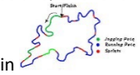
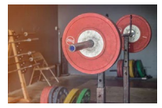
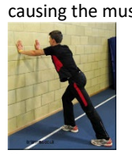
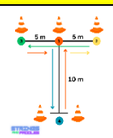
Component of Fitness	BEST sporting example	Fitness Tests				Training Methods			
Physical Components of Fitness									
Aerobic endurance – *activities lasting more than 30 minutes*	***Marathon running***	***1. Multistage fitness test (MSFT)*** - commonly known as the bleep test - cones are 20m apart - must continue to run to meet the beep	***2. Yo-Yo test*** - similar to the MSFT but *slower* and includes a *brief active recovery period* - better than the MSFT as It is replicates game based sports	***3. Harvard step test*** - step to the pace of the metronome - step on bench every 2 seconds for 5 minutes - 45cm box/bench	4. ***12 minute cooper*** run/swim - participant runs/swims for 12 minutes - distance covered is measured - measure total distance covered to the nearest 10m	***1. Continuous training*** steady pace and moderate intensity for a minimum period of 30 minutes	***2. Fartlek training*** the intensity of training is varied by running at different speeds and/or over different terrain 	***3. Interval training*** work period followed by a rest or recovery period for aerobic endurance decrease the number/length of rest periods and decrease work intensity	***4. Circuit training*** use of a number of stations/exercises completed in succession with minimal rest periods in between to develop aerobic endurance
Muscular endurance – *activities lasting more than 30 minutes*	***Rowing***	***1. One minute press up test*** - complete as many press ups as you can in 1 minute - elbows must be bent at 90 degrees	***2. One minute sit up test*** - complete as many sit ups as you can in 1 minute - you must raise yourself up to 90 degrees	***3. Timed plank test*** - hold the plank position for as long as possible - legs and back must remain straight		***1. Free weight training*** high repetitions and low loads 		***2. Circuit training*** use of a number of stations/exercises using body resistance exercises or weights with low loads and high repetition	
Muscular strength – *activities requiring force*	***Throwing events (javelin, discuss, shot)***	***1. Grip dynamometer test*** - fit hand grip dynamometer to hand size - the athlete stands holding the dynamometer parallel to the side of the body with the dial facing away from the body. - the athlete then squeezes the handle as hard as possible without moving the arm for 5 seconds and records the result. - the athlete completes the test 3 times with a 1 minute break in between each attempt – the best score is then taken.		***2. 1 RM test*** - select a weight lift that targets the muscle groups being tested - if the athlete successfully lifts the weight they should rest for 2 minutes then increase the weight		***1. Free weight training*** high loads and low repetitions 		***2. Fixed resistance machines*** high loads and low repetitions 	
Speed – *activities requiring fast movements*	***Sprinting (100m)***	***1. 30m sprint test*** - when the assistant shouts 'GO' the performer sprints 30m as fast as they can.		***2. 30m flying sprint test*** - set up cones at 0, 30m and 60m along a straight line - start the stop watch and time how long it takes the participant to get to 30m and then 60m		***1. Acceleration sprints*** pace is gradually increased from a standing or rolling start to jogging, then to striding, and then to a maximal sprint	***2. Interval training*** work period followed by a rest or recovery period. short, high intensity work periods, increasing the number of rest periods and increasing work intensity	***3. Resistance drills*** hill runs, parachutes, bungee ropes, resistance bands. 	
Flexibility – *activities requiring a wide ROM around a joint*	***Gymnastics, Martial Arts***	***1. Sit and reach test*** - remove shoes - place feet flat against the box - gradually lean forward - measure distance between ends of fingers and athletes toes	***2. Calf muscle flexibility test*** - keeping the heel of the front foot on the ground, try to bend the knee and touch the knee to the wall - Measure the distance from the front of the foot to the wall at the maximum distance the knee could touch the wall - repeat for both legs	***3. Shoulder flexibility test*** - hold a rope in front of you with both hands 4 inches apart - lift the rope over the head to behind the back, maintaining the hand grip on the rope. - return arms back to the starting position but do not move the hands along the rope. - measure the distance along the rope between the two thumbs. - measure the width of the persons shoulders - subtract the shoulder measurement from the rope measurement		***1. Static active*** the performer applies internal force to stretch and lengthen the muscle  **stretching on your own*	***2. Static passive*** requires the help of another person or an object, e.g. a wall to apply external force causing the muscle to stretch  ** using an object or another person*	***3. PNF*** the technique involves the use of a partner or immovable object, isometric muscle contractions to inhibit the stretch reflex.  ** stretching and then stretching further*
Body composition – *low body fat/ high muscle mass*	***LBF: Gymnastics HMM: Sprinters***	***1. Body mass index (BMI)*** - measure body weight in kilograms. - measure height in metres - they then calculate their BMI by using the equation: **BMI = body mass (kg) / height (m2)**	***2. Bioelectrical impedance analysis*** - the athlete lays down on a mat - the electrodes from the BIA are then connected to the athletes ankle and wrist. - the BIA is turned on and analyses the athletes body by passing a small electronic current through (the current passes through fat-free mass easier than fat mass – therefore the less easily the current passes through the body, the more fat there is).	***3. Waist to hip ratio*** - measure the circumference of the waist above the belly button (where the waist is the smallest) - then do the same for the widest part of the hips. - then calculate the waist-hip ratio by dividing the waist circumference by the hip circumference.		• N/A			
Skill-Related Components of Fitness									
Agility – *activities requiring quick changes in direction*	***Dodging in a team game (e.g. Football, Netball, Rugby)***	***1. Illinois agility test*** - set up the course (8x cones) - athlete starts lying down with hands next to shoulders - complete the course as fast as possible		***2. T test*** - cone 4 – 1 – 2 – 1 – 3 – 1 – 4 (creating  a T)		***1. Speed, Agility & Quickness (SAQ)*** Training - drills used to develop physical ability and motor skills.			
Balance – *activities requiring control of the distribution of weight*	***Gymnastics***	***1. Stork stand test*** - remove shoes, place hands on hips, place foot on the inside of knee - raise onto tip toes and hold for as long as possible		***2. Y balance test*** - remove shoes - stand on one foot and complete push the indicator as far as possible (the three movement directions are anterior, posteromedial and posterolateral, performed on each leg)		***1. Training drills for balance (drills with a small base of support)***			

Coordination – *activities requiring the movement of two or more body parts*	***Tennis, Badminton***	***1. Alternate hand wall toss test*** - stand 2m away from the wall - throw the ball against the wall in an under arm action and attempt to catch it with the opposite hand. - the ball is then thrown back against the wall and caught with the initial hand. - repeat for 30 seconds	***2. Stick flip coordination test*** - hold 2 sticks out in front waist level and place another on top (60 cm long, 2cm wide) - ***five half-flips*** with ***one point scored*** for each successful attempt (1/2 rotation) - ***five full flips*** receive 2 points if successful (full rotation)	***1. Training drills using more than one body part***
Power – *activities requiring explosive movements*	***Gymnastics, Basketball***	***1. Vertical jump test*** - reach up and make a mark on the board - stand to the side and jump - measure the distance between jumps	***2. Standing long/broad jump test*** - a two foot take-off and landing is used, with swinging of the arms and bending of the knees to provide forward drive - jump as far forward as possible	***3. Margaria-Kalamen power test*** - stand 6m in front of steps - athlete sprints up the steps (stepping on 3rd, 6th and 9th step) - measure time between 3rd and 9th step - P = (M x D) x 9.8 / t	1. ***Plyometrics*** Lunging, bounding, incline press ups, hopping, jumping
Reaction Time – *activities that require a quick response to a stimulus*	***Sprinting (gunshot), tennis (serving), goal keeping (penalty)***	***1. Ruler drop test*** - hold a 30cm ruler above the open hand, making sure the 0cm mark is directly between the thumb and index finger. - he assistant drops the ruler with no warning and the participant must catch it	***2. Online reaction time test*** - measures the time taken for you to press the stop button after the background colour changes	***1. Training exercises to practice quick responses***

Basic Principles of Training (FITT)			
Frequency	***Intensity***	***Time***	***Type***
how OFTEN you train	how HARD you train	how LONG you train for	the TYPE of training you do

Additional Principles of Training						
Specificity	***Progressive overload***	***Individual needs***	***Adaptation***	***Reversibility***	***Variation***	***Rest & recovery***
Training that meets the needs of the sport / physical/skill component of fitness	Training needs to be demanding enough to cause the body to adapt	Training should meet the needs of the individual	If training stops / the intensity of training is lowers then fitness gains will be lost	Changes to the body due to increased training loads	Altering types of training to avoid boredom and maintain motivation	To allow the body to recover and adapt

Exercise Intensity

- **Max HR: 220 – age**
- Sites to measure HR on the body: Radial (wrist) & Carotid (neck)
- Beats per minute (BPM) – units for HR
- Training zones:
  1. Aerobic Training Zone (70-80% MHR) – 0.7 X MHR & 0.8 X MHR
  2. Anaerobic Training Zone (80-100% MHR) – 0.8 X MHR & just MHR
- **Borg RPE scale: 6-20**
- RPE = Rating of Perceived Exertion
- To predict HR using the RPE scale: **RPE X 10 = HR**

Advantages & Disadvantages of Training Methods

- Can lots of people take part at the same time?
- What equipment is needed (a lot or minimal)?
- Is it easy to set up?
- Is a venue required?
- Can it be made sport specific?
- Is there a high risk of injury?
- Does it require a high motivation level?

Validity: Does the test actually test what it is meant to test?

Reliability: Do you get the same/similar results if you test again and again?

Factors affecting Reliability:

- Calibration (has the equipment been calibrated before the test?
- Motivation of participant (is it high one day and then low the next?)
- Conditions (has the test been conducted in or outside?)
- Experience of the tester (does the tester know how to administer the test?

Practicality of the test:

- Cost (is the test expensive to conduct/ does it require expensive equipment)
- Time taken to perform (does the test take a long time to perform?
- Time taken to set up the test (does it take a long time to set the test up prior to administrating?)
- Time taken to analyse the data (time consuming to analyse the data?)
- Number of participants who can take part at once (does the test allow for multiple participants to take part at the same time?)

Reasons for Fitness Testing

1. Gives baseline data for monitoring performance
2. Can design training programmes based on results and see if training programmes are working
3. Results give the performer something to aim for
4. Provide goal setting aims

Pre-Test Procedures

1. Calibration of equipment
2. Complete informed consent
3. Complete physical activity readiness questionnaire (PAR-Q)
4. Participant pre fitness test check e.g. prior exercise participation

Types of Provision			
	Public	***Private***	***Voluntary***
Advantages	• Lots of individual can take part • Good use of equipment (lots of it) • Availability – lots of different locations to take part	• Top of the range equipment due to paying high fees	• Anyone can take part due to minimal cost
Disadvantages	• Equipment may not be top of the range • Facilities may be busy	• Expensive so not everyone can take part • Availability – requires transport to get to facilities (rural locations)	• Availability – requires volunteers to run the training method • Limited equipment availability

The long term effects of fitness training on the body systems				
Aerobic endurance	***Muscular endurance***	***Muscular strength & Power***	***Flexibility***	***Speed***
- adaptations to the cardiovascular and respiratory systems - cardiac hypertrophy - decreased resting heart rate - increased strength of respiratory muscles - capillarisation around alveoli	- adaptations to the muscular system - capillarisation around muscle tissues - increased muscle tone	- adaptations to the muscular and skeletal systems - muscle hypertrophy - increased tendon and ligament strength - increased bone density	- adaptations to the muscular and skeletal systems - increased range of movement permitted at a joint - increased flexibility of ligament and tendons - increased muscle length	- adaptations to the muscular system - increased tolerance to lactic acid

Motivational techniques for fitness programming	
Motivation: 'the internal mechanisms and external stimuli that arouse and direct behaviour'	
Intrinsic (from within)	**Extrinsic (from outside)**
- Feelings of accomplishment - Feeling proud - Wanting to achieve - Feelings of self-worth - Desire to win	- Money - Trophies/medals - To visually see your name (e.g. on leader boards) - Sponsorship - Cheat meals

Influence of goal setting on motivation:	**Benefits of motivation on the performer:**
• Provides direction for behaviour • Maintain focused	• Increases participation • Maintain training and intensity • Increased fitness • Improved performance

When designing a fitness training programme you need to consider the following:

1. **Aims:** details of what the participant would like to achieve for the sport
2. **Objectives:** how the participant intends to meet their aims using appropriate component of fitness training methods
3. **Lifestyle and physical activity history:** details of how much physical activity the participant takes part in each week
4. **Attitude and motivation towards training:** whether the participant is highly motivated or not? Whether they are excited for the training or not?

When planning a training programme you need to have SMARTER personal goals:

Specific – is the goal relevant to the component of fitness they are focusing on
Measurable – e.g. numbers are involved
Achievable – not to easy or too hard
Realistic – being able to achieve the goal in the timeframe
Time related – there is a deadline for the goals
Exciting – is the goal interesting
Recorded – can they write it down and track each week