

# **Twenty First Century Science**

## **PILOT Examination Questions**

### **GCSE Science Jan 2005**

**Keeping healthy, Radioactive materials, Life on Earth  
(Foundation Tier)**

#### **Please note:**

- **These questions are not Sample Assessment Materials (SAMs) for the new OCR specification (for Sept 2006).**
- **The style of question varies from that used for the new specifications.**
- **For up to date SAMs see the OCR website:  
[www.gcse-science.com](http://www.gcse-science.com)**
- **These questions are provided for classroom use by teachers, to develop students' understanding of Ideas about Science.**
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Answer **all** the questions.

1 Your body has methods of stopping harmful bacteria getting in.

Finish labelling the diagram.

Choose the **best** words from this list.

**acid**

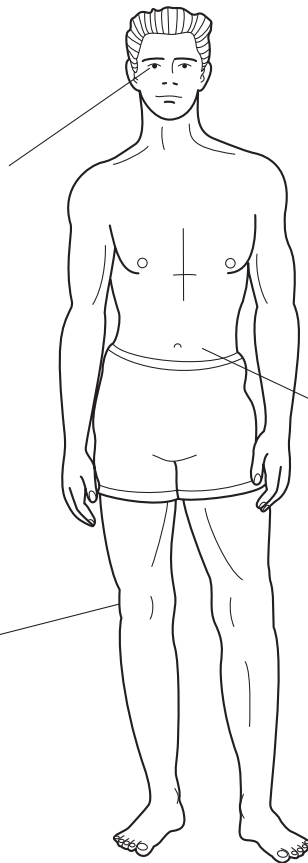
**alkali**

**muscle**

**skin**

**tears**

Chemicals in .....  
make an antiseptic liquid  
that kills bacteria.



Stomach .....  
kills bacteria in food.

.....  
acts as a barrier  
to bacteria.

[3]

[Total: 3]

2 This question is about evolution.

(a) Draw a straight line from each **scientific term** to its **correct meaning**.

One line has been drawn for you.

scientific term	meanings of scientific terms
fossil	Organisms that are most suited to the environment survive and produce more offspring.
evolution	The preserved record of a dead organism.
extinction	A species fails to adapt to changes in the environment and so dies out.
natural selection	Changes to organisms over many generations.

[2]

(b) Finish this sentence by putting a **ring** around the correct words.

Life on Earth first began ...

**hundreds of  
years ago.**

**thousands of  
years ago.**

**millions of  
years ago.**

[1]

[Total: 3]

3 Heart disease is a major cause of death in the UK and the USA.

(a) There are some factors that can make you more likely to suffer from heart disease.

Put a tick (✓) in the **two** boxes next to the factors that are most likely to cause heart disease.

- genetic inheritance
- lifestyle
- micro-organisms
- temperature
- water pollution

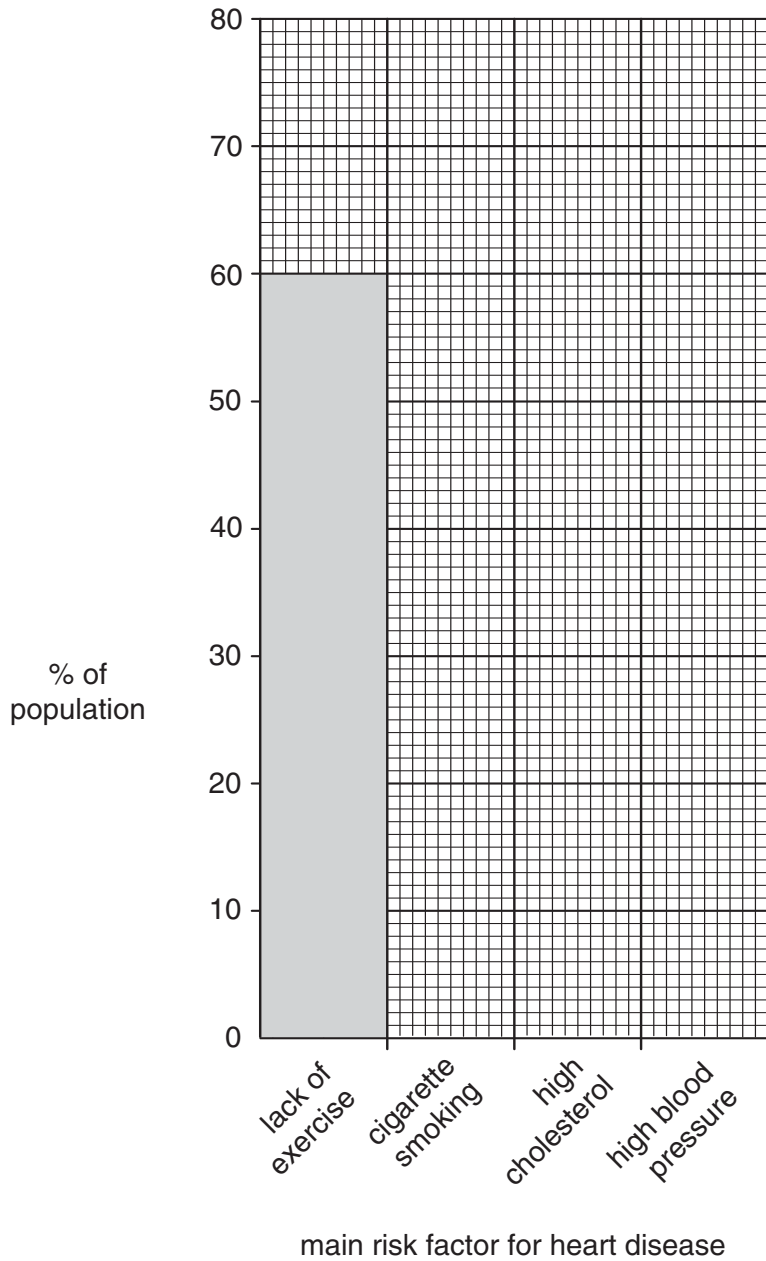
[2]

(b) Scientists in the USA carried out a study about risk factors that cause heart disease.

The table shows the percentage (%) of the population in the USA and their main risk factor for heart disease.

% of population	main risk factor for heart disease
60	lack of exercise
20	cigarette smoking
10	high cholesterol
10	high blood pressure

- (i) Use this information in the table to finish the bar chart.  
One bar has been done for you.



- (ii) Which risk factor for heart disease is the most common? [2]

..... [1]

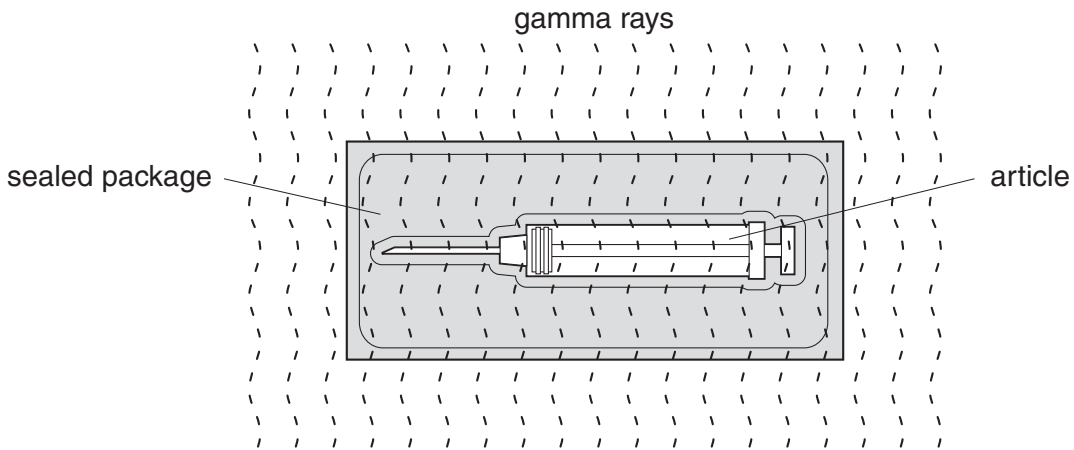
- (c) Researchers have said the report of the study carried out in the USA is not reliable because it does not provide enough information.

Suggest other information that needs to be included to make the report of the study **more reliable**.

..... [1]

[Total: 6]

- 4 Many medical products are sterilised using gamma radiation. The radiation passes through packaging to sterilise the product inside.



- (a) Radioactive materials emit three different types of radiation. One type is gamma radiation.

Name the other **two** types.

1 .....

2 ..... [2]

- (b) What property of gamma rays makes them suitable for sterilising medical products?

.....  
 ..... [1]

- (c) The sterilising process takes place in a box made of reinforced concrete, two metres thick.

Explain why the concrete box is necessary.

.....  
 ..... [1]

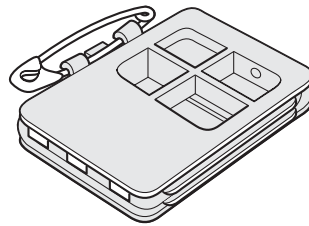
- (d) A radioactive source commonly used is cobalt-60.

This has a half-life of 5.26 years.

Explain what is meant by saying that cobalt-60 has a **half-life** of 5.26 years.

.....  
 .....  
 ..... [2]

- (e) Workers who operate the sterilisation process wear a badge to record their exposure to ionising radiation.



- (i) The badge shows that even when not at work the workers are exposed to a small amount of ionising radiation.

What is this radiation called?

..... [1]

- (ii) The amount of ionising radiation that the workers are exposed to must be limited.

Explain why.

.....  
 .....  
 ..... [2]

- (f) The badge can be used to calculate the radiation dose the worker has received.

- (i) What is the unit used to measure the radiation dose received?

..... [1]

- (ii) What information does the measured radiation dose give us about any problems for the worker?

..... [1]

- (g) Name **two** other groups of people who need to have their exposure to radiation monitored.

1 .....

2 ..... [2]

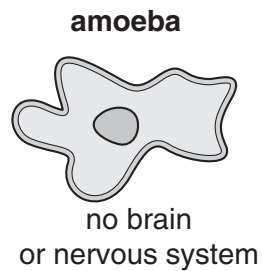
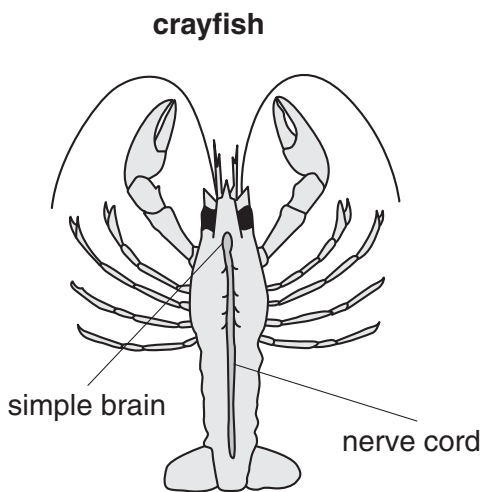
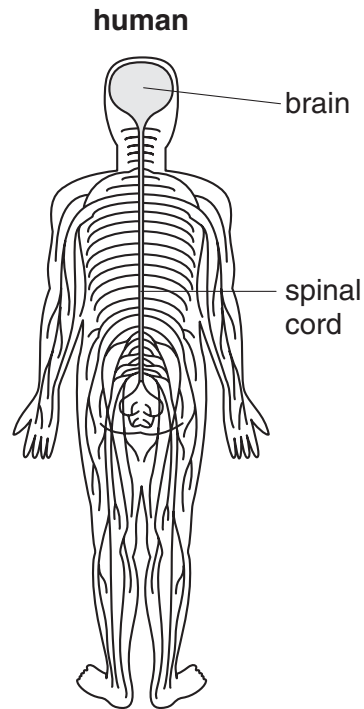
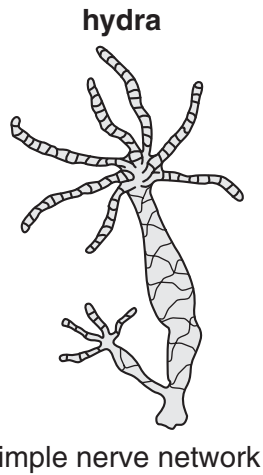
[Total: 13]

5 Single-celled animals have no brain or nervous system.

Some animals have a highly developed brain and a complex nervous system.

The complex nervous system allows the animal to detect changes in its environment. The animal can then respond to the changes.

(a) The diagrams show different animals and their nervous systems.



(i) List the animals in order, from the simplest nervous system to the most complex nervous system. The first one has been done for you.

simplest nervous system ..... *amoeba* .....

.....

.....

most complex nervous system .....

[2]



(ii) Finish the sentences. Choose words from this list.

- brain
- learn
- move
- neurone
- slower
- successful

The behaviour of the crayfish is more complex than that of the amoeba.

This is due to the development of a .....

Humans have developed the ability to ..... from experiences and to make decisions. This has allowed them to become more .....

[3]

(b) The human has a central nervous system.

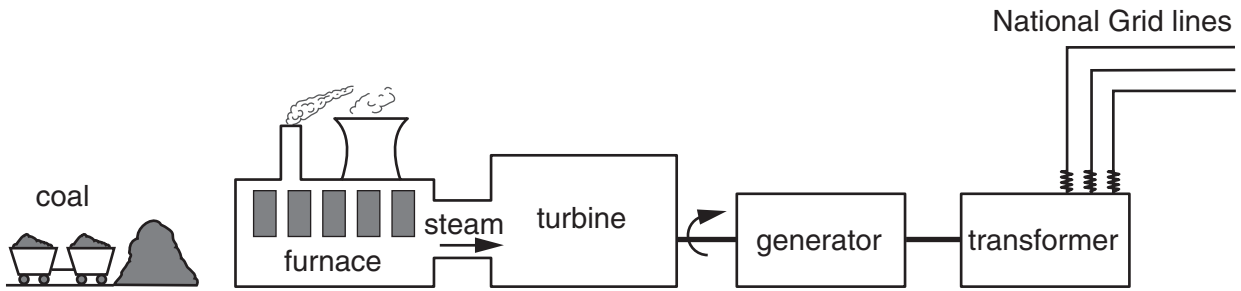
Put ticks (✓) in the **two** boxes next to the parts that make up the central nervous system.

- brain
- muscle
- effector
- receptor
- spinal cord

[2]

[Total: 7]

6 (a) The diagram shows how a coal-fired power station generates electricity for the National Grid.



(i) Use the words in the diagram to complete the sentences.

Coal is burned in the .....

Water is heated to produce ..... which drives the turbine.

The rotating turbine makes the ..... spin, which produces electricity. [3]

(ii) Give **two** reasons why electricity is such a useful source of energy.

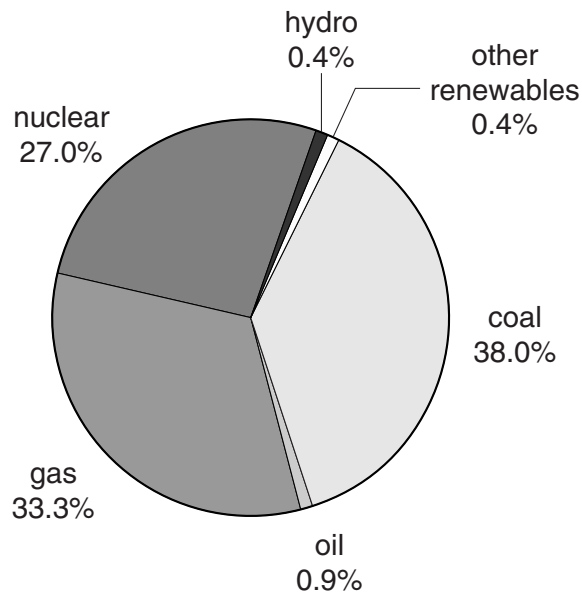
1 .....

.....

2 .....

..... [2]

- (b) The chart shows the sources used to generate electricity in the United Kingdom in 2002.



Calculate the **total** contribution of renewable energy sources to power generation in 2002.

renewable energy = ..... % [1]

- (c) The government aims for 10% of all electricity to be generated from renewable sources by 2010.

Read this information.

### Wind farms planned for Britain's coasts

Huge areas off the coasts of Britain will be opened to huge wind farms.

Each may contain up to 300 turbines.

Up to 20 000 new jobs will be created.

Campaigners describe this as the dawn of a new clean energy age.

The new turbines will be the biggest ever anywhere in the world.

They will be sited five miles out to sea to lessen the visual impact.

The first project involves 30 turbines off the North Wales coast.

The energy produced by the proposed new developments will be enough to power more than 3.5 million households.



- (i) Write down **two** benefits of building wind farms to generate some of the country's electricity.



One mark is for using correct spelling, punctuation and grammar.

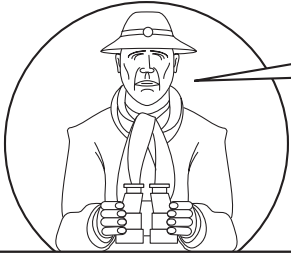
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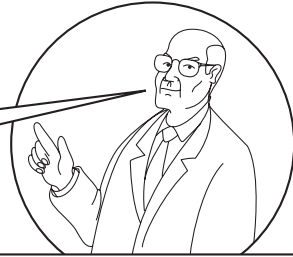
..... [2+1]

(ii) Some people are not convinced about building wind farms on this scale. Here are some of their thoughts.



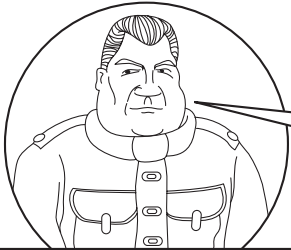
a keen birdwatcher says

Research shows that wind farms kill birds. An offshore farm in North Wales could harm the last colony of little terns in Wales. The birds are protected 24 hours a day on land, but we have no idea where they feed.



said an energy expert

Wind power is not completely clean. You have to build huge concrete foundations under the sea. There will have to be a land based station and service roads and so on. Power stations will have to be kept on standby for when the wind isn't blowing.



a man who lives on the Welsh coast says

The government is more interested in big projects and not in energy conservation. They should tell people to use less energy. I'm in favour of renewables but not at the expense of our countryside and coast.

Write down **two** arguments people could use against building wind farms.

1 .....

2 .....

[2]

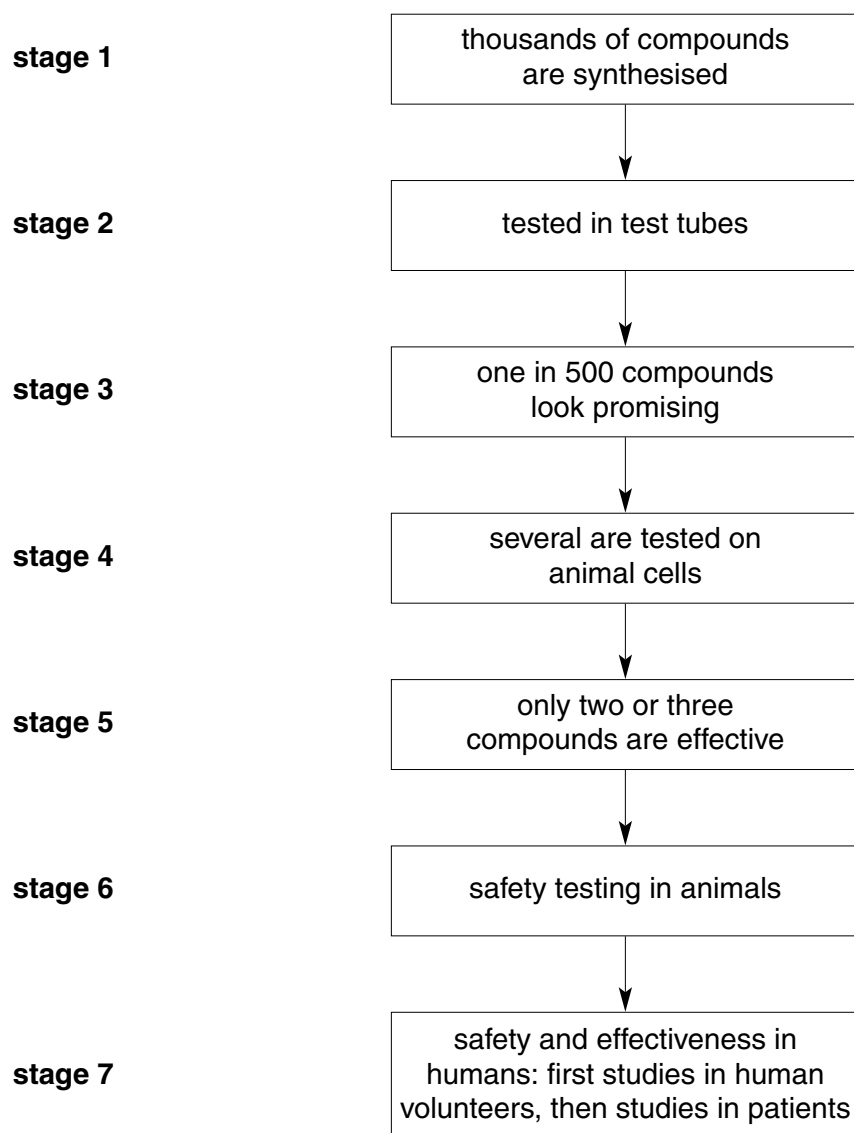
[Total: 11]

7 Many new drugs are developed from natural sources.

Many natural substances have some drug activity but they often have harmful side effects.

Scientists try to develop new drugs from these natural substances.

The scientists follow a standard procedure for researching and developing a new medicine.



(a) Explain why the chemicals are not tested on humans before **stage 7**.

.....

.....

.....

..... [2]

(b) Explain why studies are carried out on human volunteers, before the patients in **stage 7**.

.....  
.....  
.....  
..... [2]

(c) Different people have different views about using animals in medical research.

Suggest why some people disagree with using animals in medical research.




One mark is for a clear, ordered answer.

.....  
.....  
.....  
..... [2+1]

[Total: 7]

8 This is part of a leaflet that was issued by the Department of Medicines Management.



**Do you have cough, cold or flu symptoms?**

**Do you have cough, cold or flu symptoms?**

**AAA CHOO!**

Coughs, colds and flu are caused by viruses.

Each year, most people suffer from at least one bout of flu, or a cough and cold.

**Antibiotics** will not help you if you have a cold or flu.

(a) Explain what causes the symptoms of flu.

.....

.....

.....

..... [2]

(b) Explain why flu cannot be treated with antibiotics.

.....

.....

.....

..... [2]



(c) A vaccination against flu has been developed.

Some people, such as the elderly and people with long-term diseases, may become seriously ill if they catch flu.

These people are encouraged to have the flu vaccination.

Explain why people are encouraged to have a vaccination.

.....

.....

.....

..... [2]

[Total: 6]

9 The twin spacecraft Voyager 1 and Voyager 2 were launched by NASA in 1977.



The spacecraft travelled across our Solar System, sending photographs and information about different planets back to Earth. By 1989, the spacecraft had explored all the giant outer planets of our Solar System and 48 of their moons.

(a) Explain why spacecraft have not visited all the stars and planets within our Universe.

.....  
.....  
.....  
..... [2]

(b) Space exploration is very expensive.

Suggest why scientists want to find out more about space.

.....  
.....  
.....  
..... [2]

[Total: 4]

**END OF QUESTION PAPER**