

Physical Components of Fitness

Physical related components of fitness

Muscular Endurance

Body Composition

Speed

Aerobic Endurance

Flexibility

Muscular Strength

Mr Binnian Sprints Away From Mice

Speed

Distance divided by time to reduce time taken to move the body or a body part in an event or game.



Flexibility

The range of motion possible at a joint to allow improvements in technique.



Muscular Strength

The maximum force that can be generated by a muscle or muscle group to improve forceful movements within an activity.



Muscular Endurance

The ability of the muscular system to continue to contract at a light to moderate intensity to allow repetitive movements throughout a long event or game.

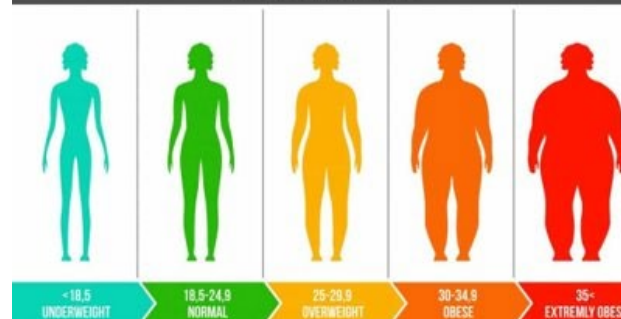


Body Composition

The relative ratio of fat mass to fat-free mass in the body allowing variation in body composition dependent on the sport.



BODY MASS INDEX



Aerobic Endurance

The ability of the cardiorespiratory system to supply oxygen and nutrients to the muscles to sustain low to medium intensity work to delay fatigue.

Skill Components of Fitness

Skill related components of fitness

Agility
Balance
Co-ordination
Power
Reaction Time
ABC Power Rangers



Agility

The ability to change direction quickly to allow performers to out-manoeuvre an opponent.



Balance

The ability to maintain centre of mass over a base of support, useful to maintain positions in performance sports (static balance) or when on the move in any other sporting situation (dynamic balance).



Co-ordination

The ability to move two or more body parts at the same time smoothly and efficiently, to allow effective application of technique.



Power

The product of speed and strength to allow for explosive movements in sport.



Reaction Time

The time taken between a stimulus and the start of a response, useful in fast-paced sports to make quick decisions about what to do.



Principles of Training

Fitness Training

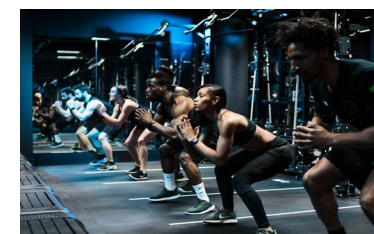
A tailored training programme will help you achieve your fitness goals. The FITT acronym and calculating target zones make training more efficient.

By using the principles of training as a framework we can plan a personal **training programme** that uses scientific principles to improve performance, skill, game ability and physical fitness.

Basic principles of training

FITT Principles

- Frequency
- Intensity
- Time
- Type



Frequency	Intensity	Time	Type
<p>The number of training sessions completed over a period of time, usually per week.</p> <p>You need to ensure that this is manageable and that you are able to achieve this.</p> <p>Can you still complete this with the demands of work/school/family etc.</p>	<p>How hard an individual will train.</p> <p>You need to ensure that this is not too challenging or too easy.</p> <p>If it is too hard then the individual might get disheartened because they can't do it. If it is too easy then they may get bored.</p>	<p>How long an individual will train for.</p> <p>How long have you got time for?</p> <p>Do not make the sessions too long else the individual might be too tired to carry on. Also they might ache too much to be able to carry out the next session.</p>	<p>How long an individual will train for.</p> <p>How long have you got time for?</p> <p>Do not make the sessions too long else the individual might be too tired to carry on. Also they might ache too much to be able to carry out the next session.</p>



Additional Principles of Training



Additional Principles of Training

These principles are to further engage in the training to improve performance and fitness.

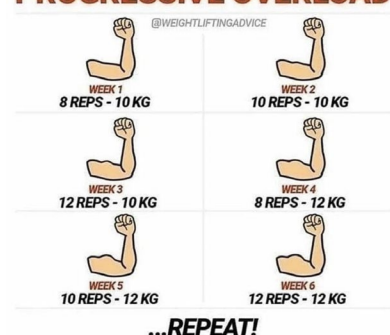
They ensure that the training is completely relevant and specific to the individual. It challenges them appropriately ensuring they are building on their weakness.

Progressive Overload

Progressive overload is when you gradually increase the weight, frequency, or number of repetitions in your strength training routine. This challenges your body and allows your musculoskeletal system to get stronger.

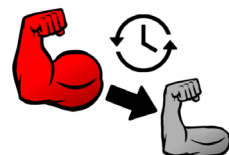


A VISUAL REPRESENTATION OF PROGRESSIVE OVERLOAD



Adaptations

The principle of adaptation refers to the process of the body getting used to a particular exercise or training program through repeated exposure.



Additional Principles

- Progressive Overload
- Specificity
- Individual differences
- Adaptations
- Reversibility
- Variation
- Rest and recovery

Specificity

- The training must be relevant to the individual and their sport.
- This can be achieved by tailoring training specifically for the sport or even the position that the individual plays, the muscle groups that they use the most or the dominant energy system of the athlete.

Reversibility

- Systems reverse if training stops or is significantly reduced or injury prevents training from training place.
- It is essential to avoid breaks in training and to maintain the motivation of the athlete.

How to Remember:

Pleased **R**unners **S**mile **V**ery **I**ntensely **A**fter **R**acing

Individual Differences

- Everyone is different.
- Training must be related to the athlete's age and gender, their injury status and fitness levels.
- Any training that fails to be relevant to the individual will fail to motivate the athlete and will prove to be unsuccessful in the long term.



Variation

- Training must be varied, this will help with progression.
- Variance tends to focus on different training sessions and activities still work on the specific component of fitness.

Rest and Recovery

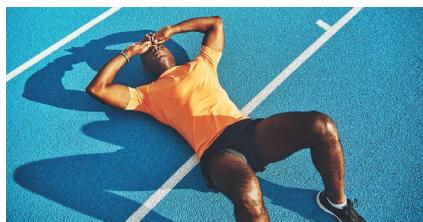
- Physical adaptations occur during the recovery and non-active period of the training cycle.



Exercise Intensity

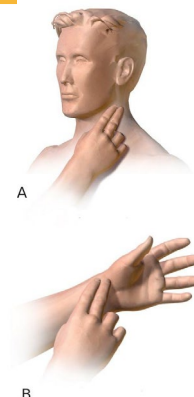
Exercise Intensity

This term is used to describe how hard an individual is training; for example the relative speed, rate or level of an individual's exertion.



Measuring Heart Rate

- Measured in BPM.
- Count the beats for full 60 seconds
- Neck (Carotid Artery)
- Wrist (Radial Artery)



Maximum Heart Rate

You measure your working heart rate during exercise.

It is important you keep an eye on your heart rate so that you are in the correct training zone.

$$220 - \text{Age} = \text{Maximum Heart Rate}$$

Training Zones

We all have a personal resting heart rate, 'a minimum heart rate', and a maximum heart rate. And between these values are different HR zones that correspond to training intensity and training benefit.

Target zone	% of max HR bpm range	Example duration	Training benefit
5 MAXIMIZE PERFORMANCE	90-100% 171-190 bpm	Less than 5 minutes	Benefits: Increases maximum sprint race speed Feels like: Very exhausting for breathing and muscles Recommended for: Very fit persons with athletic training background
4 HARD	80-90% 152-171 bpm	2-10 minutes	Benefits: Increases maximum performance capacity Feels like: Muscular fatigue and heavy breathing Recommended for: Fit users and for short exercises
3 MODERATE	70-80% 133-152 bpm	10-40 minutes	Benefits: Improves aerobic fitness Feels like: Light muscular fatigue, easy breathing, moderate sweating Recommended for: Everybody for typical, moderately long exercises
2 LIGHT	60-70% 114-133 bpm	40-80 minutes	Benefits: Improves basic endurance and helps recovery Feels like: Comfortable, easy breathing, low muscle load, light sweating Recommended for: Everybody for longer and frequently repeated shorter exercises
1 VERY LIGHT	50-60% 104-114 bpm	20-40 minutes	Benefits: Improves overall health and metabolism, helps recovery Feels like: Very easy for breathing and muscles Recommended for: Basic training for novice exercisers, weight management and active recovery



Calculating Training Zones

- Find your maximum heart rate (MHR).
- MHR X it by 0. of the percentage
- 60% = MHR x 0.6
- 80% = MHR x 0.8
- 90% = MHR x 0.9



RPE and HR

- Instead of using a HR monitor, you can use the RPE scale to predict the exercise HR of an individual using the relationship:
- RPE x 10 = HR (bpm).

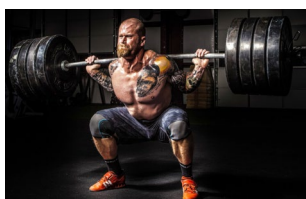
ALL-OUT SPRINT The maximum possible effort, sustainable for just 20-30 seconds.	20
VERY HARD INTENSITY Hard to speak, breathing labored after a few seconds, requires focus; good for 1-min intervals.	19
HARD INTENSITY Requires focus to maintain; hard to say more than 2-3 words; good for Cooper Tests, 5k PRs.	18
VIGOROUS ACTIVITY Can speak in short sentences; becomes uncomfortable quickly. Requires constant effort.	17
HARD ACTIVITY Labored breathing, challenging and uncomfortable but sustainable for 30-60 mins.	16
PROGRESSIVE PACE A pace that requires some pushing and effort to maintain; still able to hold a conversation.	14-15
COMFORTABLE WITH SOME EFFORT Slight 'push' but still at a pace which you could speak a few sentences without struggling.	13
COMFORTABLE PACE Able to maintain a conversation without getting out of breath while running.	11-12
LIGHT AND EASY Non-taxing, very gentle and easy to maintain a conversation - could continue for hours.	10
MINIMUM EFFORT Bare minimum exertion; a gentle stroll through the woods. Could continue all day.	6-9

The BORG Scale

- Rate of Perceived Exertion Scale (RPE)
- Used to rate an individual's level of physical exertion during PA or exercise.
- Scale starts at 6 and goes up to 20.
- 6 – No exertion at all (at rest)
- 20 – Maximal exertion
- When giving a reading consider: physical stress, effort, fatigue.

Strength Intensity

- Muscular Strength – 1RM
- Muscular Endurance – 15 reps max



Technology

- Heart Rate Monitors
- Smart Watches
- Apps



Reasons for fitness testing

- Gives baseline data for monitoring/improving performance.
- Can design training programmes based on test results.
- Determine if training programmes are working.
- Results can give a performer something to aim for.
- Provide goal setting aims.



What pre-test procedures should you carry out?

- Calibration of equipment
- Complete informed consent.
- Complete Physical Activity Readiness Questionnaire (PAR-Q).
- Participant pre fitness test check e.g. prior exercise participation

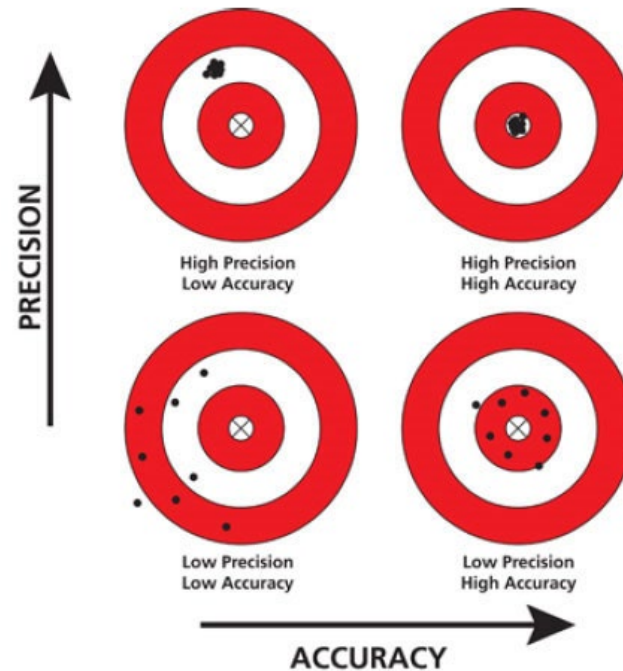
What is a standardised test?

Set rules and regulations on how to carry them out that must be followed. This means they are carried out the exact same every time. This is so that they can be compared to the normative data.



Appropriate tests

Select the appropriate fitness tests that they can complete. You need to take into consideration age, disability, medical conditions (asthma) etc.



What happens if the results of a test are not accurate?

- Not truly reflective of your strengths and weaknesses.
- Can't compare to normative data.
- Can result in setting targets that are too easy or too hard.

Interpretation of results

- What does interpretation mean?
 - The action of explaining the meaning of something.
- Normative data
 - Data that establishes a baseline based on the general population of results for that test.
- What is the point in interpreting results?
 - To be able to identify the different strengths and weaknesses.
- What can you then do after interpreting them?
 - Create goals and targets in order to improve your weakest areas to improve your overall performance.



Reliability + Validity

Reliability
The quality of being trustworthy or of performing consistently well.

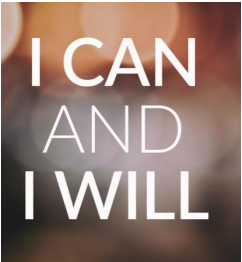
You need to be able to trust the data that you have collected in order to be able to compare it to normative data and identify strengths and areas for improvement.

- Factors that can affect reliability?**
- Calibration of equipment
 - Motivation of the participant
 - Conditions of the testing environment (inside versus outside conditions)
 - Experience of the person administering the test
 - Compliance with standardised test procedure.



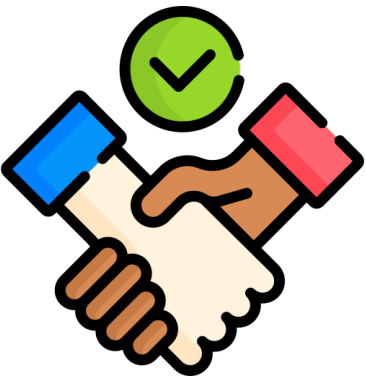
Consistency of results
The quality of always behaving or performing in a similar way, or of always happening in a similar way.

You need to ensure that the tests are always completed under the same conditions, same equipment, same everything. This is to ensure that you can truly compare results.



Validity of Results
It is the accuracy of the fitness test results i.e. whether the results you have recorded are a true reflection of what you are actually trying to measure.

For instance, if I wanted to measure aerobic running performance then a measure of someone's fifty metre swim time would have poor validity, whereas a measure of the time it took for them to run five kilometres would be much more valid.

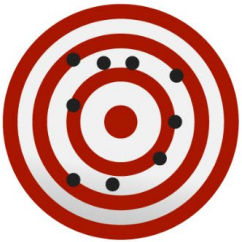


- Practicality**
- How easy it is to carry out the test in terms of the costs involved, time available and equipment required.
 - What things could affect the practicality of fitness testing?
 - Cost
 - Time taken to perform the test
 - Time taken to set up the test
 - Time taken to analyse data
 - Number of participants that can take part in the test at any time.

Reliability and Validity



Reliable
Not valid



Low validity
Low reliability



Not reliable
Not valid



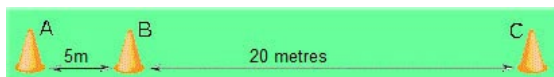
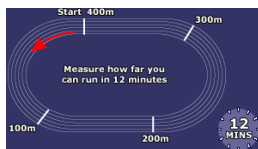
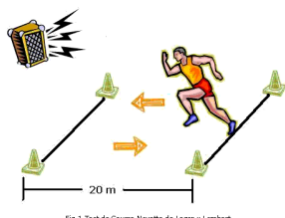
Both reliable
and valid



Physical Fitness Testing

Aerobic Endurance

- Multi-stage fitness test – Continually run from cone to cone 20m apart to the beep. Miss the beep twice your out – record the score.
- Yo-Yo Intermittent Recovery Test – Run between the cones 20m apart but then add on an extra 5m for recovery. Follow the sound on the audio.
- Harvard Step Test - Step up and down off a platform at a rate of 30 steps per minute for 5 minutes or until exhaustion. Immediately after finishing you sit down and record your heart rate every 1, 2 and 3 minutes.
- 12 minute cooper run - You have to run around a 400m track or pitch for 12 minutes. Note down the distance.



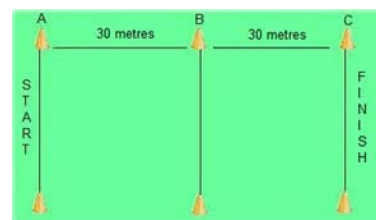
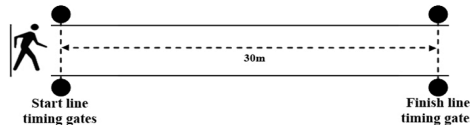
Muscular Endurance

- 1 minute press up test _ complete as many press up's as you can in 1 minute.
- 1 minute sit-up test – complete as many sit-ups as you can in 1 minute.
- Timed plank test – Complete the plank for as long as you can.



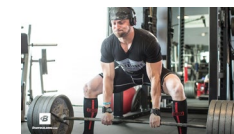
Speed

- 30m Sprint Test – Sprint 30m as quick as possible.
- 30m Flying Sprint – 30m getting up to speed and then record the last 30m sprint.



Flexibility

- Sit and reach test – Sit with your legs out in front flat on the floor, soles flat against the box. Reach down as far as you can and hold for 2 seconds.
- Calf muscle flexibility test – Stand in a lunge position and you need to get your front foot to reach the wall. Record the biggest distance away.
- Shoulder flexibility test – Put your right arm straight up and bend your elbow so it bends behind then use your other hand to try and touch it.



Body Composition

- The relative ratio of fat mass to fat-free mass in the body allowing variation in body composition dependent on the sport.
- BMI - is a measure of whether you're a healthy weight for your height.
- Bioelectrical Impedance Analysis - measures body composition based on the rate at which an electrical current travels through the body.
- Waist to hip ratio - determines the possibility of health risks and is an indication of whether you have an apple or pear shaped figure.



Ratio = $\frac{\text{Waist}}{\text{Hips}}$



Muscular Strength

- Hand grip dynamometer - You use your dominated hand to squeeze the hand grip dynamometer machine as hard as you can. You complete this test 3 times and take the best result.
- 1 rep max - It is simply defined as the maximal weight an individual can lift for only one repetition with correct technique.

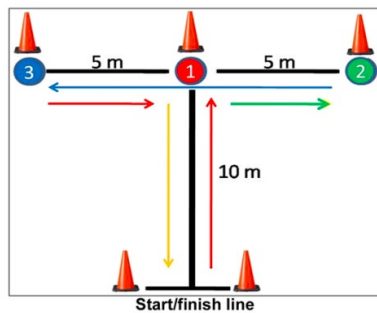
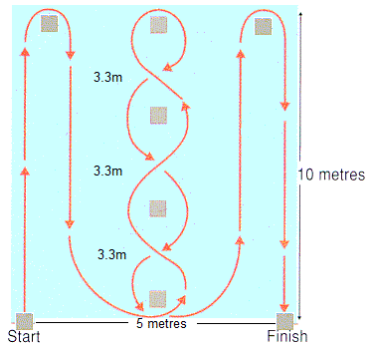


Skill Fitness Testing

Agility

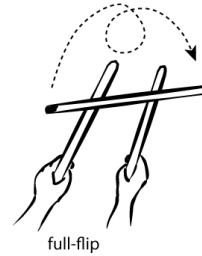
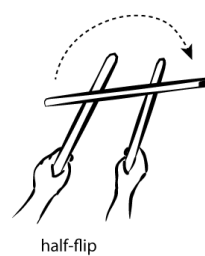
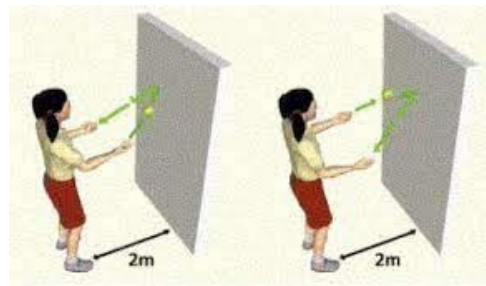
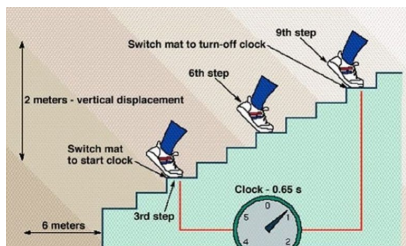
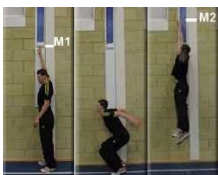
Illinois agility test – start lying down and then on go complete the course as quick as possible.

T test – Complete the course as quick as possible. Keep facing forwards.



Power

- Vertical Jump Test – Stand next to the wall, reach up as high as you can and mark the spot. Then jump as high as you can making another mark. Measure the difference.
- Standing Long Jump – Athletes stand behind a marker and have to complete a two footed jump as far as they can. Without falling backwards. 3 attempts – best value stands.
- Margaria-Kalamen Power Test.



Co-ordination

- Alternate hand wall toss test – Stand 2m from the wall. Throw the ball at the wall from one hand to the other. Complete this as many times as you can within 1 minute.
- Stick flip co-ordination test - Hold a stick in each hand and a 3rd across the top. Test 1 complete as many half flips as you can. Test 2 as many full flips as you can. Add the scores together.



Balance

- Stork stand test – Stand in the position below for as long as possible.
- Y balance test – Standing on one leg try and reach as far as you possibly can. See picture.



Reaction Time

- Ruler drop test – An assistant holds the ruler between your finger and thumb so the top of the thumb is in line with the 0. The assistant then drops it without warning and you have to catch it as quick as possible.
- Online reaction time test – You have to click the buttons on the computer as quickly as possible.

RED LIGHT - GREEN LIGHT Reaction Time Test

Instructions:

- Click the large button on the right to begin.
- Wait for the stoplight to turn green.
- When the stoplight turns green, click the large button quickly!
- Click the large button again to continue to the next test.

Test Number	Reaction Time	The stoplight to watch	The button to click
1	<input type="text"/>		
2	<input type="text"/>		
3	<input type="text"/>		
4	<input type="text"/>		
5	<input type="text"/>		
AVG	<input type="text"/>		

Start Over

