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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]

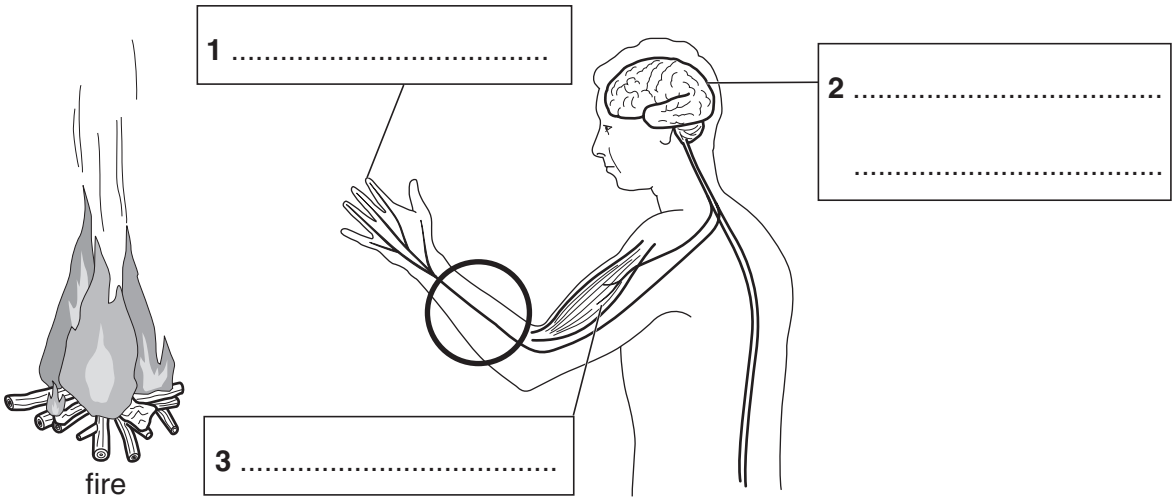
(d) The following diagram shows parts of the human body involved in controlling our body temperature.

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.

effector **processing centre** **receptor** **synapse**



[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.

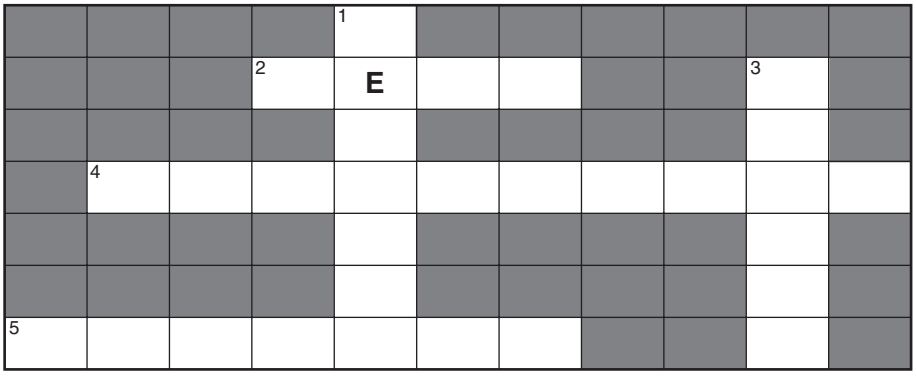
fewer collisions between enzymes and other molecules	☐
faster collisions between enzymes and other molecules	☐
slower collisions between enzymes and other molecules	☐
rapid changes of temperature	☐

[1]

[Total: 6]

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]

4 This question is about DNA.

(a) DNA is made from different bases.

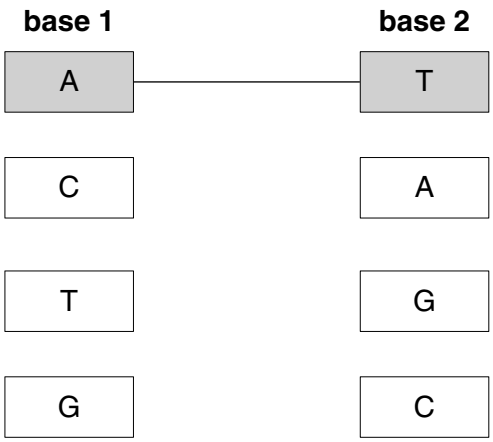
(i) Put a (ring) around the correct number of different bases found in DNA.

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]

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.

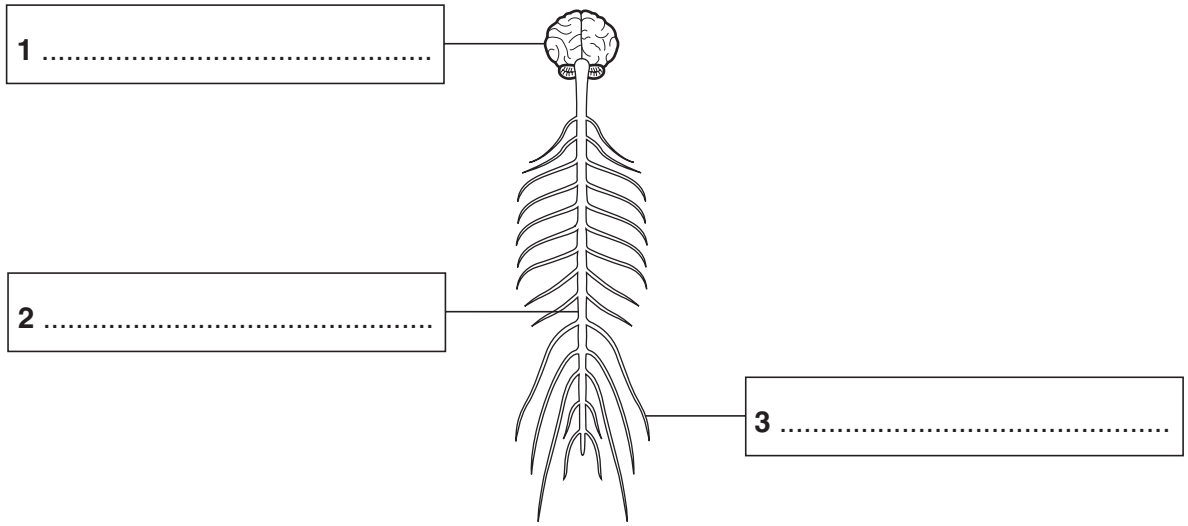
brain

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.

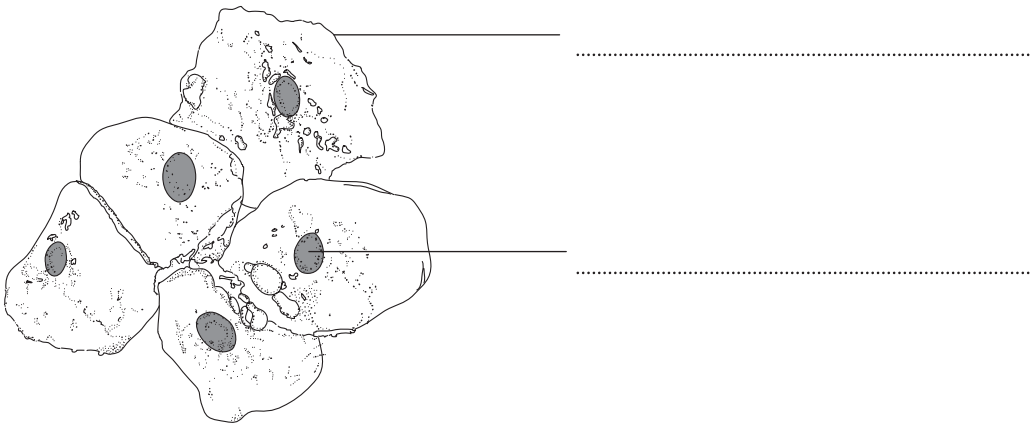
Choose the best words from this list.

cell membrane

cell wall

cytoplasm

nucleus



[2]

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

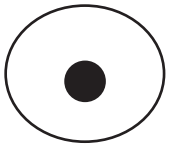
Finish the table by writing the job of each cell.

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]

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.

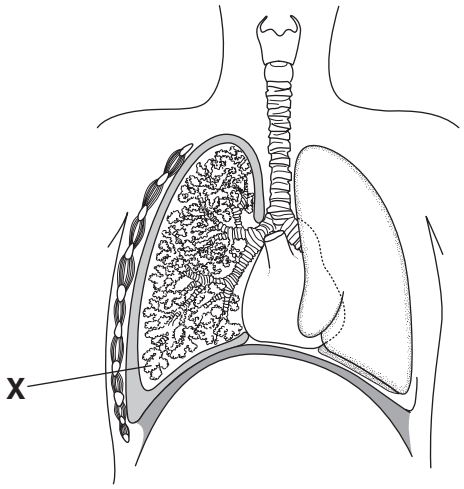
Explain why.

.....

..... [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

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?

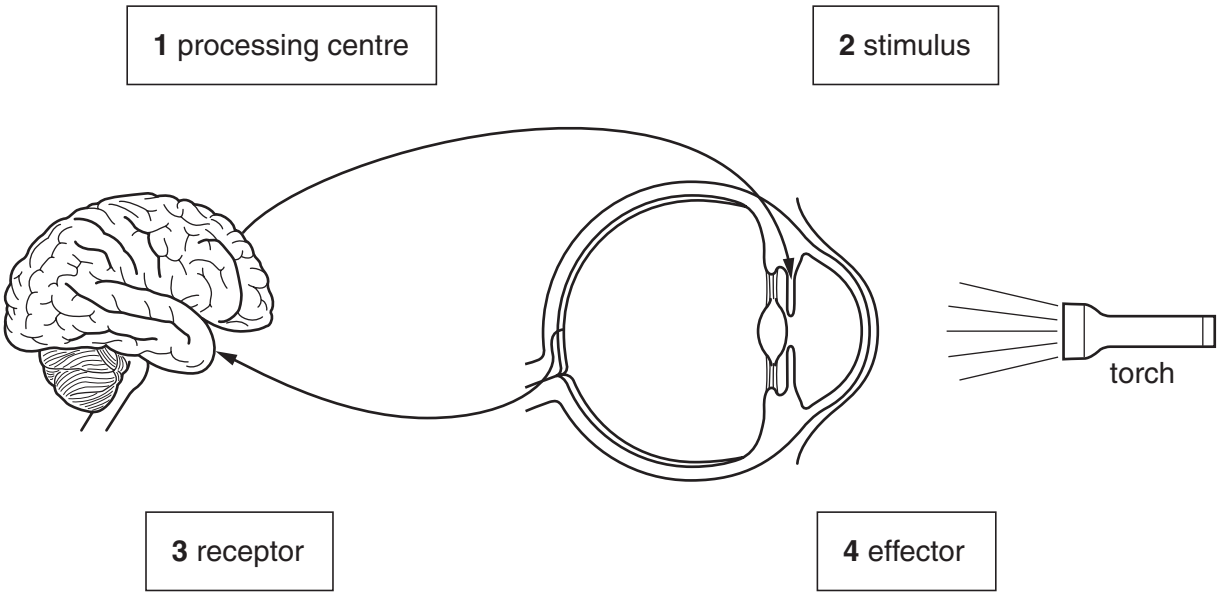
Put ticks (✓) in the boxes next to the **two** best answers.

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]

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.

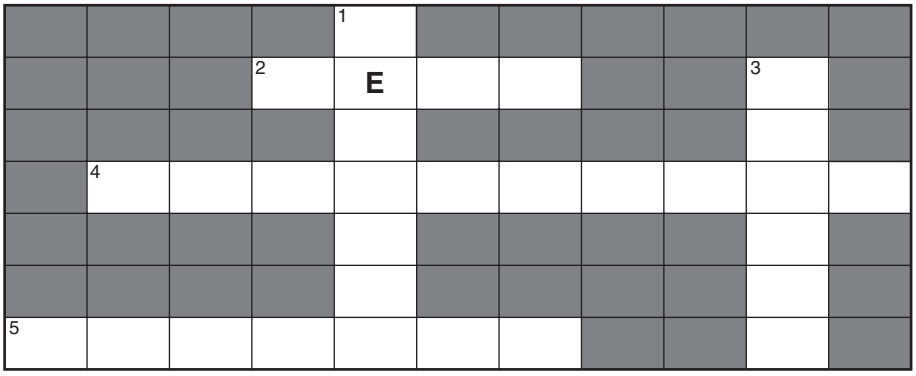
fewer collisions between enzymes and other molecules	☐
faster collisions between enzymes and other molecules	☐
slower collisions between enzymes and other molecules	☐
rapid changes of temperature	☐

[1]

[Total: 6]

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]

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.

base 1	**base 2**
A	A
C	C
T	T
G	G

[1]

(b) Cells may divide by mitosis or meiosis.

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

cell division	**descriptions**
	The new cells are gametes.
meiosis	The new cells are identical to each other.
	The new cells contain half the number of chromosomes.
mitosis	The new cells are the same as the parent cell.
	The new cells contain double the number of chromosomes.

[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]

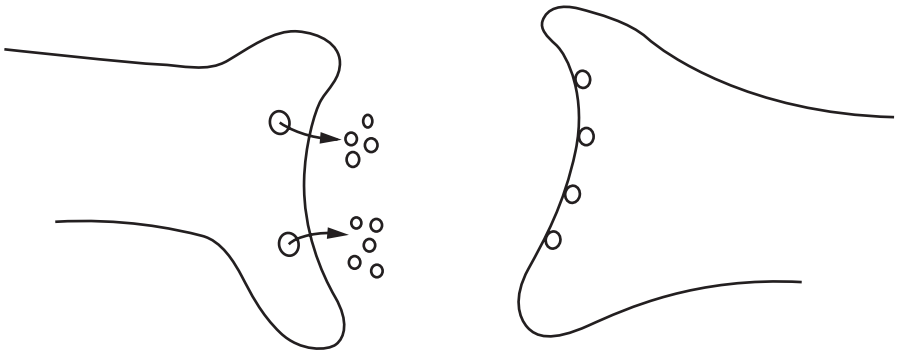
[Total: 6]

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.	
Only simple animals use simple reflexes.	
Conditioning is when reflex responses are learnt.	
Only complex reflexes are used to improve an animal's chances of survival.	
Conditioned reflexes usually increase the chances of survival.	

[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
	falling asleep	protecting a sense organ
simple		
	salivating when hearing a bell ring	refreshing the brain
conditioned		
	blinking in a bright light	helping digestion

[2]

(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.

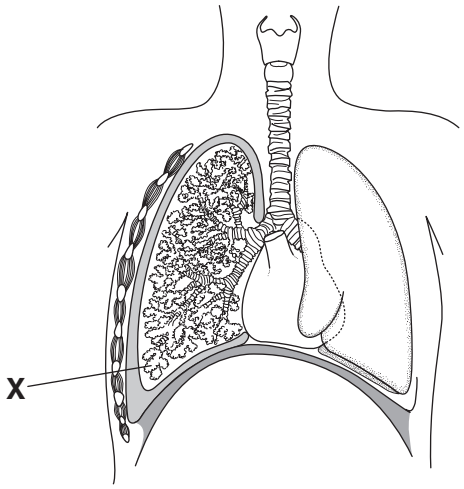
Describe **one other** thing that happens to the chromosomes during mitosis.

..... [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.

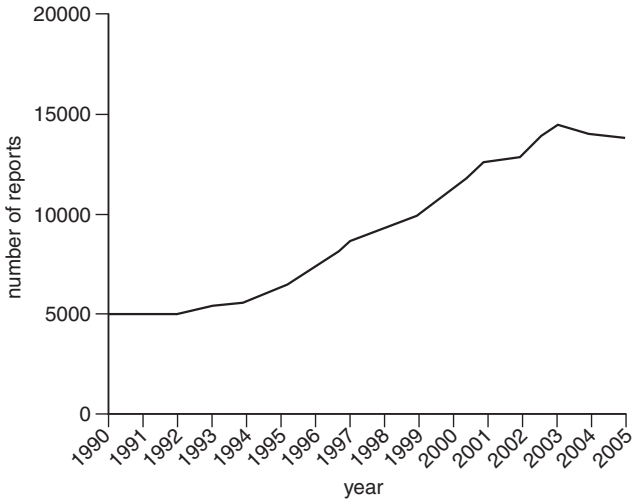
New strains occur because bacteria keep mutating.

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]

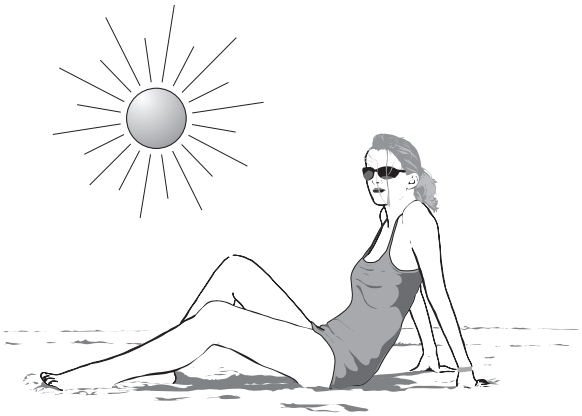
[Total: 5]

END OF QUESTION PAPER

1 (a) Rachel is on holiday.

She is lying in the sun.

It is hot.



Rachel's body reacts to the heat in a number of stages.

The stages are in the wrong order.

A Sweat glands produce more sweat.

B The brain triggers the sweat glands to become active.

C The brain processes information from the receptors.

D Temperature receptors in the skin detect the external temperature.

Write a letter **A**, **B**, **C** or **D** in each box to show the correct order of the stages.

The first box has been done for you.

D			

[2]

(b) What is the purpose of sweating?

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

evaporates and cools the skin ☐

dries up and heats the skin ☐

keeps the skin clean ☐

[1]

(c) Rachel should avoid getting heat stroke when lying in the sun.

Complete the sentences about **heat stroke**.

Choose words from this list.

decreases **food** **heat**

increases **stays the same** **water**

Heat stroke can develop when the body temperature …… .

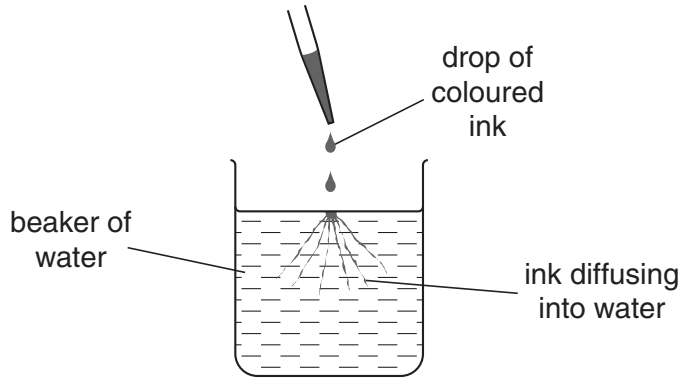
The body suffers from a lack of …… .

[2]

[Total: 5]

2 **(a)** Andy carries out a simple experiment to show diffusion.

He adds a drop of coloured ink to a beaker of water and watches what happens.



Complete the sentences.

Choose words from this list.

active **high** **low** **passive**

Diffusion is the …… movement of molecules from a region of their …… concentration to a region of their …… concentration.

[2]

(b) Osmosis is a type of diffusion.

Put a tick (✓) in the box next to each of the **three** correct statements.

Osmosis is the movement of…

…solute molecules. ☐

…water molecules. ☐

…molecules across a completely permeable membrane. ☐

…molecules across a partially permeable membrane. ☐

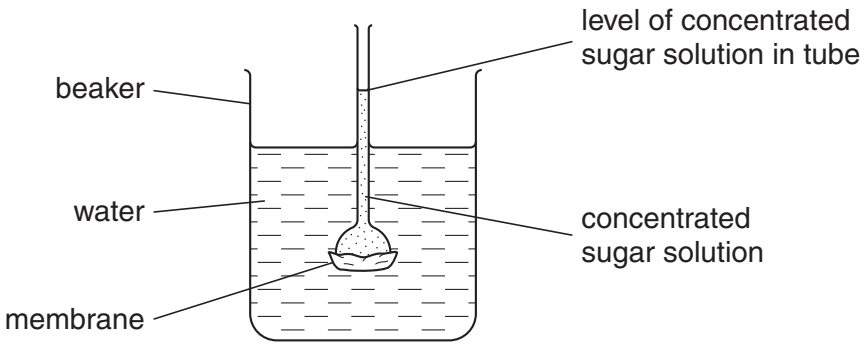
…molecules from a concentrated to a dilute solution. ☐

…molecules from a dilute to a concentrated solution. ☐

[2]

(c) Andy sets up another experiment.

The membrane allows water molecules to pass through but not sugar molecules.



What will happen to the **level** of concentrated sugar solution in the tube?

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

becomes higher **becomes lower** **stays the same**

[1]

[Total: 5]

3 This question is about maintaining water balance in the body.

(a) How do we **gain** our water?

Put a (ring) around the **three** correct answers.

breathing

drinking

excreting urine

exercising

feeding

respiring

[2]

(b) Urine is produced by the body.

The concentration of urine is affected by the concentration of the blood plasma.

Which **three** factors may change the concentration of the blood plasma?

Put a tick (✓) in the box next to each of the **three** correct answers.

amount of oxygen in the blood	☐
amount of salt eaten	☐
drinking alcohol	☐
external rainfall	☐
external temperature	☐
being male or female	☐

[3]

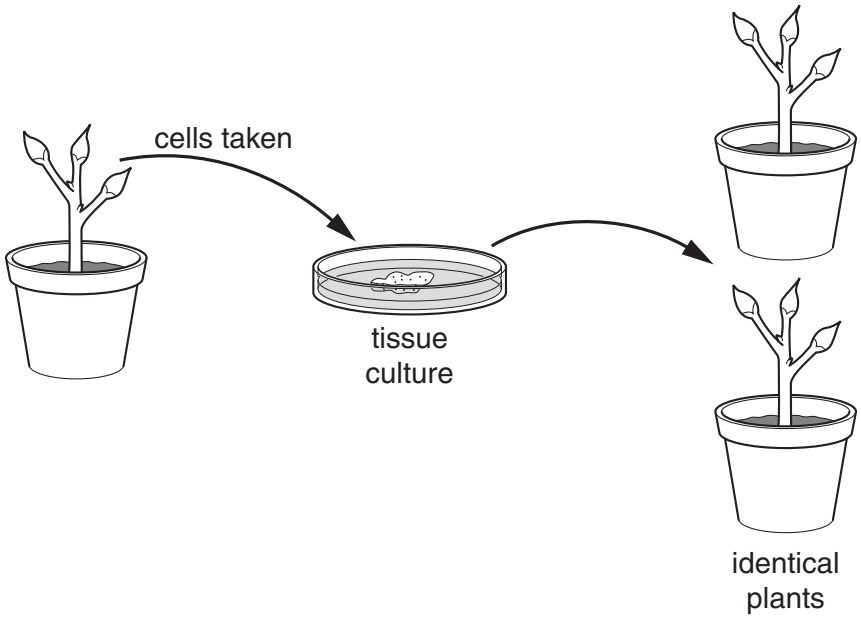
[Total: 5]

4 **(a)** James takes some cells from a plant.

He grows the cells in a dish of nutrients.

This is called tissue culture.

The cells from the tissue culture produce identical plants.



(i) What process is taking place in cells of the tissue culture to produce new cells that are identical to each other?

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

fertilisation **meiosis** **mitosis**

[1]

(ii) What happens to the number of organelles in cells during growth before they divide?

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

decreases **increases** **stays the same**

[1]

(b) James grows some geranium plants until they produce flowers.

He examines one of the flowers and finds some gametes.

A gamete is a sex cell which contains chromosomes from a parent.

Flowering plants make gametes for sexual reproduction.

(i) What happens to the chromosome number when the flower produces its gametes?

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

The chromosome number in the gamete is…

…doubled. ☐

…halved. ☐

…the same. ☐

…tripled. ☐

[1]

(ii) A male gamete from one flower can join with a female gamete from another flower.

What is the name of the cell formed **immediately** after they join?

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

embryo **fruit** **seed** **xylem** **zygote**

[1]

(iii) James finds out that the chromosome number in each gamete is 14.

How many chromosomes will be found in the cell formed after the gametes have joined together?

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

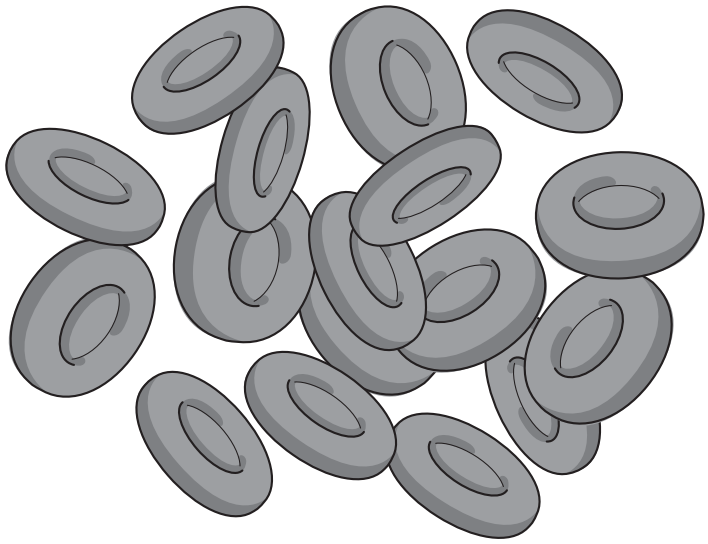
7 **14** **21** **28**

[1]

[Total: 5]

5 Red blood cells can carry oxygen around the body.

This is because they are filled with a **protein** called haemoglobin.



(a) (i) Where are proteins made in cells?

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

cell membrane **cell wall** **cytoplasm** **nucleus** **vacuole**

[1]

(ii) Each mature red blood cell loses its nucleus.

How does this affect the production of new haemoglobin in these cells?

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

The production of new haemoglobin…

…increases. ☐

…stays the same. ☐

…stops. ☐

[1]

(b) The genetic code in the nucleus is made from DNA.

Complete the sentence.

Put a (ring) around the **correct** word in each list.

The DNA molecule contains	two	different	bases.
	three		genes.
	four		proteins.

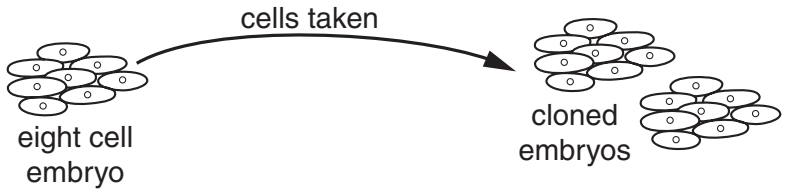
[2]

[Total: 4]

6 Ruth works in a research laboratory.

She takes cells from embryos at the 'eight cell' stage.

She uses these cells to produce cloned embryos.



(a) Why must Ruth **not** use cells from embryos after the 'eight cell' stage to make clones?

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

The cells are already specialised. ☐

The cells are too small. ☐

The cells have stopped growing. ☐

[1]

(b) Cells may be very different to each other but they have the **same genes**.

How can this happen?

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

The cells contain…

…genes that are all active. ☐

…genes that are all inactive. ☐

…some active and some inactive genes. ☐

[1]

(c) Which one of these structures divides by mitosis to form an embryo?

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

brain **egg** **muscle** **sperm** **zygote**

[1]

(d) Both plants and animals grow.

Which feature of growth is shared by both plants and animals?

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

Both plants and animals…

…continue to grow in height and width throughout their lives. ☐

…have some cells which continue to divide by mitosis. ☐

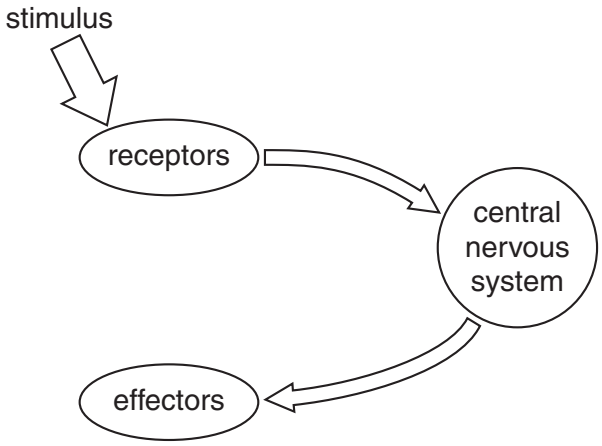
…have only specialised cells. ☐

[1]

[Total: 4]

7 **(a)** This question is about the central nervous system (CNS) in animals.

Receptors and effectors are connected to the central nervous system.



(i) What connects the central nervous system to the receptors and effectors?

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

backbone

blood vessels

brain

peripheral nervous system

[1]

(ii) Which cells are effectors?

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

bone cells

red blood cells

muscle cells

[1]

(b) (i) Nerve cells are called neurons.

There are different types of neurons.

What is the function of sensory neurons?

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

Sensory neurons carry impulses from the…

…CNS to the effectors. ☐

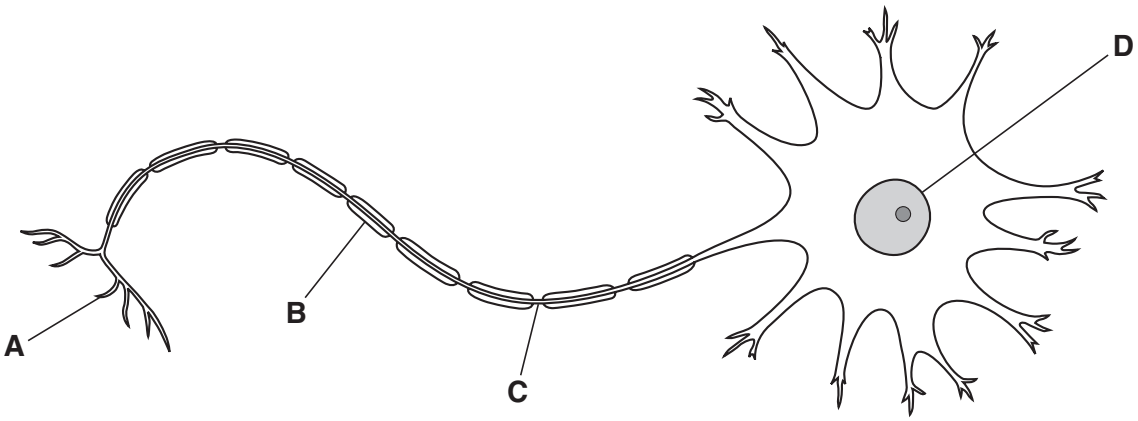
…CNS to the receptors. ☐

…effectors to the CNS. ☐

…receptors to the CNS. ☐

[1]

(ii) The drawing shows the structure of a motor neuron.



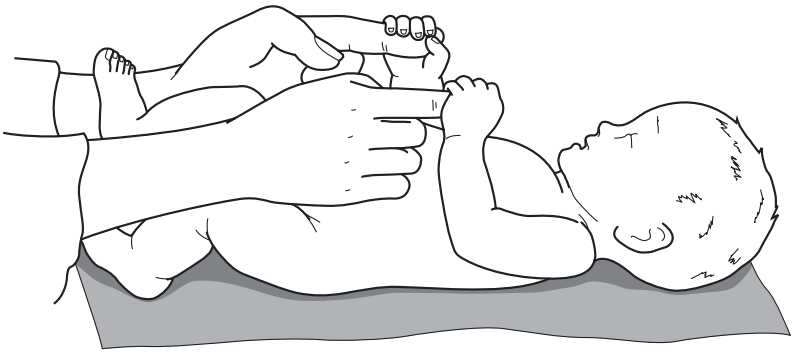
Write the correct letter **A**, **B**, **C** or **D** in the box next to each structure.

structure	letter
axon	
fatty sheath	
nucleus	

[2]

[Total: 5]

8 Jo is a newborn baby.



A nurse is testing Jo's reflex actions.

The nurse puts her fingers onto Jo's hands.

Jo grasps the nurse's fingers.

(a) Which type of reflex action and response is shown by Jo?

Draw **one** straight line to link the correct **reflex action** to the correct **response**.

reflex action	**response**
complex	involuntary
simple	voluntary

[1]

(b) As Jo's brain develops she will respond to many more things in her environment.

(i) What will happen to the neuron pathways in her brain as it develops?

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

new pathways form ☐

the pathways are broken down ☐

the pathways do not change ☐

[1]

(ii) What are these neuron pathways in Jo's brain carrying?

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

blood ☐

impulses ☐

food ☐

oxygen ☐

[1]

(c) Synapses are tiny gaps between the neurons in Jo's brain.

The speed at which synapses transmit information can change.

Which **two** people give correct reasons for this change?

answer ..... and ..... **[2]**

[Total: 5]

9 **(a)** Stuart is a doctor studying the cerebral cortex of the brain.

One of Stuart's patients has damage to her cerebral cortex.

Which **two** processes are **most directly** affected by this damage?

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

The patient's ability to…

…blink in bright light. ☐

…feel a pin prick on her skin. ☐

…move her hand away from a hot surface. ☐

…remember things. ☐

…speak. ☐

[2]

(b) What is the best way in which Stuart could find the **exact part** of the cerebral cortex which was damaged?

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

Stuart is likely to…

…apply an electrical charge to parts of the brain. ☐

…record the pulse rate. ☐

…look at images from an MRI scanner. ☐

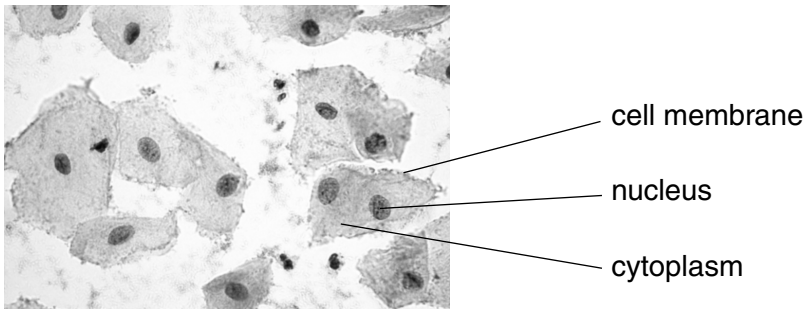
…take the core body temperature. ☐

…take a urine sample. ☐

[2]

[Total: 4]

10 Gareth is looking at cheek cells using a microscope.



(a) Answer the following questions using labelled parts from the photograph.

(i) Which part of the cheek cell controls the movement of substances into and out of the cell?

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

(ii) Where in the cheek cell do most chemical reactions happen?

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

(b) Gareth now wants to look at some onion cells using a microscope.

Describe how he could prepare a microscope slide of onion cells.

.....

.....

.....

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

[Total: 5]

11 Basil is a gardener.

He keeps a diary of the work that he does in his garden.

Here is part of his diary.

27th September

Today I decided to make some new plants.
My strawberries had sent out long shoots.
I planted the small plants which were on the end of these shoots.

I made new geranium plants in a different way.
I cut small shoots off the plants and dipped them into a powder to make them grow roots.
I then planted the shoots in some soil.

(a) What is in the powder that Basil uses to make his geraniums grow?

Put a (ring) around the correct answer in this list.

enzymes **plant hormones** **seeds** **sperm**

[1]

(b) Basil knows that both his new geranium and strawberry plants will look like their parents.

Explain why they will look like their parents.

.....

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

[Total: 3]

12 Zoe is expecting a baby and Gary is the father.

(a) Complete the sentences about Zoe's baby by writing a word in each space.

Zoe's baby grew from a single cell called a zygote.

This cell was formed when a …… cell from Gary joined with an egg cell made by Zoe.

The cell from Gary can swim to the egg cell because it has a …… .

The zygote grows into a baby by a type of cell division called …… .

[3]

(b) Zoe reads a book about how babies grow.

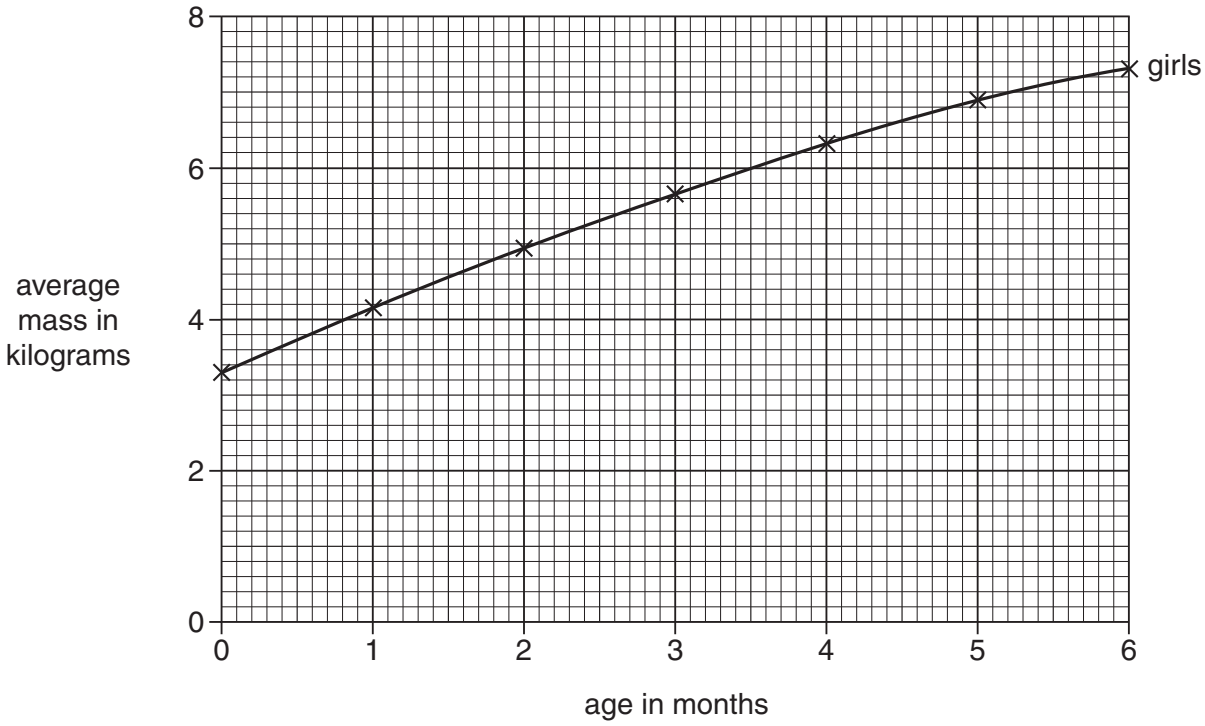
It shows how the average mass of baby boys changes during the first six months of life.

age of baby boy in months	average mass in kilograms
0	3.3
1	4.4
2	5.4
3	6.2
4	7.0
5	7.5
6	7.9

(i) The graph shows the average mass of baby girls.

Plot the information in the table about baby boys on this graph.

Finish the graph by drawing the best curve. **[3]**



(ii) Write down **one** difference between the growth of boys and girls during their first six months.

.....

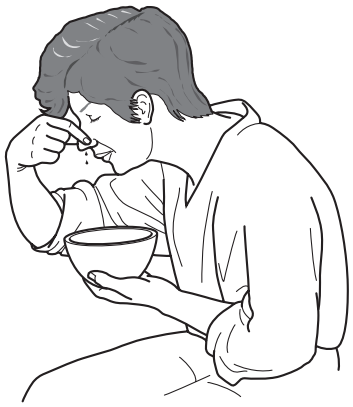
..... **[1]**

[Total: 7]

Turn over

13 HHT is a genetic disorder.

It makes people have bad nose bleeds.



(a) HHT causes problems with blood vessels.

There are three main types of blood vessel in the body.

Arteries carry blood under high pressure out to the body from the heart.

Veins normally carry blood under low pressure back to the heart.

Usually there are very small blood vessels that connect arteries to veins.

(i) Write down the name of these small blood vessels.

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

(ii) These small blood vessels do an important job in the body.

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

act as a store of cholesterol for the body	☐
allow exchange of materials with tissues	☐
contain muscle cells to pump the blood	☐
contain valves to stop the blood flowing backwards	☐

[1]

(b) In a person with HHT some of the vessels that join arteries to veins are missing.

This means that blood under high pressure flows directly into a vein from an artery.

This often causes the vein to break and cause bleeding.

Which part of the blood would cause it to clot during a nose bleed?

Put a (ring) around the correct answer in this list.

platelets **red blood cells** **white blood cells**

[1]

(c) HHT is caused by a change in a gene.

This stops a protein being made that is needed for blood vessel growth.

(i) Write down the word used to describe a change in a gene.

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

(ii) Scientists hope to be able to move genes from one person to another so that they do not develop HHT.

What name is given to this treatment that scientists are trying to develop?

Underline the name in this list.

cloning

fertilising

genetic engineering

selective breeding

[1]

[Total: 5]

END OF QUESTION PAPER

1 This question is about maintaining water balance in the body.

(a) How do we **gain** our water?

Put a (ring) around the **three** correct answers.

breathing

drinking

excreting urine

exercising

feeding

respiring

[2]

(b) Urine is produced by the body.

The concentration of urine is affected by the concentration of the blood plasma.

Which **three** factors may change the concentration of the blood plasma?

Put a tick (✓) in the box next to each of the **three** correct answers.

amount of oxygen in the blood	☐
amount of salt eaten	☐
drinking alcohol	☐
external rainfall	☐
external temperature	☐
being male or female	☐

[3]

(c) The concentration of urine is also controlled by the hormone ADH.

Draw a straight line to link ADH to its **site of secretion** and another straight line to link ADH to its **site of activity**.

site of secretion		site of activity
cerebral cortex		bladder
hypothalamus	**ADH**	brain
pituitary gland		kidney

[2]

(d) The drug, Ecstasy, has an effect on urine production.

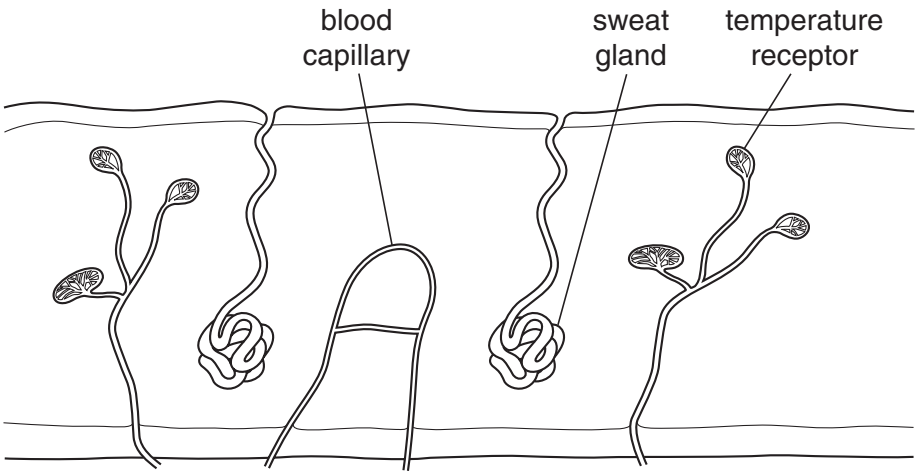
Five people were asked to describe what happens.

Which **two** people gave the correct descriptions?

answer ..... and ..... **[2]**

[Total: 9]

2 **(a)** The human skin contains a number of different receptors and effectors.



Temperature receptors detect the external temperature.

Sweat glands and blood vessels leading to capillaries are both effectors.

(i) Which region of the body receives and processes impulses from the temperature receptors?

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

cerebral cortex

hypothalamus

pituitary gland

spinal cord

[1]

(ii) The body reacts to an **increased** body temperature.

Put a tick (✓) in the box next to each of the **three** true statements.

As body temperature increases…

…blood vessels move closer to the surface of the skin. ☐

…blood vessels supplying the capillaries vasoconstrict. ☐

…temperature receptors are stimulated. ☐

…the skin becomes red. ☐

…the sweat glands produce more sweat. ☐

…shivering takes place. ☐

[2]

(b) Heat stroke is the result of an uncontrolled increase in body temperature.

A series of stages take place in the body.

They are in the wrong order.

A body becomes dehydrated

B exposure to very hot temperatures

C reduced sweating

D increased sweating

E further increase of core body temperature

(i) Put the stages in the correct order.

Write the letters **A**, **B**, **C** or **D** in the correct boxes.

The last stage has been done for you.

				E

[2]

(ii) What are the symptoms of heat stroke?

Put a tick (✓) in the box next to each **correct** symptom.

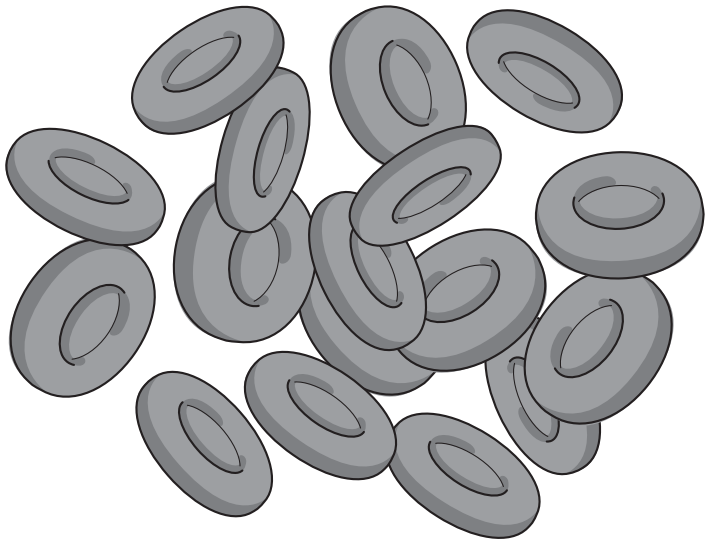
confusion	☐
dizziness	☐
feeling hungry	☐
hot, dry skin	☐
increased urine production	☐

[1]

[Total: 6]

3 Red blood cells can carry oxygen around the body.

This is because they are filled with a **protein** called haemoglobin.



(a) (i) Where are proteins made in cells?

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

cell membrane **cell wall** **cytoplasm** **nucleus** **vacuole**

[1]

(ii) Each mature red blood cell loses its nucleus.

How does this affect the production of new haemoglobin in these cells?

Put a tick (✓) in the **correct** box.

The production of new haemoglobin…

…increases. ☐

…stays the same. ☐

…stops. ☐

[1]

(b) The genetic code in the nucleus is made from DNA.

Complete the sentence.

Put a (ring) around the **correct** word in each list.

The DNA molecule contains	two	different	bases.
	three		genes.
	four		proteins.

[2]

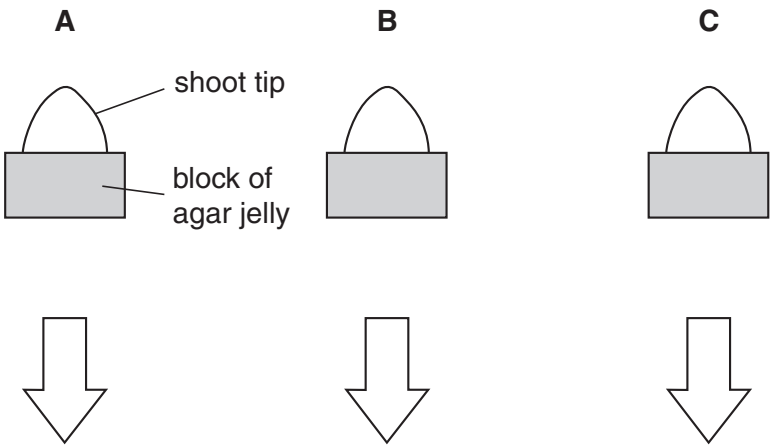
[Total: 4]

4 **(a)** Sara is studying growth in plants.

She follows three steps under different conditions, **A**, **B** and **C**.

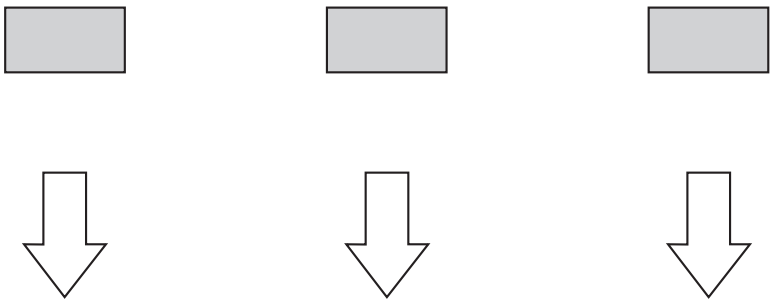
Step 1

She cuts the tips off three growing shoots and puts them onto blocks of agar jelly.



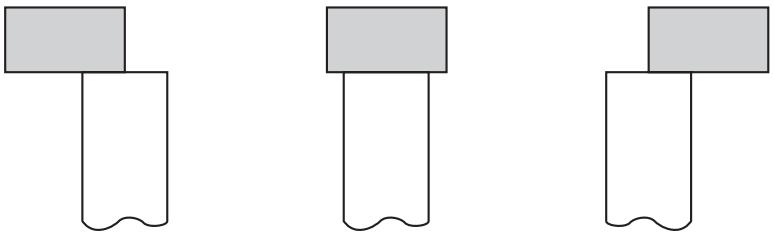
Step 2

She removes the tip from each block of agar jelly.



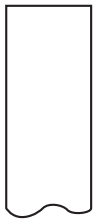
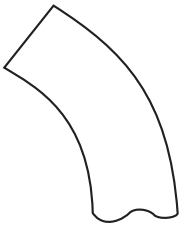
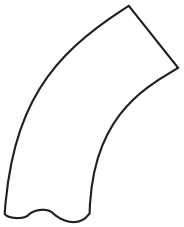
Step 3

She then places each block of agar jelly onto three shoots which have already had their tips removed.



The shoots are left to grow and Sara examines the direction of growth.

(i) Put the correct letter **A**, **B** or **C** in the box next to each shoot.

shoot appearance	letter
	
	
	

[1]

(ii) Sara's friends discuss the results.

Which **two** friends' ideas, when put together, correctly explain the results?

answer ..... and ..... **[2]**

(b) Sara finds that she can obtain similar growth patterns when giving shoots light from one direction.

This response is called **phototropism**.

Phototropism increases a plant's chance of survival.

Complete the sentence.

Choose the **correct** word from this list.

photoperiodism

photosynthesis

reproduction

respiration

This increased chance of survival is due to an increased rate of …… .

[1]

[Total: 4]

5 This question is about the development of cells in mammals and plants.

(a) Embryos of mammals develop by mitosis.

Which single cell divides by mitosis to produce an embryo?

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

egg cell

oviduct cell

sperm cell

testes cell

zygote cell

[1]

(b) During mammalian cloning the nucleus from a body cell can be inserted into an 'empty' egg cell.

This modified cell can then be made to divide.

It has the potential to produce different types of tissues.

(i) What happens to the genes in the nucleus of the modified cell during this process?

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

all genes become activated	☐
all genes become inactive	☐
some inactive genes are reactivated	☐
some genes are lost	☐

[1]

(ii) It is also possible to cause unspecialised **plant** cells to develop into a range of other tissues and organs.

A change in which of these factors may cause this to happen?

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

enzymes **hormones** **oxygen** **water**

[1]

[Total: 3]

6 **(a)** Stuart is a doctor studying the cerebral cortex of the brain.

One of Stuart's patients has damage to her cerebral cortex.

Which **two** processes are **most directly** affected by this damage?

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

The patient's ability to…

…blink in bright light. ☐

…feel a pin prick on her skin. ☐

…move her hand away from a hot surface. ☐

…remember things. ☐

…speak. ☐

[2]

(b) What is the best way in which Stuart could find the **exact part** of the cerebral cortex which was damaged?

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

Stuart is likely to…

…apply an electrical charge to parts of the brain. ☐

…record the pulse rate. ☐

…look at images from an MRI scanner. ☐

…take the core body temperature. ☐

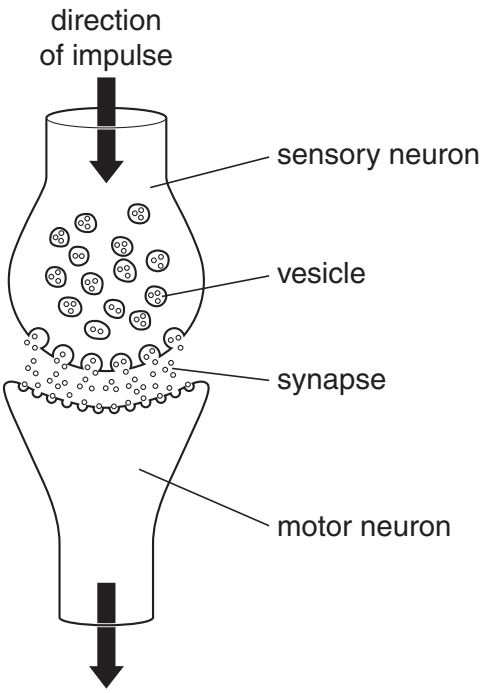
…take a urine sample. ☐

[2]

[Total: 4]

7 Synapses are gaps between neurons.

(a) The diagram shows a synapse between a sensory and motor neuron.



(i) The table describes the steps taking place at the synapse.

The steps are in the wrong order.

letter	step
A	synapse chemicals diffuse across the gap
B	synapse chemicals reabsorbed into the vesicles
C	vesicles release the synapse chemicals
D	synapse chemicals bind to receptor molecules
E	impulse arrives at the synapse

Put the steps in the correct order.

Write the letters **A**, **B**, **C** or **D** in the correct boxes.

The first step has been done for you.

E				

[3]

(ii) Which part of the synapse contains the **receptor molecules**?

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

The receptor molecules are found on the membrane of…

…the fatty sheath. ☐

…the motor neuron. ☐

…the sensory neuron. ☐

…a vesicle. ☐

[1]

(b) Ecstasy has a mood-enhancing effect by changing the transmission of impulses across synapses.

Complete the sentences.

Choose words from this list.

brain **decrease** **increase**

peripheral nervous system **spinal cord** **stay the same**

Ecstasy mainly blocks sites of synapses in the …… .

These sites are where the chemical serotonin is removed.

The concentration of serotonin in the gap between the neurons will …… .

[2]

[Total: 6]

8 Gemma is driving her car.

She is stopped by a policeman because the road ahead is closed.

The policeman describes a different route to her.

(a) Gemma listens to the policeman and remembers the details of the different route.

Which **two** parts of Gemma's nervous system have been **directly** involved in remembering this new route?

Put a (ring) around the **two** correct answers.

ears

eyes

cerebral cortex

hypothalamus

pituitary gland

[2]

(b) What is the most likely way in which Gemma tries to remember the new route?

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

Gemma tries to remember the new route…

…by thinking about the appearance of the policeman. ☐

…by repeating the instructions. ☐

…by remembering the old route. ☐

…by the pattern of left and right-hand turns. ☐

…by thinking about how the voice of the policeman sounded. ☐

[1]

(c) Gemma found the new route harder to follow than her old route.

Why can Gemma remember the old route more easily than the new route?

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

She remembers the old route more easily because…

…the old route uses more fuel. ☐

…she knows that she turns left when she smells the sweet factory. ☐

…she travels at different times each day. ☐

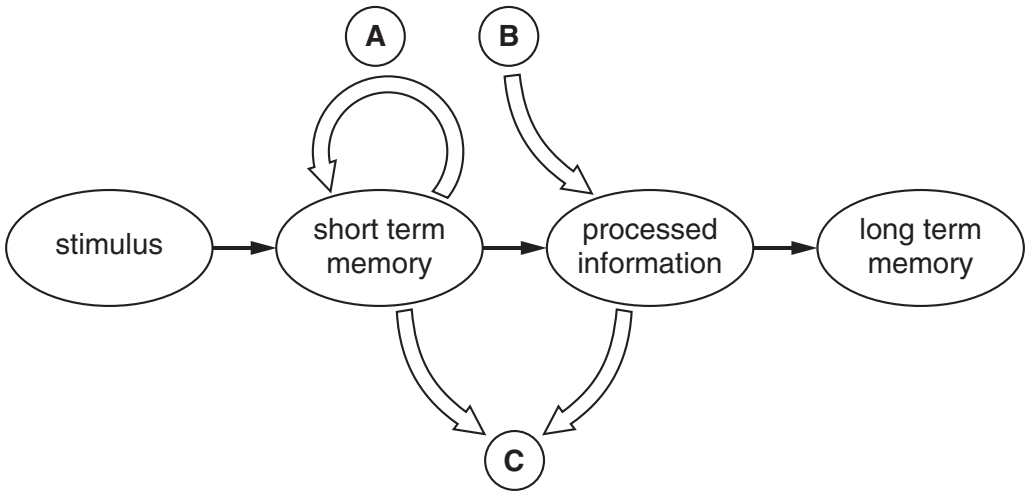
…she needs to turn left and right many more times. ☐

[1]

(d) Gemma learnt the original route a number of years ago.

There are various models used to describe the way in which we develop our memory.

The diagram shows one model.



What do the three parts of the model, **A**, **B** and **C**, represent?

Write the correct letter **A**, **B** or **C** in each box.

secondary stimulus	
information rehearsed	
information lost	

[2]

[Total: 6]

9 Zoe is expecting a baby and Gary is the father.

(a) Complete the sentences about Zoe's baby.

Zoe's baby grew from a single cell called a zygote.

The zygote has two copies of each chromosome.

A cell that has two copies of each chromosome is called …… .

The zygote grows into a baby by a type of cell division called …… .

[2]

(b) Zoe reads a book about how babies grow.

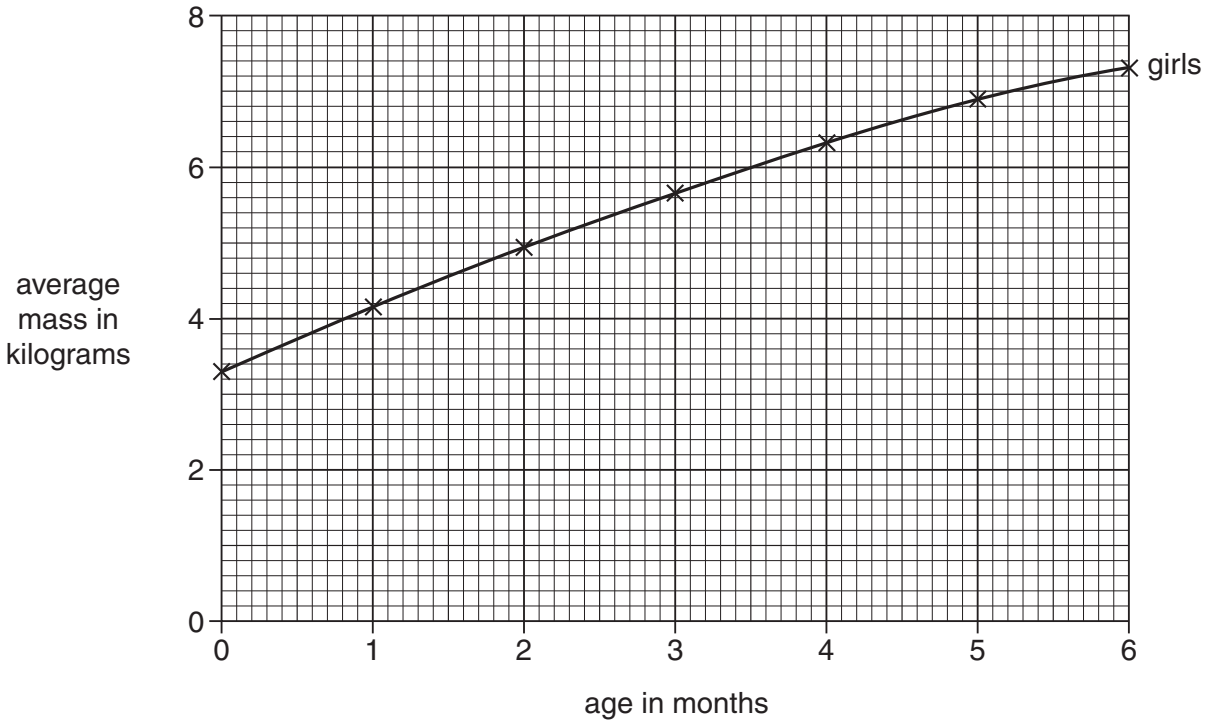
It shows how the average mass of baby boys changes during the first six months of life.

age of baby boy in months	average mass in kilograms
0	3.3
1	4.4
2	5.4
3	6.2
4	7.0
5	7.5
6	7.9

(i) The graph shows the average mass of baby girls.

Plot the information in the table about baby boys on this graph.

Finish the graph by drawing the best curve. **[3]**



(ii) What is the difference between the average mass of baby boys and baby girls at 3.5 months?

Use your graph.

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

(iii) Explain why Zoe might use a graph like this once her baby is born.

.....

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

[Total: 7]

10 HHT is a genetic disorder.

It makes people have bad nose bleeds.

(a) HHT causes problems with blood vessels.

There are three main types of blood vessel.

Arteries carry blood under high pressure out to the body from the heart.

Veins normally carry blood under low pressure back to the heart.

Usually there are very small blood vessels that connect arteries to veins.

(i) Write down the name of these small blood vessels.

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

(ii) These small blood vessels do an important job in the body.

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

act as a store of cholesterol for the body	☐
allow exchange of materials with tissues	☐
contain muscle cells to pump the blood	☐
contain valves to stop the blood flowing backwards	☐

[1]

(b) In a person with HHT, some of the vessels that join arteries to veins are missing.

This means that blood under high pressure flows directly into a vein from an artery.

This often causes the vein to break and cause bleeding.

Veins often break when blood enters under high pressure but arteries do not.

Why is this?

.....

.....

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

(c) HHT is caused by a mutation which changes the DNA of a gene.

This stops the protein that is needed for blood vessel growth being made correctly.

(i) What change might occur in the DNA of a gene?

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

(ii) Why could this change stop the protein being made correctly?

.....

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

(iii) Scientists hope to be able to change a person's genes so that they do not develop HHT.

Write down **one** reason why some people are worried about scientists being able to change a person's genes.

.....

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

[Total: 6]

11 Scientists have discovered that cells make special proteins if they get too hot.

These proteins are called heat shock proteins and they do many jobs such as repairing damaged enzymes.

(a) Explain why enzymes may be damaged if a cell becomes too hot.

.....

.....

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

(b) The heat shock proteins are coded for by genes.

Put a tick (✓) in the box next to the way that a gene codes for a protein.

The amino acids in DNA code for the order of bases in the protein.	☐
The DNA codes for proteins by unzipping and making new strands.	☐
Each of the four bases in DNA codes for a different amino acid in the protein.	☐
The bases in DNA code for the order of amino acids in the protein.	☐

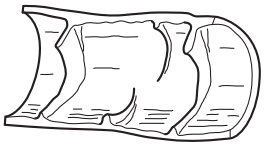
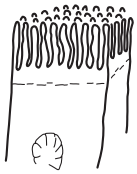
[1]

[Total: 3]

12 The small intestine has a large surface area.

The table shows three of the adaptations that give it such a large area.

The name of the second adaptation is missing.

name of adaptation	diagram of adaptation	total surface area of small intestine including adaptation in cm^2
folds		10 000
		100 000
microvilli		2 000 000

(a) What is the name given to the second adaptation?

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

(b) Why is it important that the small intestine has such a large surface area?

.....

.....

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

(c) Write down **one other** adaptation that the small intestine has that helps it to do its job.

.....

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

[Total: 4]

END OF QUESTION PAPER

1 **(a)** David's body maintains a constant internal temperature.

What is the name for this process in David's body?

Put a (ring) around the correct answer.

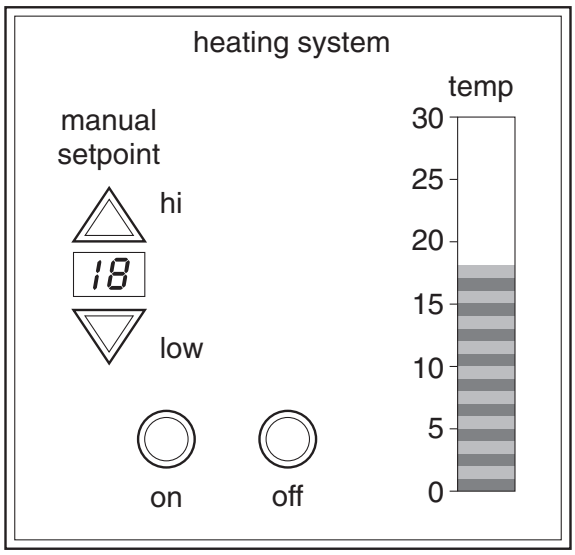
homeostasis **hormonal** **hyperactivity** **hypothermia**

[1]

(b) David moves into a new apartment.

The apartment has an automatic temperature control system.

The system maintains a constant temperature in the apartment.



Parts of the temperature control system in the apartment act like parts of the human body.

Draw a straight line from each **part in the control system** to the **part in the human body** that does the same job.

part in the control system	part in the human body
heating and cooling unit	receptor
computer	brain
unit used to detect room temperature	effector

[2]

(c) How does the control system in David's body work to maintain a constant internal temperature?

In your answer you should consider the part played by:

- receptors
- brain
- effectors.

.....

.....

.....

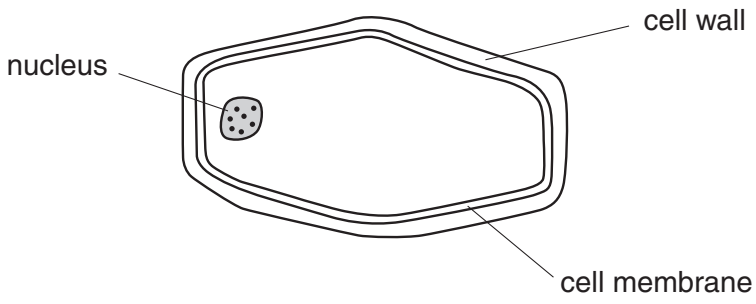
.....

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

[Total: 6]

2 Charlie is studying osmosis.

She looks at an onion cell using a microscope.



(a) The cell membrane is important in osmosis.

What is the best description of this membrane?

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

The membrane is …

… partially permeable. ☐

… fully permeable to all molecules. ☐

… not permeable to any molecules. ☐

… not permeable to water molecules. ☐ **[1]**

(b) Charlie has some onion cells in a dilute sucrose solution.

She puts some of the cells in pure water and some in a concentrated sucrose solution.

What will happen to the **amount of water** in the cells?

Put a tick (✓) in the correct box for each row.

	increases	**decreases**	**stays the same**
onion cells in pure water			
onion cells in a concentrated sucrose solution			

[2]

(c) Red blood cells are carried around the body in a fluid called blood plasma.

The amount of water in the red blood cells does not change.

Which statement explains why the amount of water does not change?

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

The concentration of the solution inside the red blood cells is …

… less than the blood plasma. ☐

… the same as the blood plasma. ☐

… greater than the blood plasma. ☐ **[1]**

[Total: 4]

3 This question is about kidneys.

(a) The kidneys excrete excess water from the body in urine.

Put a (ring) around **three** other ways in which water can be lost.

breathing **drinking** **eating** **producing faeces**

respiring **sweating**

[1]

(b) The kidneys filter some chemicals out of the blood.

Some chemicals are reabsorbed and others leave the body in the urine.

Complete the table to show what happens to each of these chemicals.

Put ticks (✓) in the correct boxes.

One row has been done for you.

	filtered out of the blood	**found in the urine**
salt	✓	✓
sugar		
urea		
water		

[2]

(c) Kidneys can produce **concentrated** or **dilute** urine.

The concentration of urine is affected by different conditions.

For these two conditions, state the type of urine produced (**concentrated** or **dilute**) and explain why this happens.

- **high external temperature**

type of urine produced ……

explanation .....

.....

- **eating too much salty food**

type of urine produced ……

explanation .....

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

[Total: 5]

4 Mr Mahmood is a biology teacher.

He gets his students to construct a model of DNA.

(a) Complete the sentences about the DNA model.

Use words from this list.

double

four

single

three

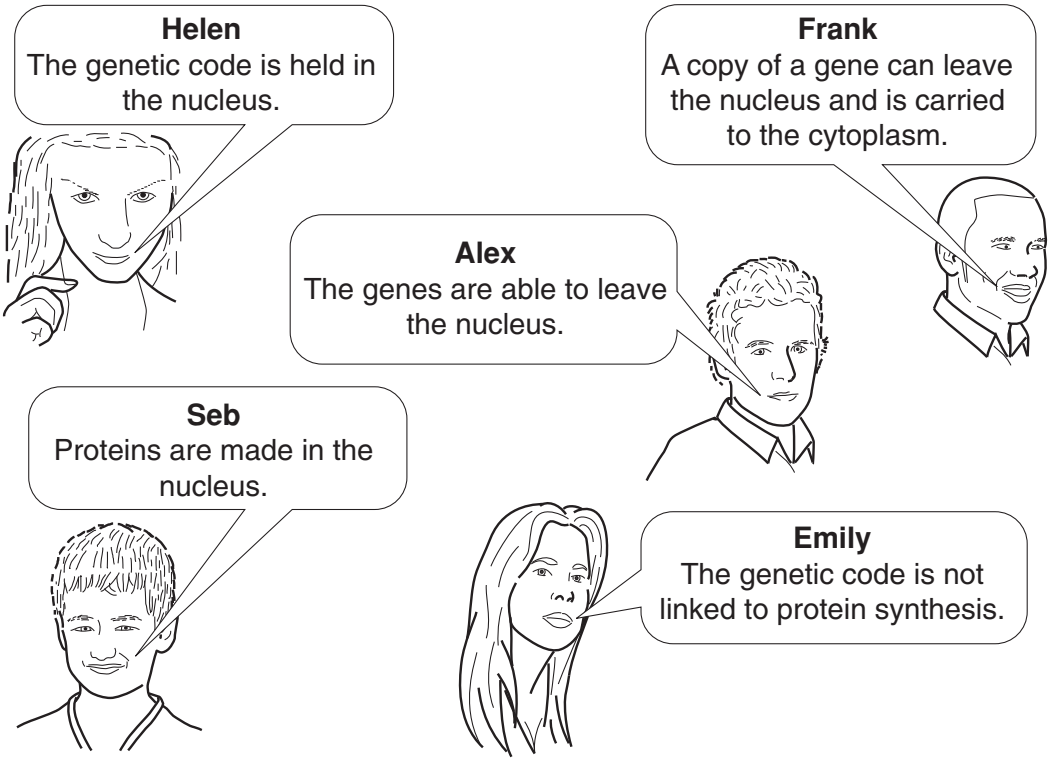
triple

two

The DNA model must be made from …… different bases.

The strands of DNA are held together by the bases to form a …… helix.
[2]

(b) Five students make statements about genes and protein production.



Which two students made correct statements?

answer …… and …… **[1]**

(c) Mr Mahmood asks his students to find out about the **cell cycle**.

What happens to the chromosomes during **cell growth** and **mitosis** in the cell cycle?

during **cell growth**

.....

.....

during **mitosis**

.....

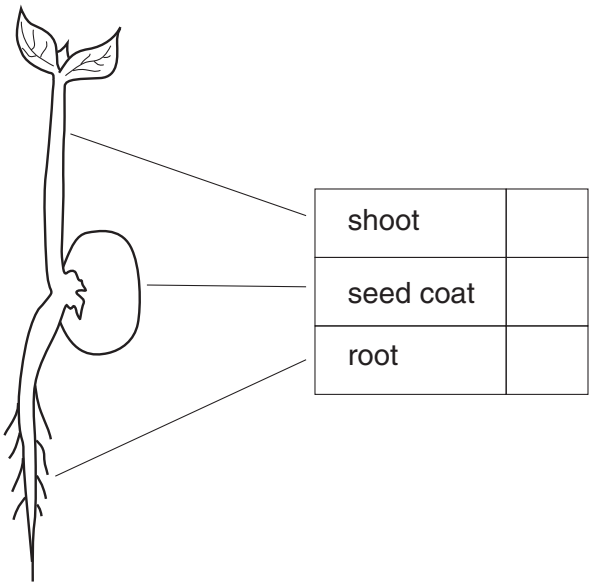
..... **[2]**

[Total: 5]

5 Amy grows a bean seedling.

(a) Which part of the bean seedling does **not** contain a meristem?

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



shoot	
seed coat	
root	

[1]

(b) The shoot of the bean seedling breaks.

Amy tries to grow a new plant from the piece of shoot that has broken off.

She dips the end of the damaged shoot in a powder before planting it.

What needs to be in the powder?

Draw a (ring) around the correct answer.

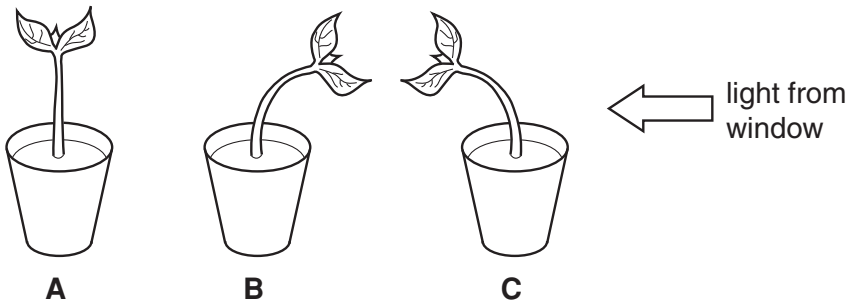
chlorophyll **enzymes** **hormones** **sugar**

[1]

(c) Amy grows some more bean seedlings.

(i) What will the seedlings look like after three days?

Choose from **A**, **B** or **C**.



answer ..... **[1]**

(ii) The seedlings carry out many different processes.

Which process is directly affected by light?

Draw a (ring) around the correct answer.

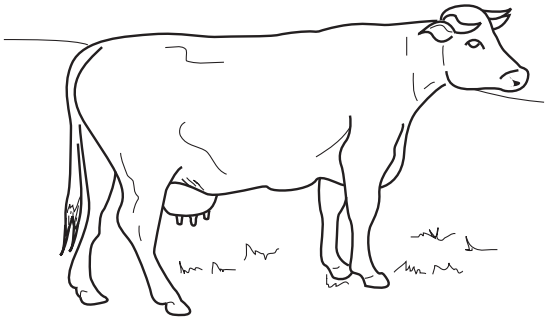
excretion **photosynthesis** **reproduction** **respiration**

[1]

[Total: 4]

6 Joe is a farmer.

He is very proud of his prize cow because she produces good quality milk.



Joe would like his cow to give birth to calves that could also produce good quality milk.

(a) An adult cow has 60 chromosomes in its body cells.

How many chromosomes are in a cow's egg cell?

Put a (ring) around the correct answer.

15 **30** **60** **120**

[1]

(b) The cow's egg cells are fertilised by sperm from a bull.

Complete the sentences.

Use words from this list.

all

fertilisation

half

meiosis

mitosis

most

The egg cells and sperm cells are gametes and are produced by …… .

An egg cell and a sperm cell fuse to form a zygote.

The zygote will contain …… of the chromosomes found in the cow's egg cell. **[2]**

(c) Each zygote will grow to form an embryo.

Joe finds out that scientists can take individual cells from an embryo and make identical copies of the embryo.

This is not successful after a certain stage of embryo development.

Why is this?

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

The cells have become …

… larger. ☐

… older. ☐

… smaller. ☐

… specialised. ☐ **[1]**

(d) An embryo grows into a female cow.

Every cell in the cow contains the same genes.

Only some of the cells in the cow produce milk.

Explain why.

Use ideas about **genes** and **protein production** in your answer.

.....

.....

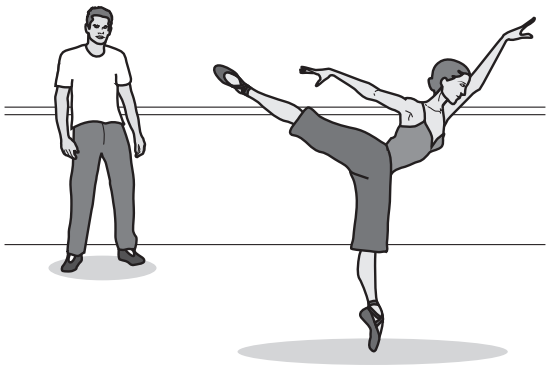
.....

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

[Total: 6]

7 Lucy and James are learning a dance for their next performance.

Lucy is struggling to remember the new steps.



Lucy's cerebral cortex is the part of her brain responsible for memory.

(a) What else is the cerebral cortex responsible for?

Put a (ring) around the **three** correct answers.

balancing water levels	**consciousness**	**homeostasis**
intelligence	**language development**	**reflex actions**

[2]

(b) Lucy asks James to describe what memory is.

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

looking at information	☐
responding to information	☐
storing information	☐
retrieving information	☐

[1]

(c) James tries to explain the dance steps to Lucy.

He uses verbal memory.

(i) What does James need to use verbal memory?

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

James needs …

… long-term memory only. ☐

… short-term memory only. ☐

… both short and long-term memory. ☐

[1]

(ii) James tells Lucy that she will eventually learn the new steps by repeating them during rehearsals.

What will happen to the neuron pathways in Lucy's brain as she learns the steps?

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

Some neuron pathways …

… are more likely to transmit impulses than others. ☐

… start to transmit impulses in both directions. ☐

… transmit impulses more quickly. ☐

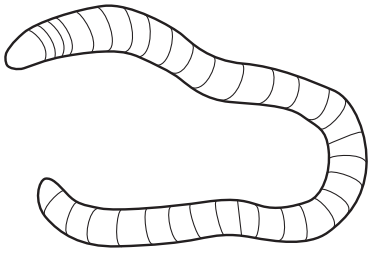
… stop transmitting impulses. ☐ **[1]**

[Total: 5]

8 Earthworms have a nervous system.

They have the same sort of reflexes as humans.

They can be seen above the soil surface when they leave their burrows.



(a) An earthworm will move back into its burrow quickly if it is touched.

This is a reflex action.

Complete this sentence about the reflex action shown by the earthworm.

Use words from this list.

complex

involuntary

simple

voluntary

The earthworm's reflex action is both …… and …… .

[1]

(b) Why is **this** reflex action an advantage to earthworms?

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

It helps earthworms to …

… find a mate. ☐

… gain oxygen. ☐

… search for food. ☐

… hide from predators. ☐ **[1]**

(c) Humans have a more complicated nervous system than earthworms.

Humans have a central nervous system.

Which **two** structures are part of the central nervous system?

Put a (ring) around the **two** correct answers.

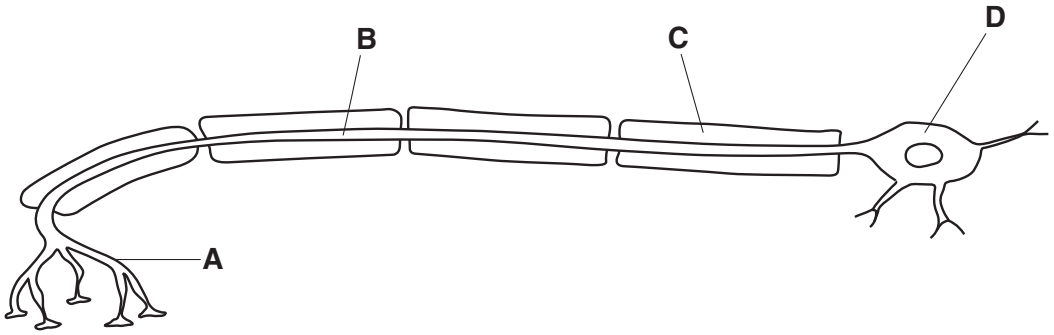
brain **liver** **muscle** **skin** **spinal cord**

[1]

[Total: 3]

Turn over for question 9

9 The diagram shows a motor neuron.



(a) Which structure, **A**, **B**, **C** or **D**, is the **axon**?

answer …… **[1]**

(b) Write about the fatty sheath.

In your answer include

- where it is
- what job it does.

.....

.....

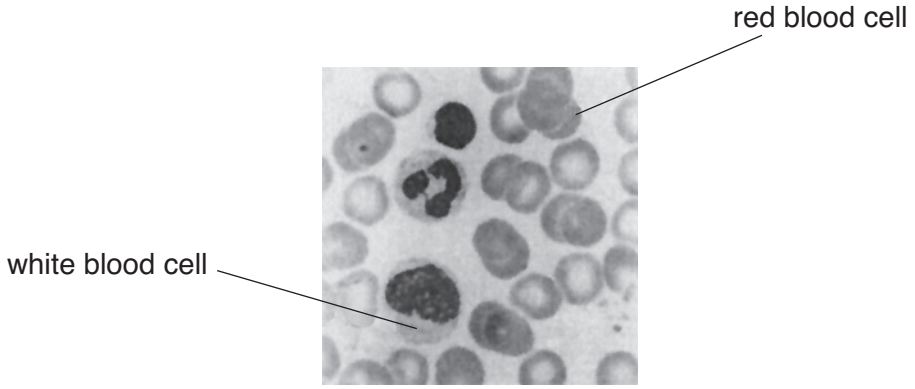
.....

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

[Total: 4]

10 Look at the picture.

It shows cells in human blood.



(a) Write down the job of red blood cells.

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

(b) Blood is moved around the body in blood vessels called arteries.

Write down the name of **one other** type of blood vessel.

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

(c) Write down the name of the organ that pumps blood around the body.

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

(d) Each white blood cell contains a nucleus.

Write down the job of the nucleus in a cell.

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

(e) Look at the statements.

Which **one** is a correct statement about substances in the blood?

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

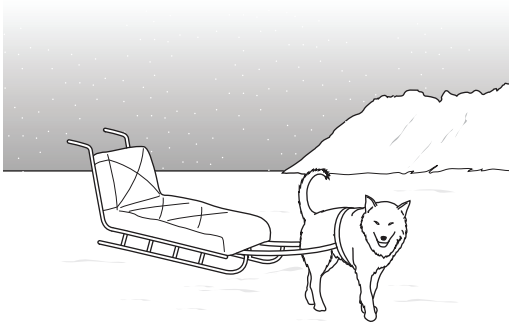
Carbon dioxide leaves the blood in the lungs.	
Food enters the blood in the lungs.	
Oxygen enters the blood in the small intestine.	
Oxygen leaves the blood in the lungs.	

[1]

[Total: 5]

11 Butch is a husky dog.

Huskies, like Butch, are a breed of dog used for pulling sledges.



(a) Husky dogs are produced by selective breeding.

They need to be strong to pull sledges.

To breed the best huskies the strongest females are bred with the strongest males.

Describe the next stages in selective breeding.

.....

.....

.....

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

(b) Scientists could clone Butch.

Which term best describes **cloning**?

Put a (ring) around the correct answer.

asexual reproduction

cell division

meiosis

sexual reproduction

[1]

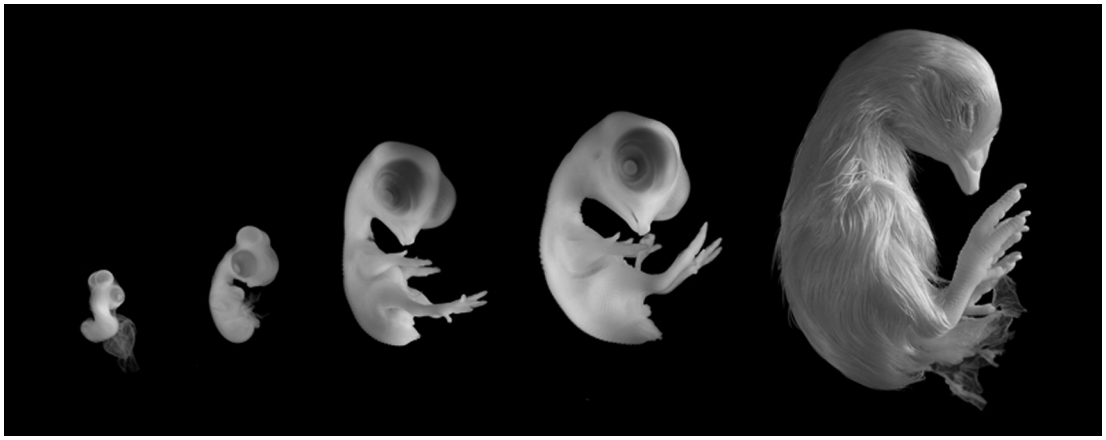
(c) The dog cloned from Butch will have the same characteristics as Butch.

Explain why.

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

[Total: 4]

12 Look at the picture. It shows a chicken embryo at different stages of growth.



(a) Cell division is needed for the chicken embryo to grow.

Cell division will continue even after the chicken is fully grown.

Write down **one other** reason, apart from growth, why cells divide.

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

(b) Adult male chickens produce sperm cells which are needed for fertilisation.

Sperm cells have different features that help them to do their job.

Write about **two** features that sperm cells have and why they have them.

1. feature .....

reason .....

2. feature .....

reason ..... **[2]**

(c) Chicken embryos contain lots of different cells.

The cells do different jobs.

What process best describes making different types of cells?

Put a (ring) around the correct answer.

cell differentiation **cell division** **mitosis**

[1]

(d) Chicken embryos contain **stem cells**.

Write down the meaning of the term stem cells.

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

[Total: 5]

13 This question is about plant hormones.

(a) Hormones control growth in plants.

Look at the list. Which **one** of the processes is also controlled by plant hormones?

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

diffusion	
flowering	
photosynthesis	
respiration	

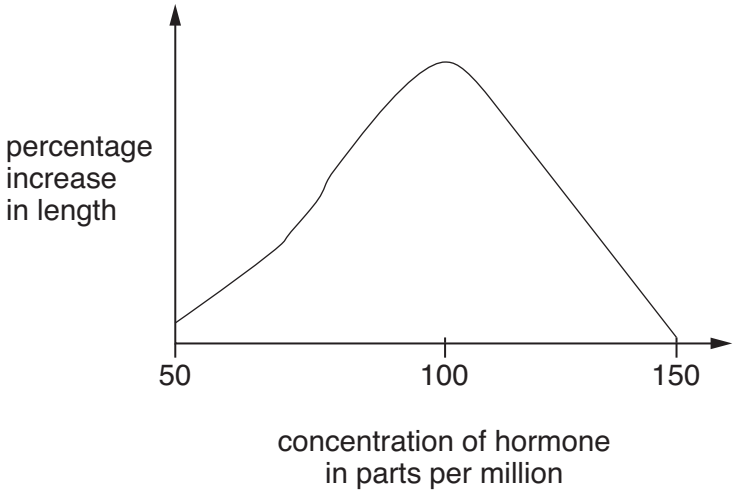
[1]

(b) Pat investigates the effect of plant hormone concentration on shoot growth.

She puts shoots of the same length in different concentrations of plant hormone.

Pat then measures the increase in length of the shoots.

The graph shows her results.



Describe the pattern in the results.

In your answer include information from the graph.

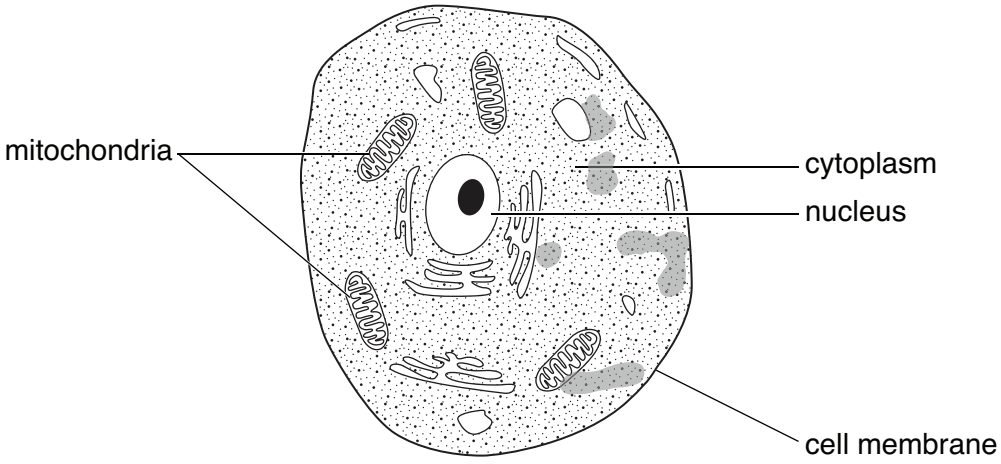
.....

.....

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

[Total: 3]

14 Look at the picture of an animal cell.



(a) Write down the name of the process that takes place in the mitochondria.

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

(b) The cytoplasm contains enzymes.

Write down the effect of enzymes on the speed of chemical reactions.

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

(c) Proteins are made in the cytoplasm.

Write down what the proteins are used for.

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

[Total: 3]

END OF QUESTION PAPER