

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B631/02**

**GATEWAY SCIENCE**

**BIOLOGY B**

**Unit 1 Modules B1 B2 B3 (Higher Tier)**

**THURSDAY 19 MAY 2011: Afternoon**

**DURATION: 1 hour**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the question paper.  
A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Pencil**

**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**
- **Answer ALL the questions.**

## **INFORMATION FOR CANDIDATES**

- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **The total number of marks for this paper is 60.**

**Answer ALL the questions.**

**SECTION A – MODULE B1**

**1 (a) Some people sneeze when they see bright lights.**

**This disorder is inherited and is called the photic sneeze reflex.**

**(i) Which part of the eye contains the receptors for this reflex?**

\_\_\_\_\_ [1]

**(ii) Nerve impulses are sent from the receptors in the eye to the central nervous system (CNS) through the optic nerve.**

**Which type of neurones carry these impulses?**

\_\_\_\_\_ [1]

**(b) Scientists have discovered that this disorder is caused by a faulty allele.**

**This allele is dominant.**

**People who show the reflex can be either heterozygous or homozygous.**

**(i) What is an ALLELE?**

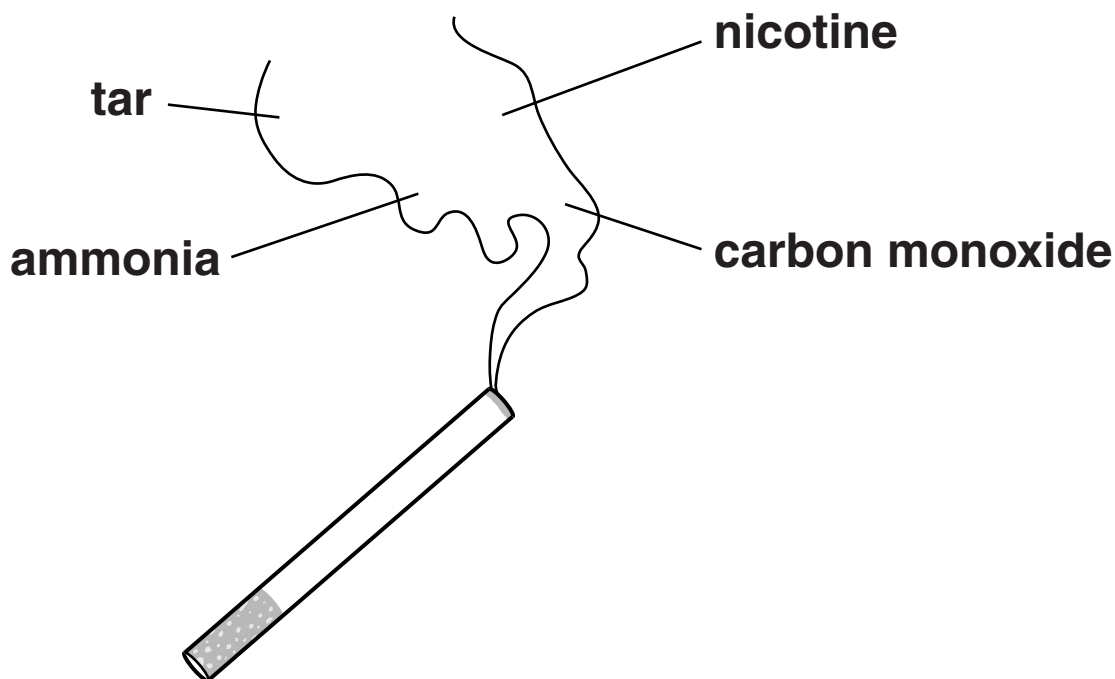
\_\_\_\_\_  
\_\_\_\_\_ [1]

**(ii) If a person is heterozygous what does this tell you about their alleles?**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**[Total: 4]**

- 2 (a) The diagram shows some of the substances that are produced by a burning cigarette.



- (i) Smoking cigarettes **REDUCES** the amount of oxygen that can be carried by red blood cells.

Which substance shown in the diagram is the main cause of this?

\_\_\_\_\_ [1]

- (ii) Manufacturers have introduced cigarettes with lower tar levels.

The manufacturers thought this could reduce the number of deaths from cigarette smoking.

Explain why.

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(b) The nicotine in cigarette smoke is a stimulant.**

**It affects the passage of nerve impulses between neurones.**

**(i) What is the name for the small gap between two neurones?**

\_\_\_\_\_ [1]

**(ii) An impulse in one neurone can trigger an impulse in the next neurone.**

**Describe how this happens.**

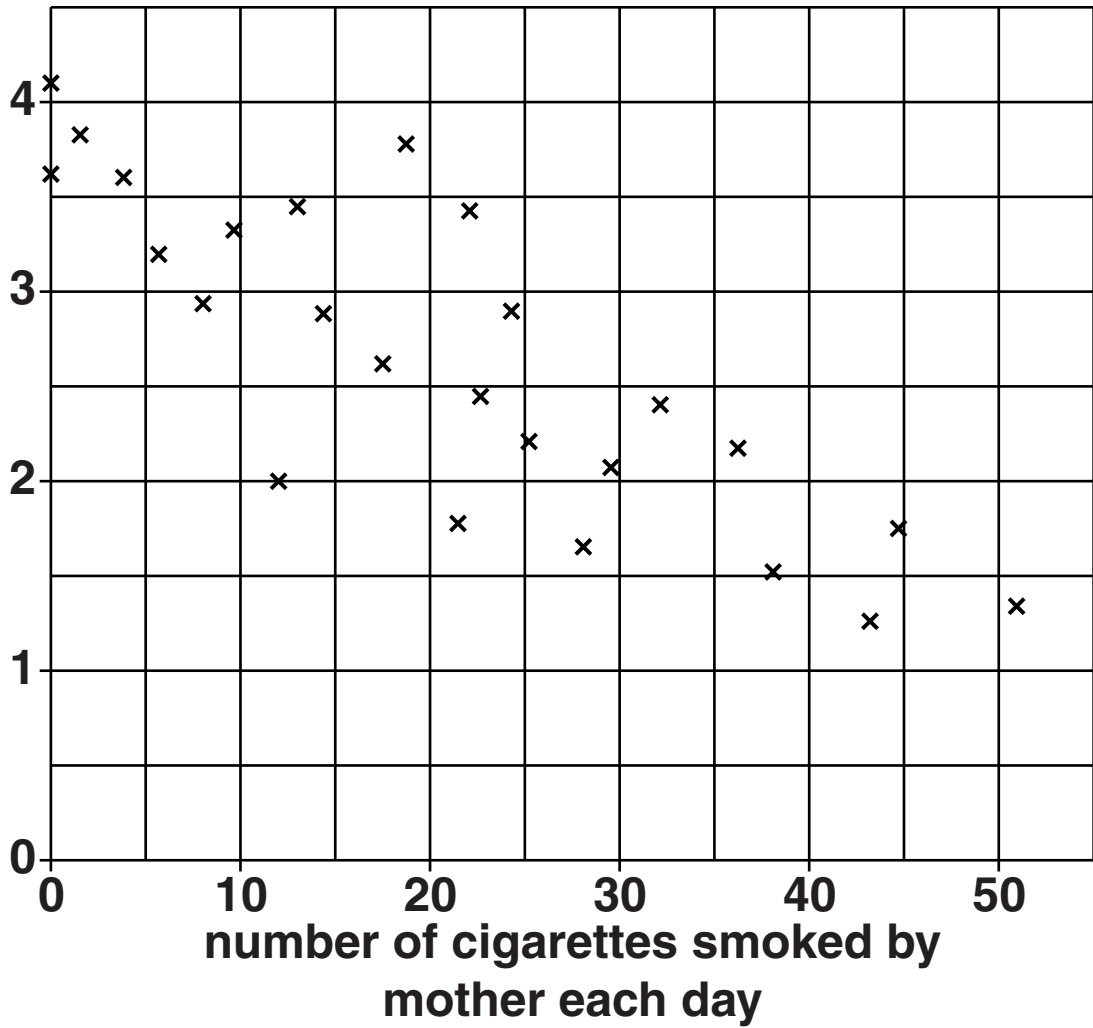
\_\_\_\_\_  
\_\_\_\_\_ [1]

**(c) Scientists recorded the birth weights of some babies.**

**They also recorded how many cigarettes each baby's mother smoked each day.**

**The results are shown on the graph on page 7 opposite.**

**birth weight of baby in kg**



**Write down TWO things which the scientists' results show.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

**[2]**

**[Total: 6]**

**3 Katie decides to make a note of all the food she eats in one day.**

**She works out some of the contents of her food.**

**These are shown in the table.**

<b>MEAL</b>	<b>ENERGY CONTENT IN kJ</b>	<b>PROTEIN IN g</b>	<b>IRON IN mg</b>	<b>VITAMIN C IN mg</b>
<b>breakfast</b>	<b>2000</b>	<b>5</b>	<b>5</b>	<b>15</b>
<b>lunch</b>	<b>2500</b>	<b>10</b>	<b>2</b>	<b>5</b>
<b>dinner</b>	<b>3000</b>	<b>25</b>	<b>1</b>	<b>10</b>
<b>supper</b>	<b>1000</b>	<b>5</b>	<b>2</b>	<b>5</b>

**(a) Katie's breakfast is the best meal for preventing scurvy.**

**Use the data in the table to explain why.**

\_\_\_\_\_ [1]



**(b) Katie has a mass of 52 kg.**

**She reads that the recommended amount of protein that she needs each day is called her RDA.**

**This can be worked out using the formula:**

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

**Katie decides that she is eating enough protein on this day.**

**Use the formula and the data in the table to explain why she thinks this.**

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[2]

**(c) Katie reads that many animal proteins are first class proteins.**

**These proteins are better for the body than most plant proteins.**

**Explain why.**

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[1]

**(d) Katie sees an advertisement in a magazine.**



**Many people are concerned about this type of advertisement.**

**Explain why they are so concerned.**

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**[2]**

**[Total: 6]**

**4 (a) Different parts of the body can fail to work properly.**

**Tests can be done to try and find out the problem.**

**Draw straight lines to join each TEST to the PROBLEM that it can detect.**

**TEST**

**PROBLEM**

**measuring blood sugar level**

**lens is the wrong shape**

**using colour deficiency charts**

**cells in the pancreas are not working**

**testing for short sightedness**

**stress**

**measuring blood pressure**

**cells in the retina are not working**

**[2]**

**(b) Some scientists think that cells in the pancreas can be destroyed by the body's own immune system.**

**It would be very difficult to make a vaccine to stop this.**

**Put a tick (✓) in the box next to the main reason for this.**

**It is impossible to make a vaccine that stimulates the production of specific antibodies.**

**Vaccines stimulate the production of antibodies and it is antibodies that are destroying the cells.**

**The antibiotics produced by vaccines would kill other types of cells as well.**

**The body's immune system can easily become resistant to vaccines.**

**[1]**

**(c) Short sight can be corrected by wearing glasses.**

**What type of lens should be used in these glasses?**

\_\_\_\_\_ [1]

**[Total: 4]**

## SECTION B – MODULE B2

5 This question is about seals.

- (a) Seals are mammals belonging to a larger group of animals called vertebrates.

Finish the sentences about seals by writing a word in each space.

Seals are vertebrates because they have a

\_\_\_\_\_ .

They are mammals because the females produce

\_\_\_\_\_ .

Another name for the grey seal is *Halichoerus grypus*.

*Halichoerus grypus* is the \_\_\_\_\_ name for the grey seal. [3]

- (b) Seals compete with humans for fish.

Fish can be described as a sustainable resource.

This means it is possible to catch fish such as cod but still maintain their population.

- (i) Describe ONE way of maintaining fish populations as a sustainable resource.**

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[1]

- (ii) Maintaining a fish population needs international agreement.**

**Explain why.**

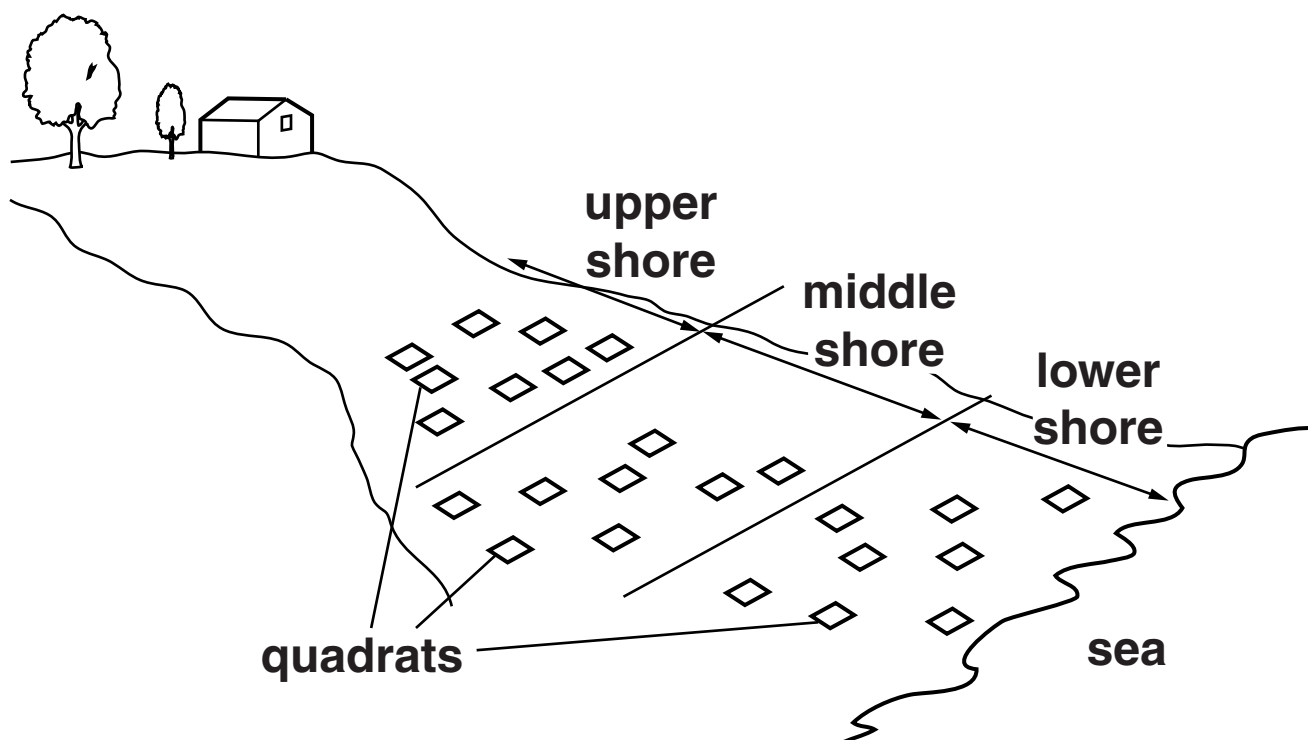
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[1]

**[Total: 5]**

**6 Hannah and Alice investigate a group of shellfish called dog whelks on a rocky shore.**



**They divide the shore into three areas: upper, middle and lower.**

**They count the number of dog whelks in 8 quadrats in each area.**

**The table shows their results.**

<b>PART OF SHORE</b>	<b>NUMBER OF DOG WHELKS IN EACH QUADRAT</b>								<b>AVERAGE</b>
<b>UPPER</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0.5</b>
<b>MIDDLE</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>4</b>	
<b>LOWER</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1.0</b>



- (a) Calculate the average number of dog whelks in each quadrat in the middle shore.**

**You are advised to show your working.**

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**answer** \_\_\_\_\_ **[2]**

- (b) Hannah uses their results to conclude that more dog whelks live on the lower shore than the upper shore.**

- (i) Suggest TWO reasons why more dog whelks might live on the lower shore than the upper shore.**

**1** \_\_\_\_\_

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**2** \_\_\_\_\_

\_\_\_\_\_ **[2]**

- (ii) Alice tells Hannah that her conclusion **MIGHT NOT** be reliable.

**Suggest TWO reasons why Hannah's conclusion might not be reliable.**

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_ [2]

[Total: 6]

- 7 **Sweetcorn flowers are pollinated by the wind.**

**Write about how flowers are adapted for wind pollination.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

[Total: 2]

**8 Read the information about the Petrified National Park in America.**

**THE PETRIFIED NATIONAL PARK**

**This is a park with a difference.**

**It contains the world's most colourful petrified wood.**

**Petrified wood is another name for fossilised wood.**

**200 million years ago large trees grew on the site.**

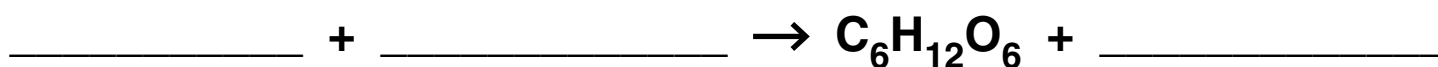
**The trees fell into rivers and were buried in mud.**

**Over time the wood changed into a hard mineral called quartz.**

**The trees had become fossils.**

**(a) The trees growing 200 million years ago made glucose by photosynthesis.**

**(i) Finish the balanced symbol equation for photosynthesis.**



**[2]**

- (ii) The trees change the glucose into other substances, such as starch for storage.**

**Write down ONE OTHER substance that trees change glucose into.**

**Write down what this substance is used for.**

**Glucose is changed into**

\_\_\_\_\_ .

**The new substance is used for**

\_\_\_\_\_ .

**[2]**

- (b) The trees were buried in mud.**

**They became fossilised as minerals replaced the wood.**

**Organisms can be preserved without being replaced by minerals.**

**Write down ONE OTHER way organisms can be preserved for thousands of years.**

\_\_\_\_\_  
\_\_\_\_\_ **[1]**

**[Total: 5]**

**9 The narwhal is a type of whale.**

**The tusk of the narwhal evolved from a tooth.**

**Charles Darwin believed that the tusk of a male narwhal helps it to attract a female.**

**The longer its tusk the more likely a male narwhal is to attract a mate.**

**Use Darwin's theory of natural selection to explain how the tooth evolved into a tusk.**

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**[2]**

**[Total: 2]**

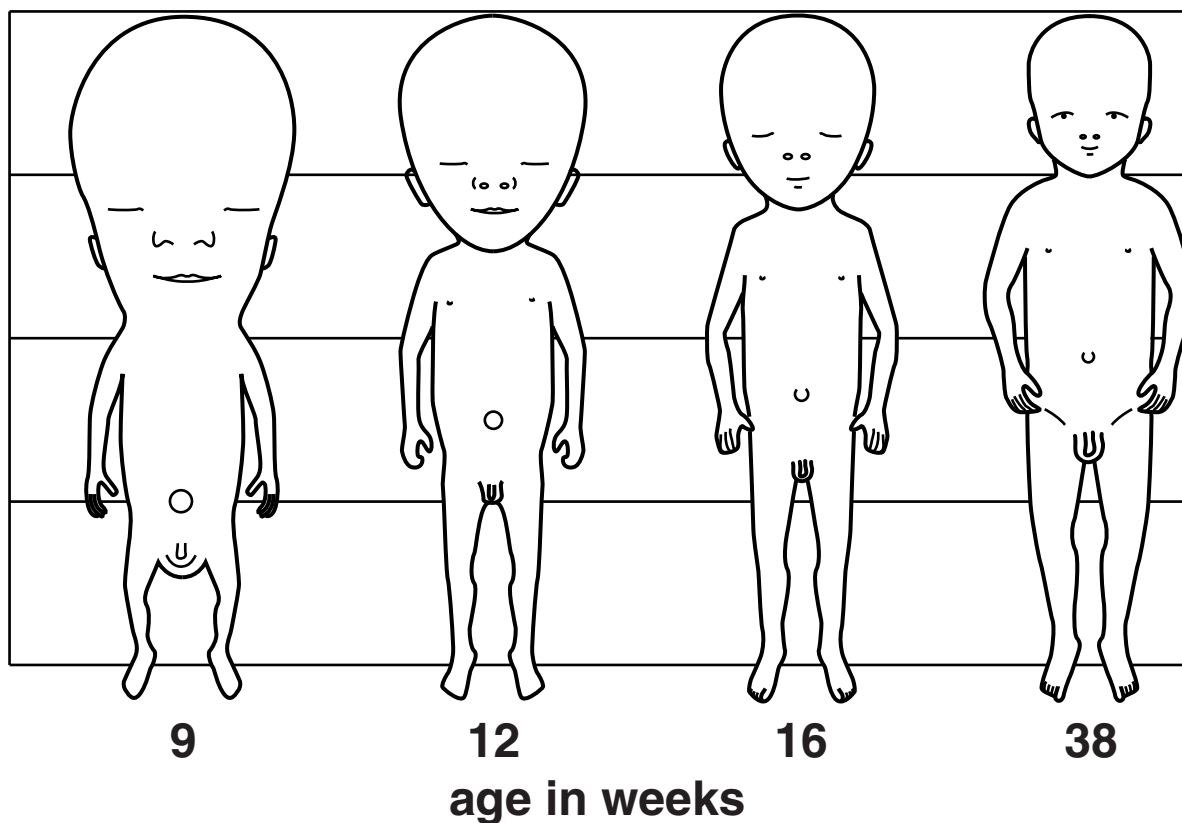
## SECTION C – MODULE B3

10 This question is about growth in humans.

Look at the diagrams of a developing foetus during pregnancy.

The diagrams are NOT drawn to scale.

The diagrams show how the proportions of the body parts change during pregnancy.



**(a) Different parts of the foetus grow at different rates.**

**Look at the statements about the developing foetus.**

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

**The head is the last part of the body to develop.**

**During weeks 16 to 38 the head grows slower than the arms and legs.**

**The legs are always longer than the arms.**

**The size of the head decreases as the foetus develops.**

**[1]**

**(b) Zoe is a baby girl.**

**A doctor measures her head size every two months from birth.**

**The doctor plots the measurements on a growth chart.**

**Look at the growth chart on page 25 opposite.**

**The chart shows the average head size for girls between birth and 36 months.**

**The upper and lower limits are shown for healthy girls between these ages.**

**(i) How old is Zoe when she reaches the upper limit for head size?**

**answer \_\_\_\_\_ months [1]**

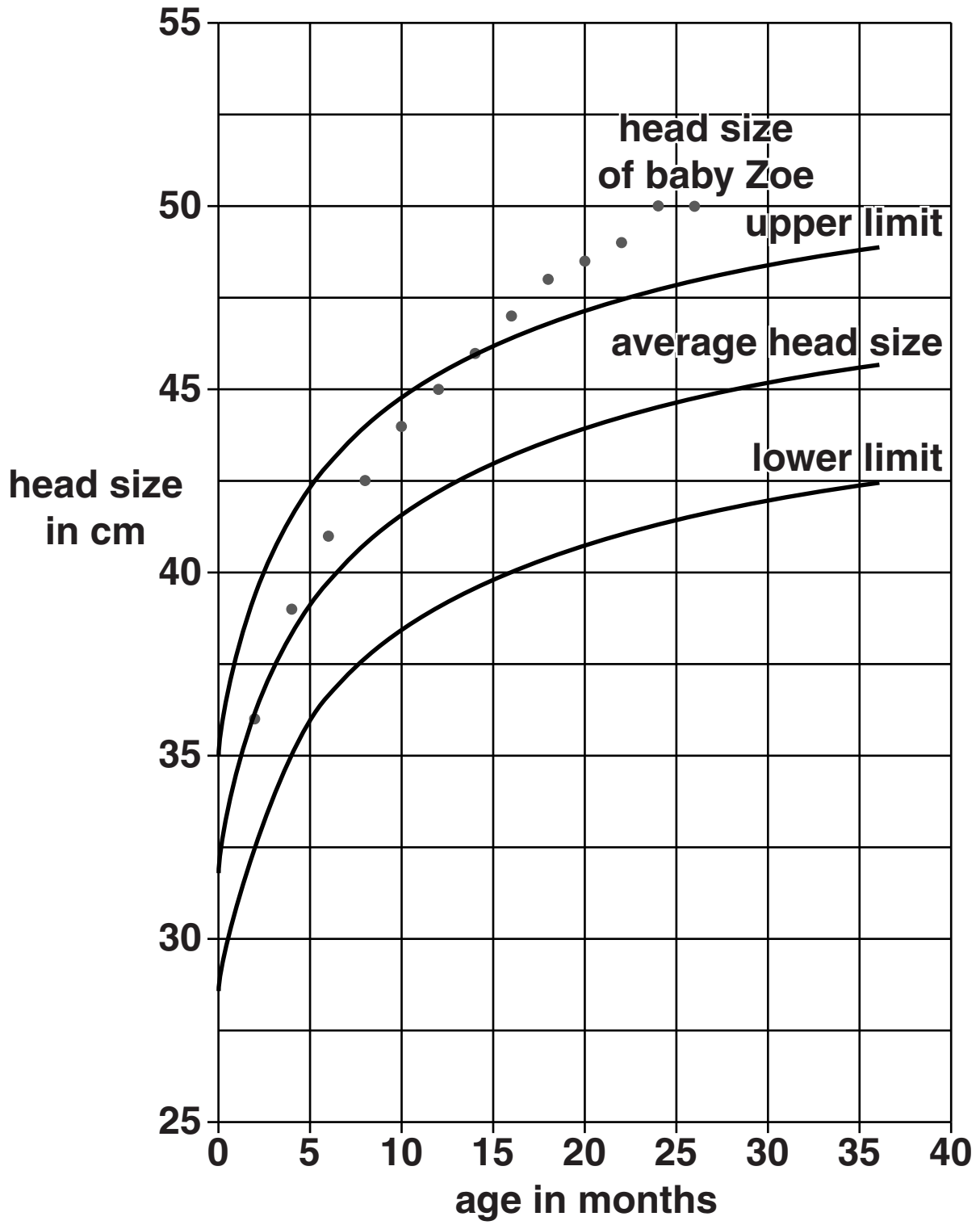
**(ii) Between 12 and 26 months Zoe's head size increases by 5 cm.**

**Calculate what percentage this is of Zoe's head size at 12 months old.**

\_\_\_\_\_  
\_\_\_\_\_

**answer \_\_\_\_\_ % [2]**





**(iii) Why is it important that the head size of young children is measured regularly?**

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[1]

**(c) The doctor says that Zoe's increased head size is due to a mutation.**

**(i) What can cause a mutation to occur?**

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[1]

**(ii) Genetic material changes during mutation.**

**How does it change?**

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[1]

**(iii) Why does this change in genetic material affect the cell?**

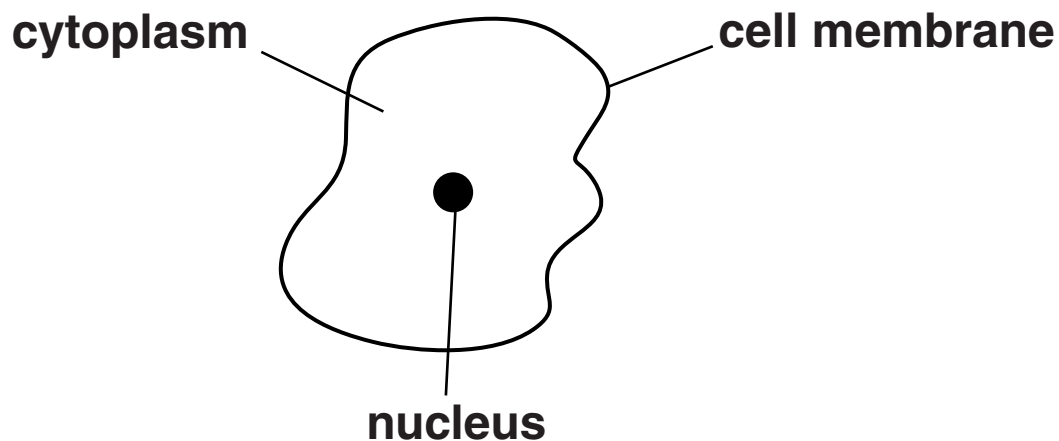
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[1]

**[Total: 8]**

**11 (a) The diagram shows a human cheek cell.**



**The cheek cell needs glucose.**

**Blood carries glucose molecules to the cheek cell.**

**By what process do glucose molecules move from the blood into the cheek cell?**

\_\_\_\_\_ [1]

**(b) The diagram shows a human sperm cell.**



**(i) Sperm cells are specialised.**

**Each sperm cell has many MITOCHONDRIA and an ACROSOME.**

**Explain how these TWO features help a sperm cell fertilise an egg.**

**mitochondria** \_\_\_\_\_

\_\_\_\_\_

**acrosome** \_\_\_\_\_

\_\_\_\_\_ [2]

**(ii) What type of cell division makes sperm cells?**

\_\_\_\_\_ [1]

(c) Sperm cells have half the normal number of chromosomes found in other body cells.

What word **BEST** describes a cell that has half the normal number of chromosomes?

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

DIPLOID

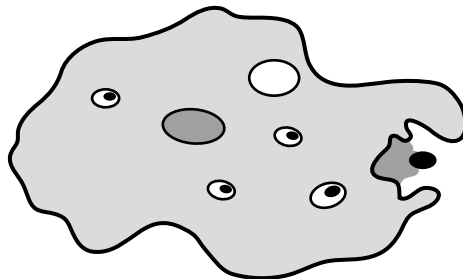
EMBRYO

HAPLOID

ZYGOTE

[1]

(d) An amoeba is a single-celled organism.



Single-celled organisms are limited to a small size.

Explain why.

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[1]

[Total: 6]

**12 This question is about plant growth.**

**Anita is a keen gardener.**

**She takes a cutting from her favourite plant.**

**(a) Taking plant cuttings is a form of CLONING.**

**Anita could produce more plants by growing them from seeds.**

**Write down ONE advantage of using cloning instead of using seeds.**

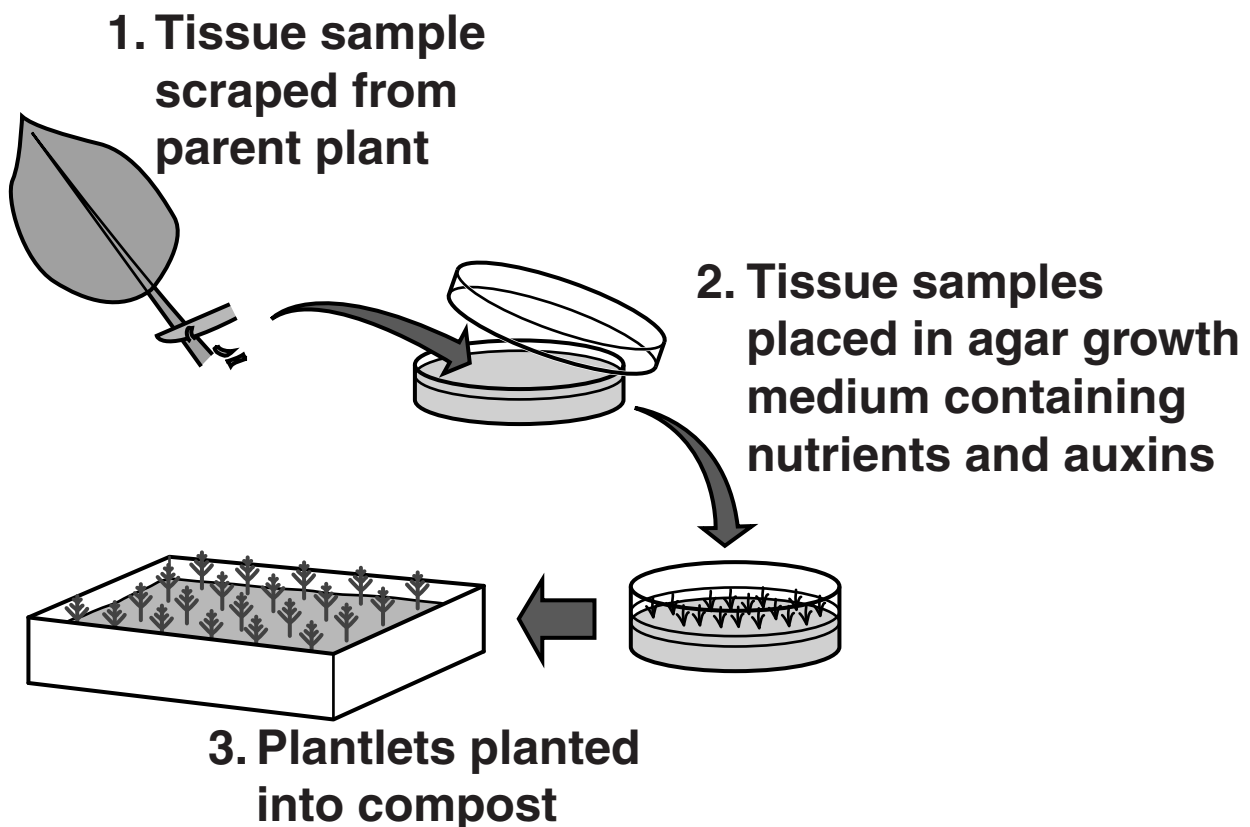
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**[1]**

**(b) The diagram shows plant tissue culture.**

**This is a different way of cloning plants.**



**(i) Stage 1 is done under ASEPTIC conditions.  
Explain why this is important.**

\_\_\_\_\_ [1]

**(ii) The agar contains auxins.  
Auxins are chemicals usually made by plants.  
The tissue samples cannot make auxins.  
Explain why.**

\_\_\_\_\_ [1]

**(iii) As the plantlets grow, their cells divide.  
Describe what happens to the chromosomes  
during this type of cell division.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**(c) Cloning plants is easier than cloning animals.  
Explain why.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**[Total: 6]**

**END OF QUESTION PAPER**



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