be returned to the school **eight days** after they were distributed, where a member of the research team will collect them. The monitors will be set to start recording on at 22:00 on the day that they are assigned to the participants. The standard epoch of 15-seconds will be used.

Day of school visit:

1. Set up an activPAL station, where the activPALs are laid out in numerical order. A laptop with the activPAL software, as well as spare activPALs and a docking station will also be at the station.
2. The activPALs will be set administered once the participants have completed all other tests. As the participants finish the 20MST, they can then be fitted with the activPALs.
3. Give the activPALs out one at a time and cross-check the participant ID, with the activPAL code (located on the front of the monitor).
4. Document the participant ID, activPAL code and date the monitor was handed out.
5. Each participant will be given a pack, which contains a wear diary, re-attachment materials and re-attachment instructions.

Instructions to the participant:

- The monitor is attached the middle section of the front of your right leg. The monitor is attached via a water proof dressing.
- The monitor can be worn day and night; **it does not need** to be removed when sleeping.
- The monitor **has to be removed** for an activity where you will be **submerged in water** (swimming or bathing). It **can be worn while in the shower**. All removals should be documented on the supplied wear diary.
- The monitor can be worn for sports and activities. However, if you feel that the monitor may get damaged in heavy contact sports (e.g. rugby), please remove and replace once finished.
- If you notice the dressing coming lose, please re-attach the monitor using the supplied re-attachment materials.
- The monitor is worn for **seven days**, so can be removed on the morning of the **eight day**. Once removed, please return the monitor to your P.E. teacher, where a member of the research team will collect them.
- The monitor is to be worn as much as possible over the seven-day period.

Activity Data Inclusion Criteria:

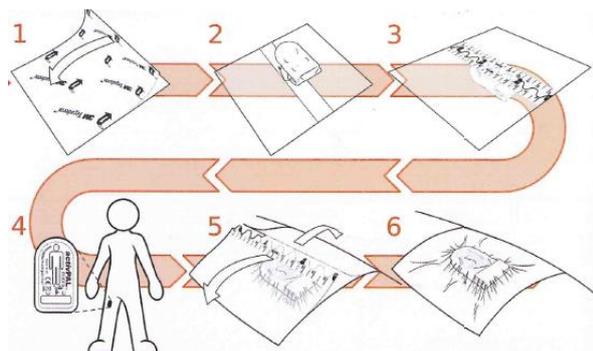
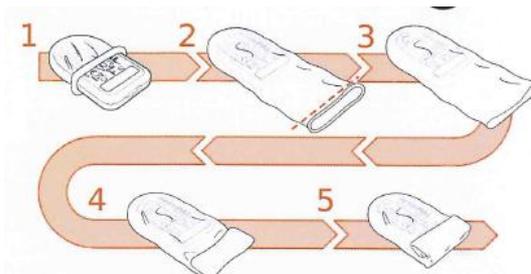
Once collected and downloaded, the inclusion criteria for activity data will be;

- ≥4 days
- ≥10 hours of waking activity/day
- Minimum of one week day and weekend day

Attaching the monitor/instructions

Step 1:

The activity monitor must first be waterproofed. The diagram on the right will help you. Place the sleeve (curved edge first) over the device, so that the activPAL is positioned at the very bottom of the sleeve. Then, roll the sleeve up, until it reaches the base of the device. Remember to make sure this is rolled up tight, to ensure that no water could get into it.



Step 2:

To attach the activPAL to the thigh, first separate the Tegaderm dressing. Remove the backing sheet from the Tegaderm dressing. Once separated, you will be left with a clear piece of dressing. You will see/feel that there is a sticky side and a non-sticky side. Place the **non-sticky** side down on a flat surface. Place the activPAL **face down** in the middle of the sticky side of the Tegaderm dressing. Face down mean that the side with the green light flashing should be face down on the sticky clear bandage. Position the device on the middle of the front of your thigh (halfway between your knee and your hip). **The curved part of the activPAL should be facing up.** Press the clear bandage down on your leg hard, to ensure that it is stuck in place. The picture on the left may help you put the device on.