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Answer **all** the questions.

1 Scientists have collected evidence to support their ideas about evolution.

(a) Finish the sentences by choosing the best words from this list.

DNA enzymes fossils skeletons

(i) Much of this evidence is in the form of made from the remains of the dead bodies of living things. [1]

(ii) More recently, scientists have been able to analyse the chemicals which control how organisms develop.

These chemicals are called [1]

(b) Read the following article about how life on Earth might have begun.

Was life on Earth born in a clay womb?

- 1.** Volcanoes under the ocean produce the right mixture of chemicals to form the building blocks of life.
- 2.** The temperature near these volcanoes is too hot for life.
- 3.** Scientists think that lumps of clay may have protected these building blocks of life from the high temperatures.
- 4.** Laboratory experiments have identified a type of clay which can do this.

(i) Which sentence, **1**, **2**, **3** or **4**, contains a hypothesis?

answer [1]

(ii) Which sentence, **1**, **2**, **3** or **4**, contains the evidence to support the hypothesis?

answer [1]

[Total: 4]

2 Giraffes feed on tree leaves.

Giraffes have evolved from ancestors which had shorter necks.

Scientists have proposed two explanations of how this may have happened.

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Details:
photograph of a giraffe

Explanation A:

- when there was little food, giraffes with longer necks survived
- they passed on their genes
- over many generations, the neck length of giraffes increased.

Explanation B:

- male giraffes with longer necks are preferred as mates by female giraffes
- they passed on their genes
- over many generations, the neck length of giraffes increased.

Choose the **best** word from the list to complete the sentences.

deductions

evidence

imagination

predictions

(a) To think of their explanations, scientists need [1]

(b) Both explanations can be tested because they allow you to make [1]

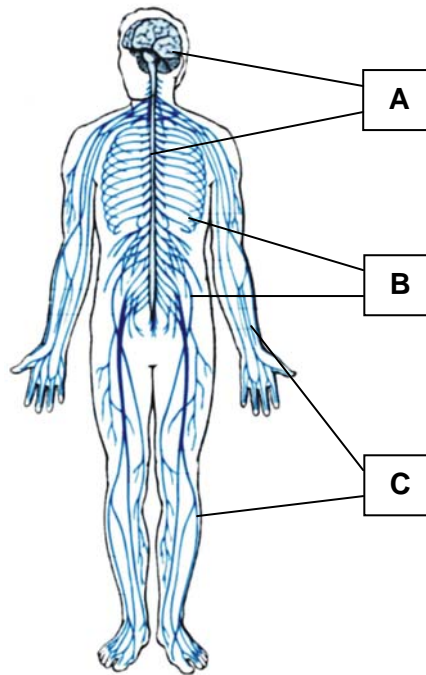
(c) **Explanation B** is becoming more widely accepted because it is supported by better

.....

[1]

[Total: 3]

3 This is a question about nervous systems.



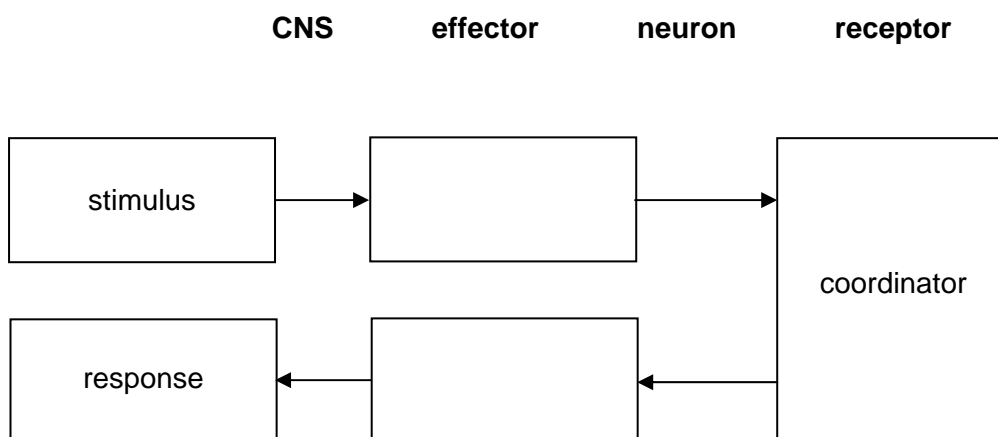
(a) Which of the labels, **A**, **B** or **C**, is the **Central Nervous System** on the diagram?

answer [1]

(b) Nervous systems have evolved to allow animals to respond quickly to changes in their environment stimuli.

The flow chart below shows how this works.

Choose the best words from the list to complete the flow chart.



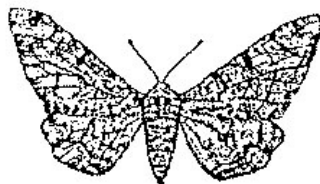
[2]

[Total: 3]

- 4 Some moths come in two forms, grey speckled and black.

Moths are eaten by birds.

An experiment was carried out in a wood in Birmingham to find out which form of moth survived better.



Grey speckled moths and black moths were marked on the underside of their wings and placed on tree bark. They were left and the survivors collected later the same day.

- (a) Here are some of the results.

	grey speckled moths	black moths
number of moths released	64	164
number of moths recaptured	16	82
percentage recaptured	25	

Calculate the percentage of black moths recaptured. Write the result in the table.

[1]

- (b) Which is the best explanation for calculating the **percentages** of moths recaptured?

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

It is more scientific to use percentages.

☐

Everyone understands what a percentage is.

☐

Different numbers of moths were released.

☐

Different numbers of moths were recaptured.

☐

[1]

- (c) In Birmingham, more black moths survived than grey speckled moths. Scientists think that this is due to human activity changing the environment. Rapid environmental change can cause species to become extinct.

The table shows some other possible **causes of extinction**.

Some extinctions are due to **direct** human activity, some are due to **indirect** human activity, and some are **natural** processes.

For each of the **causes of extinction** in the table, put ticks (✓) in the correct boxes.

causes of extinction	direct	indirect	natural
hunting for food			
expansion of towns			
evolution of new disease			

[2]

[Total: 4]

- 5 This is a question about organic farming.

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Details:
 photograph of a combine harvester loading
 harvested wheat into a container on the
 back of a tractor

- (a) Different things will change the amount of wheat a farmer can grow.

Finish the sentences by choosing the **best** word(s) from the list.

decrease increase stay the same

By adding fertilisers to the soil, the amount of wheat grown will

If pests attack the crop, the amount of wheat grown will [2]

- (b) Fred is an organic farmer. He has to follow the standards for his farm set by the Soil Association.

Which of the following will he be expected to do on his farm?

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

use pesticides to kill insects that eat his crops

☐

rotate the crops by growing a different crop in each field every year

☐

spread manure on his fields

☐

put chemical fertilisers onto his fields

☐

not use any kind of fertiliser

☐

[2]

An image has been removed due to copyright restrictions.

Details:
a photograph of a mother and toddler
looking at organic vegetables on display
in a supermarket

- (c)** Kate's mother likes to buy organic fruit and vegetables.

She thinks that organic farming is better.

Here are some sentences about organic farming.

Next to each sentence, write **A** if it is an **advantage** of organic farming or **D** if it is a **disadvantage**.

One has been done for you.

	A advantage	or	D disadvantage
Pests can be found in fruit and vegetables.	D		
Fruit and vegetables are smaller.			
Crops grow without damaging the soil.			
Fruit and vegetables are more expensive.			

[2]

[Total: 6]

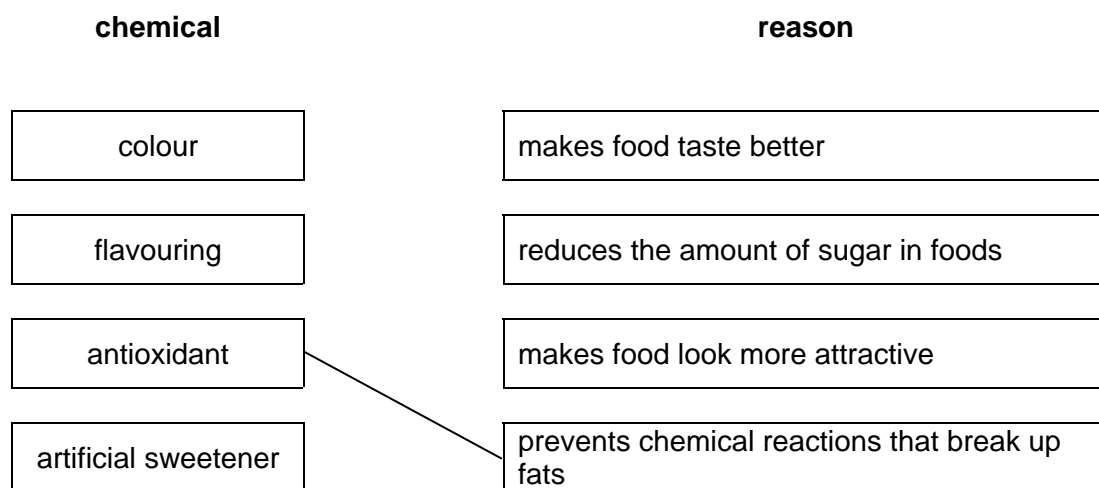
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- 6 Many different chemicals can be added to foods before they are sold.

Draw a straight line from each **chemical** added to food to the **reason** why it is added.

One has been done for you.



[2]

[Total: 2]

7 Read this article from a website.

How a fatty diet may cause diabetes

Researchers say they have discovered how a high-fat diet may increase the risk of type 2 diabetes.

The study was carried out on mice. The researchers hope their findings will lead to new ways to treat and prevent diabetes in people.

The number of people with diabetes has soared to over two million in the UK.

Of these, 85% have type 2 diabetes. This is linked to obesity.

(from Diabetic Society web site)

(a) What type of diabetes is linked with obesity?

answer [1]

(b) Why was the study done?

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

to find out why two million people have diabetes

☐

to find new ways to treat and prevent diabetes

☐

to stop people becoming fat

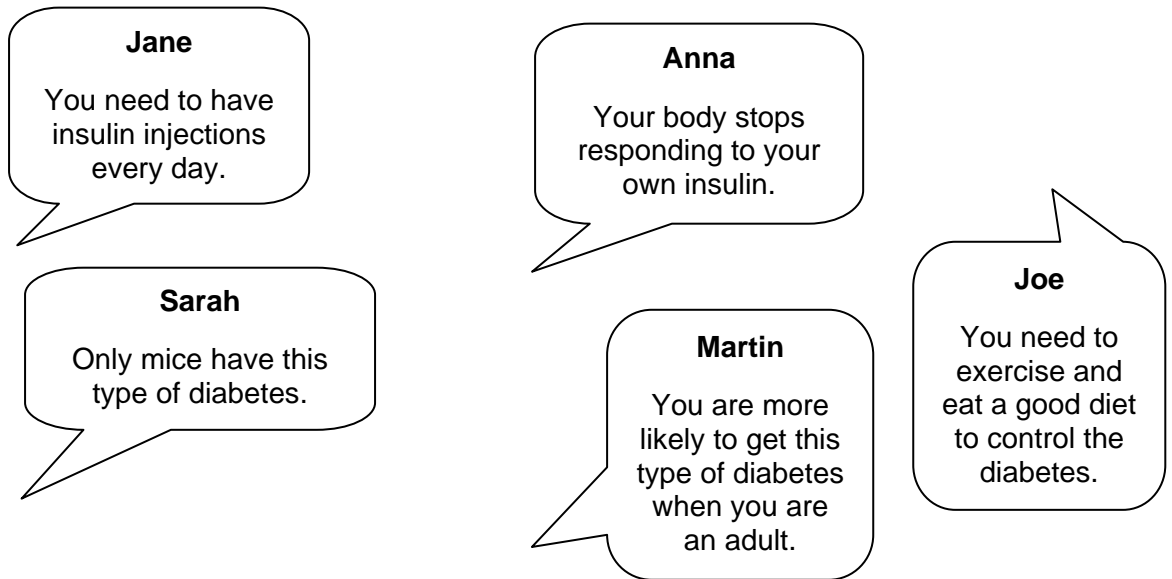
☐

[1]

(c) In the UK, what **percentage** of the 2 million people with diabetes have **type 1** diabetes?

answer [1]

(d) Five people read the website and made these comments about **type 2** diabetes.



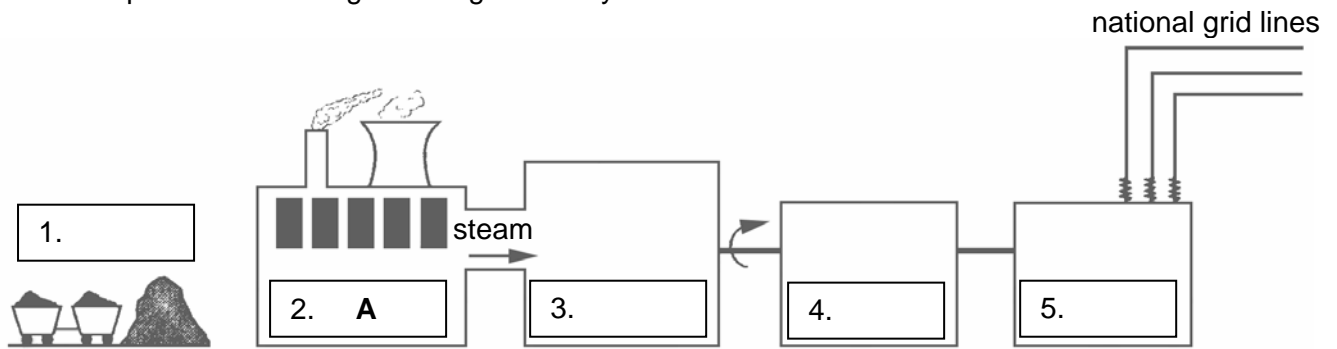
Put ticks (✓) in the table to indicate which people are making **true** statements and which people are making **false** statements.

	true	false
Sarah		
Martin		
Anna		
Jane		
Joe		

[3]

[Total: 6]

8 This question is about generating electricity.



(a) Label the diagram of a coal fired power station.

Put the letters **A**, **B**, **C**, **D** and **E** in the correct boxes on the diagram above.

One has been done for you.

A	furnace
B	transformer
C	fuel
D	turbine
E	generator

[3]

(b) This power station uses a carbon based fuel.

Which greenhouse gas will definitely be produced when the fuel is burnt?

answer

[1]

(c) Coal is a non-renewable energy source.

Name two **renewable** energy sources that are used to generate electricity.

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

natural gas

☐

nuclear fuel

☐

wind power

☐

oil

☐

wave power

☐

[2]

[Total: 6]

- 9 Nina is a radiotherapist.
She treats people who have been diagnosed with cancer.
Nina is also exposed to ionising radiation.

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Details:
a medical technician treating a
patient by radiotherapy; the patient lies shirtless
and face down on a table while the technician guides
the radiotherapy machine over him

- (a) What may happen when ionising radiation strikes a healthy cell?

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

The cell repels it.

☐

It kills the cell.

☐

The cell becomes cancerous.

☐

The cell turns green.

☐

White blood cells engulf the radiation.

☐

[2]

(b) Treating people with cancer using radiotherapy carries a risk for Nina and for her patient.

(i) What can Nina do to minimise the risk to herself?

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

only use the machine once a week

☐

make sure that she is shielded from the radiation

☐

turn her back when the machine is on

☐

wear a white coat and safety glasses

☐

[1]

(ii) Why is the treatment still carried out if there is a significant health risk associated with it?

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

It makes good use of new technology.

☐

It is the cheapest method of treating cancer.

☐

The patient could end up free from cancer as a result of the treatment.

☐

[1]

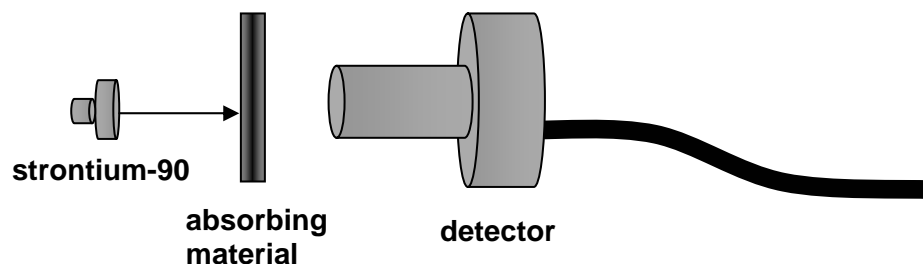
[Total: 4]

10 This question is about radioactivity.

Strontium-90 is radioactive. It emits beta radiation.

- (a) One way of classifying different types of radioactive emission is by their penetration properties.

An experiment was done to confirm that strontium-90 is emitting beta radiation.



Different absorbing materials were placed between the strontium-90 and a radiation detector. The amount of radiation detected was noted for each absorbing material.

Which **two** of the following materials would you expect the beta radiation to pass through?

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

thick concrete

☐

a sheet of paper

☐

a few centimetres of aluminium

☐

a few centimetres of lead

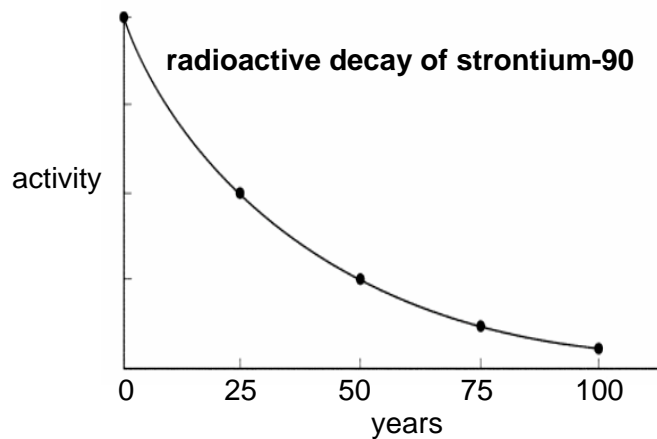
☐

a few centimetres of air

☐

[2]

- (b) The following graph can be used to work out the half-life for strontium-90.



- (i) What will happen to the activity of the sample of strontium-90 over the next hundred years?

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

It remains the same if you don't use it.

☐

It does not change much in one hundred years.

☐

It decreases to about a half of the original activity.

☐

It decreases to less than a quarter of the original activity.

☐

[1]

- (ii) What is the **best** description of the term **half-life**?

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

half of the total time for the activity to reach zero

☐

the time taken for half of the radioactive material to decay

☐

half of the total time for the activity to reach background levels

☐

[1]

[Total: 4]

END OF QUESTION PAPER

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