

# KNOWLEDGE ORGANISER – PE BTEC Unit 1: Fitness for sport and exercise

## Physical related fitness components:

**Aerobic endurance** = It is the ability of the cardio-respiratory system to efficiently supply nutrients and oxygen to working muscles during sustained physical activity. It is used mainly for low intensity exercise that lasts for a long time.

**Muscular strength** = The maximum force a muscle or muscle group can produce. (Measured in N or KG)

**Muscular endurance** = It is the ability of a muscle or group of muscles to keep contracting over a period of time against light to moderate load. It is the ability of the muscles to keep repeating the same action and keep working efficiently.

**Flexibility** = Having an adequate range of motion in all joints of the body. It is the ability to move a joint through its complete range of movement.

**Speed** = The ability to perform a movement or cover a distance in a short period of time = distance/time taken. Measured in metres per second. 3 types of speed – accelerative (up to 30m), pure speed (up to 60m) and speed endurance (sprints with a short recovery time in between)

**Body composition** = This is the relative ratio of fat mass to fat-free mass (vital organs, muscle, bone) in the body.

**YOU MUST KNOW THESE DEFINITIONS**



## Memory Aid

An Eagle Made  
Money From  
Selling  
Blackcurrants

QUICK TASK - MATCH  
UP THE CLASSIC  
SPORTING EXAMPLE  
WITH THE DEFINITION

EXTENSION TASK - HOW  
WOULD A GAMES PLAYER  
USE EACH OF THESE  
COMPONENTS OF  
FITNESS??

EG A FOOTBALLER, OR A  
BASKETBALLER??

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## Skill related fitness components:

**Balance** = The ability to maintain your centre of mass over a base of support.

Static balance means being balanced without movement.  
Dynamic balance means staying balanced while moving.

**Agility** = The ability of a sports performer to quickly and precisely move or change direction without losing their balance.

**Coordination** = The smooth flow of movement needed to perform a task efficiently and accurately. It often involves being able to use 2 or more body parts together.

**Reaction Time** = The time taken for a sports performer to respond to a stimuli and the start their response.

**Power** = The work done in a unit of time.  
It is the ability to apply a combination of strength and speed.  
$$\text{Power} = \text{Force (kg)} \times \text{Distance (m)} / \text{time (min or s)}$$

This is expressed as kilogram-metres per min (kgm/min) or kilogram-metres per second (kgm/s)

**YOU MUST KNOW THESE DEFINITIONS**



**Memory Aid**  
**Ben and**  
**Cameron Raced**  
**The Pony**



**QUICK TASK - MATCH**  
**UP THE CLASSIC**  
**SPORTING EXAMPLE**  
**WITH THE DEFINITION**

**EXTENSION TASK - HOW**  
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**EG A FOOTBALLER, OR A**  
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## Exercise intensity and how it can be determined:

**Exercise intensity:** how hard an individual is training.

**Heart rate:** the amount of beats your heart makes in 1 minute.

The lower and upper rate you should be training between for aerobic endurance is: Lower = 60% and upper = 85%

Maximum heart rate (HR max) =  $220 - \text{age (Years)}$

RPE (rating of perceived exertion) is another The RPE (rating of perceived exertion) can be used to predict the exercise HR (heart rate) of an individual by:

$$\text{RPE} \times 10 = \text{HR(bpm)}$$

**Training** = a well planned programme to improve performance, skill, game ability and fitness, that uses scientific principles.

**FITT**

**Frequency** = how often you train.

You could increase from training twice a week to training three times a week.

**Intensity** = how hard you train. Intensity can be prescribed using HR or RPE

**Time** = how long you train for. You could increase the time you train from 20 minutes to 25 minutes.

**Type** = type of activity.

How you train. The appropriate method/s of training should be selected according to your needs and goals. For example if you wanted to increase muscular strength you may choose to do weight training

## FITNESS PRINCIPLES

**Progressive Overload** – In order to progress, training needs to be demanding enough to cause the body to adapt, improving performance. Overload can be achieved by using the FITT principles

**Adaption** = this occurs during the recovery period after the training session is complete. Adaption is how your body increases its ability to cope with training loads

**Reversibility** = any improvement in fitness that takes place as a result of training will be reversed when a person stops. If you are unable to train due to injury or illness fitness levels will decrease. Also known as de-training. If muscles get smaller then this is known as atrophy.

**Individual differences/needs** = the programme should be designed to meet your training goals, needs, ability, level of fitness, skill level, and exercise likes/dislikes.

**Specificity** = training should be specific to the individual's sport, activity or physical/skill related fitness goals to be developed

**Variation** = boredom can lead to a decrease in motivation to train so try to make training fun.

**Rest and recovery** = these are essential to allow the body to repair and adapt, with renewal of body tissues. If your body doesn't get a chance to recover then the rate of progression can be reduced.

SAT  
TUE  
THUR





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## TRAINING METHODS

### Flexibility training:

- **static:** there are two types of static flexibility training. Firstly active stretching, which is performed independently where the performer applies internal force to stretch and lengthen the muscle. The second is passive stretching, also known as assisted stretching, which requires the help of another person or an object such as a wall. The other person/object applies external force causing the muscle to stretch.

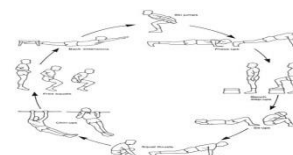
- **Ballistic:** this is where the performer makes fast, jerky movements through the complete range of motion, usually in the form of bobbing or bouncing. Ballistic stretching is specific to the movement pattern of the sport/activity to be performed. It needs to be undertaken with care as the technique can cause muscle soreness and strains.

- **Proprioceptive Neuromuscular Facilitation (PNF)** technique: this is used to develop mobility, strength and flexibility. The technique may be performed with the help of a partner or alternatively by using an immovable object (as resistance to inhibit movement).



### Strength, muscular endurance and power training

circuit training: this is where different stations/exercises are used to develop strength, muscular endurance and power. The stations/exercises use different muscle groups to avoid fatigue.

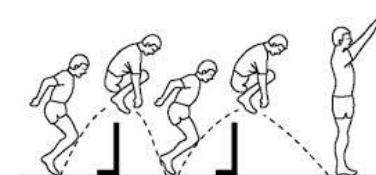


Free weights: = use of barbells or dumb-bells to perform different types of dynamic exercises

Resistance machines - push and pull

Use when training for strength (low reps and high loads), use when training for endurance (high reps and low loads)

Training for strength endurance (50–60% 1RM and 20 reps – repetitive movements of a muscle or muscle group) Training for elastic strength (75% 1RM and 12 reps – for producing movements in very close succession, like in gymnastics) Training for maximum strength (90% 1RM and 6 reps – producing a single movement against a resistance/load), reps, sets, rest period.



- **Plyometrics:** this type of training develops sport-specific explosive power and strength. It is used by sports performers such as sprinters, hurdlers, and netball, volleyball and basketball players. Plyometric exercises need maximal force as the muscle lengthens (eccentric action) before an immediate maximal force as the muscle shortens (concentric action). Types of exercises include lunging, bounding, incline press-ups, barrier hopping and jumping. This type of training needs to be performed carefully because it can cause muscle soreness.

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## TRAINING METHODS

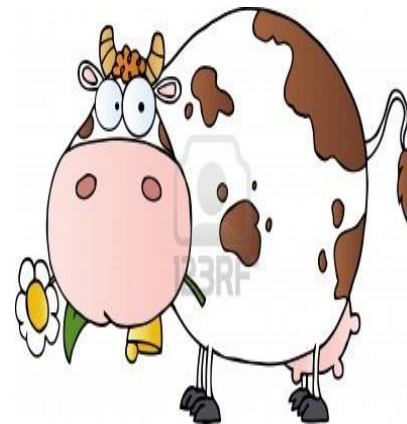
### Speed training:

- **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. Different drills can be used, such as resistance drills and hill sprints. 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 – performed at a high intensity, close to maximum. Increase the number of rest periods and increase work intensity to develop speed



### 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. The training is continuous with no rest period.
- **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 aerobic endurance. The station order/order of exercises is important to ensure different muscle groups are used to avoid fatigue. The number of stations, time spent at each station, number of circuits, rest period between exercises and number of circuit sessions per week can be varied.



## Memory Aid

Fat Cow Can't Swim  
Without A Float, It  
Panics

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## Body composition

Skin Fold Calliper



## Cardiovascular fitness

Multi Stage Fitness Test



12 Minute Cooper Run

## Flexibility

Sit and Reach



## Muscular endurance

60 Second Press up Test



## Muscular strength

1 Rep Max Test

Hand Grip

Dynamometer



## Validity

*"refers to the test measuring what it claims to measure"*



## FITNESS TESTING



Age	Female Mean	Female	Male	Male	Excellent	Good
13-15	<25.0	25.0-30.0	21.0-24.0	24.0-30.0	30.0-40.0	>40.0
16-19	<25.0	25.0-30.0	21.0-24.0	24.0-30.0	30.0-40.0	>40.0
20-29	<25.0	25.0-30.0	21.0-24.0	24.0-30.0	30.0-40.0	>40.0
30-39	<25.0	25.0-30.0	21.0-24.0	24.0-30.0	30.0-40.0	>40.0

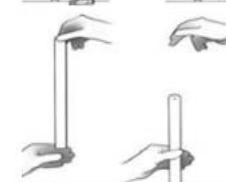
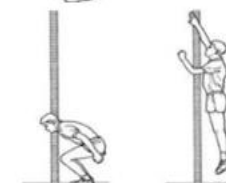
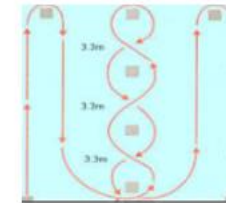


**WARM UP!**



## Reliability

*"requires that the test should produce similar results each time the test is taken"*



## Agility

Illinois Agility Test

## Balance

Stork Test

## Coordination

Alternate hand throw test

## Power

Vertical Jump Test

## Reaction time

Ruler Drop Test

## Speed

30 metre sprint test