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Practice 1-foundation

1 Look at the list of things found inside cells.

amino acid

bases

chromosomes

DNA

genes

protein

Finish the following sentences.

Choose the best words from the list.

Inside cells, there are coded instructions called

The instructions are made of a chemical called

The instructions are carried inside the nucleus on structures called

[3]

[Total: 3]

[Turn over

2 Ann, John and Lynne are friends.

Ann has a cold.

When Ann sneezes, John and Lynne both breathe in some of the viruses that cause the cold.



Later, John develops a cold but Lynne does not.

(a) Suggest why Lynne does **not** develop the cold even though she does breathe in the viruses.

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

(b) Is a cold an infectious disease or a non-infectious disease?

Explain your answer.

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

(c) Look at the list of diseases and disorders.

- athlete's foot
- cholera
- cystic fibrosis
- dysentery
- flu

(i) Write down **one** disease caused by a virus.

Choose from the list.

answer [1]

(ii) Write down **one** inherited disorder.

Choose from the list.

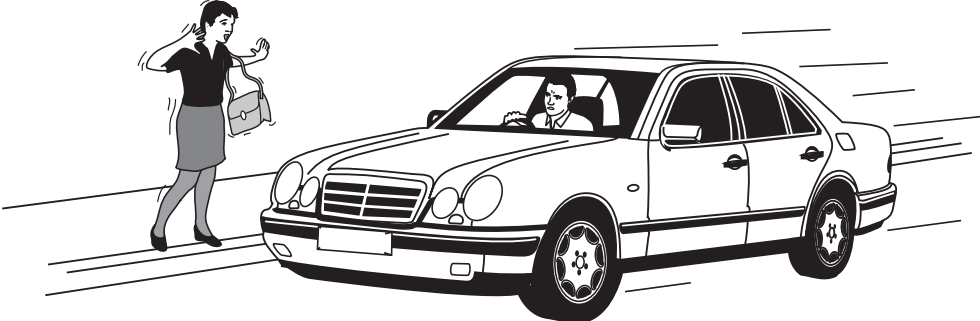
answer..... [1]

[Total: 4]

3 Natasha is starting to cross the road.

A car is coming towards her.

When Natasha notices the car, she jumps back quickly without thinking.



(a) Natasha sees the car coming with her eyes.

What other sense organ does she use to notice the car?

Put a (ring) around the correct answer.

- ear
- nose
- skin
- tongue

[1]

(b) (i) Natasha’s friend, Vicki, says that jumping back from the car is an example of a reflex.

Is it a reflex?

Explain your answer.

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

(ii) If Natasha had been drinking alcohol, how would her response to the car have been different?

..... [1]

(c) Some people can only see with one eye.

Describe how this affects vision.

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

[Total: 4]

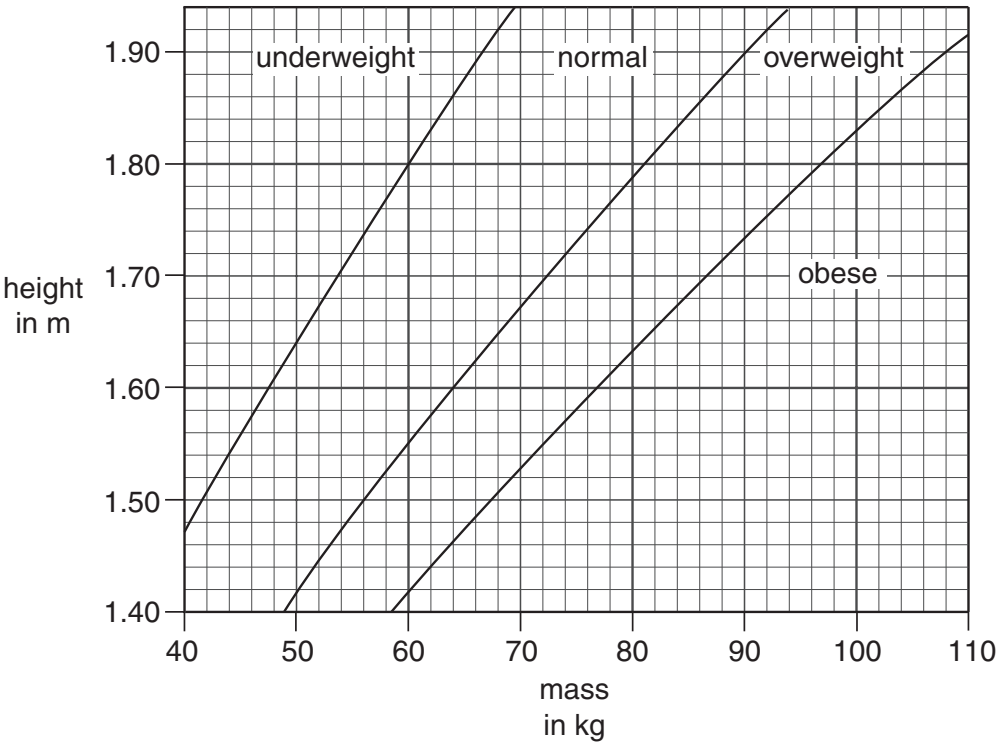
[Turn over

4 Chris and Sam want to see if they have suitable balanced diets.

They measure their mass and height.

	mass in kg	height in m
Chris	90	1.85
Sam	50	1.75

(a) (i) Use the information in the table and the BMI chart to work out whether **Chris** is underweight, normal, overweight or obese.



Put a ring around the correct answer.

underweight **normal** **overweight** **obese**

[1]

(ii) Sam works out that he is slightly underweight.

How much should he increase his mass by to reach a normal mass?

Use the information in the table and the BMI chart to work out your answer.

answer kg

[1]

(b) Sam's doctor tells him to eat the recommended daily average intake of protein.

Work out Sam's recommended daily average intake (RDA).

Use information in the table and the formula:

$$\text{RDA in g} = 0.75 \times \text{body mass in kg}$$

answer [1]

(c) A balanced diet also includes carbohydrates.

Why do we need carbohydrates?

..... [1]

[Total: 4]

[Turn over

5 Ayshea is running in a long-distance race.



(a) During the race, Ayshea’s breathing rate and heart rate increase.

Write about why her breathing rate and heart rate increase during the race.

.....
.....
.....
..... [3]

(b) During the race, Ayshea’s muscles produce a lot of heat.

One way she loses this extra heat is by sweating more.

(i) Explain how sweating causes Ayshea to lose heat.

..... [1]

(ii) Losing extra heat keeps Ayshea’s body temperature the same.

What word describes keeping body temperature the same?

Put a (ring) around the best answer.

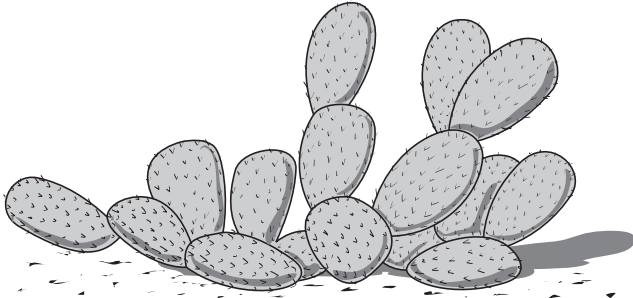
- dehydration homeostasis hypothermia insulation respiration

[1]

[Total: 5]

6 Read the following article that appeared in a recent newspaper.

Money to grow Cacti!



Las Vegas is a city in the middle of the desert in America.
Water is in very short supply.
The local council have decided to take action.
They are paying local people one dollar per square metre to replace their grass lawns with a plant called the cow's tongue cactus.
They think that this will help to solve the water shortage.

(a) Cacti are plants.

Write down **one** characteristic of cacti that places them in the plant kingdom.

..... [1]

(b) The scientific name for the cow's tongue cactus is *Opuntia engelmannii*.

Put a tick (✓) in the box next to the system used to produce this name.

- bimodal
- binomial
- classification
- conservation

[1]

(c) The council think that the cacti will need less water than grass plants.

Finish the following sentences by writing words in the gaps.

Choose your words from this list.

adapted

insulated

photosynthesis

reproduction

respiration

resistant

Plants such as cacti and grass use water for

Cacti need less water than grass because they are

to living in hot, dry areas.

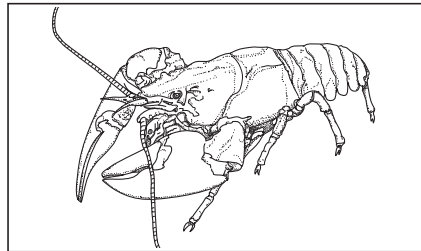
[2]

[Total: 4]

[Turn over

7 Read the passage about the British crayfish.

British Crayfish in Danger



Crayfish are small animals that live on the bottom of rivers.

Scientists have discovered that British crayfish are becoming endangered due to a larger, faster breeding American crayfish.

These crayfish were brought over from America for food but escaped into rivers.

This is disturbing the **community** living in the rivers.

There is a plan to move a **population** of British crayfish to a **habitat** where there are no American crayfish.

(a) (i) The two species of crayfish are competing with each other.

Write down **one** resource that they might be competing for.

..... [1]

(ii) The following sentences are meanings for some of the words in **bold** in the passage.

Write the correct word next to the meaning.

An area where the crayfish live.

All the living organisms found in one area of a river.[2]

(b) Crayfish may feed on snails.

(i) Write down **one** feature that you can see on the crayfish that makes them adapted to eating snails.

..... [1]

(ii) What name is given to an animal that hunts other animals for food?

Put a **ring** around your answer in this list.

competitor

parasite

predator

prey

[1]

(c) The passage says that British crayfish are becoming endangered.

(i) What does the word **endangered** mean?

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

(ii) Put a **ring** around **one other** British animal in this list that is also endangered.

fox

osprey

pigeon

rat

[1]

[Total: 7]

[Turn over

8 (a) Burning fossil fuels such as oil produces a number of substances that can cause pollution. One of these substances is carbon dioxide.

(i) Put a ring around **one other** pollutant that is produced by burning fossil fuels.

- CFCs
- nitrogen
- sewage
- sulfur dioxide

[1]

(ii) The amount of fossil fuels that is being burned is increasing.

Write down **one** reason why.

..... [1]

(b) Many scientists think that increasing levels of carbon dioxide may alter the temperature of the Earth.

Finish the following sentences to show how they think this might happen.

Radiation from the sun passes through the surrounding the Earth.

The Earth's surface is warmed and some of the radiation is re-radiated.

The carbon dioxide in the air some of this radiation.

The Earth therefore warms up.

This process is called [3]

[Total: 5]

9 Byron wants to investigate two ecosystems near his house.

One is a natural pond.

The other is a pond that had been dug in a field that contained cows.

(a) Why is the pond in the cows' field called an **artificial** ecosystem?

..... [1]

(b) Byron samples the small animals living in the natural pond.

Put a tick (✓) next to the apparatus that he would use to sample the pond.

- a net
- a pit-fall trap
- a pooter

[1]

(c) These are the animals that he catches in this pond.



He sampled about 0.5 m³ of the water in the pond.

The pond contains 200 m³ of water in total.

Estimate the number of flatworms () living in the pond.

total number of flatworms =

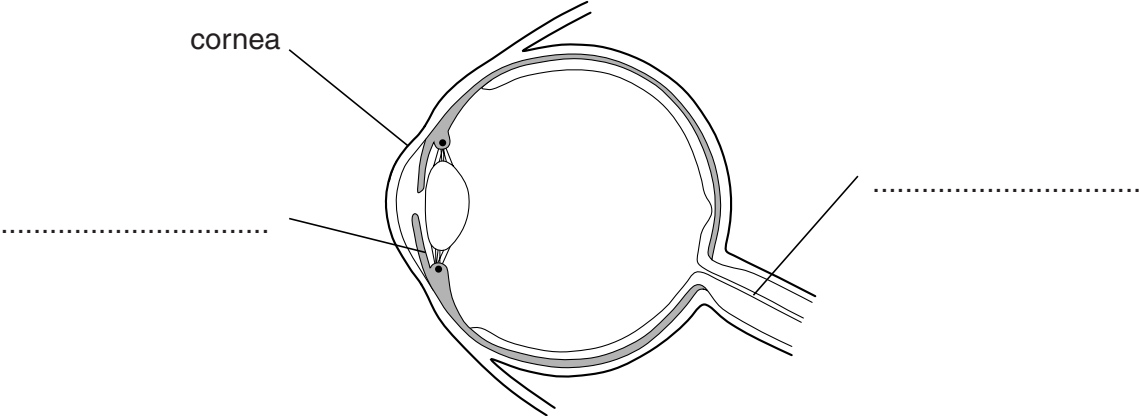
[2]

[Total: 4]

[Turn over

Practice 2-foundation

1 The diagram shows parts of a human eye.



(a) Finish labelling the diagram.

Choose words from this list.

- iris
- optic nerve
- pupil
- retina

[2]

(b) Describe the job of the **cornea**.

.....

..... [1]

(c) Eye colour is a characteristic controlled **only** by genes.

(i) Write down **one other** characteristic controlled only by genes.

Choose from this list.

- body mass
- earlobe shape
- scars
- spoken language

answer [1]

(ii) Which part of the human cell contains genes?

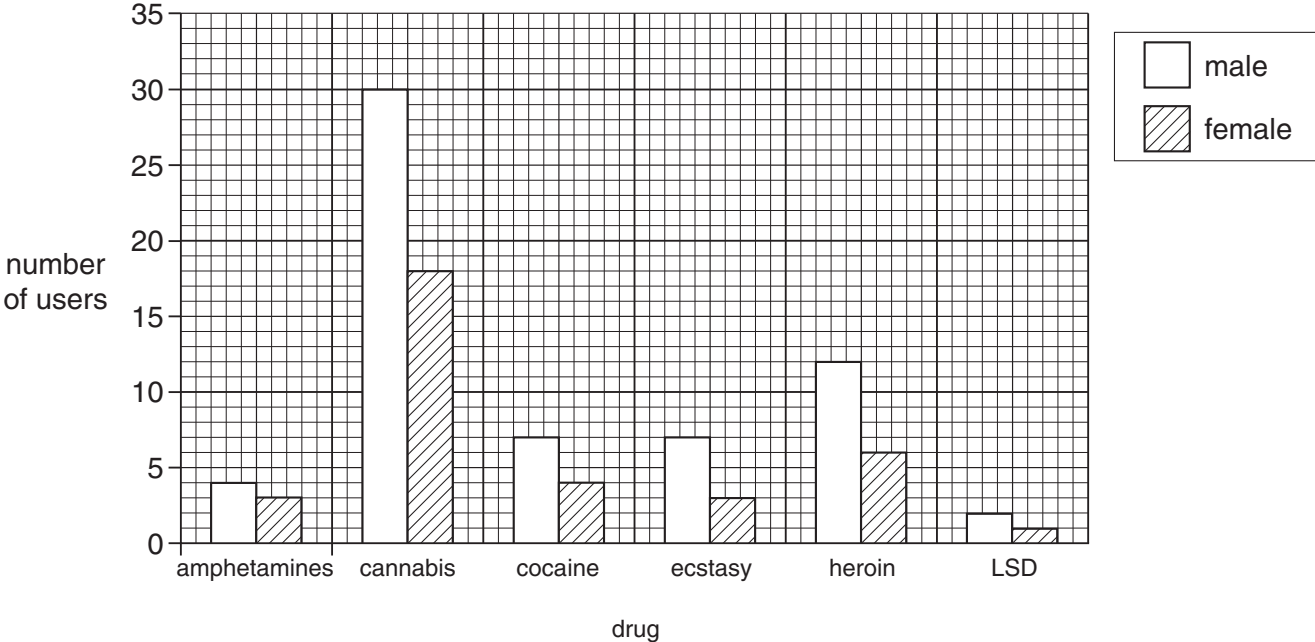
..... [1]

[Total: 5]

2 Some people use illegal drugs.

A sample of 16-24 year old drug users were asked to name one drug they use.

The bar chart shows how many named each drug.



(a) Which drugs are used by less than 5 males in the sample?

..... [1]

(b) More males than females in the sample use cannabis.

Calculate how many more males than females use cannabis.

answer [1]

(c) Ecstasy is a **stimulant**.

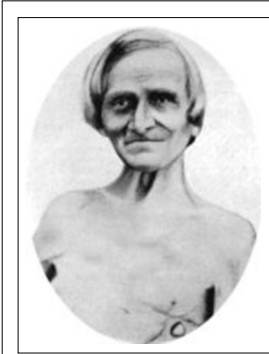
Describe the effect stimulants have on the brain.

..... [1]

[Total: 3]

Turn over

3 Read the report about Alexis St Martin.



In 1822 Alexis St Martin was shot. He survived but was left with a hole in his stomach. A doctor by the name of Dr Beaumont used the hole to investigate digestion.

Dr Beaumont removed gastric juice from the stomach. He added a piece of meat to the juice. The gastric juice digested the meat.

He also put a piece of meat in the stomach. This meat digested faster.

(a) Gastric juice contains substances that help with chemical digestion.

Some of these substances are enzymes.

Write down the name of another substance which helps digestion in the stomach.

..... [1]

(b) Meat contains protein.

Write down the name of **one** enzyme that digests the protein in meat.

..... [1]

(c) A second type of digestion helps meat to be digested faster in the stomach.

Write down the name of this type of digestion.

..... [1]

(d) Digestion in the stomach needs energy from respiration.

Finish the word equation for aerobic respiration.

glucose + → + + energy
[2]

[Total: 5]

4 This question is about diseases.

(a) The lists show examples of diseases and pathogens which can cause disease.

Draw a **straight** line from each **disease** to the **pathogen** that causes it.

disease	pathogen
athlete's foot	fungus
cholera	bacteria
dysentery	protozoa

[2]

(b) Sarah has cut her knee.



Some bacteria enter the cut.

Describe how Sarah's body will protect her from these bacteria.

.....

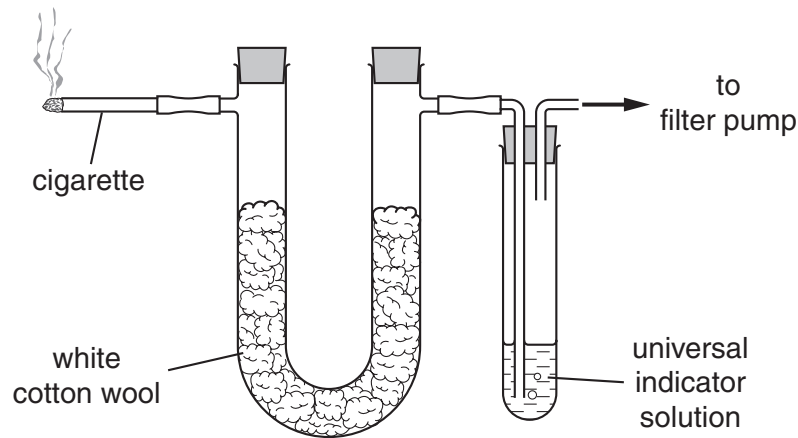
.....

..... [2]

[Total: 4]

Turn over

5 Look at the diagram of a smoking machine.



(a) Cigarette smoke turns the white cotton wool yellow.

Which chemical in cigarette smoke turns the white cotton wool yellow?

..... [1]

(b) Cigarette smoke causes less oxygen to be carried in the blood.

Which chemical in cigarette smoke causes this lack of oxygen?

..... [1]

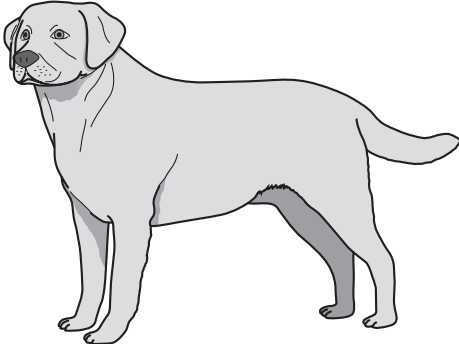
(c) Cigarette smoke can cause cancer.

Write down **one other** disease that can be caused by cigarette smoke.

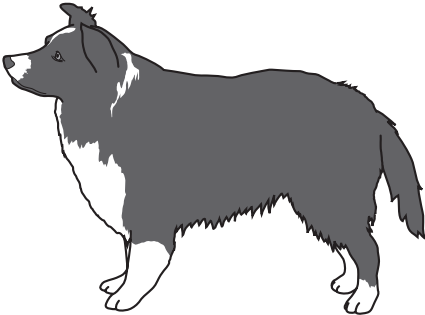
..... [1]

[Total: 3]

6 The pictures show two different breeds of dog.



labrador



border collie

(a) Look at the pictures. The two dogs show **variation**.

Describe **two** ways you can see in the diagram that the two dogs show variation.

- 1
- 2 [2]

(b) Look at the list.

- amphibians
- birds
- fish
- mammals
- reptiles

(i) To which group of animals do dogs belong?

Choose your answer from the list.

answer [1]

(ii) Give **one** reason for your choice.

..... [1]

(c) All the different breeds of dog are descended from wild animals that lived as predators.

Dogs have features that are adaptations to be a predator.

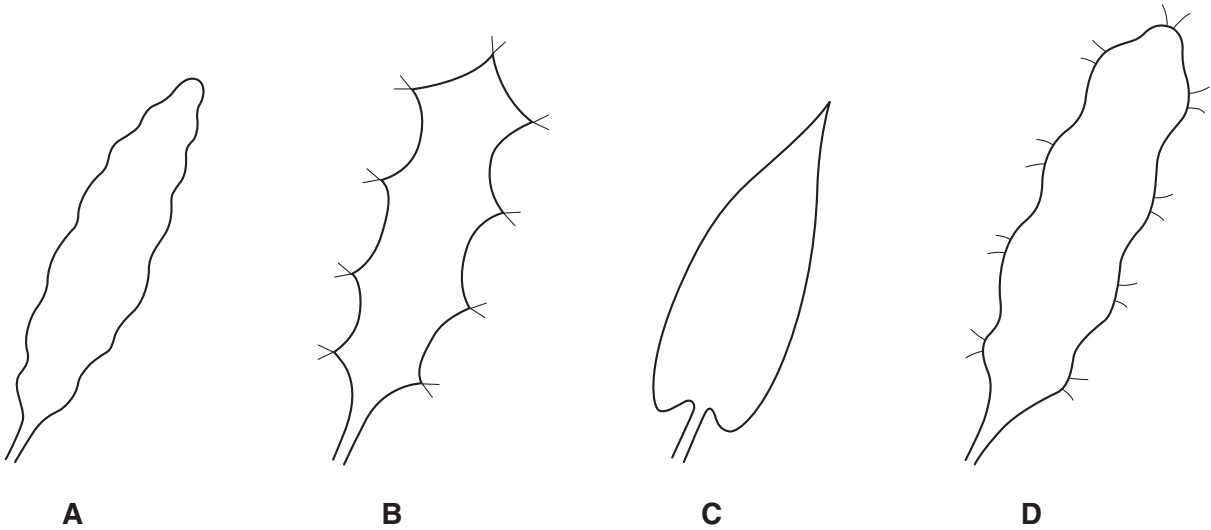
Describe **one** feature of dogs that is an adaptation to be a predator.

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

[Total: 5]
Turn over

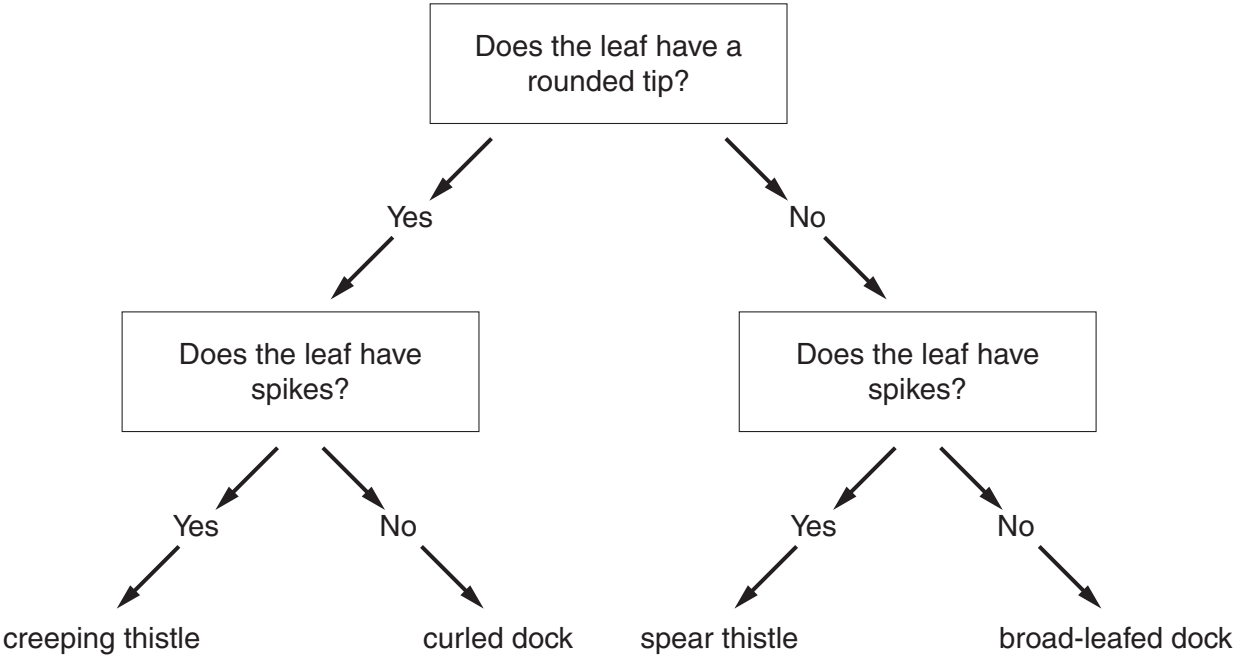
7 Tom and Elloise are studying some of the plants growing in the school playing field.

Look at the drawings of leaves from four of these plants.



(drawings not to scale)

(a) Use the key to identify plants A and B.



Plant A is

Plant B is [2]

(b) Tom and Elloise use quadrats to count how many there are of plant **A**.

The table shows their results.

quadrat	number found of plant A
1st	0
2nd	1
3rd	0
4th	2

Each quadrat has an area of 0.25 m^2 .

The playing field has an area of 2000 m^2 .

Use this information to estimate the total number of plant **A** in the playing field.

You should show how you work out your answer.

answer [2]

(c) All plants photosynthesise.

Why do plants need to photosynthesise?

..... [1]

[Total: 5]

Turn over

8 Anglesey is an island off the coast of Wales.

Before the 1960s the only squirrels living on the island were red squirrels.

In the 1960s the first grey squirrels arrived on the island.

By the 1980s red squirrels had disappeared from many parts of the island.

At the same time the number of grey squirrels had increased a lot.

By 1998 there were about 3000 grey squirrels and only about 40 red squirrels on the island.

In 1998 a project started to protect the red squirrels.

This was done by removing grey squirrels from Anglesey.



red squirrel



grey squirrel

(a) Why did red squirrels need protecting on Anglesey?

..... [1]

(b) What effect would removing grey squirrels from the island have on the population of red squirrels?

..... [1]

(c) Suggest **one other** way red squirrels could have been protected on Anglesey.

..... [1]

(d) Red squirrels and grey squirrels compete for food.

Write down **one other** thing animals compete for.

..... [1]

(e) Some animals have eyes on the front of the head.

Suggest why squirrels have eyes on the **side** of the head.

..... [1]

[Total: 5]

9 This question is about pollution.

(a) A lot of pollution is caused by using fossil fuels.

Write about how using fossil fuels causes pollution.

In your answer include

- how fossil fuels are used
- the different types of pollution caused.

.....

.....

.....

..... [3]

(b) Look at the list.

- finite resources**
- maintained resources**
- sustainable resources**

What term best describes fossil fuels?

Choose your answer from the list.

answer [1]

(c) CFC gases are used in some aerosols and refrigerators.

CFCs are **not** produced by fossil fuels but they still cause a pollution problem.

What problem does CFC pollution cause?

.....

..... [1]

[Total: 5]

Turn over

1 This question is about keeping things inside the body the same.

(a) Which word means **maintenance of a constant internal environment**?

Put a tick (✓) in the correct box.

homeopathy

homeostasis

homogenised

homologous

[1]

(b) Which **two** are examples of conditions inside the body that need to be kept constant?

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

body temperature

hair growth

water and salt balance

[1]

(c) Which **two** activities are most likely to affect the maintenance of a constant internal environment?

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

sitting reading a book

sleeping

running a marathon

watching the television

camping in winter

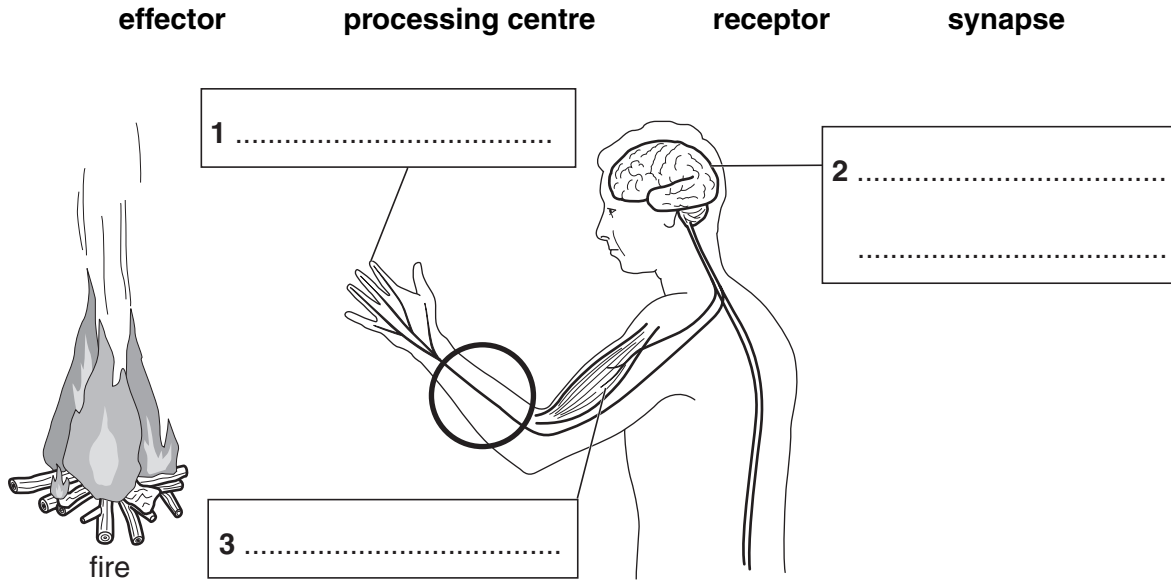
[2]

(d) The following diagram shows parts of the human body involved in controlling our body temperature.

Ian puts out his hand to feel the heat from a fire.

(i) Add labels to the boxes, 1, 2 and 3, to identify the parts involved.

Choose from this list.



[3]

(ii) Draw an arrow in the circle to show the direction the nerve impulse travels.

[1]

(iii) An animal responds to a stimulus.

Which of the following methods could be used to investigate this?

Put ticks (✓) in the boxes next to the **three** best answers.

- gossip
- internet
- rumours
- experiment
- library
- dreams
- argument

[3]

[Total: 11]
[Turn over

2 This question is about processes in cells.

(a) Which statement **best** describes osmosis?

Put a tick (✓) in the correct box.

movement of molecules from a region of high concentration to a region of low concentration

movement of water molecules from a dilute to a more concentrated solution through a partially permeable membrane

movement of molecules from a region of low concentration to a region of high concentration

movement of water molecules from a concentrated to a more dilute solution through a partially permeable membrane

[1]

(b) Look at the examples of diffusion and osmosis in an animal cell.

Put a **d** in the boxes next to the examples of diffusion.

Put an **o** in the boxes next to the examples of osmosis.

carbon dioxide moving out of a cell

water moving into a cell

oxygen moving into a cell

water moving out of a cell

digested food moving into a cell

[3]

(c) Enzymes are found in cells.

Which **one** of the following must remain constant for enzymes to work at their optimum?

Put a **(ring)** around the correct answer.

number of cells

size of cell

temperature of cell

shape of cell

[1]

(d) Which condition will increase the rate of reaction of enzymes?

Put a tick (✓) in the correct box.

fewer collisions between enzymes and other molecules

faster collisions between enzymes and other molecules

slower collisions between enzymes and other molecules

rapid changes of temperature

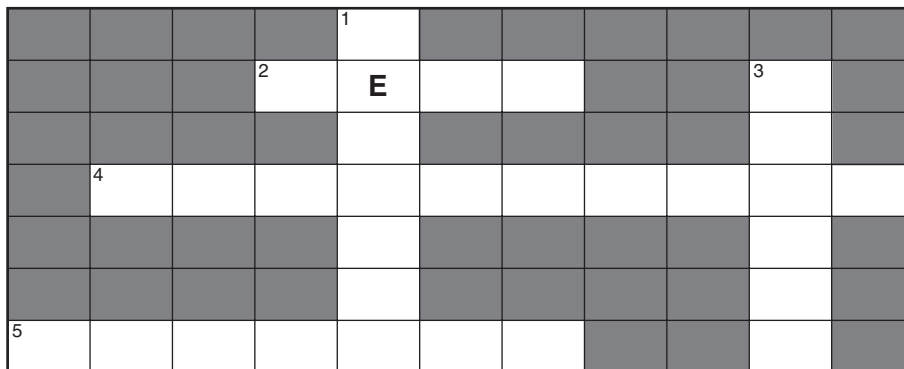
[1]

[Total: 6]

[Turn over

3 This question is about how organisms produce more cells.

(a) Use the clues to complete the crossword puzzle.



Across

- 2 A section of DNA that codes for one protein
- 4 A long strand of DNA found in the nucleus of a cell
- 5 A type of cell division that produces identical copies of the cell

Down

- 1 A type of cell division that produces a sex cell with half the number of chromosomes
- 3 Another name for a sex cell

[5]

(b) The statements describe how organisms produce new cells. They are in the wrong order.

- A The copies of chromosomes separate.
- B The number of organelles in the cell increases.
- C The cell divides into two cells.
- D Each strand is copied to make two new strands (chromosomes).
- E The two strands of each DNA molecule separate.

Put the statements into the correct order. The first one has been done for you.

B				
---	--	--	--	--

[3]

[Total: 8]

[Turn over

4 This question is about DNA.

(a) DNA is made from different bases.

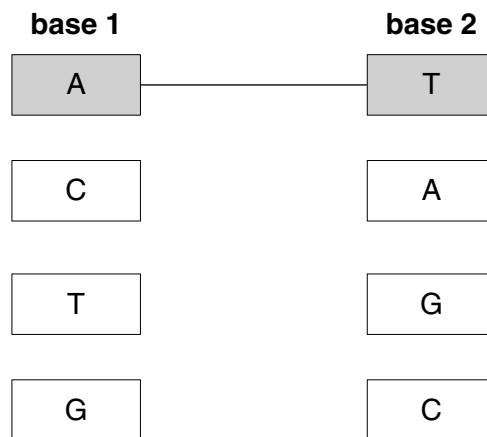
(i) Put a **ring** around the correct number of different bases found in DNA.

2 4 8 16

[1]

(ii) Draw **three** straight lines connecting the different bases in the left hand column with the correct bases in the right hand column to show which bases always pair up.

One has been done for you.



[2]

(b) In humans, the zygote divides by mitosis to form which structure?

Put a **ring** around the correct answer.

uterus

embryo

ovary

seed

[1]

(c) Which **two** of the statements best describe embryonic stem cells?

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

cells that have not yet become specialised

cells that are found in plant stems

cells that can develop into any other kind of cells

cells that do not develop from an embryo

cells that do not change once they have been produced

[2]

[Total: 6]

[Turn over

5 This is a question about the human nervous system.

(a) Add labels to the boxes, 1, 2 and 3, to identify the parts involved.

Choose from this list.

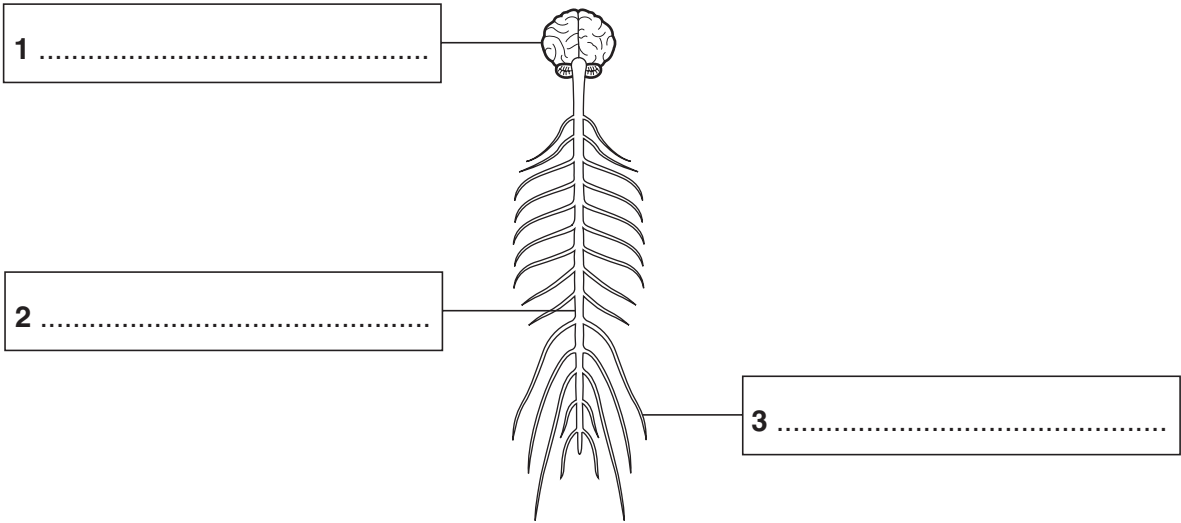
brain

effector

PNS (peripheral nervous system)

spinal cord

synapse



[3]

(b) Some actions controlled by the nervous system are called reflex actions.

Which **two** statements are examples of reflex actions?

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

- working out a maths problem
- deciding what to eat
- pupils in the eyes closing in bright light
- new born baby gripping a parent's finger
- thinking about your last holiday

[2]

(c) Human beings have the ability to learn.

This involves memory.

Which statement **best** describes memory?

Put a tick (✓) in the correct box.

reflex arc

storage and retrieval of information

response to a stimulus

mapping the different regions of the brain

[1]

(d) Verbal memory can be divided into long and short term memory.

The statements, **A**, **B**, **C**, **D** and **E**, are examples of either short term or long term memory.

Put the letter of each statement into the correct column in the table.

A using a phone number from a telephone directory

B remembering your address

C using a shopping list

D knowing your science teacher's name

E knowing whether you are male or female

long term memory	short term memory

[2]

[Total: 8]

[Turn over

6 This question is about how drugs affect the nervous system.

Neurons are separated by small gaps called synapses.

Drugs taken into the body are carried by the blood stream to the synapses where they have their effect.

The statements describe how this happens.
They are in the wrong order.

- A drugs are carried by the blood around the body
- B person experiences the effect of the drugs
- C drugs then affect transmission of impulses across the synapse
- D drugs are taken into the body
- E drugs reach the synapse

Put the statements into the correct order. The first one has been done for you.

D				
---	--	--	--	--

[3]

[Total: 3]

7 Scott is learning about cells.

He uses a microscope to look at some of his cheek cells.

The picture shows what he can see.

(a) Label the diagram.

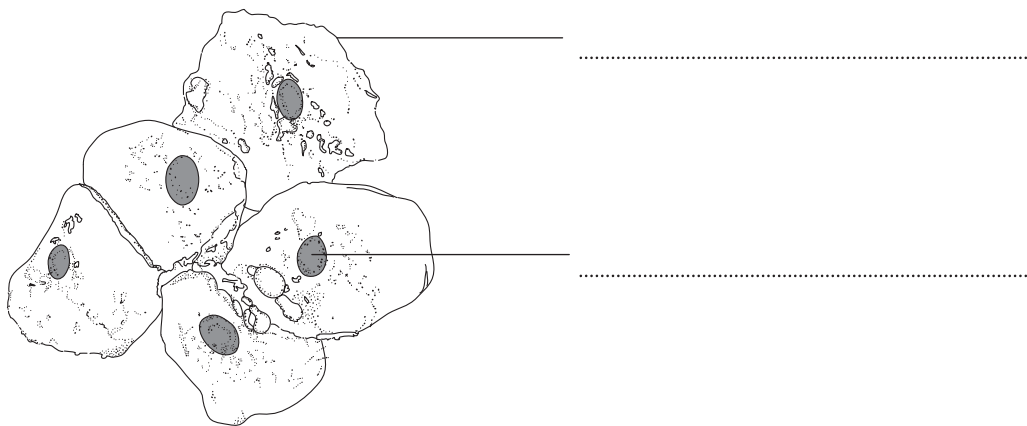
Choose the best words from this list.

cell membrane

cell wall

cytoplasm

nucleus



[2]

(b) Scott finds out about different cells in the body and the jobs they do.

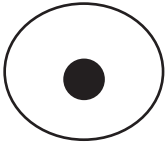
Finish the table by writing the job of each cell.

The first one has been done for you.

cell	job it does
egg cell	develops into an embryo when fertilised
sperm cell	
white blood cell	
red blood cell	

[3]

(c) Look at the picture of a fertilised egg cell.



If this egg implants into the uterus it will grow into a foetus.

Describe the **two** processes involved in growth.

1

2 [2]

[Total: 7]

[Turn over

8 Look at the picture.

It shows a strawberry plant reproducing.



(a) Finish the sentences about the strawberry plant.

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

- asexual**
- different**
- identical**
- sexual**
- similar**

The strawberry plant sends out runners.

This is a type of reproduction called reproduction.

The runners have plantlets on them.

The plantlets are genetically to the parent plant. [2]

(b) Gardeners can make more plants by taking cuttings.

Here are four sentences (A-D) about taking cuttings.

- A** Put the cutting into a pot of sandy compost.
- B** Cut a short stem off the parent plant.
- C** Put a clear plastic bag over the plant.
- D** Dip the stem into plant hormone.

They are in the wrong order.

Fill in the boxes to show the correct order.

The first one has been done for you.

B			
----------	--	--	--

[2]

(c) The plant stem needs to be dipped into plant hormone.

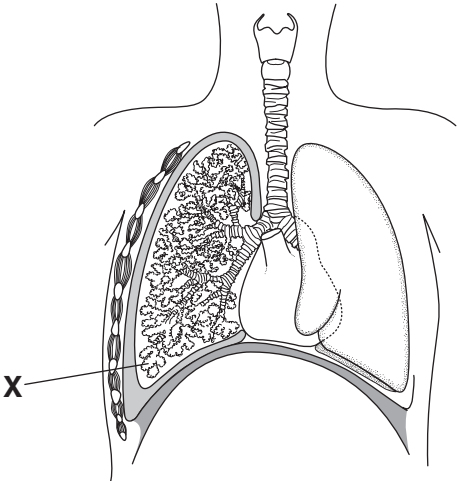
Explain why.

.....

..... [1]

[Total: 5]

9 Look at the diagram. It shows the lungs and heart.



(a) Write down the name of part X.

..... [1]

(b) A gas leaves the lungs and enters the blood.

(i) Write down the name of this gas.

..... [1]

(ii) Describe how this gas enters the blood.

Include ideas about concentration in your answer.

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

[Total: 4]

[Turn over

10 Read the article about bacterial mutations.

Bacterial mutations

There are many types of bacteria.

New strains occur because bacteria keep mutating.

Some of these new strains have an advantage when it comes to fighting off antibiotics.

MRSA is a bacterium which is resistant to antibiotics.

(a) Write down what is meant by the term **mutation**.

..... [1]

(b) Mutations can occur spontaneously or are caused by some factors.

Write down **two** factors that can cause mutations to occur.

1

2 [2]

(c) Bacteria reproduce in the body and make us ill.

They reproduce by dividing into two.

This can take about 30 minutes.

If you start with 10 bacteria there would be 40 bacteria after 1 hour.

How many would there be after 3 hours?

number of bacteria [1]

[Total: 4]

END OF QUESTION PAPER

Practice 2-higher

1 This question is about keeping things inside the body the same.

(a) Name the process which means **maintenance of a constant internal environment**.

..... [1]

(b) Which conditions inside the body need to be kept constant?

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

- blood oxygen levels
- skin pigmentation
- water content of the body
- salt content of the body

[1]

(c) The internal environment is often controlled by **negative feedback**.

Which **two** statements describe negative feedback?

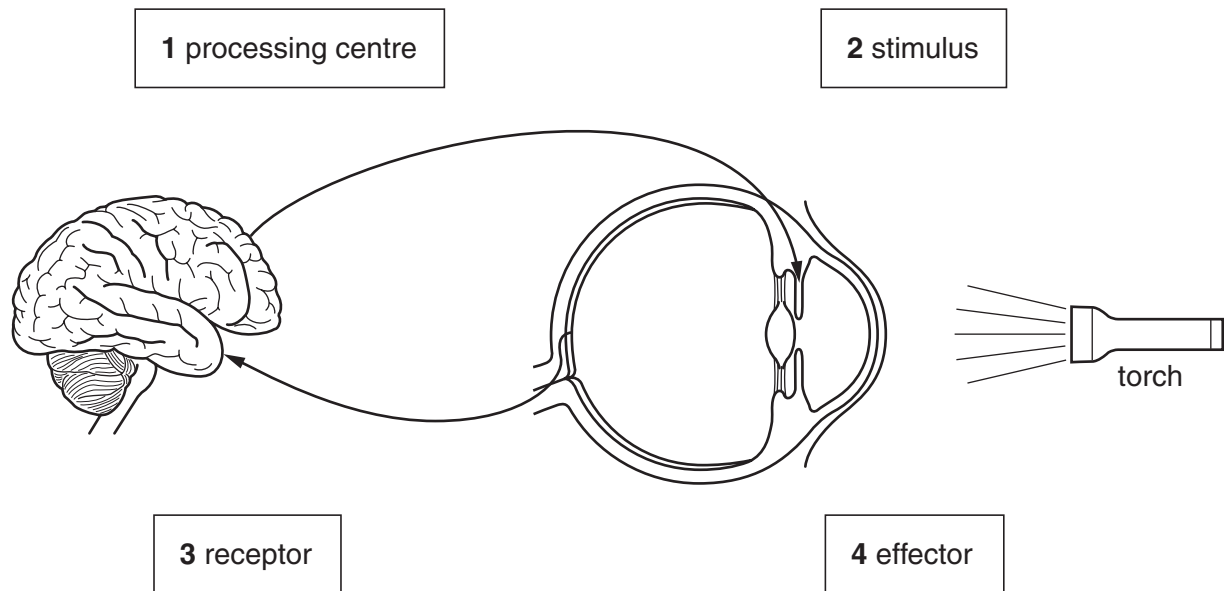
Put ticks (✓) in the boxes next to the **two** best answers.

- negative feedback increases rates of chemical reactions as body temperature rises
- negative feedback works to change any steady state
- negative feedback can be used to maintain a constant level
- negative feedback between effectors and receptors reverses any changes that take place
- negative feedback decreases rates of chemical reactions as body temperature rises

[2]

(d) Negative feedback mechanisms are involved in controlling the amount of light entering the eye. The diagram shows negative feedback between the brain and the eye.

Draw **straight lines** to join each of the labels, **1**, **2**, **3** and **4**, to the correct part of the diagram.



[4]

[Total: 8]

[Turn over

2 This question is about processes in cells.

(a) Which statement **best** describes osmosis?

Put a tick (✓) in the correct box.

movement of molecules from a region of high concentration to a region of low concentration

movement of water molecules from a dilute to a more concentrated solution through a partially permeable membrane

movement of molecules from a region of low concentration to a region of high concentration

movement of water molecules from a concentrated to a more dilute solution through a partially permeable membrane

[1]

(b) Look at the examples of diffusion and osmosis in an animal cell.

Put a **d** in the boxes next to the examples of diffusion.

Put an **o** in the boxes next to the examples of osmosis.

carbon dioxide moving out of a cell

water moving into a cell

oxygen moving into a cell

water moving out of a cell

digested food moving into a cell

[3]

(c) Enzymes are found in cells.

Which **one** of the following must remain constant for enzymes to work at their optimum?

Put a **ring** around the correct answer.

number of cells

size of cell

temperature of cell

shape of cell

[1]

(d) Which conditions will increase the rate of reaction of enzymes?

Put a tick (✓) in the correct box.

fewer collisions between enzymes and other molecules

faster collisions between enzymes and other molecules

slower collisions between enzymes and other molecules

rapid changes of temperature

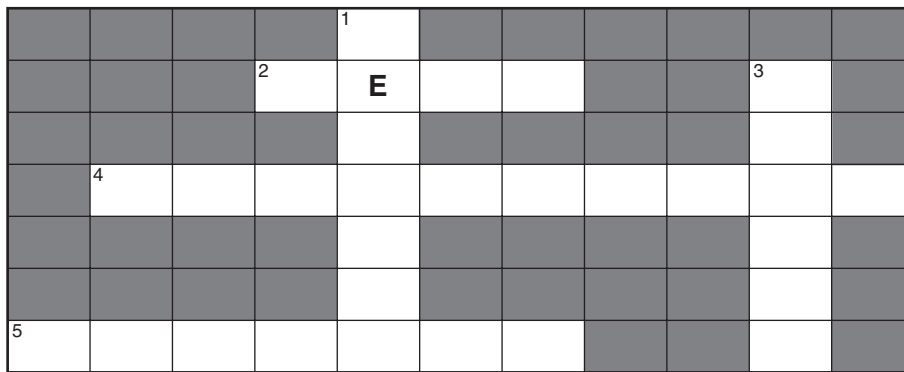
[1]

[Total: 6]

[Turn over

3 This question is about how organisms produce more cells.

(a) Use the clues to complete the crossword puzzle.



Across

- 2 A section of DNA that codes for one protein
- 4 A long strand of DNA found in the nucleus of a cell
- 5 A type of cell division that produces identical copies of the cell

Down

- 1 A type of cell division that produces sex cells with half the number of chromosomes
- 3 Another name for a sex cell

[5]

(b) The statements describe how organisms produce new cells.
They are in the wrong order.

- A** The copies of chromosomes separate.
- B** The number of organelles in the cell increases.
- C** The cell divides into two cells.
- D** Each strand is copied to make two new strands (chromosomes).
- E** The two strands of each DNA molecule separate.

Put the statements into the correct order. The first one has been done for you.

B				
----------	--	--	--	--

[3]

[Total: 8]

[Turn over

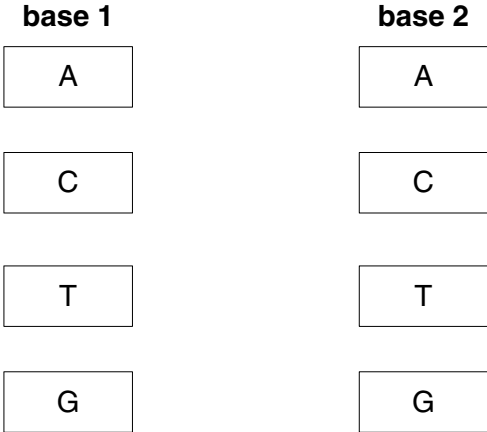
4 This question is about DNA.

(a) DNA is made from different bases.

(i) How many different types of bases are found in DNA?

answer [1]

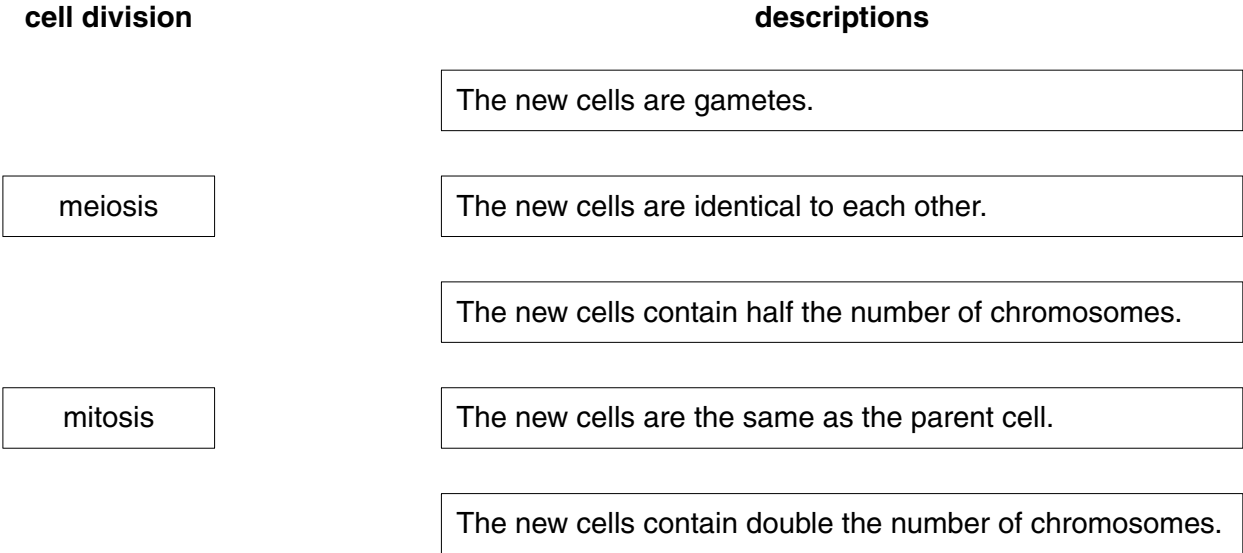
(ii) Draw **four** straight lines connecting the different bases in the left hand column with the correct bases in the right hand column to show which bases always pair up.



[1]

(b) Cells may divide by mitosis or meiosis.

Draw **two** straight lines from **each** type of **cell division** to its **two** correct **descriptions**.



[2]

(c) Which **two** of the statements best describe embryonic stem cells?

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

cells that have no inactive genes so that they can form cells of all tissue types

cells that are found in stems

cells that have the potential to replace damaged tissue

cells that have developed to become highly specialised

cells that do not change once they have been produced

[2]

[Total: 6]

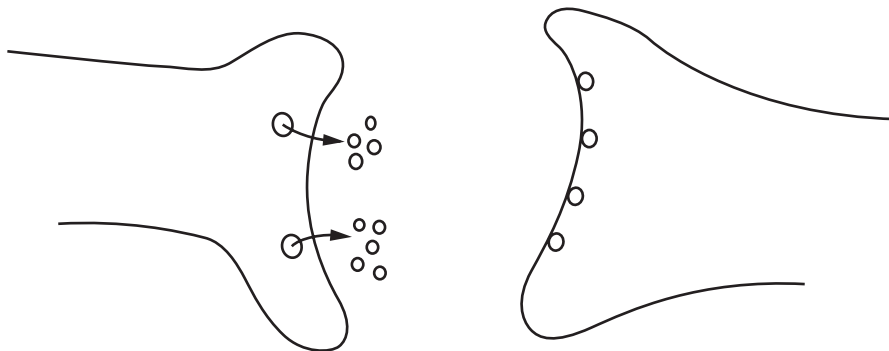
[Turn over

5 This is a question about the human nervous system.

(a) The diagram shows the endings of two nerve cells.

(i) Use these words to label the diagram.

receptor molecules synapse synaptic chemicals



[3]

(ii) Add an arrow to the diagram to show which way the impulse is travelling.

[1]

(b) Reflex actions are used by most animals.

Look at the statements about reflex actions.

Some are **true** and some are **false**.

Write **T** in the box next to each **true** statement and **F** in the box next to the **false** one.

	T (true) or F (false)
Reflexes produce rapid involuntary responses.	<input type="checkbox"/>
Only simple animals use simple reflexes.	<input type="checkbox"/>
Conditioning is when reflex responses are learnt.	<input type="checkbox"/>
Only complex reflexes are used to improve an animal's chances of survival.	<input type="checkbox"/>
Conditioned reflexes usually increase the chances of survival.	<input type="checkbox"/>

[3]

[Total: 7]

6 This question is about different kinds of reflexes.

(a) Which **two** statements best describe a conditioned reflex?

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

Conditioned reflexes happen when something occurs only once.

Pavlov's dogs show an example of a conditioned reflex.

Being startled by a loud noise is an example of a conditioned reflex.

Conditioned reflexes reduce an animal's chances of survival.

The final response has no direct connection with the stimulus.

[2]

(b) Draw a straight line linking each **type of reflex** to its correct **example** and then to its correct **purpose**.

type of reflex	example	purpose
<input type="text" value="simple"/>	<input type="text" value="falling asleep"/>	<input type="text" value="protecting a sense organ"/>
<input type="text" value="conditioned"/>	<input type="text" value="salivating when hearing a bell ring"/>	<input type="text" value="refreshing the brain"/>
	<input type="text" value="blinking in a bright light"/>	<input type="text" value="helping digestion"/>

[2]

[Turn over

(c) In some circumstances it is possible for the brain to modify a reflex response.

Which three statements are the best examples of how the brain can modify a reflex response?

Put ticks (✓) in the boxes next to the **three** best answers.

being frightened of thunderstorms

holding on to a hot plate

going to the dentist even though you are frightened

killing spiders

salivating when you smell some delicious food

not blinking when something comes close to your eyes

hearing someone speak your name across a crowded room

[3]

[Total: 7]

7 Scott is learning about cells.

(a) He finds out that muscle cells contain large numbers of mitochondria.

Explain why muscle cells need large numbers of mitochondria.

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

(b) Scott uses a microscope to look at a plant leaf cell.

He sees three structures that are **not** in muscle cells.

Write down the names of **two** of these structures.

1
2 [2]

(c) Scott looks on the internet and finds out about stem cells.

Stem cell research: Yes or no?

The debate on stem cell research continues.

New laboratories for stem cell research are being built in Newcastle.

Scientists will use stem cells taken from early embryos to make different body tissues.

Some scientists claim the research could lead to the cure of some diseases.

However, some people object to this research.

(i) Explain what is meant by the term **stem cell**.

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

(ii) Some people object to stem cell research.

Suggest **one** reason why.

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

[Total: 6]

8 Look at the picture.

It shows someone cloning a plant by taking a cutting.



© The Garden Picture Library / Alamy

(a) The plant stem needs to be dipped into plant hormone.

Explain why.

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

(b) Plants can also be cloned by tissue culture.

Describe the method used.

In your answer include

- the precautions taken
- the conditions needed.

.....
.....
.....
..... [3]

(c) During cloning, cells divide by mitosis.

During mitosis, chromosomes in the nucleus divide.

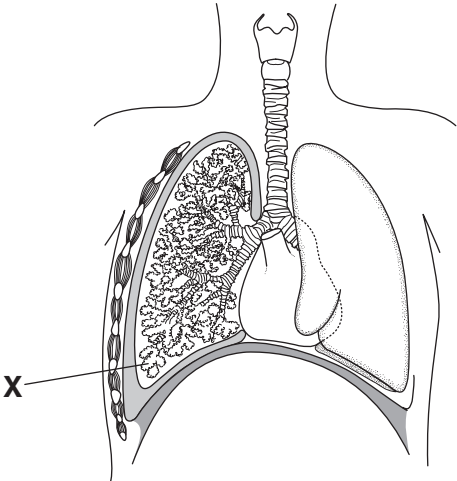
Describe **one other** thing that happens to the chromosomes during mitosis.

..... [1]

[Total: 5]

[Turn over

9 Look at the diagram. It shows the lungs and heart.



(a) Write down the name of part X.

..... [1]

(b) Oxygen leaves the lungs and enters the blood.

Describe how oxygen enters the blood.

Include ideas about concentration in your answer.

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

(c) The cells lining part X are very thin.

This helps them carry out their function.

Explain why.

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

[Total: 4]

10 Read the article about bacterial mutations.

Bacterial mutations

There are many types of bacteria.

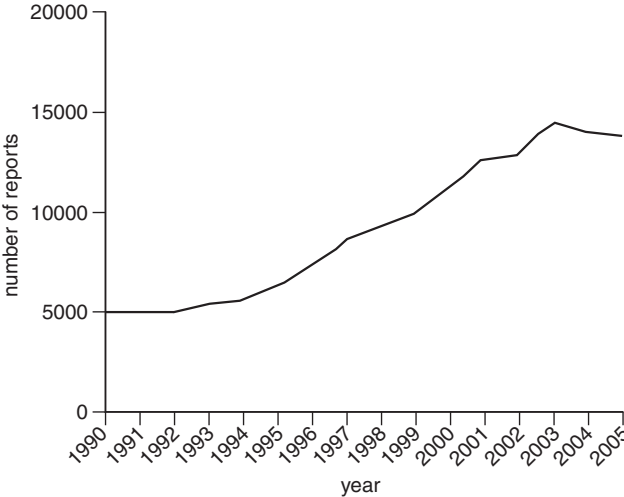
New strains occur because bacteria keep mutating.

Some of these new strains have an advantage when it comes to resisting antibiotics.

MRSA is a bacterium which is resistant to antibiotics.

(a) Look at the graph.

It shows the number of MRSA cases between 1990 and 2005.



Estimate the rise in cases between 1990 and 2003.

..... [1]

(b) Mutations can occur spontaneously or are caused by some factors.

Write down **two** factors that can cause mutations to occur.

1

2 [2]

(c) Mutations are changes to DNA.

(i) How could the structure of DNA change?

..... [1]

(ii) Why may a DNA change alter the functioning of a cell?

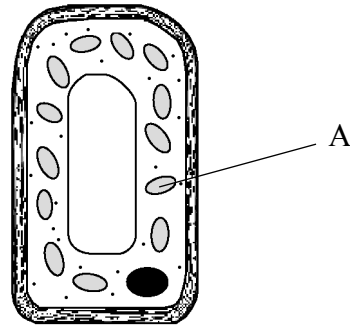
..... [1]

[Total: 5]

END OF QUESTION PAPER

Practice 1-foundation

1. The diagram shows a plant cell.



(a) Put a cross (☒) in the correct box to complete the following sentence.

Part A is a

chloroplast

nucleus

vacuole

(1)

(b) Draw **one** straight line from each part of a plant cell to its function.
One has been completed for you.

part of plant cell

function

cell wall ●

● gives the cell strength and makes it rigid

cell membrane ●

● where most cell chemicals are made

nucleus ●

● controls what the cell does

cytoplasm ●

● controls what substances go into and out of the cell

(3)

Q1

(Total 4 marks)

2. David and Lorraine climbed to the top of a mountain and rested for an hour.



Use words from the box to complete the following sentences.

carbon dioxide	faster	white
oxygen	slower	red

Even though they had rested for an hour, David noticed that Lorraine's rate of breathing was still than usual.

This is because there is less in the air compared with the air at lower levels.

They decided to camp at the top of the mountain for a week.

During the week their bodies changed to help them cope with the high altitude. One change was that the number of their blood cells increased.

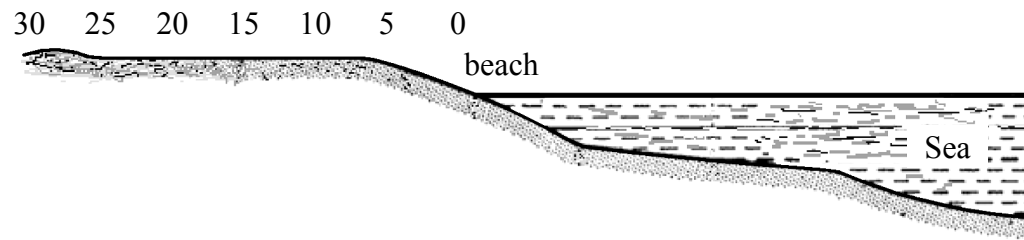
Q2

(Total 3 marks)

Turn over

3. Sandeep and Mollie are studying the plant species growing near the sea. They recorded the number of plant species per square metre at seven places on a sandy beach. Each place is five metres further away from the sea.

places and distance from the sea in metres



Here are their results

distance from sea (m)	0	5	10	15	20	25	30
number of plant species per square metre	0	3	7	11	18	17	18

- (a) Complete the sentence to describe the patterns shown in the data.

As the distance from the sea increases.....

(2)

- (b) Suggest a reason to explain this pattern.

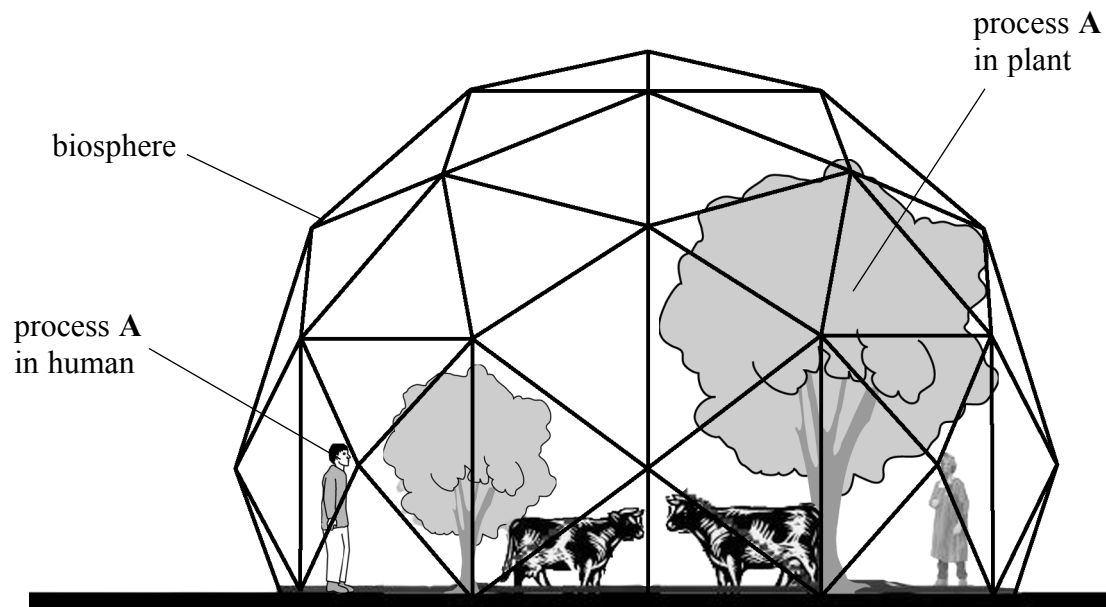
.....

(1)

Q3

(Total 3 marks)

4. A biosphere is an enclosed building that can be used to let humans live on a planet like Mars.
The diagram shows part of the carbon cycle in a biosphere.



- (a) Name process A which produces carbon dioxide.

..... (1)

- (b) The concentration of the different gases in the air in the biosphere is measured regularly.

Suggest **two** ways that the concentration of carbon dioxide could be reduced.

1

.....

2

..... (2)

- (c) When waste materials decay, carbon dioxide is released.

Name a type of organism that causes decay.

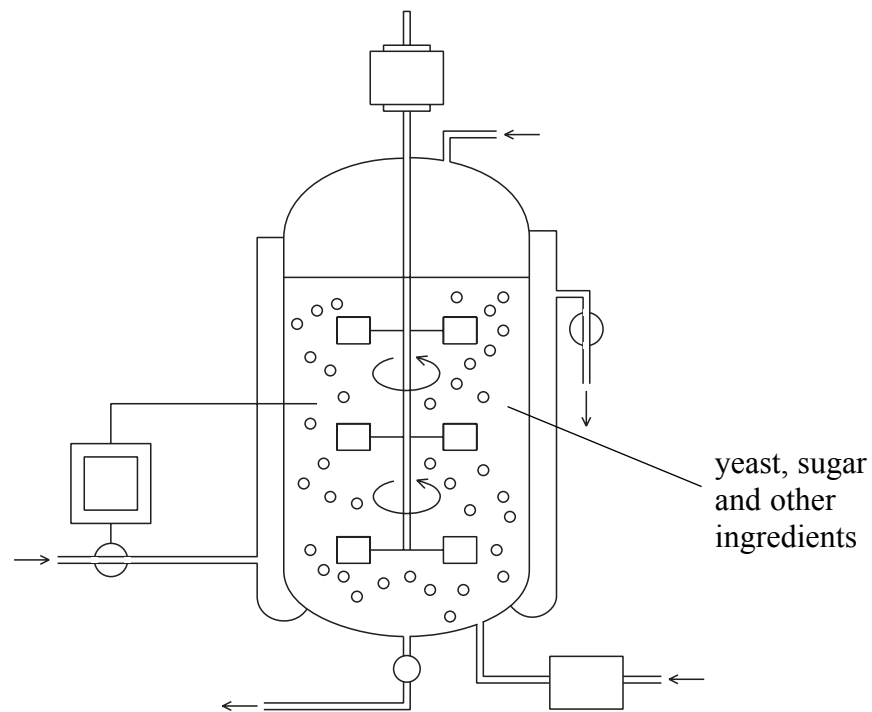
..... (1)

(Total 4 marks)

Q4

Turn over

5. A brewery uses the microorganism called yeast as part of the process to make beer.



(a) Name **one** ingredient, other than yeast or sugar, that would be added to the fermenter.

.....
(1)

(b) Microorganisms, like yeast, use an external food source to obtain energy. This changes some of the substances in the medium to useful products. Name this process.

.....
(1)

(c) State **two** advantages of using microorganisms for food production.

1

.....

2

.....

(2)



(d) At the end of the beer making process, waste yeast is collected and sold.
Yeast contains high levels of vitamin B.

(i) Why is yeast said to be a waste product at the end of the brewing process?

.....
.....

(1)

(ii) Suggest a way that the waste yeast may be used after it is sold.

.....
.....

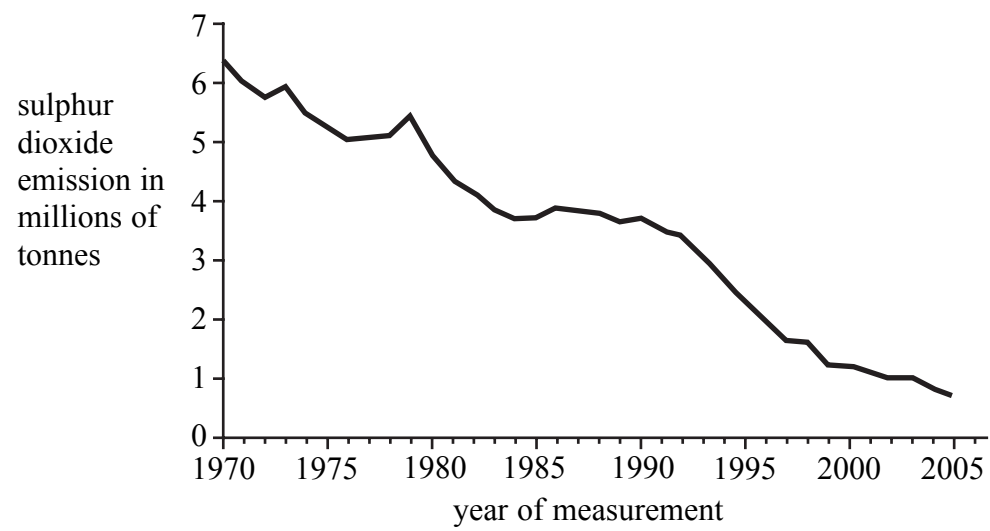
(1)

Q5

(Total 6 marks)

Turn over 

6. The graph shows how sulphur dioxide emissions by human activity have changed in the UK between 1970 and 2005.



(a) Describe the pattern in sulphur dioxide emissions between 1970 and 2005.

.....
.....
(1)

(b) How is sulphur dioxide produced by human activity?

.....
.....
(1)

(c) Describe how sulphur dioxide can become acid rain and how this affects the environment.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
(3)

(Total 5 marks)

Q6

7. Richard has found lots of blanket weed in a local pond.
Blanket weed is a kind of algae.



- (a) Blanket weed grows when there is too much nitrate in the water.
Suggest a possible source of the nitrate.

.....
.....

(1)

- (b) The blanket weed grows at the surface of the water.
What effect might this have on the plants at the bottom of the pond?

.....
.....
.....
.....
.....

(2)



(c) Eventually the blanket weed will die, sink to the bottom and rot.
What effect will this have on the pond environment?

.....

.....

.....

.....

.....

.....

.....

(2)

Q7

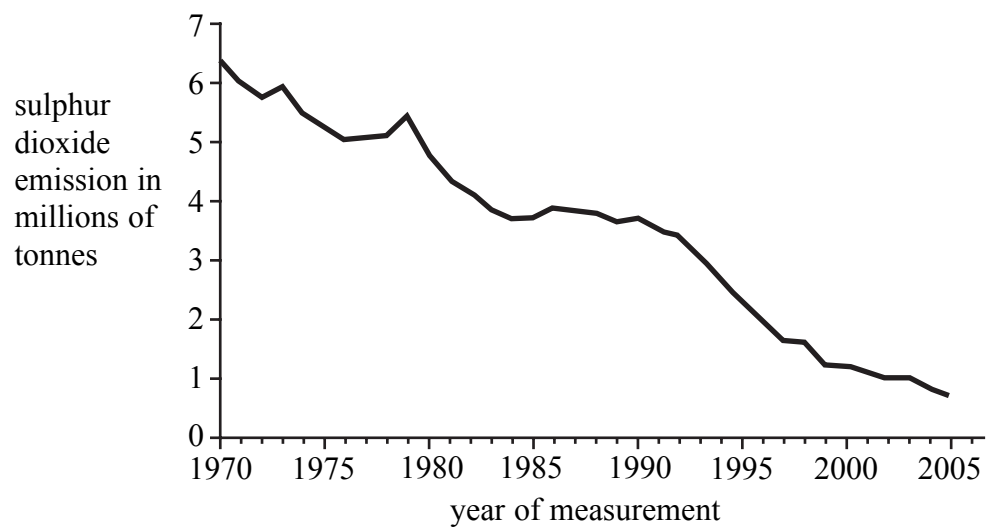
(Total 5 marks)

TOTAL FOR PAPER: 30 MARKS

END

Practice 2-higher

1. The graph shows how sulphur dioxide emissions by human activity have changed in the UK between 1970 and 2005.



(a) Describe the pattern in sulphur dioxide emissions between 1970 and 2005.

.....
.....
(1)

(b) How is sulphur dioxide produced by human activity?

.....
.....
(1)

(c) Describe how sulphur dioxide can become acid rain and how this affects the environment.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
(3)

(Total 5 marks)

Q1

Turn over

2. Richard has found lots of blanket weed in a local pond.
Blanket weed is a kind of algae.



- (a) Blanket weed grows when there is too much nitrate in the water.
Suggest a possible source of the nitrate.

.....
.....

(1)

- (b) The blanket weed grows at the surface of the water.
What effect might this have on the plants at the bottom of the pond?

.....
.....
.....
.....
.....
.....

(2)

(c) Eventually the blanket weed will die, sink to the bottom and rot.
What effect will this have on the pond environment?

.....

.....

.....

.....

.....

.....

.....

(2)

Q2

(Total 5 marks)

Turn over 

3. The International Olympic Committee has banned athletes from using some chemicals, such as growth factors.

(a) (i) What effect do these growth factors have on the body?

.....
.....

(1)

(ii) Why might some athletes be tempted to take growth factors?

.....
.....

(1)

(b) Give **two** harmful side-effects that using growth factors can have on the body.

1

2

(2)

(c) Why do many people have ethical concerns about athletes using growth factors?

.....
.....

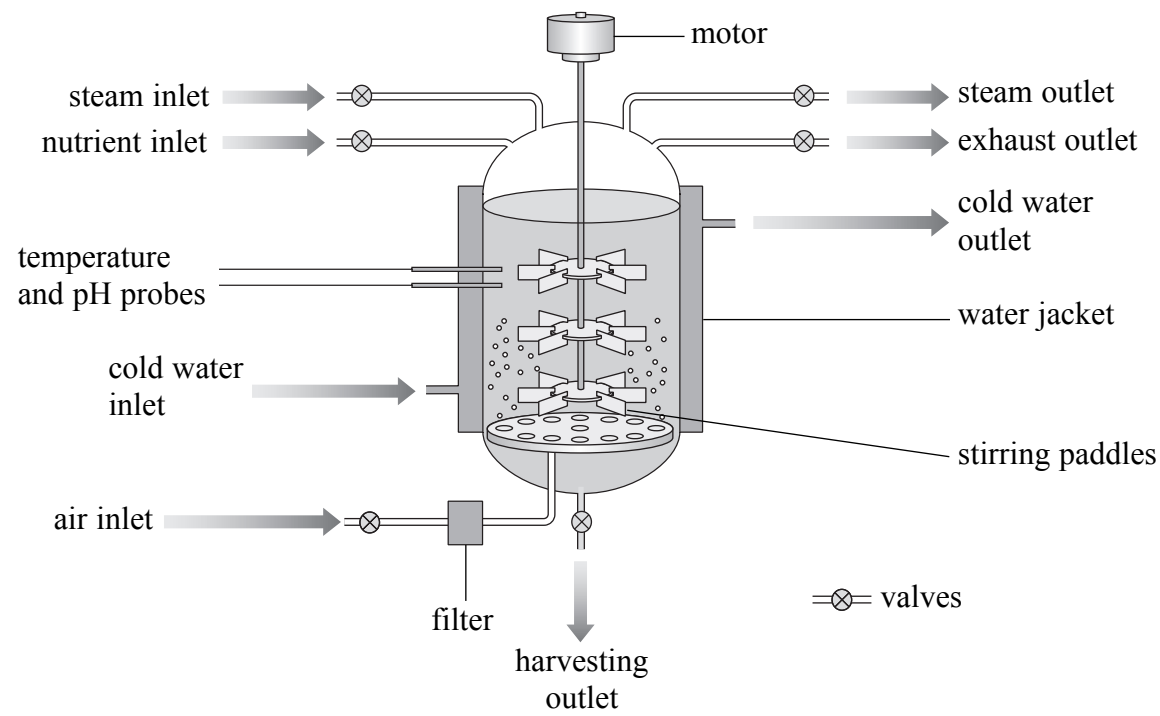
(1)

(Total 5 marks)

Q3

Turn over 

4. An industrial fermenter is designed to provide optimum conditions for the growth of microorganisms.



(a) The inside of the fermenter is sterilised before it is used.
Why are aseptic precautions necessary?

.....
.....
.....

(1)

(b) (i) Why is the air filtered before it is pumped into the fermenter?

.....
.....

(1)

(ii) Why would the fermenter be supplied with air?

.....
.....

(1)

(c) How are conditions inside the fermenter monitored?

.....

.....

(1)

(d) Why are the conditions inside the fermenter controlled?

.....

.....

(1)

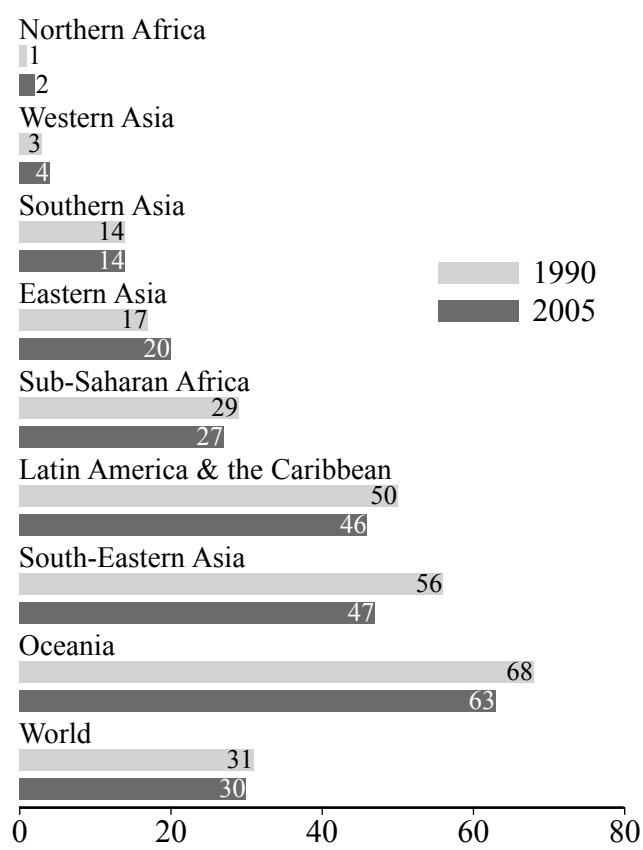
Q4

(Total 5 marks)

Turn over 

5. The human population of the world is increasing by about 3 people every second. One effect of this increasing population is more deforestation. The diagram shows how the amount of forest has changed between 1990 and 2005 in different parts of the world.

Percentage of land covered by forest



- (a) (i) In how many regions are forests increasing?

..... (1)

- (ii) In which region did the highest percentage of deforestation take place?

..... (1)

(b) Describe the impact of deforestation on the environment.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

Q5

(Total 5 marks)

Turn over 

6. Dolly the sheep was a cloned mammal.
There are several stages in the cloning process.

(a) The first stage is the removal of an unfertilised egg from a sheep.
What happens to this unfertilised egg in the next stage of cloning?

.....
.....

(1)

(b) Describe the remaining stages in the process of cloning.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

(4)

Q6

(Total 5 marks)

TOTAL FOR PAPER: 30 MARKS

END