

PLC 1 - COMPONENTS OF FITNESS

A) Describe the components of physical fitness.

- **Aerobic endurance** - The ability of the cardiorespiratory system to work efficiently, supplying nutrients and oxygen to working muscles during sustained physical activity.
- **Muscular endurance** - The ability of the muscular system to work efficiently, where a muscle can continue contracting over a period of time against a light to moderate fixed resistance load.
- **Flexibility** - Having an adequate range of motion in all joints of the body; the ability to move a joint fluidly through its complete range of movement.
- **Speed** - distance divided by the time taken. Speed is measured in metres per second (m/s). The faster an athlete runs over a given distance, the greater their speed
 - There are three basic types of speed: accelerative speed (sprints up to 30 metres), pure speed (sprints up to 60 metres) and speed endurance (sprints with short recovery period in-between).
- **Muscular strength** - The maximum force that can be generated by a muscle or muscle group.
- **Body composition** - The relative ratio of fat mass to fat-free mass (vital organs, muscle, bone) in the body.

B) Describe the components of skill-related fitness (ABC,PRS)

- **Agility** - The ability of a sports performer to quickly and precisely move or change direction without losing balance or time.
- **Balance** - The ability to maintain centre of mass over a base of support.

There are two types of balance: static balance and dynamic balance. A gymnast uses static balance when performing a headstand and dynamic balance to perform a cartwheel.

- **Coordination** - The smooth flow of movement needed to perform a motor task efficiently and accurately.
- **Power** - The product of strength and speed.
- **Reaction time** - The time taken for a sports performer to respond to a stimulus and the initiation of their response.

C) Why are fitness components important for sporting success?

- being able to **successfully meet** the **physical demands** of the **sport** in order to reach **optimal performance**
- being able to **successfully meet** the **skill-related demands** of the **sport** in order to reach **optimal performance**
- being able to **perform efficiently**
- giving due **consideration** to the **type of event/position played**.

PLC 2 - INTENSITY LEVELS

A) Describe how you measure your resting heart rate.

- **Calculating Resting Heart Rate:** sitting down, find your **pulse** at the **wrist**, count how many **beats** are in **1 minute**. **Measured** in (**Bpm**).

B) Explain why performers measure their exercising heart rate.

- Measuring **exercise heart rate** is done to make sure you are **training** in the **correct zone**.

C) Describe how to calculate you maximum heart rate.

- Calculating **maximum heart rate:** $220 - \text{age} = \text{MHR}$

D) Describe how you calculate your heart rate to train within the aerobic training zone.

- Work out your **HRmax**.
- Work out **60%** of your **HRmax** ($0.6 \times \text{HRmax}$)
- Work out **85%** of your **HRmax** ($0.8 \times \text{HRmax}$)
- The **range** between these is your **training zone %**.

E) Identify and describe the 3 training zones.

- **Training zones:** Aerobic zone (60-85% of max heart rate); Anaerobic zone (85-95% of max heart rate); Speed zone (95-100% of max heart rate)

F) Describe the Borg Rating of Perceived Exertion Scale.

- **Borg** (1970) (**6–20**) **Rating of Perceived Exertion (RPE) Scale** can be used as a **measure** of exercise **intensity**

G) Describe the relationship between the RPE scale and HR.

- Relationship between **RPE** and **heart rate** where: $\text{RPE} \times 10 = \text{HR (bpm)}$

PLC 3 - FITT & ADDITIONAL PRINCIPLES OF TRAINING

A) Describe the basic principles of training (FITT)

- **Frequency**- the number of training sessions completed over a period of time .
- **Intensity** - how hard an individual will train.
- **Time** - how long an individual will train for.
- **Type** - how an individual will train by selecting a training method to improve a specific component of fitness and/or their sports performance.

B) Describe the additional principles of training.

- **Progressive overload** - In order to progress, training needs to be demanding enough to cause the body to adapt, improving performance.
- **Specificity** - training should be specific to the individual's sport, activity or physical/skill-related fitness goals to be developed.
- **Individual differences/needs** - The programme should be designed to meet individual training goals and needs.
- **Adaptation** - How the body reacts to training loads by increasing its ability to cope with those loads. Adaptation occurs during the recovery period after the training session is completed.
- **Reversibility** - If training stops, or the intensity of training is not sufficient to cause adaptation, training effects are reversed.
- **Variation** - It is important to vary the training regime to avoid boredom and maintain enjoyment
- **Rest and recovery** - These are required so that the body can recover from the training and to allow adaptation to occur.

PLC 4 - WARM UP, COOL DOWN & METHODS OF TRAINING

A) Describe the requirements for undertaking fitness training methods?

- **Warm up** – Pulse Raiser; Static Stretches; Dynamic Stretches; Skill Related Activity
- Every training method requires a full warm up and cool down to ensure the performer's safety.
- All performer should prepare well for exercise. A thorough warm up is vital to prepare the mind and body.

- **Cool Down** – Low aerobic activity; Static Stretches; Hydration
- A cool down will return the body to a complete resting state. Gentle stretching will remove lactic acid and prevent muscles cramps. A cool down will also prevent DOMS (*delay onset muscle soreness*)

B) Describe the 3 types of flexibility training?

Flexibility training:

- **Static:** there are two types of static flexibility training.
 - Firstly **active** stretching, which is performed independently.
 - The second is **passive** stretching, which requires the help of another person or an object such as a wall.
- **Ballistic:** this is where the performer makes fast, jerky movements in the form of bobbing or bouncing.
- **Proprioceptive Neuromuscular Facilitation (PNF) technique:** The technique may be performed with the help of a partner or alternatively by using an immovable object. You stretch your muscle as far as you can, then your partner stretches it further.

C) Describe the 3 types of strength, muscular endurance and power training?

Strength, muscular endurance and power training:

- **Circuit training:** this is where different stations/exercises are used to develop strength, muscular endurance and power. Each exercise is called a station. Each station should work a different area of the body to avoid fatigue.
- **Free weights:** WEIGHT TRAINING is a form of training that uses progressive resistance against a muscle group. Weight training can increase:

Muscular strength: High weight x low repetitions

Muscular endurance: Low weight x high repetitions

- **Plyometric:** this type of training develops power and strength. It is used by sports performers such as sprinters, hurdlers, and netball, volleyball and basketball players. Types of exercises include lunging, bounding, barrier hopping and jumping. This type of training needs to be performed carefully because it can cause muscle soreness.

PLC 5 - METHODS OF TRAINING

A) Describe the 4 types of Aerobic endurance training?

Aerobic endurance training:

- **Continuous training:** this is training at a steady pace and moderate intensity for a minimum period of 30 minutes.
- **Fartlek training:** this is where the intensity of training is varied by running at different speeds or over different terrain.
- **Interval training:** this is where the individual performs a work period followed by a rest or recovery period.
- **Circuit training:** this is where different stations/exercises are used to develop strength, muscular endurance and power. Each exercise is called a station. Each station should work a different area of the body to avoid fatigue.

B) Describe the 3 types of speed training?

Speed training:

- **Hollow sprints:** a series of sprints separated by a 'hollow' period of jogging or walking.
- **Acceleration sprints:** This is where the pace is gradually increased from a standing or rolling start to jogging, then to striding, and then to a maximum sprint. Rest intervals of jogging or walking are used in between each repetition.
- **Interval training:** the individual performs a work period followed by a rest or recovery period. For speed training, the work intervals will be shorter and more intense.

PLC 6 - FITNESS TESTING

A) Identify 2 Pre-test procedures?

- Informed consent
- Calibration of equipment

B) Explain how you can ensure that test results are measured and recorded accurately.

- Allow sufficient time to practice each test method before you collect data
- Use an appropriate data collection sheet to record your results
- Record each result as you get it
- For reliable results fitness tests should be repeated
- Use correct units of measurement
- Use published normative data tables to interpret results

C) Describe the terms reliability, validity and practicality.

- **Reliability** – Reliability is a question of whether the test is accurate. It is important to ensure that the procedure is correctly maintained for ALL individuals.
- **Validity** – Validity relates to whether the test actually measures what it sets out to measure.
- **Practicality** – This is how easy it is to carry out the test in terms of cost, time and equipment.

D) How can validity, reliability & practicality be improved?

- The tester should be experienced.
- Equipment should be standardised.
- Different performers might have differing motivation to complete the test to the best of their ability.
- Tests should be repeated to avoid human error.

E) Explain why fitness tests are important?

- Gives **baseline data** for **monitoring/improving performance**
- It can **design training programmes based on test results** and **determine** if training programmes are working
- Results can give a performer something to **aim for/goal setting**.

PLC 7 - FITNESS TESTING

F) Describe the tests used to measure Flexibility.

Sit and Reach Test

Flexibility: Sit and reach test (usually measured in cm or inches)

Measures the range of movement at the hips/torso.

Rules:

- Legs straight with feet touching the box.
- Push marker as far as possible without bending your knees.

Advantages	Disadvantages
Easy to complete	There are different, inconsistent test methods
Quick to administer	
Published tables of norms available	

A) Describe the tests used to measure Strength.

Grip Dynamometer Test

Strength: Grip dynamometer (usually measured in KgW)

Measures the strength of the performer hand grip strength in one action.

Rules:

- No swinging your hand
- Start with your hand up and bring down to side while pulling in handle

Advantages	Disadvantages
This is a simple and commonly used test of general strength level, well researched and many norms are available.	The dynamometer must be adjusted for hand size, how successfully this is done will affect the accuracy of the measurement.

A) Describe the tests used to measure Aerobic Endurance.

Multistage Fitness Test

- o Multi-stage fitness test, known as the bleep test (usually predicted in ml/kg/min)

The athlete performs a 20m progressive shuttle run in time with a beep, to the point of exhaustion. The level reached depends on the number of shuttle runs completed and is ascertained from a standard results table.

Advantages	Disadvantages
Large groups can perform this test all at once for minimal costs.	Practice and motivation levels can influence the score attained, and the scoring can be subjective.
Also, the test continues to maximum effort unlike many other tests of endurance capacity.	As the test is often conducted outside, the environmental conditions can affect the results.

Forestry Step Test

- o Forestry step test (usually predicted in ml/kg/min)

Performers step onto and off the bench/step continuously for 5 minutes. (steady pace). Recovery heart rate is then measured.

- 1 minute after exercise = take pulse
- 2 minute after exercise = take pulse
- 3 minute after exercise = take pulse

Add 3 scores together and use the following formula:

$30,000 / 3$ pulse score added together

Advantages	Disadvantages
This simple test requires minimal equipment and costs, can be performed indoors or out. It is possible to self-administer this test.	Some subjects may not have the fitness or coordination to maintain the required stepping rate.

PLC 8 - FITNESS TESTING

A) Describe the tests used to measure Speed.

35m Sprint Test

Speed: 35m sprint (usually measured in s)

Performers to cover a straight 35 m from a standing start. The time taken should be accurately recorded.

Advantages	Disadvantages
This simple test requires minimal equipment and costs, can be performed indoors or out.	Problems with accuracy of timing and false starting.

A) Describe the tests used to measure Speed and Agility.

Illinois Agility Run Test

Speed and agility: Illinois agility run test (usually measured in s)

Performers start at the first cone. On the whistle pupils should follow the course in the diagram and finish at the end cone.

Performers are timed from start to finish.

Advantages	Disadvantages
This is a simple test to administer, requiring little equipment.	Choice of footwear and surface of area can effect times greatly.
Also, the player's ability to turn in different directions and different angles is tested.	Results can be subject to timing inconsistencies, which may be overcome by using timing gates.
	Cannot distinguish between left and right turning ability

A) Describe the tests used to measure Power.

Vertical Jump Test

Power: Vertical jump test (usually measured in kgm/s)

Performers to reach up to highest point without going onto tiptoes. They then jump vertically and touch highest point on the wall/board.

The score is the difference between the 2 measurements

Advantages	Disadvantages
This test is simple and quick to perform.	Technique plays a part in maximising your score, as the subject must time the jump so that the wall is marked at the peak of the jump.

PLC 9 - FITNESS TESTING

A) Describe the tests used to measure Muscular Endurance.

One Minute Press-Up Test & One Minute Sit-Up Test

Muscular endurance: One-minute press-up, one-minute sit-up (usually measured in number of reps/minute)

The sit-up or press up test assesses muscular endurance of the abdominals. The athlete performs sit ups or press ups to the point of exhaustion. The level of fitness reached depends on the number of repetitions completed.

Advantages	Disadvantages
This test is simple and quick to perform.	Technique plays a part in maximising your score.
	Poorly performed sit up or press ups may be counted especially towards the later part of the test due to fatigue.

A) Describe the tests used to measure Body Composition.

Body Mass Index

Body Composition: Body Mass Index (BMI) (usually measured in kg/m^2)

BMI is a general way of working out whether a person is the right weight for their height. Use the following formula:

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

Bioelectrical Impedance Analysis

Body Composition: Bioelectrical Impedance Analysis (BIA), used for prediction of percent body fat

BIA is another way to measure percentage of body fat using a Bioelectric Impedance Analyser. Place BIA electrodes on right wrist, right hand, right ankle and right foot.

Advantages	Disadvantages
This method of body composition analysis is very simple and quick to perform, and if you have the right equipment can be done at home.	The equipment is relatively expensive.

Skinfold Test

Body Composition: Skinfold testing (sites for males: chest, abdominal and thigh; sites for females: triceps, suprailiac and thigh).

To assess suitability for a particular sport you can measure the ratio of the body. Fat levels vary depending on age and gender.

Measuring fat levels can be done with skin fold calipers.

Measuring fat during a skin fold test should be done at the CHEST, ABDOMINALS & THIGH.