

BTEC Tech Award Sport



Student Book

eboru



Component 2 Taking part and improving other participants' sporting performance

In this component you will learn about:

- Components of physical and skill-related fitness, and how they are important in different sports and activities
- Different skills and strategies for different sports
- The roles and responsibilities of officials in sport
- Sporting rules and regulations
- Planning and delivering drills to develop sporting skills

There are three learning outcomes in this component.

A Understand how different components of fitness are used in different physical activities

- A1 Components of physical fitness
- A2 Components of skill-related fitness

B Be able to participate in sport and understand the roles and responsibilities of officials

- B1 Techniques, strategies and fitness required for different sports
- B2 Officials in sport
- B3 Rules and regulations in sports

C Demonstrate ways to improve participants sporting techniques

- sporting skills
- C2 Drills to improve sporting performance

Assessment

This unit is internally assessed. This means that your teacher will mark it. There are 4 tasks in the assessment. These tasks are based around a vocational context that will be provided by your teacher.

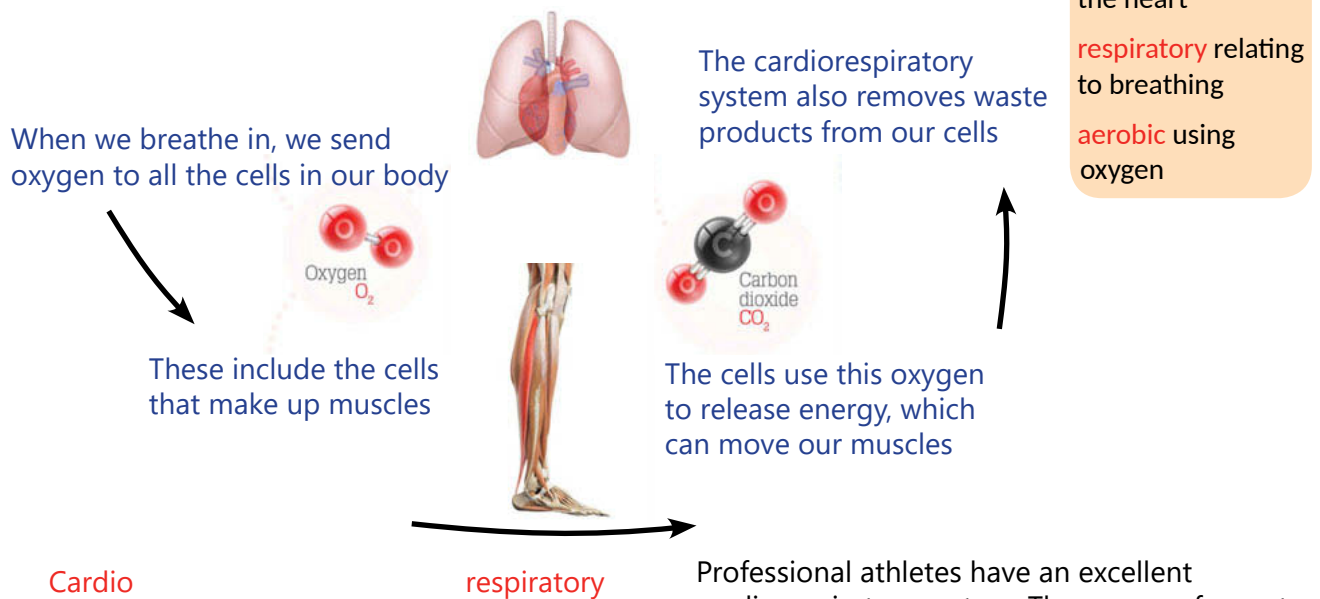
A1 Components of physical fitness

Aerobic endurance

The human body needs energy to move. One way we get energy is by using oxygen to break down food.

Our bodies use the **cardiorespiratory** system to transfer oxygen from the air to our cells.

The cardiorespiratory system is made up of the heart and lungs, blood and blood vessels.



When our bodies get energy using oxygen we call it **aerobic**

The cardiorespiratory system provides enough oxygen so that:

- muscles can move at a low or medium level of intensity
- muscles can keep working at this intensity for quite a long time.

Aerobic endurance is how long we can keep performing at a low or medium level of intensity. Aerobic endurance is important for any activity that takes place for more than around 30–90 seconds.

You can tell when an activity is testing your aerobic endurance, because you will begin to feel out of breath.

Aerobic endurance depends on how good the cardiorespiratory system is at getting oxygen to the muscles.

Intro

With a partner, take it in turns for one person to jog gently on the spot whilst the other person times them for 1 minute. How long does it take for your breathing to get quicker?

The cardiorespiratory system also removes waste products from our cells

The cells use this oxygen to release energy, which can move our muscles

Professional athletes have an excellent cardiorespiratory system. They can perform at a higher intensity, for longer.



This professional marathon runner has a very high aerobic endurance. He can run very fast for more than two hours without stopping.

Muscular endurance

Muscular endurance means how long your muscles can keep working for at low or medium intensity. Muscular endurance is not the same as muscular strength – for that see the next page.

To understand muscular endurance, consider an activity such as a plank. Many people find it hard to do hold a plank for long. At a certain point the stomach and arm muscles can no

aerobic endurance – you are not out of breath. It is because the muscle cannot physically take it any more.

A plank requires good muscular endurance rather than aerobic endurance



Muscular endurance allows you to use a muscle at low or medium intensity for quite a long period of time. It is important in many sports and physical activities. For instance, muscular endurance is important for:

- kicking a ball in a football or rugby match
- serving throughout a long tennis match
- climbing.

There are many different muscles in the human body. Muscular endurance is different for different groups of muscles. For instance:

- a professional rower has excellent muscular endurance in their arms, shoulders and back
- a professional cyclist has excellent muscular endurance in their legs and buttocks.

Muscular endurance can be measured by how many exercise repetitions someone can do, rather than the heaviest weight they can lift or move.



Activity

1. List i) one team sport, ii) one individual sport, and iii) one activity, where aerobic endurance is important.
2. List i) one team sport, ii) one individual sport, and iii) one activity, where muscular endurance is important.
3. a) Explain why aerobic endurance is important for a football player.
b) Explain the impact of aerobic endurance on the performance of a football player.
4. a) Explain why a tennis player needs to have muscular endurance.

Muscular strength

The largest force that a muscle or group of muscles can produce is called **muscular strength**.

An example of muscular strength would be the heaviest weight that someone can lift in a single bench press.



A shot putter with low muscular strength would not be able to throw the shot very far.



This gymnast needs very high levels of upper body muscular strength to lift and support their body weight.



Intro

With a partner discuss which muscle in the human body you think is the strongest.

Muscular strength depends on the size of muscles but also on the way the brain controls the muscle.

Speed

Speed means how quickly something can move.

It is measured by how far something travels in a certain amount of time. For instance, a world-class male sprinter can run 100m in 10 seconds. This means they cover 10m every second. Their speed is 10 metres per second.

In some sports or activities, it is important that the whole body moves quickly.

In races, such as slalom downhill skiing and sprinting, speed is vital.



Speed is also important in team sports such as American football.



In other sports or activities only a part of the body needs to move quickly.

In tennis the serving arm must move very quickly.



A kicker in rugby must move their kicking leg very fast.



In the javelin, the throwing arm must move quickly.



Activity

1. List i) three team sports, ii) three individual sports, where speed is important.
2. List i) three team sports, ii) three individual sports, where muscular strength is important.
3. What is the impact of muscular strength on the performance of a rock climber?
4. Describe the activities within a game of badminton which benefit from movement at high speed.

Flexibility

Each joint in the body has a range of movements.

Flexibility is being able to move a joint through its full range of movements, without feeling any pain.

Even the most flexible joint can only move within limits. For instance, the knee only bends one way – even a very flexible person can only bend their knee so far.

Flexibility can be different for each joint. For instance, someone might have a very flexible elbows and shoulders but less flexible hips.

Flexibility is particularly important for some sports and activities, such as gymnastics and yoga.



Intro

With a partner discuss how flexible you think you are.

Being flexible is also important in everyday life. A person who is not very flexible will be more restricted in their movements.

Flexibility is affected by the condition of ligaments, tendons and muscles associated with each joint. It is also affected by other factors – for instance, flexibility decreases with age.

Flexibility can be improved by stretching.

See Component 1 C1 for more on different types of stretching.



Body composition

Your body is made up of a number of different things. Together all of these things make up your overall **body mass**.

Body mass can be broken down into two main categories:

- mass due to body fat
- mass due to everything else – this includes bones, water and muscle.



Second row rugby players typically have a higher level of body fat and a lot of muscle. Body fat helps to cushion the body from impacts during the game.

Body composition refers to how much of the overall mass is due to body fat and how much is due to everything else.

- Training and exercise tends to reduce the mass due to body fat and increase the mass due to muscle.
- A lack of exercise tends to reduce the mass due to muscle and increase the mass due to body fat.

Different sports and activities suit different body compositions.



Long-distance runners typically have an extremely low level of body fat.

Activity

1. List i) one team sport, ii) one individual sport, and iii) one activity, where flexibility is important.
2. For each of your answers to question 1, describe how flexibility helps performance.
3. Describe i) one Olympic sport that benefits from a higher level of body fat, ii) one Olympic sport that benefits from a lower level of body fat. Justify your answers.

A2 Components of skill-related fitness

Power

In sport and fitness, **power** combines strength and speed.

Power is calculated as force multiplied by speed.

A muscular force applied at high speed produces explosive movement. This can be movement of the body or of another object.



Intro

Discuss why a powerful kick is important in football.

Power is really important in a long jump. The more power in the launching leg upon takeoff, the further the jump.

The start is really important in sprinting. The fastest starters provide the most power out of the starting blocks.



To shoot from distance in football a player needs to kick the ball hard. They need to move their kicking leg very quickly and apply a large force to the ball. Applying this large force quickly generates a high level of power.



Agility

Agility

change direction and speed quickly.

Agility is more important than outright speed in many sports.

Tennis requires a high level of agility. Players need to constantly change direction and produce short bursts of speed.



Agility is also important in other sports such as basketball.



A basketball court is relatively small, so players must have good agility levels to change direction and dribble past opposing players.



Activity

1. Describe the difference between strength and power.
2. List i) one team sport, ii) one individual sport, iii) one activity, where power is important.
3. Explain how power affects performance in hockey.
4. a) What is the definition of agility? b) Explain why agility is less important in the 1500m than it is in squash.

Reaction time

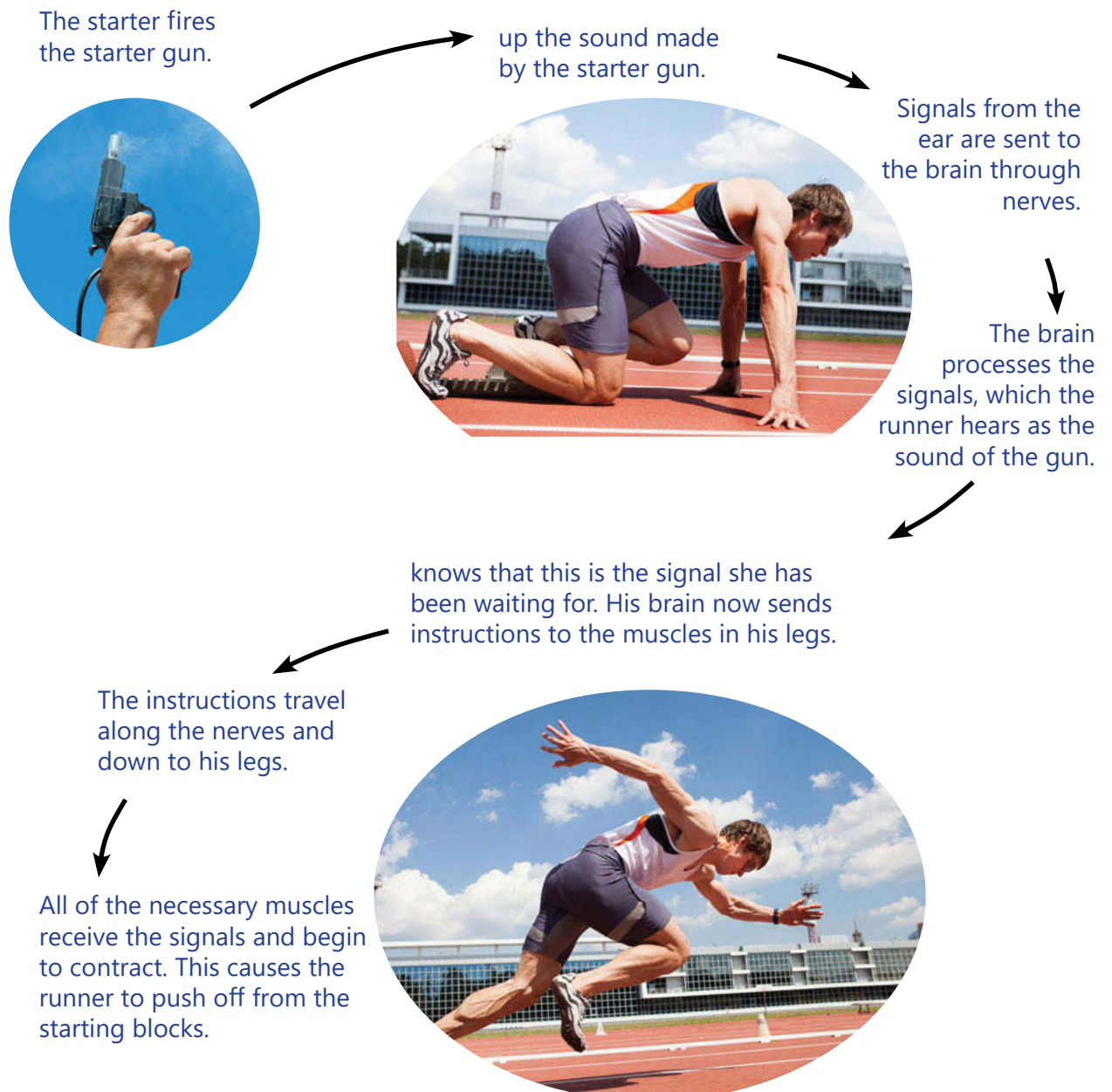
Reaction time is how quickly someone can respond to an external event. An external event is called a stimulus. In sport a stimulus is normally:

- something you see
- something you hear
- something you feel.

Intro

Write down (in fractions of a second) what you think your own reaction time is.

When you react to a stimulus, certain things happen in the body. Let us think about what happens to a runner at the start of a running race:



All of these processes take a certain amount of time. Together, they make up the reaction time between hearing the gun and pushing off the blocks.

Reaction time is critical in a 100m sprint because the race is so short. A runner with a slow reaction time may never be able to make up the time that they lost at the start.

In cricket a batter has to have very quick reaction times to respond to changes in direction of the ball after it bounces.

Reaction times can vary depending on the stimulus and the action. They also vary with age and experience of an event.

- an average reaction time for something you see is around a quarter of a second (0.25 seconds)
- an average reaction time for something you hear is quicker, at around 0.17 seconds
- sports people and gamers (including e-sports) will normally have faster than average reaction times.



- In athletics sprint events, if an athlete starts the race less than one-tenth of a second (0.1 seconds) after the gun, they are given a false start. This is because it is physically impossible for a human to react that quickly.

Coordination

Coordination means being able to move and position two or more parts of the body at the same time. Coordinated movements are smooth and efficient, not jerky.

Effective sports and fitness techniques need a high level of coordination.

Good coordination is needed to respond to other moving objects or people. This requires hand-eye or foot-eye coordination. For example:

- striking a ball in softball
- performing a tackle in football.

Good coordination is also needed to carry out a series of complicated moves, like those in the long jump.



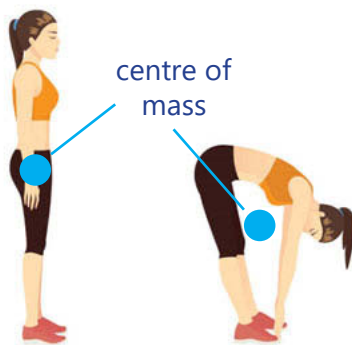
Balance

Balance is the ability to stay upright. Balance depends on two things: the centre of mass and the base of support.

The **centre of mass** of an object is the point around which all mass is equally balanced.

- For a symmetrical object like a ball, the centre of mass is in the exact centre of the object
- For irregular shapes, like the human body, the centre of mass is not in the centre of the body.

The position of the centre of mass depends on the shape of the body. Bending, stretching, and the position of the arms and legs all affect its position. The centre of mass can even be outside the body.



When standing, the **base of support (BOS)** is the area enclosed by the feet. The size of the base of support depends on how wide apart the feet are.

Static balance is being able to stay upright – not fall over – when not moving. Static balance is achieved when the centre of mass is above the base of support.

Static balance is important in sports and activities such as yoga, Tai Chi and gymnastics.



In the photo on the left, the woman has a wide base of support and her centre of mass is low. This means she is balanced and very stable.

In the photo on the right, the woman has moved position. Now she has a narrow base of support, and her centre of mass is higher. She is still balanced, as the centre of mass is still within her base of support. But if she were to move slightly, her centre of mass would be outside her base of support and she would begin to fall. This is a less stable pose than in the first photo.



base of support



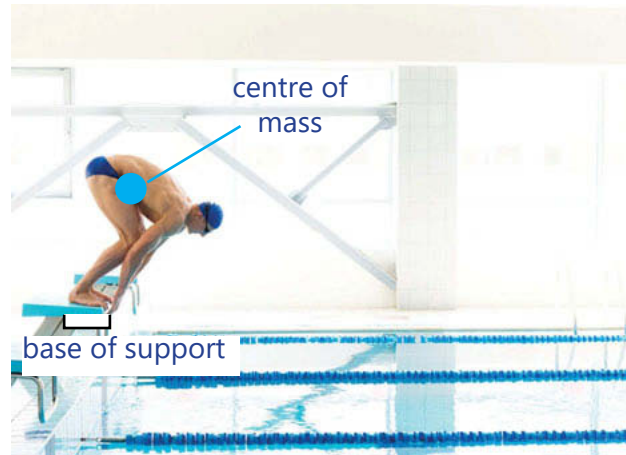
base of support

This swimmer is in a position where his centre of mass lies outside his base of support. He is no longer in static balance, and this causes him to begin moving. In this case he purposely lost static balance in order to move.

Dynamic balance is being able to stay upright while moving. This can be done by repositioning the body, particularly the arms and legs, to shift the centre of mass and the base of support.

Dynamic balance is important in any sport or activity which involves movement. Examples include skateboarding, ice hockey and badminton.

Balance is a surprisingly complicated system that involves our eyes, our ears, movement sensors in our body, and our muscles.



Activity

- List one skill or technique in football where reaction time is critical.
- a) Define the term coordination. b) What might happen to a performer in tennis with poor coordination?
- a) Explain what the terms Centre of Mass and Base of Support mean. b) List i) one team sport, ii) one individual sport, iii) one activity, where balance is important. c) For each answer, describe how balance affects performance.