

Subject: Physiology
Year: 7
Term: 1b
Topic: Human body

Lesson Sequence

1. Muscles – names and placement in the body
2. Muscles – antagonistic pairs
3. Joints – structure & synovial joints
4. Movement
5. Sporting movements
6. Health and fitness
7. Balanced diet

Key assessments

EA Exam 2

Core Texts

Smart Science Textbook
BBC Bitesize KS3 Science

Key Words

Muscle	A bundle of tissue that has the ability to produce movement.	Abduction	Movement away from the midline of the body.
Antagonistic pairs	A pair of muscles that act on a joint. As one contracts, the other relaxes.	Rotation	Movement of a limb around its long axis.
Synovial joint	A freely movable joint.	Balanced diet	A diet consisting of a variety of different foods to provide adequate nutrients for good health.
Cartilage	Soft, spongy connective tissue which prevents friction and wear and tear between bones.	Carbohydrates	Needed to give the body energy from sugar and starch.
Contract	Muscle changing length (shortening) to move a body part.	Protein	Assist with growth and repair of the body.
Relax	Muscle changing length (lengthening) to return a body part to original place.	Fats	Help to provide concentrate sources of energy and insulate the body in cold weather.
Extension	Increasing the angle at a joint.	Vitamins	Needed for growth and health.
Flexion	Decreasing the angle at a joint.	Minerals	Helps the body function properly and stay strong.
Adduction	Movement towards the midline of the body.	Fibre	Helps food move through the gut.

Muscles (Week 1)

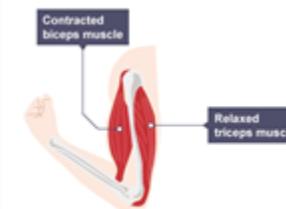
Muscles work by getting shorter. We say that they **contract**, and the process is called **contraction**. Muscles are attached to bones by strong tendons. When a muscle contracts, it pulls on the bone, and the bone can move if it is part of a joint.



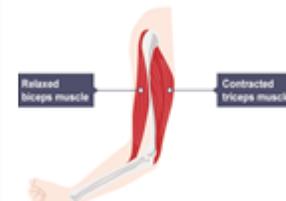
Muscles – antagonistic pairs (week 2)

Muscles can only pull and cannot push. This would be a problem if a joint were controlled by just one muscle. As soon as the muscle had contracted and pulled on a bone, that would be it, with no way to move the bone back again. This problem is solved by having muscles in pairs, called **antagonistic muscles**.

For example, your elbow joint has two muscles that move your forearm up or down. These are the biceps on the front of the upper arm and the triceps on the back of the upper arm:



To raise the forearm, the biceps contracts and the triceps relaxes.



To lower the forearm again, the triceps contracts and the bicep relaxes.

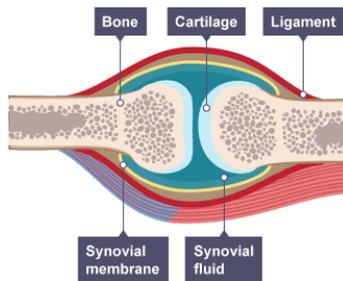
Joints (week 3)

Bones are linked together by joints. Most joints allow different parts of the skeleton to move. The human skeleton has joints called **synovial joints**.

Synovial joints allow us the free movement to perform skills and techniques during physical activity.

Synovial joints have synovial fluid in the joint cavity that lubricates or 'oils' the joint so it moves smoothly. Synovial fluid is made by the synovial membrane.

In synovial joints, the ends of the bones are covered with **cartilage** (called articular cartilage) which cushions the joint and prevents friction and wear and tear between the bone ends. Cartilage is a soft, spongy connective tissue.



Types of Synovial joints (week 3)

1. **Hinge** - these can be found in the elbow, knee and ankle. Hinge joints are like the hinges on a door, and allow you to move the elbow and knee in only one direction. They allow flexion and extension of a joint.
2. **Ball and socket** - these types of joint can be found at the shoulder and hip and allow movement in almost every direction. A ball and socket joint is made up of a round end of one bone that fits into a small cup-like area of another bone.
3. **Pivot** - this joint can be found in the neck between the top two vertebrae. It allows only rotational movement such as moving your head from side to side as if you were saying 'no'.
4. **Condyloid** - this type of joint is found at the wrist. It allows you to flex and extend the joint, and move it from side to side.
5. **Saddle** - this type of joint can be found in the thumb. It allows you to flex, extend, abduct, adduct and circle your thumb.

Sporting movements (week 5)

Flexion – bending a joint. This occurs when the angle of a joint decreases. For example, the elbow flexes when performing a biceps curl.

Extension – straightening a joint. This occurs when the angle of a joint increases, for example, at the elbow when putting a shot.

Abduction – movement away from the midline of the body. This occurs at the hip and shoulder joints during a jumping jack movement.

Adduction – movement towards the midline of the body. This occurs at the hip and shoulder, returning the arms and legs back to their original position from a jumping jack movement.

Rotation – this is where the limb moves in a circular movement around a fixed joint towards or away from the midline of the body. This occurs in the hip in golf while performing a drive shot.

Health and Fitness (week 6)

Health is defined as a state of complete mental, physical and social well-being; not merely the absence of illness or infirmity.

Fitness is the ability to meet the demands of the environment.

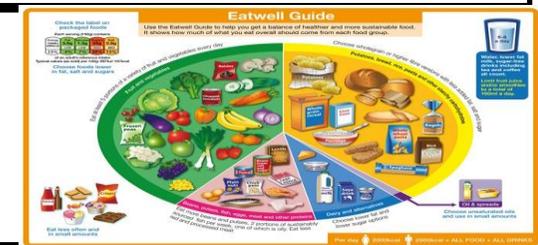
Mental benefits include improved confidence and relief of stress/tension and stress related illness.

Physical benefits include losing weight, improved posture and improved body shape.

Social benefits include meeting people and making friends.

A balanced diet (week 7)

A good diet is a balanced diet which has all the necessary components in the right amounts. The seven components are carbohydrates, proteins, fats, vitamins, minerals, fibre and water. Too little of these could cause **malnutrition** – illness due to eating badly. **Obesity** is a form of malnutrition as is being too thin because of not eating enough.



Substance	From which foods	Use
Carbohydrates	Wheat products, sugar	For energy
Protein	Meat, fish, dairy products	For growth
Fats	Meat, dairy products	For storing energy and keeping us warm
Vitamins	Different vitamins from different vegetables and fruit.	To help with chemical reactions in the body
Minerals	Different minerals from different vegetables and fruit	For healthy bones, teeth and blood
Fibre	Dark parts of rice or wheat (like bran)	To help food move through the digestive system
Water	Most vegetables and fruit and water drinks	For all the chemical reactions in the cells.