SAMPLE PAGES

GCSE PE for OCR

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UNCORRECTED PROOFS

This sample contains the contents page, introduction and three double page spreads from GCSE PE for OCR student book, in PDF format. Because this advance material has not yet been through all checking stages, it may still contain minor errors. A downloadable sample of information from the accompanying Teacher's Resource File is also available from this site.

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About your course

This book has been written for the OCR GCSE Physical Education specifications.

There are three ways in which you can study for a GCSE in PE with the OCR exam board:

- GCSE in Physical Education
- GCSE in Physical Education (Games)
- GCSE (short course) in Physical Education (Games).

This book can be used for all three of these specifications. If you are doing the short course, however, you will not have to know about all the information in this book. Again, your teacher will guide you on what you need to know for your course.

All three of the OCR GCSE PE courses involve both coursework and preparation for a written paper. For your coursework, you will choose four different types of activities (two if you are doing the short course). Over your course, you will work on how well you can do these activities, and at the end of the course you will be assessed on your performance in each of your activities. You will also carry out an 'analysis of performance' task for one of your activities, which involves trying to improve either your own or someone else's performance. We will look at what you need to do in your coursework in more detail in section 4 of this book.

Depending on what your school offers, if you are doing the GCSE in Physical Education, you can choose from the following list of activity areas (each area contains lots of different types of activity, which your teacher can tell you about):

- Games activities
- Gymnastic activities
- Dance activities
- Athletics activities
- Outdoor adventurous activities
- Swimming activities
- Exercise activities.

Your four activities need to come from at least two of these different activity areas (e.g. football and cricket from Games, cross-country running and track and field athletics from Athletics). If you choose an activity from the Exercise activities area, you have to then choose your other three activities from at least two other activity areas. If you live in Northern Ireland, your four activities need to come from three activity areas.

If you are studying PE (Games) or the Games short course GCSE, you have three activity areas to choose from:

- Invasion games
- Net/wall games
- Striking/fielding/target games.

Again, your four activities, or two in the case of those of you who are following g the short course, need to come from at least two different Games activity areas.

How the book is set out

This book is in four sections. The first three sections give you information for the written paper (Paper 1) of your GCSE course. This exam is on the theory of PE and Games – the reasons why our bodies work like they do, what sort of factors improve performance in sport and physical activity, about fitness and health and different ways to get fitter and more healthy, and about safety.

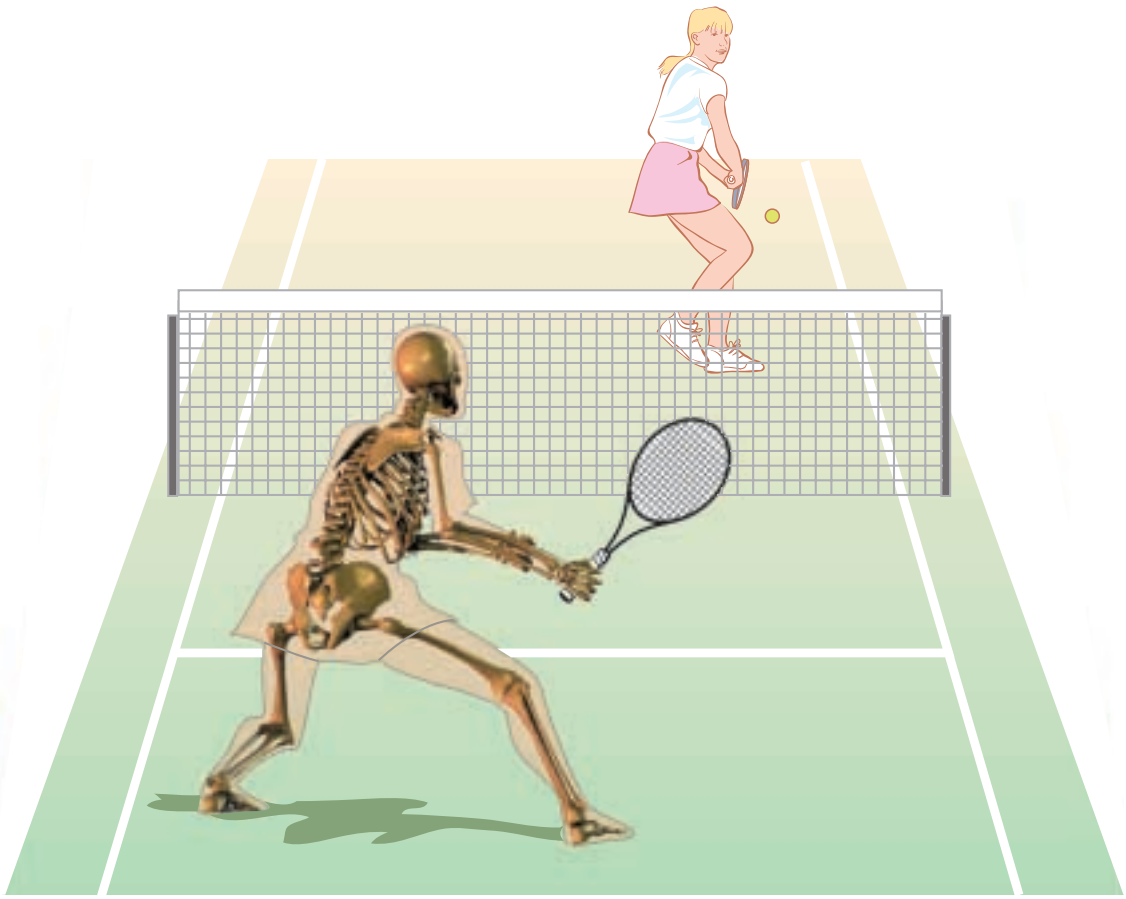
This book follows the same order as the specification for the full course GCSEs. Your teacher will tell you which parts are relevant to you if you are studying for the short course.

You will be tested on this information in the exam at the end of your course – so this book will be useful to help you prepare for that. It will be very useful for your coursework as well. It will help you improve how well you can do your activities by giving you 'background information' about what helps us improve performance in sport and physical activity, what helps us be more fit and healthy, and how we can avoid getting injured.

There is a glossary of key terms on page 158. Words included there appear in **bold** in the text.

Practise, practise, practise!

To do well in your course, you need to practise. You need to practise your skills in your activities so you can improve them, of course. But you should also practise applying your knowledge about your activities and your theory knowledge too. For example, when you are warming up for an activity, you could try to remember what joints of your skeleton you are using.



Try to apply your theory knowledge in your practical work

The skeleton and joints

What the skeleton does

The skeleton is the basic framework of the body. It has four major functions:

- **shape and support**
- **movement**
- **protection**
- **blood production.**

It is important to remember that the body has other systems that support and enhance these functions as well.

These four major functions have important consequences for physical activity.

Shape and support

Without its rigid skeleton, the body would have no framework to support itself on – the skeleton gives us our shape.

The skeleton also gives the body its size. Taller people have longer bones than short people and in some cases the sturdiness or weight of the skeleton will influence overall bodyweight. See pages 86–8 which explains how body composition is an important factor affecting participation and performance.

Movement

How does a skeleton made up of hard, rigid bones move? The reason we can move is because of the joints between bones. Movement occurs when the muscles that are attached to the bones on either side of a joint contract (shorten) and make the joint move. This movement is called **articulation**.

So it's not just the joints of the skeleton that are important in movement: the skeleton provides something for our muscles to attach to. Without this, muscles couldn't produce movement, which is crucial to performance in all kinds of sport and physical activity in general.

Different joints work in different ways, and movement is greater at some joints than at others (see pages 8–11). The greatest range of movement is at the shoulder, the elbow and the wrist in the upper body, and the hip, the knee and the ankle in the lower body.

A smaller but still very important amount of movement is found at other joints such as in the hands, the neck and the spine in the upper body, and in the feet in the lower body.

Protection

The skeleton also fulfils a very important role in protecting the vital soft tissue organs of the body. Most important are:

- the rib cage – protects the heart and lungs
- the pelvic girdle – protects the abdomen
- the spinal column – protects the spinal chord
- the skull – protects the brain.

Blood production

Blood is made in **bone marrow** – particularly in the marrow of the long bones of the body. Blood contains both red and white blood cells. The red blood cells carry oxygen to muscles, which they need in order to work. The white blood cells fight infection in the body. There is more about blood later in this book (see pages 28–9).

Types of bones

There are over 200 bones in the body, and over 100 joints. The diagram on this page shows the bones you need to know about for this course.

Bones are divided into three main types:

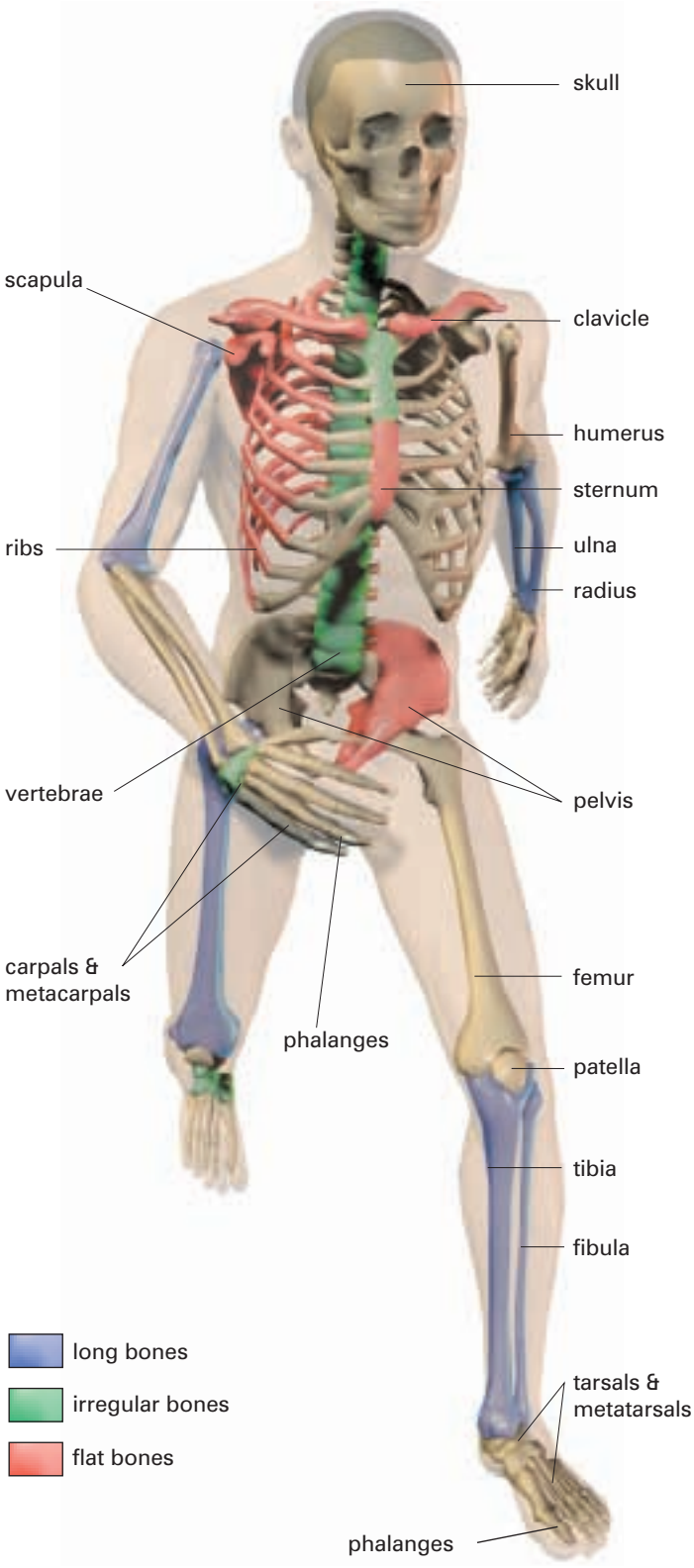
- *flat bones* – the scapula, the patella, the sternum, the pelvis and the ribs
- *irregular bones* – the vertebrae and the short bones of the hands and feet
- *long bones* – the bones of the arms and the legs, and the long bones in the hands and feet.

Flat bones and irregular bones are usually protective bones: the skull, the ribs, the pelvis and the ribs protect vital organs. Other flat and irregular bones are also protective – the patella is a flat bone protecting the knee joint, for example.

Long bones are the 'levers' of the body – where lots of movement happens. The arm contains three long bones: the humerus, the radius and the ulna. The leg has three long bones as well: the femur, the tibia and the fibula. We also have long bones in our hands and feet: the phalanges and metacarpals that make up our fingers, and the phalanges and metatarsals of our toes.

Tasks

1. List the *four* functions of the skeleton.
2. Describe how bones and muscles work together to produce movement.
3. Give an example from any sport of how each of the four functions of the skeleton plays a part in physical activity.



The major bones of the body

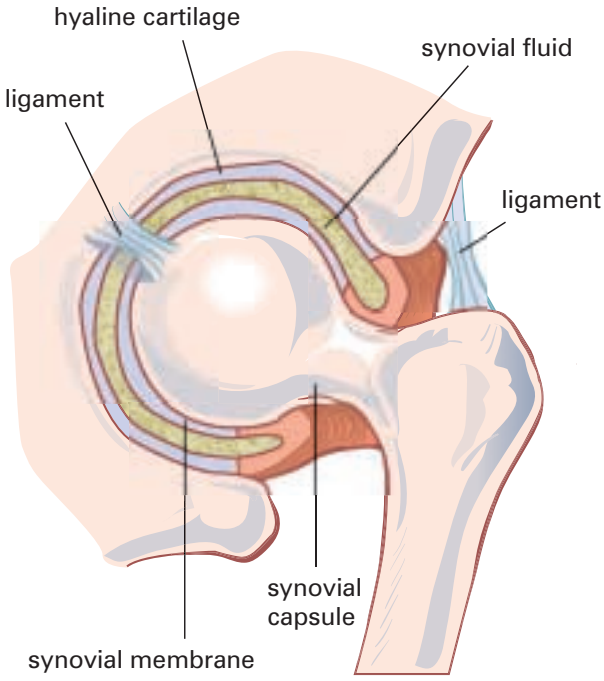
Joints and movement

There are many different types of joint in the body, including joints that do not move or move only slightly. We need to know about those involved in movement as these are vitally important factors affecting participation and performance.

Some joints support our whole body weight, so you can imagine that without something to reduce friction between moving bones and the pressure of one bone pressing on another, the bone ends would soon get damaged. This would severely affect our ability to move. So how do joints work to enable us to move freely?

Joint structure

Most moving joints are **synovial joints**. Synovial joints are enclosed inside a capsule filled with a lubricating fluid, called synovial fluid. This fluid greatly reduces the friction on the joint surfaces as they move against each other. A membrane seals the synovial capsule so that the fluid doesn't leak out.



The hip joint is a synovial joint

Cartilage

Joint surfaces are also covered by smooth, slippery **hyaline cartilage**. This cartilage aids in the production of synovial fluid.

Joints often also include another kind of cartilage, called white fibro-cartilage. While hyaline cartilage is smooth and hard in order to help free movement, fibro-cartilage is tough and elastic. It acts as a shock absorber, providing vital cushioning against impacts. Synovial joints like the knee contain fibro-cartilage to cushion the joint against the impact of walking, running and jumping.

Ligaments and tendons

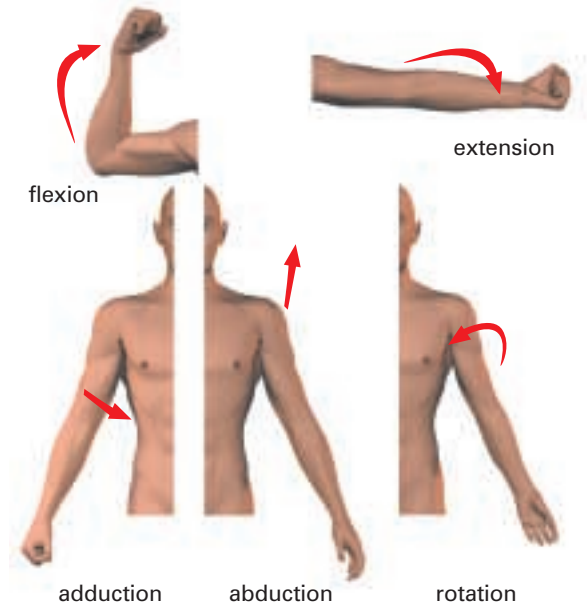
Moving joints are held together by **ligament**s and **tendons**. Ligaments are very strong elastic fibres that keep joints intact, even under pressure. All the major joints of the body rely on a combination of ligaments and tendons for stability.

Tendons attach muscles to bones, and we will be looking at them in more detail on page 18. Both ligaments and tendons can be strained or torn as a result of violent movement.

Types of movement

Different kinds of joints allow different amounts of movement. Because movement is so important in sport and physical activity, we have special terms to describe these different kinds of movement:

- **flexion**
- **extension**
- **rotation**
- **abduction**
- **adduction.**



Different types of movement

Flexion

Flexion is the bending of a joint. For example, flexion occurs at the knee as the foot is drawn back to kick a ball.

Extension

Extension is the straightening of a limb at a joint. For example, in putting the shot the elbow is straightened during release.

Rotation

Rotation is the 'swiveling' of a joint, for example moving the head from side to side.

Abduction and adduction

If there was a piece of string going through your body, from the top of your head straight down to the ground, it would mark the central axis of your body.

Abduction involves moving a limb or limbs *away from* the central axis of the body. *Adduction* is the opposite of abduction: moving a limb or limbs back *towards* the central axis of the body.

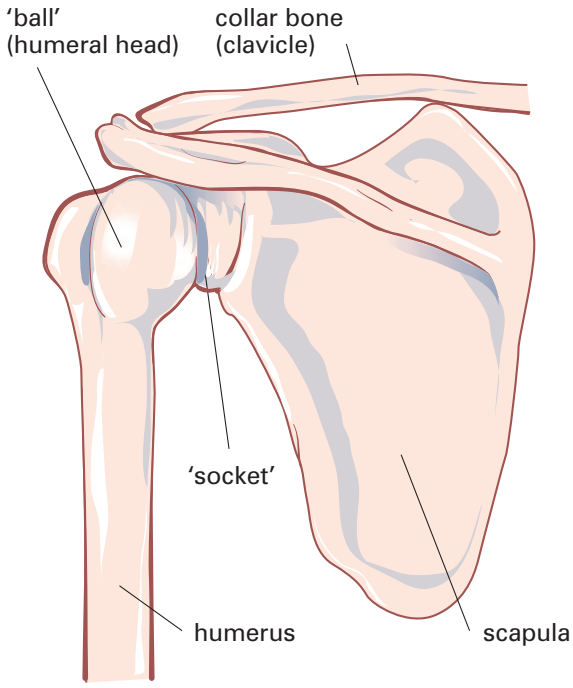
Types of joint

The types of joints that are particularly important for physical activity and sport are:

- **ball and socket joint**
- **hinge joint**
- **gliding joint**
- **pivot joint.**

Ball and socket joints

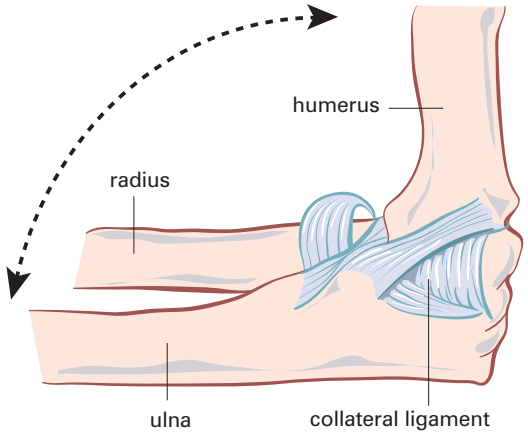
Of all the joints in the body, **ball and socket** joints allow the greatest range of movement. In this type of joint, one end of a bone is shaped like a ball, and it fits into a hollow socket at the end of another bone. This allows the joint to move up and down, from side to side and around. The joint is held together by ligaments and tendons, which give the joint stability. It is also a synovial joint, contained inside a capsule of synovial fluid and with hyaline cartilage on the two surfaces of the joint.



The shoulder joint is a ball and socket joint

The two main ball and socket joints are at the shoulder and at the hip. Move your whole arm around in different directions and you'll see just how great a range of movement this joint allows.

The shoulder joint allows the greatest range of movement: flexion, extension, abduction, adduction, and rotation. Bowling a cricket ball, for example, involves rotating the shoulder forward through a huge arc of movement. The hip joint allows a slightly smaller range. Both are vital joints for human movement, and are very strong.



A hinge joint: flexion and extension at the elbow

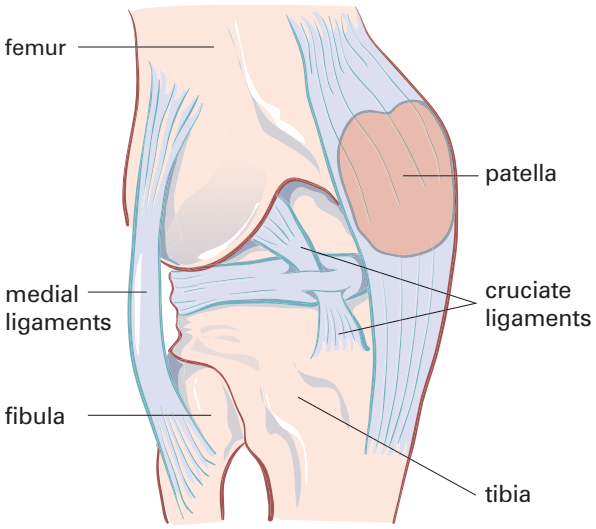
Hinge joints

Hinge joints allow extensive flexion and extension (bending and straightening of the joint), but only a very small amount of rotation. The main hinge joints are the knee and the elbow.

In this type of joint, there is no socket for the ends of the bones to fit together in. Instead, the two bone ends have smooth hyaline surfaces that are shaped to move against each other, backwards and forwards, with the minimum of friction. Strong ligaments stop the bones from sliding off to one side or the other. So this joint works just like a door hinge.

Every time you bend your elbow or your knee, you are using a hinge joint. Squats are a good example of the knee joint in action, while curls are an example of the elbow acting as a hinge joint.

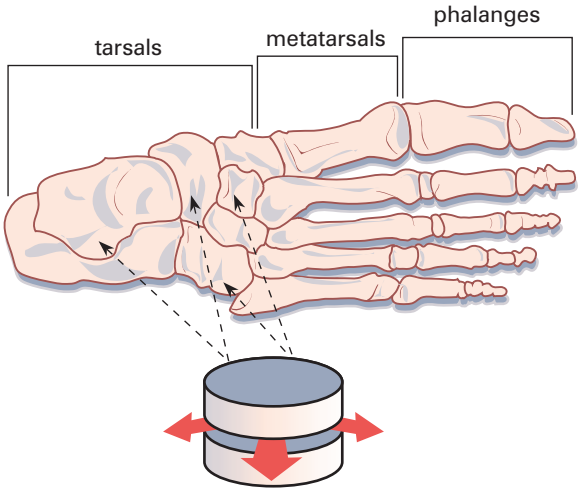
Like ball and socket joints, hinge joints are vital for movement and greatly affect participation and performance in sport – running, jumping and throwing all involve hinge joints. However, they have a more limited range of movement than the ball and socket as they can rotate only very slightly. This limited rotation can cause serious sporting injuries, especially at the knee as it has to support the weight of the body.



The knee joint: bound together by strong ligaments

The knee joint is, in effect, one bone, the tibia, balanced on top of another, the fibula, and held in place by ligaments. Strong twisting or turning of the joint puts great pressure on the ligaments holding the tibia and fibula together, and can damage them. This happens most often in sports involving physical contact or twists and turns, such as rugby or football tackles.

The knee joint is, the largest and most complex joint in the body. It is a synovial joint that also contains discs of white fibro-



Gliding joints between the bones of the foot

cartilage to absorb shocks. Damage to this joint can badly affect performance and participation, sometimes even ending professional careers.

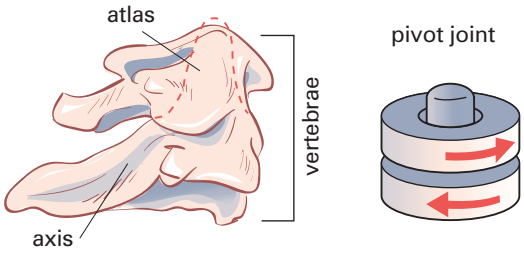
Gliding joints

Gliding joints allow flexion and extension through a slight gliding motion between the ends of the small bones of the hands and feet. These small bones can move over one another to increase the flexibility of the hands and the feet. Strong ligaments link them together and stop them from moving too far.

Pivot joints

Pivot joints allow only rotation. As the diagram at the top right of this page shows, a pivot joint works by the end of one bone having a 'peg' that fits into a 'ring' formed by the other bone.

There is a pivot joint at the top of the spinal column, between the axis and atlas bones of the neck. This joint allows us to turn, raise and lower our heads – crucial in controlling balance and maintaining awareness.



The pivot joint between the axis and atlas bones at the top of the spine

Joints and performance

Healthy and efficient joints are of paramount importance for performance in sport and physical activity. We have seen how joints are constructed in order to minimise friction and maximise free movement in the range the joint permits.

Because of this, it is very important to keep your joints as healthy as possible. **Flexibility** exercises can maintain a good range of movement, or even increase the range of movement joints allow. However, do not overstretch as this can damage ligaments and muscle tendons. Ligaments and tendons can also be strained or torn from violent movement and you should not undertake any activity without a full and correct warm-up procedure first. If you do injure a joint, then it should be allowed to heal properly, or you may face more permanent problems in later life.

Tasks

1. Explain how and why a synovial capsule protects synovial joints.
2. Describe, using the correct terminology, the movements at the elbow and knee joints during a basketball free throw.
3. Select *one* movement from each of three activities of your choice and describe, using the correct terminology, the movements involved at specific joints.