Unit 4 Health and Fitness

Learning objective: To develop your knowledge and understanding of the terms 'health' and 'fitness', fitness tests used in sport and the importance of fitness components to athletes

Knowledge Checklist

	Revised	Understood	What you need to do
Be able to define 'health' and 'fitness'			
Describe the relationship between health and fitness			
Explain the effects of lifestyle choices on health and fitness			
Be able to name, describe and give a sporting example of the components of fitness			
Be able to analyse the reasons for, and limitations of, fitness testing			
Be able to describe the process of different fitness tests and any drawbacks to the tests			

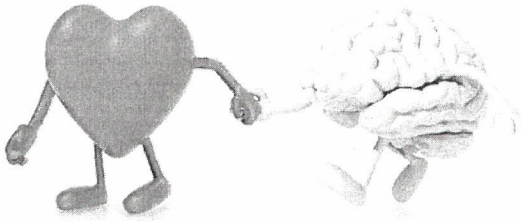
Key Terms

1. **Health** – a person's social, mental and physical well-being
2. **Fitness** – an individual's ability to cope with the stresses and challenges of their environment
3. **Obesity** – having a BMI of over 30
4. **Components of fitness** – the broad term used to identify the individual elements of fitness; for example, agility, speed and strength
5. **Validity** – the level to which the test being performed is testing what it is supposed to test
6. **Reliability** – whether a test produces the same or similar results if repeated
7. **Qualitative data** – data based on subjective, opinion-based measurements
8. **Quantitative data** – data based on numbered, objective measurements

The Relationship between Health and Fitness

Health and fitness are two terms that are often used interchangeably but it is important to know the difference between the two.

- **Health** is defined as a person possessing **social**, **mental** and **physical** well-being.
- **Fitness** is defined as an individual's ability to cope with the stresses and challenges of their environment.



Linking Health and Fitness

You should know the factors and influences of fitness on a person. However, it is also important to consider the link between health and fitness. For example, poor health can lead to a reduced fitness level because of the inability to train. Also, remember that while a person may have ill-health (e.g. depression), they may still be able to train, increasing fitness levels.

Poor health, such as:

Social

- Limited social life
- Not having many friends
- Not meeting new people
- Not working or interacting with groups

Mental

- Depression
- Anxiety
- Stress

Physical

- Obesity
- Improved heart function
- Improved immune system
- Improved efficiency of body systems (e.g. respiratory, immune and cardiac)

Can lead to decreased fitness levels as you are often unable to train or are demotivated to train!*

On the flipside, you may be unfit, e.g.:

- Not being strong enough to carry out everyday tasks
- Lacking energy and stamina
- Feeling lethargic

However, just because you are unfit, does not mean you cannot train. You are still able to train and increase your overall fitness levels.*

***Note:** Health and fitness are covered in more detail in Paper 2 – see *Physical, emotional and social health, fitness and well-being*.

Components of Fitness

'Fitness' is made up of many different components that are key to successful performance. The components of fitness of most importance will vary between sports and activities. It is important that you can apply the components of fitness to a relevant sporting example and give reasons why that component of fitness is important to the sporting example.

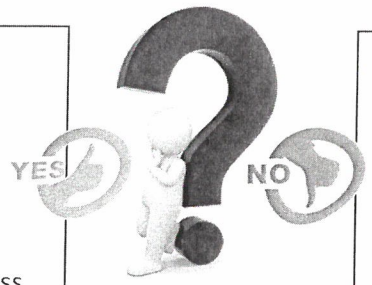
Component of Fitness	Definition	Sporting Example	Importance of Fitness Component to Sporting Example
Agility	Being able to change direction at speed, maintaining control throughout.	Rugby scrum half performing a 'dummy' and changing direction to make a break	The player is required to fool the opponents before quickly changing direction to make a break.
Balance	The ability to keep the centre of mass over the base of support.	Gymnast performing a routine on the balance beam	The gymnast must have good balance to stay atop the balance beam while performing the skills in the routine.
Cardiovascular endurance	The ability of the cardiovascular system to supply the body with oxygenated blood for a continuous period of time.	Marathon runner	The marathon runner needs a sufficient supply of oxygen to reach the working muscles to maintain performance and minimise fatigue through the long race.
Coordination	The ability to use more than one body part at the same time efficiently.	Tennis player responding to a serve	The tennis player must have the ability to efficiently move their legs to move into position and swing their arm (hand–eye coordination) to return the ball.
Flexibility	The range of movement about a joint.	Gymnastics floor routine	When performing a floor routine, a gymnast must have good flexibility to contort their body into different positions.
Muscular endurance	The ability of muscles to perform continuous contractions without fatigue.	800m freestyle swimmer	The swimmer requires muscular endurance to produce powerful muscular contractions to move through the water as quickly as possible, over a long distance / period of time.
Power / explosive strength	The ability of muscles to produce strength at speed (strength × speed).	Throwing a javelin	The javelin thrower needs power / explosive strength to produce a large force quickly, throwing the javelin at the highest velocity possible.
Strength (maximal, static, dynamic and explosive)	Maximal – largest force created in a single contraction	Weightlifting	Deadlift – the weightlifter needs maximal strength to lift the weight quickly, in a single movement.
	Static – contracting a muscle without changing its length	Rugby scrum	Rugby scrum – in an even rugby scrum, the team must contract their muscles to remain stationary.
	Dynamic – performing repeated contractions over a long period of time	Sprint cycling	Sprint cycling – the cyclist must produce powerful contractions over a long period of time.
Speed	The rate at which a movement is performed over a specific distance (speed = distance / time).	100 m sprinter	A 100 m sprinter needs speed to cover the 100 m in the quickest time possible.
Reaction time	The time taken for a human to respond to a stimulus.	A rugby player who is defending, reacting to a sidestep performed by an opponent	The defender needs good reaction times to identify that a sidestep has taken place and to readjust their body / running line to catch and tackle the opponent.

Reasons for and Limitations of Fitness Testing

Components of fitness should be carefully monitored and measured to assess progress, health and fitness of an individual. This can be important for recreational athletes as well as professional athletes.

Reasons for Fitness Testing

- Identifying strength and weaknesses in performance
- Assessing the influence of a training programme
- To establish starting levels of fitness
- The establish end level of fitness (following a training programme)
- To adapt training programmes to the athlete's needs
- To compare fitness levels to national averages
- To aid goal-setting
- To motivate an individual



Limitations of Fitness Testing

- Many tests are not sport-specific and so do not represent the actual skills being performed in the sport
- Test may not replicate the movements involved in the sport
- Do not replicate the conditions faced when in a competitive situation
- Validity of tests is dependent on correct procedures and knowledge of the tester
- Validity and reliability of submaximal and indirect measurement methods unknown or questionable

Validity and Reliability

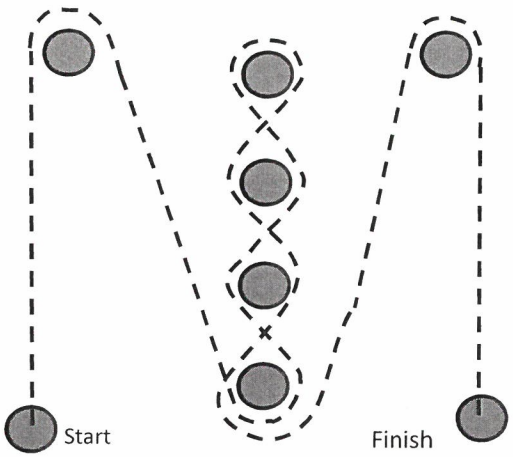
Validity – the level to which the test being performed is testing what it is supposed to test. For example, using shoe size to estimate the height of a person is not a valid test. However, using a tape measure to measure height is a valid measurement.

Reliability – the 'repeatability' of the test, i.e. if the test was repeated, whether it would produce the same or similar results.

Measuring Components of Fitness

As fitness is a key component of success in sport at all levels, it is important to be able to measure components of fitness to track progress of athletes. For example, if a player has just been signed to a new football club, the new club will perform baseline fitness tests when they arrive. Periodically following periods of training, the same fitness tests will be performed to see whether the player has improved or not and to give them targets to become better players. The main fitness tests used in sport are outlined below. Remember, not all athletes will perform all of these tests – it depends on what components of fitness are important in their sport. For example, a weightlifter will not perform agility tests as agility does benefit their performance.

Agility – Illinois Agility Test

Equipment and Set-up	Protocol
• Cones, measuring tape, stopwatch • Four 'external' cones make up a 5 × 10 m rectangle • Four 'internal' cones are placed in a straight line within the rectangle  	1. Performer begins lying face down on the floor 2. Performer must run to the far end of the rectangle and back 3. Performer must then run around all four of the internal cones 4. Performer runs back to finishing cone

Balance – Stork Test

Equipment and Set-up	Protocol
• Stopwatch 	1. Performer stands upright with two feet firmly on the ground, with their hands on their hips 2. One leg is lifted with the foot placed on the inside of the 'standing' leg 3. The performer balances in this position for as long as possible 4. The time that they are able to hold the pose for is their score

Cardiovascular Endurance – Multistage Fitness Test / Bleep Test

Equipment and Set-up	Protocol
• Cones, tape measure, CD instructions • Start and end cones placed opposite each other at a 20 m distance 	1. The performer must run the 20 m distance in the set time given by the 'bleeps' of the CD instructions 2. The time between the bleeps gets shorter so the performer will have to get faster to cover the distance in time 3. The performer continues until they cannot keep up with the pace of the bleeps 4. The 'level' (e.g. speed 5, round 6) that the athlete reaches before not being able to continue further is their score

Coordination – Wall Toss Test

Equipment and Set-up	Protocol
• Ball, flat wall, stopwatch and observer • Performer stands with two feet on the floor, 2 m away from the wall	1. The performer throws the ball against the wall using one hand 2. The ball is caught with the opposite hand 3. This is repeated for 30 seconds 4. The amount of times the ball is thrown and caught is counted

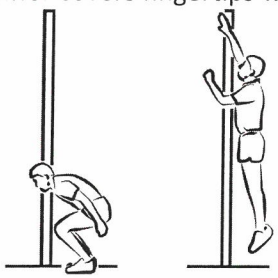
Flexibility – Sit-and-Reach test

Equipment and Set-up	Protocol
• Box with distance (in cm and/or inches) measured out on top of it • Performer starts with their feet flat against the side of the box, sitting upright 	1. The performer gradually moves forward while sitting with their arms outstretched 2. They try to reach as far along the top edge of the box as possible, alongside the measurement marks 3. The distance that the performer reaches (in cm or inches) is recorded

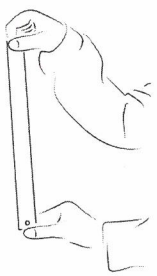
Muscular Endurance – Sit-up Bleep Test

Equipment and Set-up	Protocol
• Working in pairs, gym mat, CD instructions	1. One person is completing the sit-ups, the other is supporting the performer's ankles 2. The CD bleeps twice – once for the upwards phase of the sit-up and once for the downwards phase 3. The performer must keep in time with the bleeps 4. The bleeps get faster and so the performer must complete the sit-ups faster 5. The number of sit-ups completed in one minute is recorded

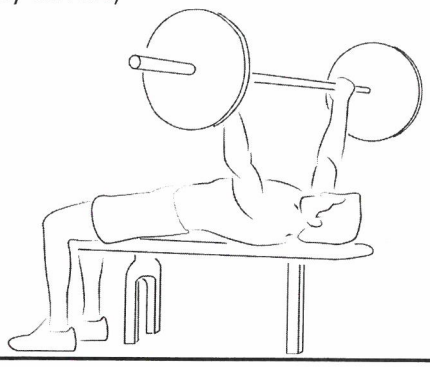
Power / Explosive Strength – Vertical Jump Test

Equipment and Set-up	Protocol
• Flat wall with distance marked up it, chalk • Performer covers fingertips with chalk 	1. The performer starts with their side to the wall 2. With their feet flat on the ground, they reach up and mark the wall – this is their standing reach height 3. The performer completes a maximal vertical jump and marks the wall at the peak height of their jump, with their arm outstretched 4. The distance (in cm or inches) between the standing reach height and the peak height is the jump height of the performer

Reaction Time – Ruler Drop Test

Equipment and Set-up	Protocol
• Metre ruler 	1. An assessor holds the ruler vertically, starting above the performer's hand 2. The performer has their hands open in front of them, ready to catch the ruler 3. The assessor drops the ruler and the performer must catch it as quickly as they can 4. The distance (cm) along the ruler that the performer catches the ruler is recorded

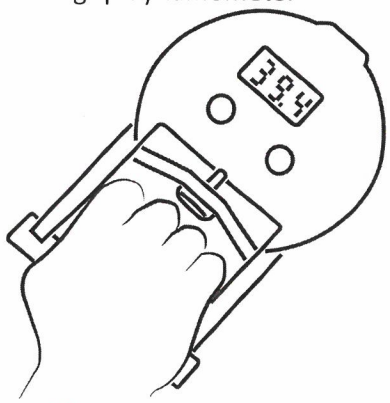
Maximal Strength – One-rep Max Test

Equipment and Set-up	Protocol
• Weights, bench press machine • Performer must know, or work out, their maximum one-rep max (the maximum amount they can lift) 	1. The mass of the one-rep max is divided by body weight to give a score 2. Score is compared to previous research data 3. Maximal strength test = mass (kg) ÷ body mass (kg)

Speed – 30 m Sprint

Equipment and Set-up	Protocol
• Cones, tape measure, stopwatch • Two cones placed 30 m apart to mark start and end of sprint 	1. Performer is timed from a flying start (they get a run-up before the starting cone) 2. Time is recorded for the performer to run 30 m

Strength – Handgrip Dynamometry

Equipment and Set-up	Protocol
• Handgrip dynamometer 	1. Dynamometer held in dominant hand 2. Arm should be at 90 degrees with the elbow held against the body 3. Hand needs to squeeze the dynamometer as hard as possible 4. Score is recorded in kilograms (kg) and pounds (lbs) of force

Test Measurements and Considerations

When completing fitness tests it is important to know what you are measuring (e.g. distance, force, size) as well as what type of data you are collecting. Some key terms to know are:

- **Qualitative data** – measurements based on opinions, thoughts and observations. Subjective, rather than objective.
- **Quantitative data** – measurements based on numbered measurements. Factual evidence with no opinions given. Objective data.
- **Time** – how long something takes place for, measured in seconds or minutes
- **Distance** – the space between two points, e.g. measured in centimetres and metres
- **Mass** – how much matter or 'stuff' is within something, measured in kilograms
- **Weight** – the force that gravity places on an object due to its mass (weight = mass × acceleration due to gravity)

Normative Data

As previously mentioned, scores from fitness tests can be compared to old scores achieved by the athlete, to see whether they have improved or declined in performance. Another way that scores can be assessed is to compare scores to **normative data**. Normative data is data collected by researchers that is representative of a particular population. It can be grouped into categories such as age, gender and playing ability. This allows someone to complete a fitness test and compare their result to someone in a similar situation as them. For example, an average male aged 69 could complete handgrip dynamometry and compare their score to other males in the over 65 normative data table. This would allow them to see whether they are stronger or weaker than the majority of people their age.

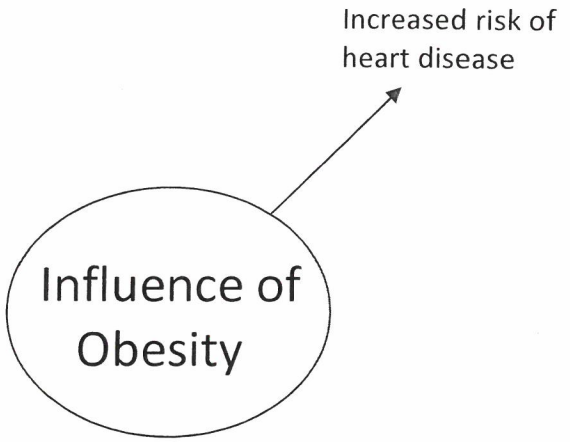
1. Name the three components of health.

   1. .....

   2. .....

   3. .....

2. Complete the mind map by naming the influences of obesity on physical health and well-being.



3. Give a definition of **agility** and **speed**, and then give a sporting example of an athlete who needs both agility and speed to perform successfully in their sport.

   Agility: .....

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   Speed: .....

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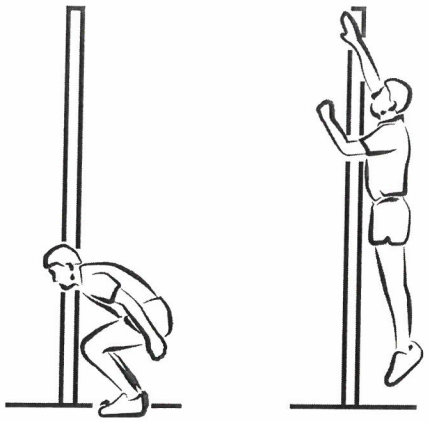
   Sporting example: .....

   .....

4. Identify the test represented by the image below. Describe the protocol and the equipment needed.



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1. Which **one** of the following tests is most suitable for assessing the coordination of a diver?
   A. Wall toss test ☐
   B. Vertical jump test ☐
   C. Sit-up bleep test ☐
   D. 30 m sprint ☐

(1 mark)

2. Athletes in sport regularly monitor their fitness levels using a variety of tests.

   Outline two reasons why fitness tests can be limited.

   1. .....

   2. .....

(2 marks)

3. Using a sport of your choice, outline the fitness tests used to measure muscular endurance and coordination, and justify their usefulness for athletes in your chosen sport.

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(9 marks)

