

BTEC PE Knowledge Organisers – Year 10 and 11

1. Components of Fitness
 2. Exercise Intensity
3. Components of Fitness
4. Principles of Training
5. Training Methods



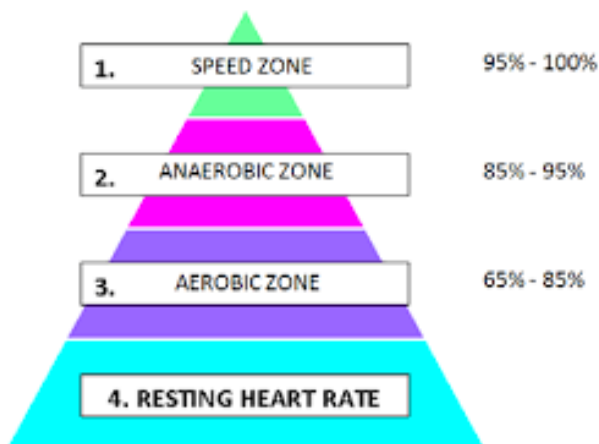
Component	Definition (Orange=Physical Fitness/Green=Skill-Related Fitness)
Muscular Strength	<p>This is the amount of force, measured in kilograms (kg) or Newtons (N), that can be generated by a muscle when it is contracting.</p> <p>Explosive Strength – the amount of force that can be exerted in one quick, powerful contraction.</p> <p>Dynamic Strength – the amount of force that can be exerted repeatedly by a muscle.</p>
Speed	<p>This is how long it takes for an individual or an object to travel a certain distance.</p> <p style="text-align: center;">Speed = distance/time.</p>
Power	<p>Power is the ability to combine strength with speed.</p> <p style="text-align: center;">Strength x speed</p>
Aerobic Endurance	<p>This is a measure of how efficiently you are able to keep your muscles supplied with nutrients and oxygen whilst exercising.</p>
Flexibility	<p>Flexibility is the ability to move all your joints through their full range of movements smoothly.</p>
Agility	<p>Agility is the ability to move and change direction quickly, precisely and under control.</p>
Balance	<p>Balance is the ability to keep the body stable, when still or moving, by keeping the centre of gravity over the base of the support.</p> <p>Static Balance – performed when little or no movement takes place e.g. a headstand</p> <p>Dynamic Balance – performed when movement takes place during a balance e.g. a cartwheel</p>
Coordination	<p>Coordination is the ability to move two or more parts of the body at the same time efficiently and accurately, while ensuring a smooth flow of movement.</p>
Reaction Time	<p>Reaction time is the amount of time it takes to respond to a stimulus. E.g. the ball coming towards you in cricket.</p>
Muscular Endurance	<p>This is the ability of a muscle or a muscle group to keep exerting force for a long period of time.</p>
Body Composition	<p>This is a measure of how much of your body is made up of fat-free mass, of vital organs, and how much is made up of fat.</p> <p>Different sports will suit different body compositions</p>

Exercise Intensity



Maximum Heart Rate (MHR) = 220 – Your Age

Training Pyramid



This is used as a way to calculate how hard you need to train and how long each training session should be. Each section of the pyramid represents a different training zone.

Max HR x **0.60 = 60%**
0.85 = 85%
0.95 = 95%

The BORG Scale - Rating of Perceived Exertion (RPE)



This is used to measure exercise intensity by asking the performer to rate their perceived level of exertion (how hard they think they are working).

RPE x 10 = Heart Rate bpm
E.g. Level 13 x 10 = 130bpm



Component of Fitness	Fitness test		Advantages	Disadvantages
Body Composition	Body Mass Index (BMI) $\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)} \times \text{Height (m)}}$		Easy to carry out	Results can be misleading as muscles weighs more than fat
	Bioelectrical Impedance Analysis (BIA) BIA = electricity passed through body from WRIST to ANKLE . Measures the resistance from muscle and fat		Quick and gives instant results Can be repeated over time with no bad effects	Needs expensive equipment
	Sum of Skinfolds Use CALLIPERS to measure skin on the BICEP, TRICEP, SHOULDER BLADE and HIP . Add measurements together and use to the JACKSON-POLLOCK nomogram (4 lines)		Provides accurate percentages of body fat	Needs specialist equipment Problems with people revealing bare skin
Aerobic Endurance	Multi Stage Fitness Test (MST/Bleep test) Cones/Lines 20m apart, run in-between to the sound of a beep. Gradually gets faster . Longer you can keep up the higher the level		Can test a large group at once Tests to maximum effort	Practice can affect score If outside environment may affect Scores can be subjective
	Forestry Step Test Step/ bench- 33cm for females and 40cm for males. Step up and down for 5 minutes to a metronome. (90bpm/22.5steps a min) . Record pulse and compare to table		Low cost Can be performed inside or outside Can test on your own	People may struggle to keep with the stepping pace on metronome
Speed	35m sprint test Sprint from one line/cone to another in a straight line over 35m. Record time and compare to normative data		Little equipment so cheap to run	Human error when timing can affect results
Strength	Grip dynamometer 3 attempts, squeeze grip dynamometer measure result in Kg or KgW.		Simple and easy test Lots of normative data	Must be adjusted for hand size which may affect results
Flexibility	Sit and Reach test Both feet against the sit and reach box , reach forward and measure result in centimetres		Well known test Quick and easy to perform	measures lower back & hamstrings only length of arms and legs affect results
Muscular Endurance	Sit up and press up tests Count how many sit ups or press-ups completed in 1 minute		Quick and easy Little equipment Large groups at once	Arguments of correct technique can affect results
Agility	Illinois Agility test Cones set up as in the image, lie face down on the floor at the start, measure time to complete course in seconds		Cheap and easy to conduct	Human error with timing can affect results Weather or surface conditions can affect results
Power	Vertical Jump test Stand side on to wall reach up and mark/set the measure. Standing jump as high as possible touching wall. Measure between two marks/measures		Quick and easy	Technique can affect result as need to jump and mark wall

Principles of Training

Specificity	Focusing training on activities relevant to an individual's sporting goals and needs
Progressive Overload	Training at an appropriate intensity and then gradually increasing the amount of stress that the body is put under to see improvements
Adaptation	By ensuring you progressively overload/challenge your body in training you encourage it to adapt to the new stresses placed upon it, this leads to improvements being made as a result
Reversibility	If training isn't continued then your body will revert back to its original state, this makes it important to keep challenging your body during training "use it or lose it"
Variation	You must vary your training so that you don't become bored and continue your training
Rest & Recovery	The body needs time to rest and recover so that adaptation can occur. If this isn't done then overtraining can occur possibly resulting in a loss of strength and fitness

Training Methods

<p>Warm Ups & Cool Downs</p>	<p>Warm up – Consists of a pulse raiser, stretches, joint mobilisation, sport familiarisation Cool down – Consists of pulse lowering and stretching</p>
<p>Flexibility Training</p>	<ol style="list-style-type: none"> Static Stretching – <u>Active</u> (you apply the force), <u>Passive</u> (someone/thing else is used to help) Ballistic Stretching – momentum is used so limbs stretch further e.g. bouncing, this should only be done when warm to avoid injury PNF Stretching – Help from a partner to apply resistance to push against when stretching
<p>Strength, Muscular Endurance & Power Training</p>	<ol style="list-style-type: none"> Free Weights – Sets & reps. Examples of free weights are barbells & dumbbells. Improve maximum strength – low reps & high load 90% of rep max Improve muscular endurance – high reps & load 50%-60% of 1 rep max Circuit Training – number of stations to complete incorporating different exercises Plyometric – Strength & explosive power. Bouncing/jumping exercises
<p>Aerobic Endurance Training</p>	<ol style="list-style-type: none"> Continuous training – performing the activity for an extended period of time (longer than 30mins) Fartlek Training – Known as ‘Speed play’. Athlete varies their pace significantly throughout training. Walk-Jog-Sprint-Walk-Jog-Sprint Interval Training – Training with set recovery periods breaking up the training.
<p>Speed Training</p>	<ol style="list-style-type: none"> Hollow Sprints - broken up by ‘hollow’ lower level work (similar to interval training) Acceleration Sprints – form of anaerobic training where the speed is increased usually every 50m jogging to striding and finally to sprinting at maximum speed. Interval Training – Short intervals where the intensity is high when working this is then broken up with a lot of recovery periods.