

Twenty First Century Science

PILOT Examination Questions

GCSE Science June 2004

**Food matters, Material choices, Radiation and life
(Foundation Tier)**

Please note:

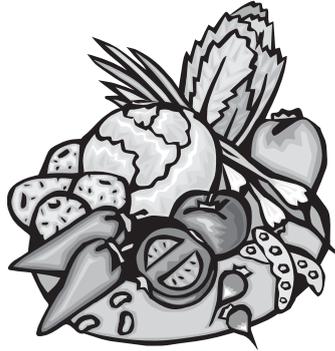
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- **The style of question varies from that used for the new specifications.**
- **For up to date SAMs see the OCR website:
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Answer **all** the questions.

1 (a) Food can taste nice and look good.



There are other possible reasons why we eat food.

Put ticks (✓) in the **two** correct boxes.

Food can contain toxic chemicals.

Food contains harmful microorganisms.

Food contains chemicals needed to stay alive.

Food provides energy.

[2]

(b) Liz likes chips.



Chips contain starch, protein and fats.

These are changed into **smaller, soluble** molecules by digestion.

(i) Write down **two** reasons for these changes.

1

2 [2]

(ii) Draw a straight line from each food to the result of digestion.

One line has been drawn for you.



[2]

(c) We sometimes eat **harmful** chemicals.

Which organ in the body changes them into **harmless** chemicals?

Choose from this list.

Put a ring round the correct answer.

brain
heart
liver
stomach

[1]

[Total: 7]

2 This question is about the risks associated with having a dental X-ray examination.

(a) X-rays are a member of the electromagnetic spectrum family of radiations.

Finish the diagram of the electromagnetic spectrum.

Choose words from this list.

alpha beta microwave ultrasound X-ray

radio		infrared	visible	ultraviolet		gamma
-------	--	----------	---------	-------------	--	-------

[2]

(b) Read the information below and answer the questions.

The National Radiological Protection Board provides data about the risk of cancer being caused by ionising radiation.

The risk of getting cancer at some time in your life is 1 in 3. Some of this risk is due to the background radiation we all receive.

On a flight to Spain, a passenger is exposed to as much radiation as from 4 days' background radiation.

A single dental X-ray is equivalent to two days' background radiation.

A single dental X-ray increases the risk of getting cancer by less than 1 in one million.

A professor of public health has carried out research into the work of dentists. He has reported that dentists are carrying out unnecessary treatment to get more money.



Patients do not need a check up every six months and X-ray examinations are only required every five years.

Tooth decay happens so slowly that frequent X-rays are unnecessary.

The dentists' organisations disagree.



X-rays are only carried out when necessary. All patients are different. People at high risk of tooth decay should have X-rays every six months; those with a moderate risk every year and those in the low risk group every two years.

(i) What do X-rays do, in the body, that may cause cancer?

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

(ii) Compare the risk of having a dental X-ray with flying to Spain.

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

(iii) Why does the professor say that X-rays are only required every five years?

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

(iv) Suggest the **benefit** of giving an X-ray examination to a patient when the dentist thinks it is necessary.

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

(v) Use your ideas about risk to explain why a patient should not have more X-rays than is necessary.

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

[Total: 8]

3 Crude oil is an important natural resource.

(a) What does crude oil look like?

Put ticks (✓) in the **two** correct boxes.

black

colourless

solid

tarry

[2]

(b) Finish the sentences about crude oil.

Choose from this list.

fibres

hydrocarbons

recycled

refined

Crude oil is a mixture which consists mainly of

The mixture is by the petrochemical industry.

[2]

(c) Many things are made from crude oil.

Put (circled) **rings** round **two** things made from crude oil.

copper

cotton

lubricant

petrol

silk

[2]

(d) Cling film is a polymer obtained from crude oil.

What is a polymer?

Put a tick (✓) in the box next to the **best** answer.

a runny substance

a thin material

a long chain molecule

a see-through material

[1]

[Total: 7]

- 4 The table gives information about some metals.

name of metal	melting point in °C	strength of force holding metal atoms together
mercury	-39	not very strong
aluminium	660	strong
barium	714	strong
iron	1535	very strong

- (a) How is the melting point of the metals linked to the strength of forces holding the metal atoms together?

.....
[1]

- (b) The metal chromium has a melting point of 1890 °C.

Suggest what strength of force holds the atoms of chromium together.

.....[1]

- (c) Scientists now consider the full impact on the environment of any product. This is called the Life Cycle Assessment.

Which **two** of the following would scientists consider in a Life Cycle Assessment when extracting a metal from its ore?

Put ticks (✓) in the **best two** boxes.

colour of the ore

disposal of the metal after use

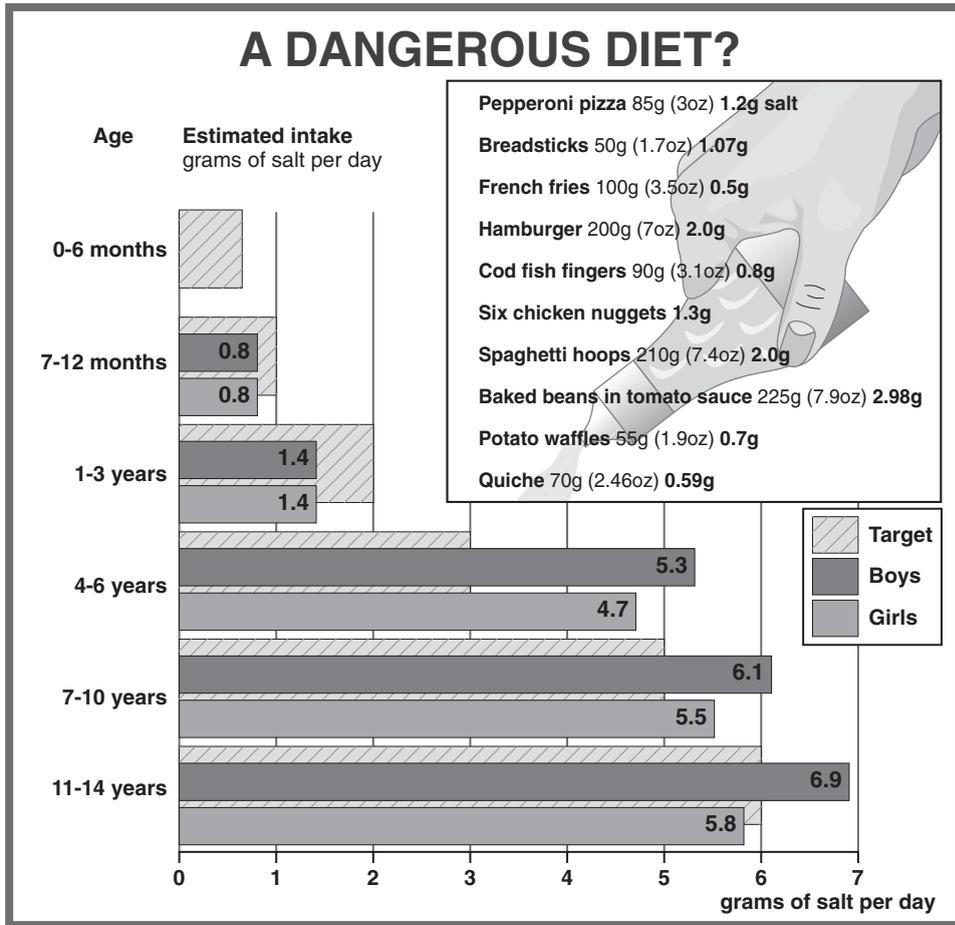
energy used in extracting the metal

melting point of the metal

[2]

[Total: 4]

5 A Public Health warning about the levels of salt in our diet was given in May 2003.



Use the information in the diagram to answer the following questions.

(a) (i) Finish the following sentence.

Choose from this list.

- increases decreases stays the same**

The salt intake in **both** boys and girls as they get older. [1]

(ii) Finish the following sentence.

Choose from this list.

- more than less than the same as**

The salt intake in **boys** aged 11-14 years is for girls of the same age. [1]

(b) John is 5 years old.

For his tea, he eats:

one 200g hamburger

225g baked beans.

In his tea, has he eaten more than the target (recommended) amount of salt for one day?

Work out the following amounts to help you find the answer.

total intake of salt in John's tea g

recommended intake of salt for one day grams per day

answer [2]

(c) Most food companies add salt to improve the taste of food. It also acts as a preservative.

Too much salt in food increases the risk of heart disease, high blood pressure and strokes.

Explain why food companies,

- **may not want** to reduce the amount of salt in their foods

.....

.....

- **should be made** to reduce the amount of salt in their foods.



(One mark is for giving a clear, ordered answer.)

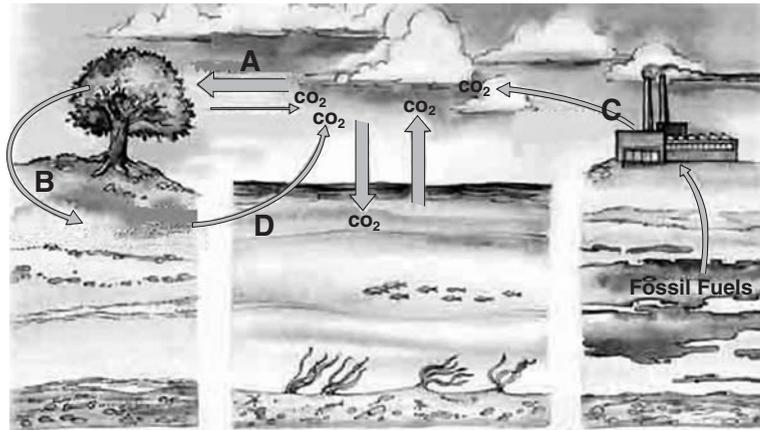
.....

.....

.....[4+1]

[Total: 9]

6 The diagram shows part of the carbon cycle.



(a) The labels **A**, **B**, **C** and **D** on the diagram show four of the processes in the carbon cycle.

Complete the sentences below. Choose words from this list.

- burning**
- decomposing**
- inspiration**
- photosynthesis**
- respiration**

- A** Plants take up carbon dioxide from the atmosphere during the process of
.....
- B** Carbon is returned to the ground by dead plants
- C** Carbon locked in the ground is released back into the atmosphere by
.....
- D** Carbon dioxide is released into the atmosphere by living organisms during
.....

[4]

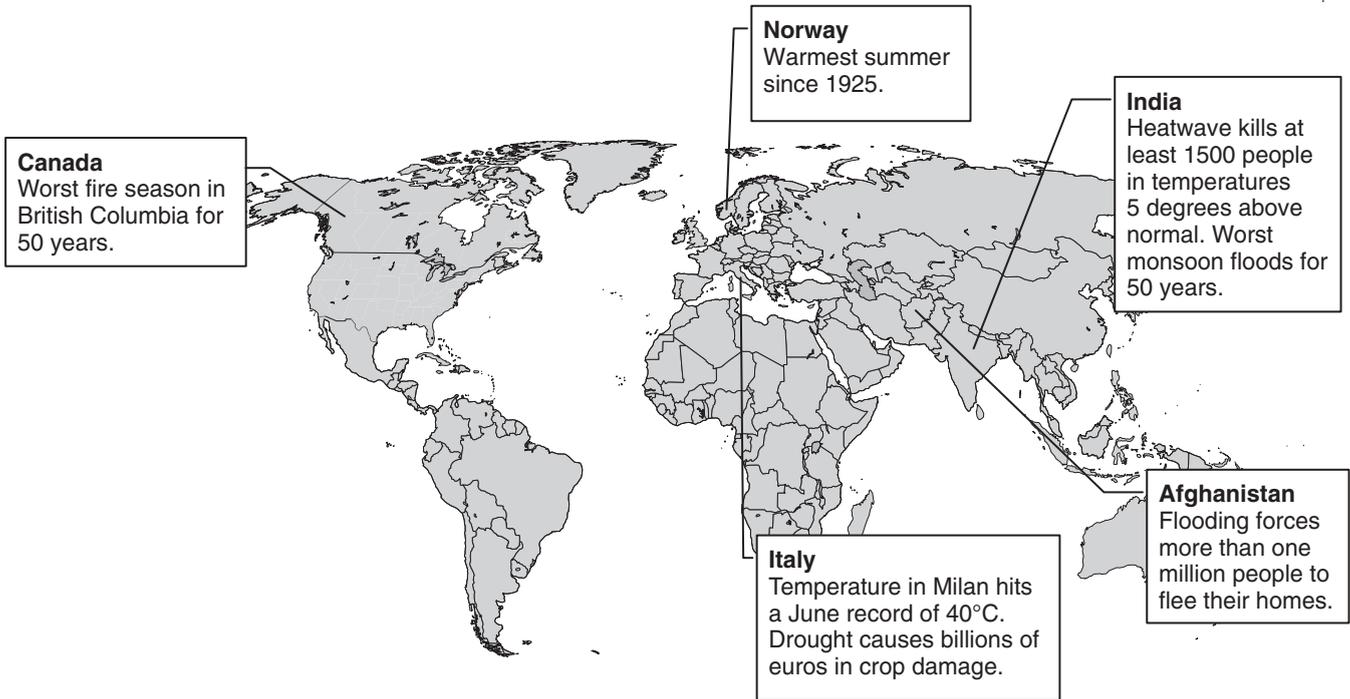
(b) The level of carbon dioxide in the atmosphere has increased over the past 200 years. Explain why.

.....

.....

.....[2]

- (c) The increase in carbon dioxide in the atmosphere has been blamed for global warming. In August 2003, temperatures across the World reached record levels. The map shows some of the effects.



- (i) Write down **three** effects that the high temperatures have had on people's lives.

1

.....

2

.....

3

.....[3]

(ii) Read this newspaper report.

Global warming may be speeding up, fears scientist

A climate scientist said that the high temperatures could be evidence of global warming.

He warned that several months' research would be needed to analyse data from around the world before scientists could say why the heatwaves are so intense this year.

"What we are seeing is absolutely unusual," said the scientist. "We know that global warming is happening, but most of us thought that we would be seeing hot spells like this in 20-30 years time. But it's happening now. Clearly extreme weather events will increase."

based on *The Guardian* 6th August 2003

The scientist says that the heatwave **could be** evidence of global warming.

Suggest **two** reasons why the scientist cannot be certain.

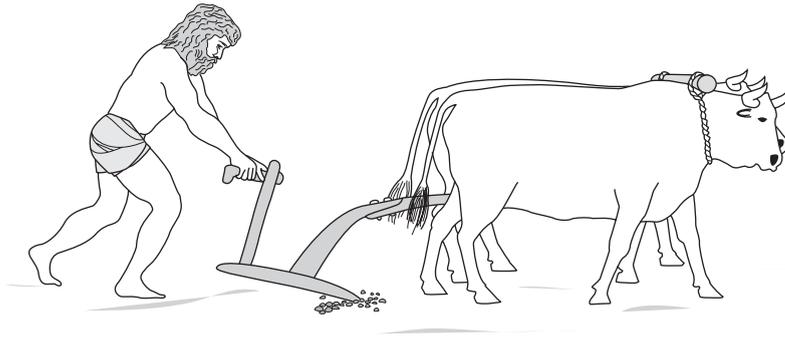
(One mark is for spelling, punctuation and grammar.)



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

[Total: 12]

7 Thousands of years ago, farmers used a “slash and burn” method to grow crops.



A small area of forest was burned and crops planted.

After a few years of growing the same crops, the yield (amount harvested) fell.

The farmers then moved on to another area of forest.

(a) Write down **two** reasons why the crop yield fell after a few years.

1

2[2]

(b) Modern farmers are able to grow crops with high yields without moving to a new area.

Suggest **two** reasons for this.

1

2[2]

[Total: 4]

8 Tom works as a scientist with a company that makes rubber products.

He carries out tests on two samples of rubber.

Sample **A** has been heated with chemicals. This is called vulcanised rubber.

Sample **B** has not been treated. This is unvulcanised rubber.

He tests the samples for the following

- the resistance to breaking when it is stretched (tensile strength)

The higher the value, the less likely it is to break.

- hardness.

The higher the value, the harder the rubber is.

Tom does each test five times.

The table shows Tom's results.

	tensile strength in MPa	hardness
sample A (vulcanised rubber)	33 34 33 34 36	43 38 45 65 40
sample B (unvulcanised rubber)	3 4 2 5 3	22 29 24 28 25

(a) (i) Work out the best estimate for the tensile strength of sample **A** by calculating an average value.

You **must** show how you work out your answer.

..... MPa [2]

(ii) Explain why Tom repeated each test and took an average.

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

(iii) There are small differences in the repeat measurements.

Suggest **one** reason why.

.....[1]

(b) Look at Tom's results for the hardness of sample **A**.

Tom thinks that the best estimate for the hardness of sample **A** lies in the range 38 to 45.

Explain why.

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

(c) The discovery of the process for vulcanising rubber was important in the manufacture of car tyres.

How do Tom's results confirm this?

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

[Total: 9]

END OF QUESTION PAPER