

**Lesson
Sixteen****Biology: Skeletons and
Health****Aims**

By the end of this lesson you should:

- know the main functions of the human skeleton
- understand some of the dangers that alcohol and other drugs pose to human health
- know more about the importance of diet for health
- understand the benefits of regular exercise.

Context

This lesson continues the work on human health started in Year 7, Lesson 21, and Year 8, Lesson One.



Oxford Home Schooling

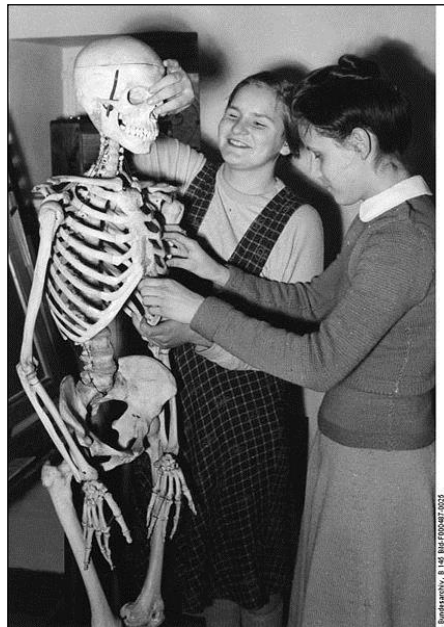
Introduction

This is our last Biology lesson, and in it we are going to look at two different things concerning our own bodies:

- the various functions (jobs) of the skeleton;
- some ways to avoid harming our bodies and to positively encourage them to be healthy.

We shall look at the skeleton first.

The Human Skeleton



http://commons.wikimedia.org/wiki/File:Bundesarchiv_B_145_Bild-F000487-0025,_Marburg-Lahn,_Blindenschule.jpg

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Three human skeletons: two of them covered up by other materials!

The human skeleton is made of several bones, held together at joints. It has not one, but three important jobs:

1. It provides **support**. If you have even seen a jellyfish stranded on a beach, you will have seen what we would look like without a skeleton! It is needed to hold us up and give us shape.

2. It **protects** some delicate organs, and stops them getting damaged. The **skull** protects the brain, the **ribs** protect the heart and lungs, and the **backbone** protects the delicate spinal cord (part of our central nervous system) that runs down a hole inside it.
2. It is important in movement, or **locomotion**. Muscles work by pulling on the **bones** they are attached to as they contract, which moves the bones around their **joints**. And as the bones move, the rest of the body follows.



http://commons.wikimedia.org/wiki/File:Barrel_Jellyfish_on_the_Beach_at_Criccieth_-_geograph.org.uk_-_463028.jpg

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A jellyfish stranded on a beach

Bone



Log on to Twig and look at the film titled: **Bones**

www.ool.co.uk/990ua

Bones are living, growing tissues. What are they made of and how do they develop from young to old?

The **bones** of the skeleton are made of a material called **bone**. To do its job, bone must be **hard**, but it must not be **brittle**. It is made of two components which between them give it these properties:

- Salts rich in **calcium** and **phosphorus** make it hard and stop it bending. For example your leg bones don't bend when you stand up.
- **Protein** makes it flexible rather than brittle. Glass is hard, but it is brittle; it certainly doesn't bend, but if you drop it it breaks! That would be useless for bones – they would break whenever you jumped downstairs!

Joints

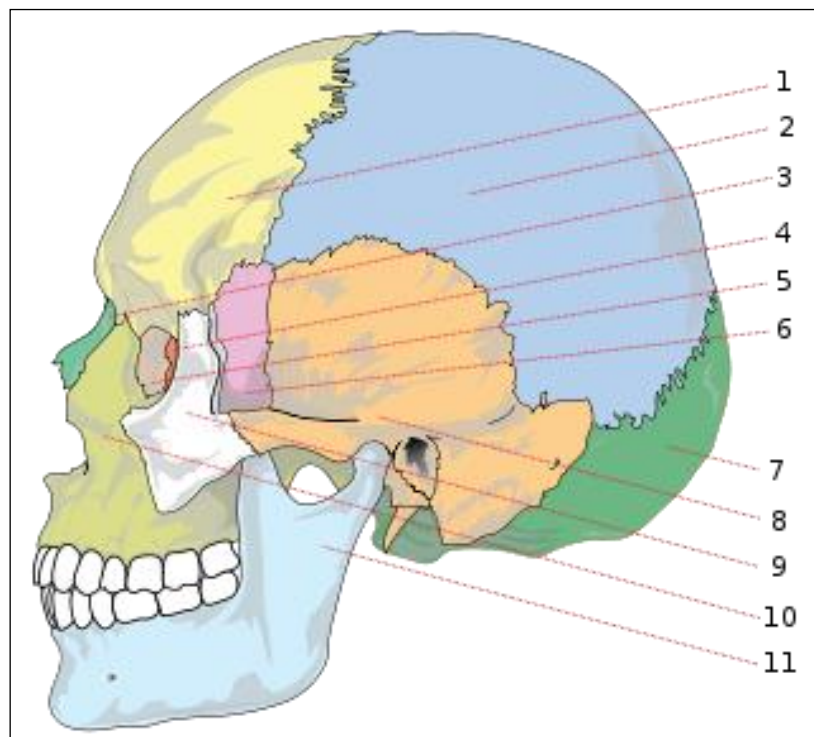


Log on to Twig and look at the film titled: **Joints**

www.ool.co.uk/994xk

An introduction to joint movements, including hinge, ball-and-socket and pivot joints.

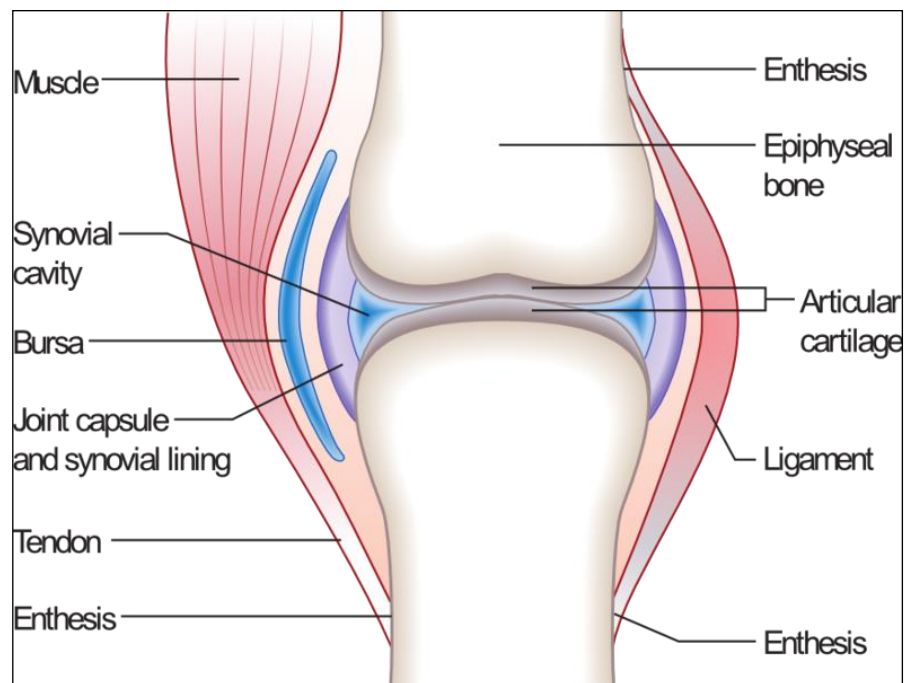
Bones are held together at **joints**. Some of these are immovable, for example the ones that join the separate bones of the skull together. But in our arms and legs they allow the bones to move compared to each other for locomotion.



http://commons.wikimedia.org/wiki/File:Human_skull_side_bones_numbered.svg

The skull is actually made up of eleven different bones, as shown

The two bones at a joint are held together by **ligaments**, so they don't fall apart from each other. The ends of the bones are covered with the smooth, tough material **cartilage**, and are lubricated by an oily **synovial fluid**, so the ends of the bones can move over each other without too much friction.



<http://commons.wikimedia.org/wiki/File:Joint.png>

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The structure of a joint is complicated, as you can see. You do not need to know the other names labelled on here. The synovial fluid is in the synovial cavity. The cartilage is called "articular cartilage", i.e. "joint cartilage", because it is also found elsewhere in the body.

Arthritis occurs when either the cartilage is lost, or too little synovial fluid is made. Movement becomes painful as the ends of the bones rub on each other.

Dislocation of a joint occurs when the ligaments are overstretched and the bones pop out of their normal positions.

Alcohol and other Drugs

In Lesson Seven of the Year 8 course we looked at the damage you can do to yourself by smoking to get the drug **nicotine**. In this section we look at some of the other drugs which people sometimes take. The most important of these, because it is used so much, is **alcohol**.

The Dangers of Alcohol



Log on to Twig and look at the film titled: **Alcohol: the Poison**

www.oool.co.uk/1646mf

Alcohol is a naturally occurring poison. What are the risks and health problems people can suffer from alcohol use or abuse?

Alcohol can be dangerous in two different ways:

- because it can damage our *organs*, and
- because of the way it changes our *behaviour*.

Too much alcohol damages the **brain** and the **liver**, among other organs. In particular it destroys a lot of the liver cells, causing a disease called **cirrhosis**. Unfortunately liver cells are unable to re-grow if they are killed, so cirrhosis is an incurable disease that gradually gets worse until it kills the sufferer. The only solution is a **liver transplant**, which is extremely expensive, and difficult to get because there is a shortage of livers to transplant.



http://commons.wikimedia.org/wiki/File:Lager_beer_in_glass.jpg

Alcohol changes our behaviour, making us less **inhibited** – less scared to do things we normally wouldn't. It also makes our **reactions** slower and impairs our judgement. This is a

lethal combination if someone is driving a car: the driver becomes less scared to take risks, has worse judgement of their ability to take the risks successfully, and reacts more slowly when things start to go wrong. This is why it is illegal to drive with more than a small quantity of alcohol in your blood.

Activity 1



Investigate the effects of alcohol on this website:
<http://www.drinkaware.co.uk/>.

Illegal Drugs

Some adults and teenagers break the law by taking one or more illegal drugs like marijuana, heroin, cocaine or ecstasy. These all alter your **mood**, generally making you feel happier *in the short term*. However:

- they often damage vital organs, especially if taken over a long period
- like alcohol, they also alter your behaviour, and can make you do silly things which harm yourself or others
- they are often **addictive**: once you have started them it becomes very difficult to stop, and you often need more and more of the drug to feel OK

Police estimate that more than half of the crime in our country is drug-related. This is often people stealing to get the money to buy the drugs they need because they have become addicted. Well over half of the people in our prisons are addicted to illegal drugs.



http://commons.wikimedia.org/wiki/File:Heroin_aufkochen.JPG

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A heroin addict prepares the drug he will inject into his veins

There is one simple way to avoid all of these problems: if someone offers you an illegal drug, SAY NO!

Activity 2



Find out more about illegal drugs and your health at this website provided by the National Health Service:
<http://www.nhs.uk/livewell/drugs/Pages/Drugshome.aspx>

Diet and Health

We looked at three important things about diet in Lesson One of the Year 8 course:

- A lack of **vitamins** can cause **deficiency diseases**. For example, lack of Vitamin C (found in fresh fruit and vegetables) causes scurvy.
- Too much **saturated (animal) fat** in the diet increases the risk of your arteries becoming blocked, leading to a **heart attack** or **stroke**.
- **Fibre** is needed in the diet to avoid **constipation** and to reduce the risk of **colon cancer**.

Two other things are important: not having too much sugar or too much salt in the diet.

1. As well as containing a lot of energy, which can contribute to **obesity**, eating a lot of sugar increases the risk of **diabetes**. This is when the body loses control of the amount of **glucose** in the blood, which is fatal unless treated. The treatment often involves repeated injections of **insulin** and being very careful about what you eat, and sufferers die younger than healthy people on average. Diabetes is increasing very fast in the UK, largely because of bad diet. Lots of sugar also encourages **tooth decay**.
2. Too much **salt** makes **high blood pressure** more likely, and this in turn causes heart attacks, strokes, kidney disease and other complications.

In the UK, many of our dietary problems come from eating too much “**fast food**”, and not enough food cooked from basic ingredients and including lots of vegetables. “Fast foods” are often very high indeed in animal fats, sugar and salt, and poor in fibre – not a good combination!



[http://commons.wikimedia.org/wiki/File:Fast_food_\(282678968\).jpg](http://commons.wikimedia.org/wiki/File:Fast_food_(282678968).jpg)

Here they are: all those fast foods that are bad for you!

Activity 3

1. Find out more about healthy eating on the government website: <http://www.eatwell.gov.uk/>
2. Keep a list of all the food you eat for three days. Divide the list into "healthy" and "unhealthy" using the above information. Then draw up an action plan for what to do about it!



The Benefits of Regular Exercise



Log on to Twig and look at the film titled: **What is Fitness?**

www.ool.co.uk/1649ys

Discover why fitness is not always obvious from appearance. Rather, it is a measurement of how well your body operates on a daily basis. Find out how BMI, heart rate and blood pressure indicate how fit you are.

Regular **exercise** is very beneficial to mental as well as physical health. It:


- makes you *feel* more positive, more relaxed, and more energetic;
- helps to prevent high blood pressure, with its dangerous complications (see above);
- helps to keep your weight under control, because it releases extra energy in respiration;

- increases the strength of your heart and the capacity of your lungs, making you more physically fit;
- helps long-term mobility in middle and old age;
- is fun!



http://commons.wikimedia.org/wiki/File:Jogging_Woman_in_Grass.jpg

To gain these benefits, the exercise should be *hard enough* and *regular*. You need a minimum of 30 minutes at a time, for a minimum of three days a week, for the best results. What you do to exercise (run, swim, cycle, play team sports) doesn't matter – what matters is that it is intense enough to make you breathe hard while you are doing it. Obviously it makes sense to achieve this doing an activity you enjoy!

<p>Activity 4</p>	<p>For a whole week, keep a record of how many minutes of proper exercise (enough to make you breathless) you have each day. Then decide whether you need any lifestyle changes.</p>
	Empty space for student work

Conclusion

In conclusion, here is a check-list of things to do (or not do) for a long and healthy life:

- Don't smoke. Ever.
- Don't take illegal drugs. Ever.
- If you drink alcohol, do so only in moderation, and never when you drive.
- Cut down on fats, sugar and salt in your food and increase the amount of vegetables and fruit.
- Take regular exercise

You will, of course, come across people who have broken all these rules and have lived to be 100. But bear in mind the other 999/1000 who also broke these rules and who died early. Don't bank on being lucky!

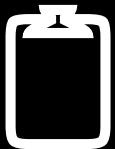
Activity 5



Investigate this topic on BBC Bitesize at

<http://www.bbc.co.uk/schools/ks3bitesize/science/>. Click on "Organisms, behaviour and health" and then explore all of the material under "Diet, drugs and health".

Extension Activity



Design an informative and persuasive poster on the topic of healthy living, aimed at people of your own age.

Keywords

Support
Locomotion

Arthritis
Dislocation

Protection	Nicotine
Ribcage	Cirrhosis
Skull	Inhibited
Spinal cord	Mood
Bone	Addictive
Bones	Diabetes
Brittle	Insulin
Joints	High blood pressure
Ligaments	Fast food
Synovial fluid	Exercise
Cartilage	

Self-Assessment Activities

The following passage was written by a very confused student. Correct their mistakes, and then try the passage out on a friend:

“The human skeleton is made up of several bone joined together by tendons. The skull protects the brain and the spinal cord protects the backbone. The skeleton supports us, and it helps us move when the ligaments contact.

Drinking alcohol can be dangerous because it speeds up our reactions and raises our inhibitions. It can also cause cirrhosis, a disease of the brain.

A healthy diet is very important. You should eat lots of vegetables and salt, but not too much fast food. Too much sugar can cause tooth decay and kidney damage, while too much animal fat makes a heart attack more likely.

Regular exercise is healthy, because it keeps your blood pressure high and makes your heart and liver stronger. However, it can make you feel tense and can make you less mobile in old age.”