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F

Monday 20 May 2013 – Afternoon

GCSE GATEWAY SCIENCE
BIOLOGY B

B731/01 Biology modules B1, B2, B3 (Foundation Tier)

B722290613

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)

Duration: 1 hour 15 minutes

B731013

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- 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 **75**.
- This document consists of **24** pages. Any blank pages are indicated.

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Answer **all** the questions.

SECTION A – Module B1

1 Malaria is a disease caused by a pathogen.

The pathogen gets into a person when they are bitten by a mosquito.

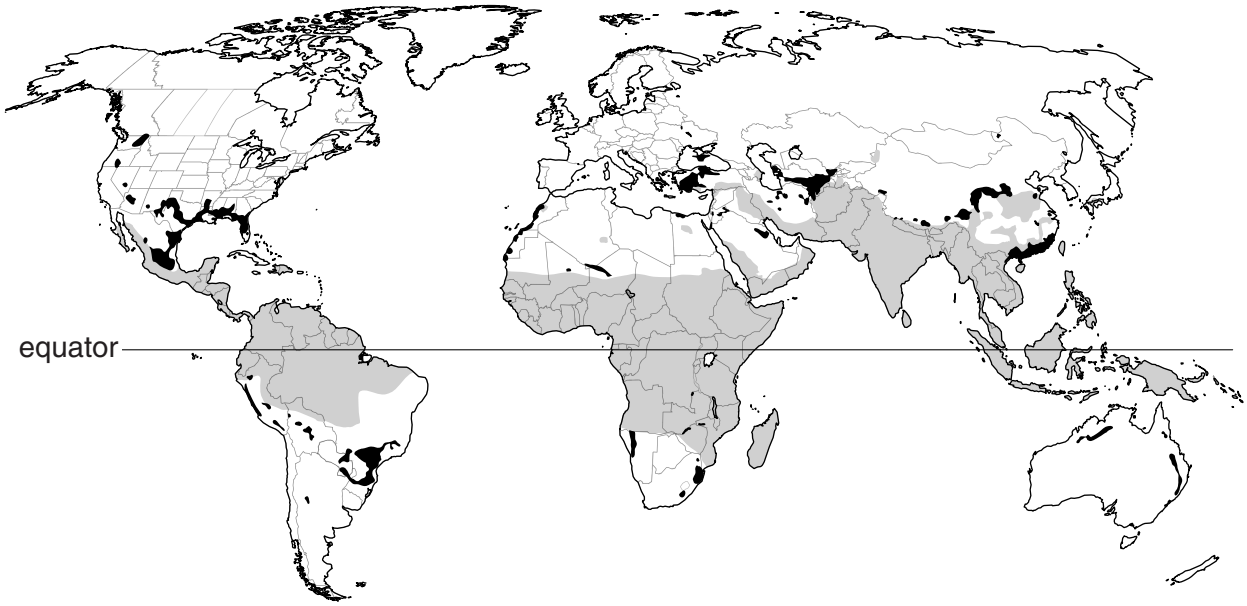
(a) Which type of pathogen causes malaria?

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

bacteria **fungi** **protozoa** **viruses** **[1]**

(b) The map shows the areas where mosquitoes that spread malaria live.

It also shows other areas where these mosquitoes may be able to live, if the world's climate gets warmer.



Key

area where these mosquitoes live now

other areas where these mosquitoes may also be able to live if the world's climate gets warmer

Describe how the distribution of malaria might change if the world gets warmer.

.....

.....

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

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(c) This headline appeared in a recent newspaper.

'Scientists have produced an injection that may protect people against the malaria parasite.'

Write down the name given to an injection that protects people from a specific pathogen.

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

[Total: 4]

Question 2 begins on page 4

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2 *Conus magus* is a large tropical sea snail.



The sea snail feeds on fish.

When the snail detects a fish it fires a hook into it.

(a) What word is used to describe the fish in this action?

Choose your answer from this list.

effector **neurone** **response** **stimulus**

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

(b) The hook contains a chemical which slows down the movement of the fish.

Which type of chemical is most likely to have this effect?

Choose your answer from this list.

depressant **hallucinogen** **performance enhancer** **stimulant**

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

(c) Scientists are investigating the chemical produced by the snail.

They think that it could be used as a pain killer in humans.

Explain why the drug would have to be tested before it is used on people.

.....

.....

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

[Total: 4]

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3 Linda has a mass of 60 kg.
She wants to find out if she is eating the correct amount of protein.
She starts to work out the protein content of all the food she eats in one day.

Food	Mass eaten in g	Protein content per 100 g of food	Protein content in Linda's food in g
bread	100	7.8	7.8
butter	50	0.6	0.3
egg	50	12.0	6.0
baked potato	200	2.0	……
cheese	50	26.0	13.0
chocolate	50	8.0	4.0
chicken	50	21.0	10.5
vegetables	50	0.8	……
cake	100	5.0	5.0
			total ……

(a) Is Linda eating the correct amount of protein?

Complete the table and calculate Linda's estimated average daily requirement of protein (EAR) to help explain your answer.

EAR in g = 0.6 × body mass in kg

.....

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

(b) Linda is twenty years old.

Her cousin Sue is thirteen years old and has the same mass as Linda.

Suggest why Sue needs more protein than Linda needs.

.....

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

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Turn over for the remainder of question 3

(c) Three of Linda's friends do **not** eat meat.

Suggest how these friends can still achieve a balanced diet.

.....

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

[Total: 6]

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4 Sweat glands in the skin release sweat.

(a) Why does the body release sweat?

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

(b) Some people sweat too much.

This is called hyperhidrosis.

Scientists have discovered that this is a genetic disorder.

(i) Gemma's cells contain the gene that causes hyperhidrosis.

Write about where in cells genes are found.

.....

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

(ii) Gemma can **not** pass on hyperhidrosis to her friends.

Explain why.

.....

.....

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

[Total: 5]

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5 Singapore is a small country.

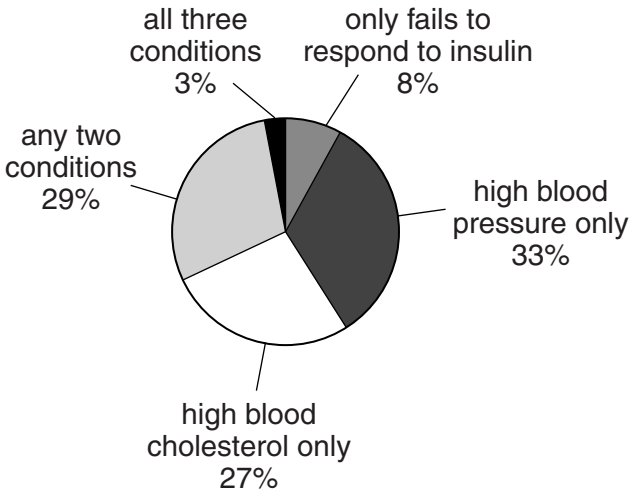
Everyone living in Singapore was offered a health check to test for three conditions.

They were tested:

- for high blood pressure
- for high levels of blood cholesterol
- to see if they failed to respond to insulin.

The check found that one million people had at least one of these conditions.

The pie chart shows the results for these one million people.



The government is worried that large numbers of people may develop serious diseases.

Use the data and your biological knowledge to explain why the government is worried.
In your answer, include the links between the conditions tested for and the diseases they may cause. Include calculations to support your answer.

The quality of written communication will be assessed in your answer to this question.

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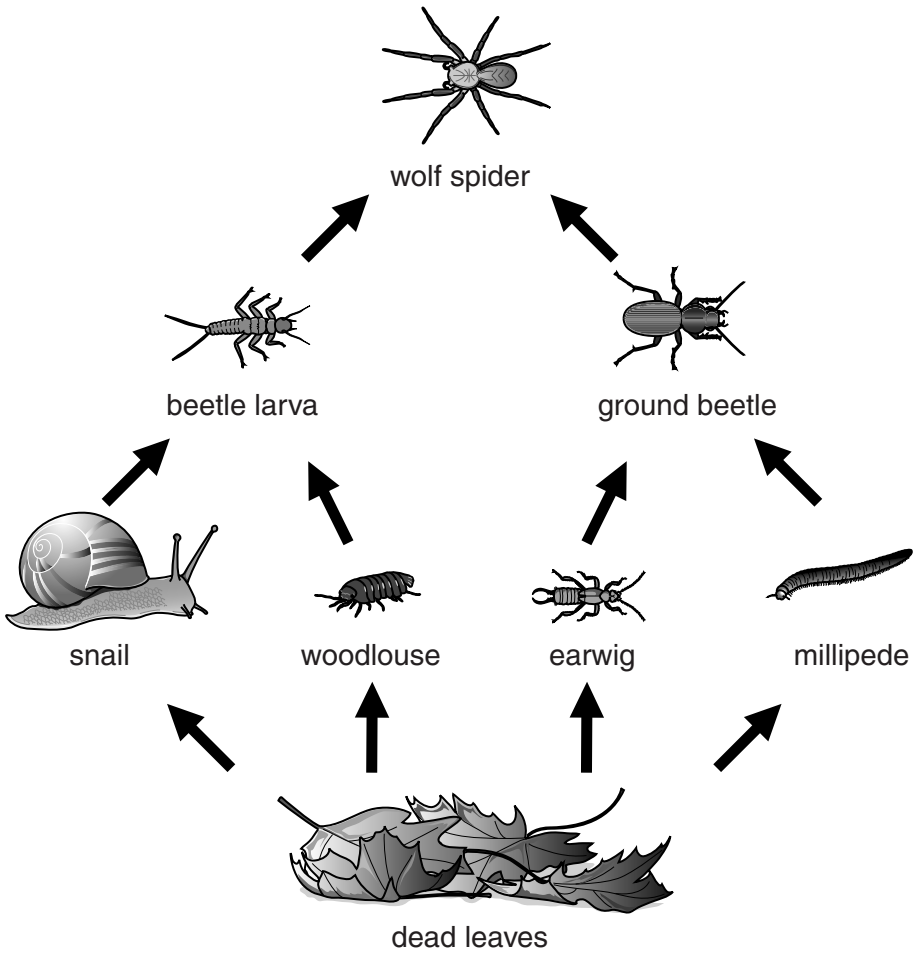
..... **[6]**

[Total: 6]

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SECTION B – Module B2

6 **(a)** Look at the woodland food web.



(i) The woodlouse and earwig are in the same trophic level.

What is a trophic level?

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

(ii) The woodlouse and earwig live in the same habitat.

Food is one resource they compete for.

Write down one **other** resource they might compete for.

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

(iii) The ground beetle is a predator of the earwig and millipede.

Explain what would happen to the population of earwigs in this food web if all the millipedes were killed by a disease.

.....

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

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Turn over for the remainder of question 6

(b) Look at one food chain in this web.

dead leaves → snail → beetle larva → wolf spider

A survey was done to find the numbers in this food chain.

The results are shown in the table.

Organism in food chain	Number found in 1 m^2			
	Sample 1	**Sample 2**	**Sample 3**	**Mean**
dead leaves	31	29	36	……
snails	9	12	12	11
beetle larvae	6	9	9	8
wolf spiders	5	4	6	5

(i) Calculate the mean number for dead leaves.

Show your working below and write your answer in the table.

[2]

(ii) Use the completed table to help you decide which of the statements are **true** for this food chain.

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

A normal shaped pyramid of numbers is produced. ☐

An upside down pyramid of numbers is produced. ☐

Dead leaves do not contain energy from the Sun. ☐

Energy flow from the Sun supports this food chain. ☐

Energy from the Sun will not flow any further than the snail. ☐

[2]

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(c) (i) The plants in this food web are dead.

If they are not eaten by the animals they decay.

Name a type of organism that causes decay?

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

(ii) During decay, nitrogen compounds are broken down.

What is the percentage of nitrogen in the atmosphere?

Put a (ring) around the correct answer.

0.04% **1%** **21%** **58%** **78%** **95%** **[1]**

[Total: 10]

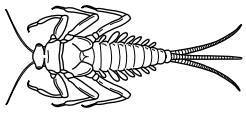
Question 7 begins on page 12

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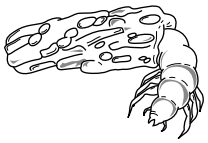
7 This question is about pollution.

Look at the diagrams.

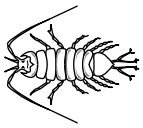
They are indicator species used to show levels of water pollution.



mayfly larva



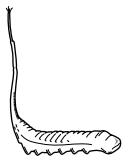
caddisfly larva



water louse



sludgeworm



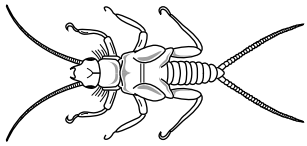
rat-tailed maggot

low pollution ⟶ high pollution

(a) Which **two** of the indicator species show characteristics found only in insects?

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

(b) Look at the picture of a stonefly larva.



This is another indicator species used to show levels of water pollution.

Stonefly larvae live underneath stones in fast-flowing streams.

Stonefly larvae have adapted legs that end in small hooks and the body is flattened.

Explain how these adaptations help it survive in fast-flowing streams.

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

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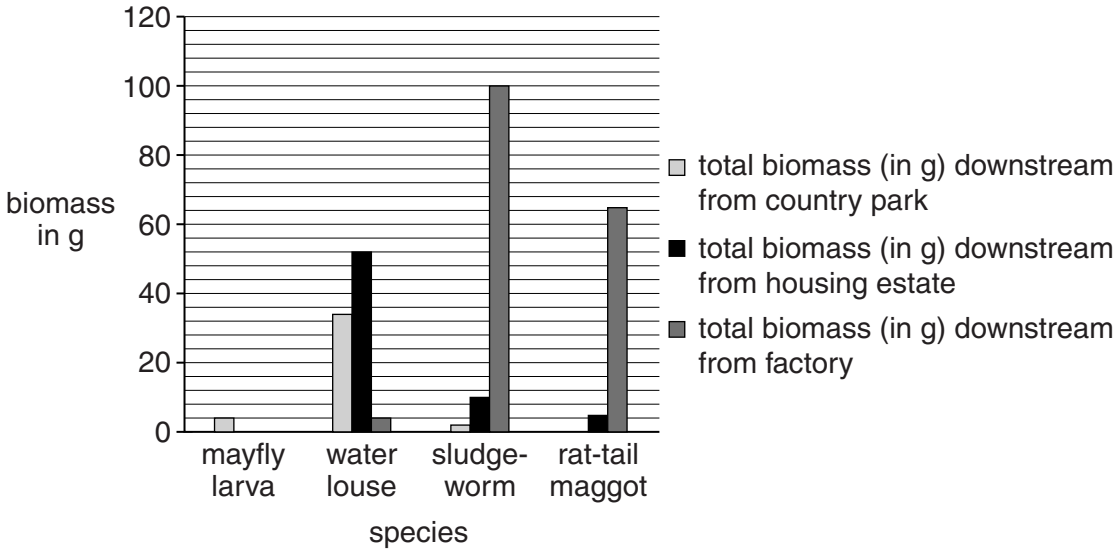
(c) The County Council want to find out pollution levels in a local stream.

Water samples were taken downstream from three different places:

- a country park
- a housing estate
- a factory.

The indicator species were measured in each sample.

Results were plotted on a graph.



Should the County Council be concerned about levels of pollution downstream from the factory?

Use evidence from the graph and your knowledge of indicator species in your answer.

The quality of written communication will be assessed in your answer to this question.

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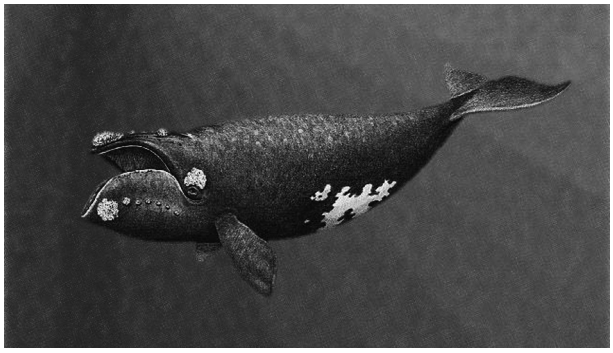
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[Total: 10]

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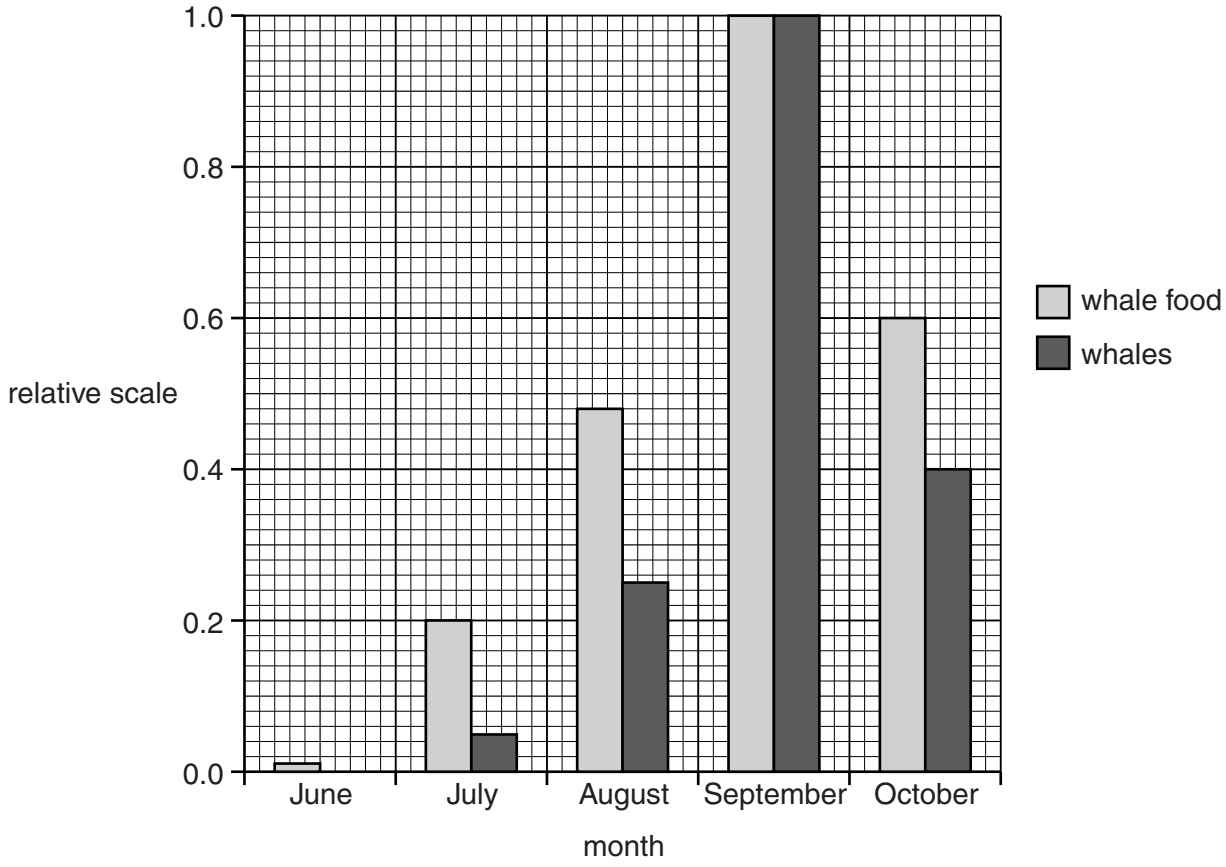
8 The picture shows a right whale.



Biologists have measured the population of right whales in an area of the North Atlantic during five separate months.

They also measured the amount of food available in that area.

Results were plotted on the graph.



(a) (i) Look at the number of whales in September and August.

How many times bigger is the relative number of right whales in September compared to August?

.....

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

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(ii) Look at the patterns in the data.

Explain the change in the numbers of right whales found in the area of the North Atlantic between August and October.

.....

.....

.....

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

(b) Over millions of years right whales evolved to be very slow moving, filter feeders.

They had no predators.

Over the past thousand years, humans have changed their environment.

Suggest reasons why the right whales are in danger of becoming extinct in their current environment.

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

[Total: 5]

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SECTION C – Module B3

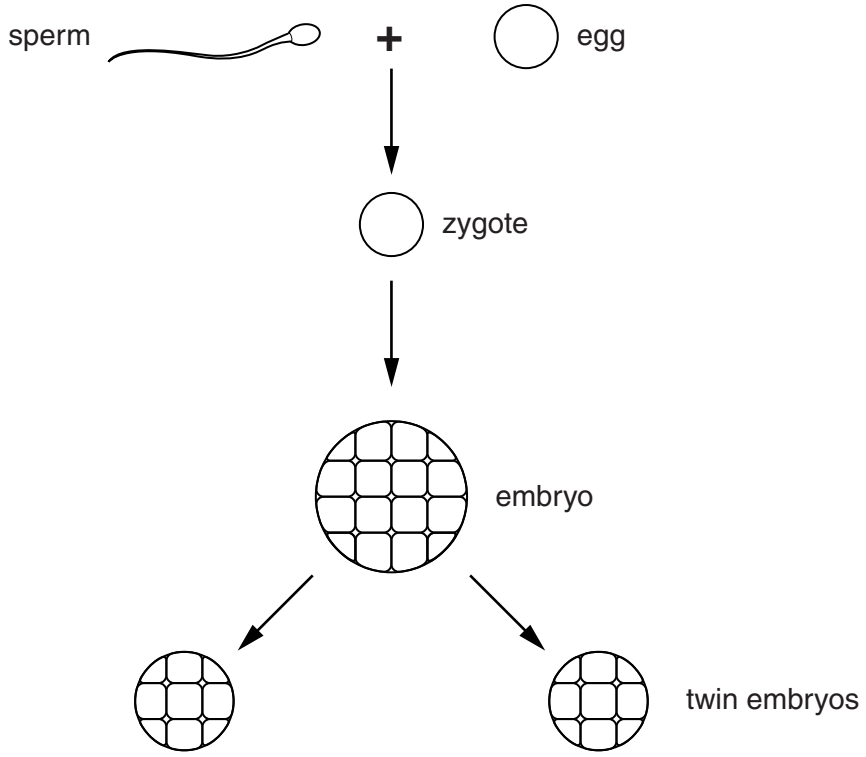
9 Amy and Sarah are identical twins.

Their development began when an egg cell and sperm cell joined to form a zygote.

The zygote developed into an embryo made of many cells.

After about a week the embryo split into the two twin embryos.

The two embryos grew to become Amy and Sarah.



(a) What is it called when an egg cell and a sperm cell join?

Choose from

cloning **contraction** **fertilisation** **mutation**

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

(b) Put **one** tick (✓) in **each** row of the table to show which cells are haploid and which are diploid.

	Haploid	**Diploid**
egg cell		
sperm cell		
zygote		
cells in embryo		
cells in twin embryos		

[2]

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(c) What type of cell division happens to the zygote to form the embryo?

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

(d) When an embryo grows, one of the first organs to form is the heart.

(i) What is the job of the heart?

.....

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

(ii) The heart cells develop from stem cells by a process called cell differentiation.

What is meant by cell differentiation?

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

(e) As they are identical twins, Amy and Sarah look more like each other than non-identical twins.

Explain why identical twins look so similar.

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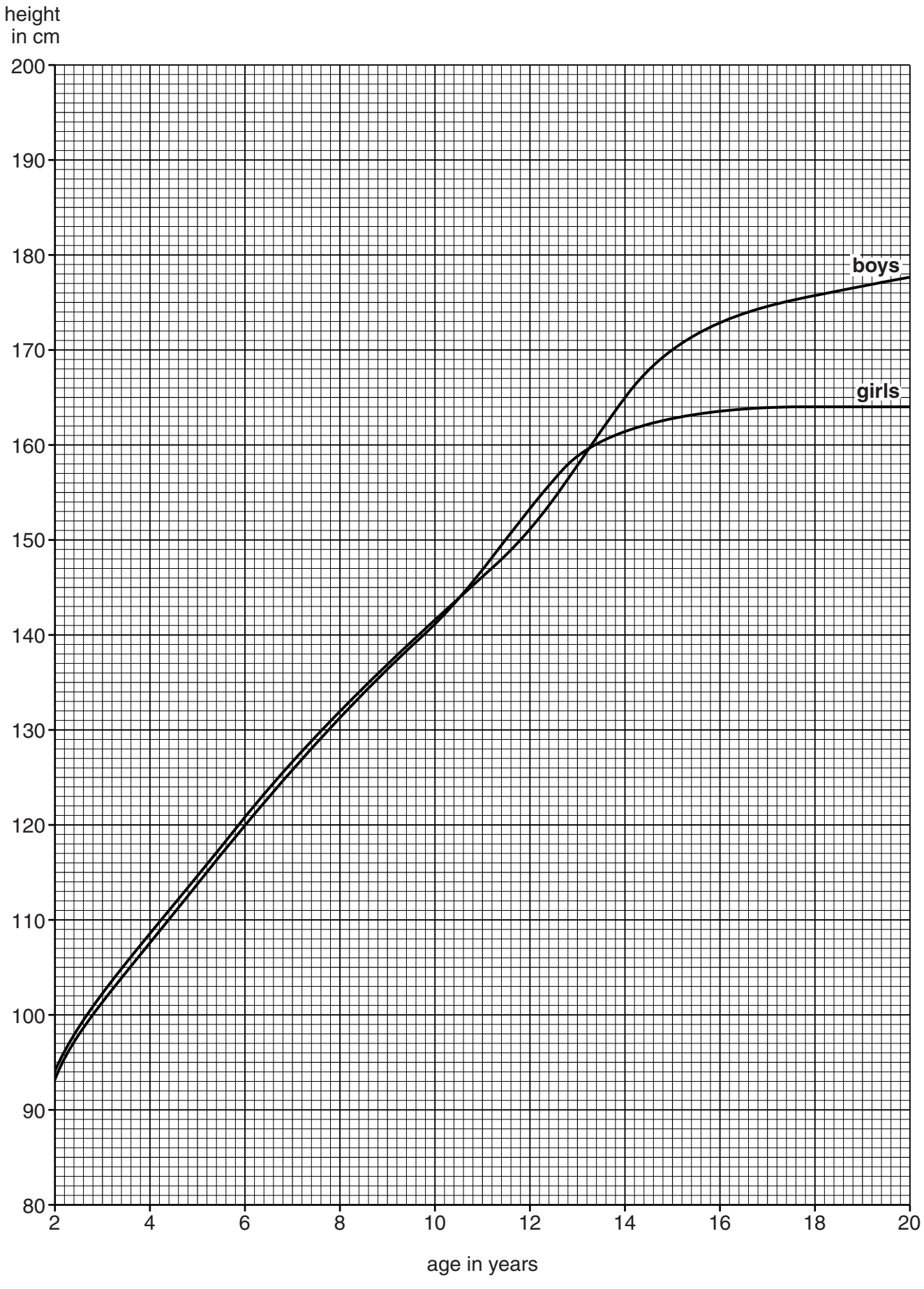
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[Total: 9]

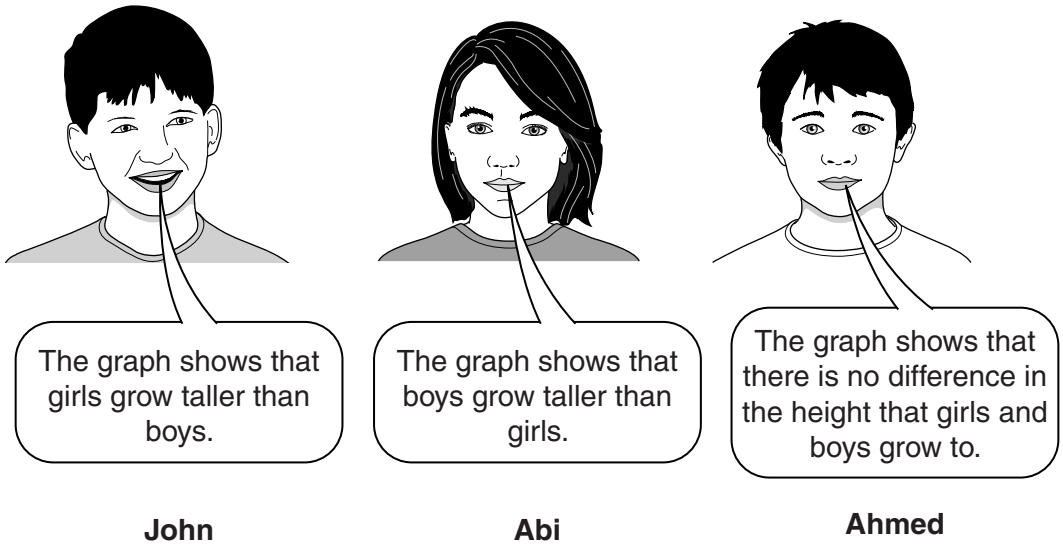
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10 The graph shows average height growth curves for girls and boys in the USA.



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(a) Read what the students say about the graph.



Who has made the correct statement? .....

Explain your answer, using data from the graph.

.....

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

(b) Have the girls and boys stopped growing in height after 20 years?

Use the graph to explain your answer.

.....

.....

.....

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

(c) During growth, different types of protein are made and used.

Write down **two** types of protein that do different jobs and describe the job of each protein during growth.

1 .....

.....

.....

2 .....

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..... **[4]**

[Total: 8]

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11 Bulldogs have been produced by selective breeding to have a large head and a flat face.



(a) The ancestors of bulldogs did **not** have such a large head or flat face.

Describe how selective breeding was used to produce bulldogs.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

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(b) The features of the bulldog can cause health problems.

The large head means that many bulldogs have to be born by a Caesarean operation where the mother has to be cut open.

The flat face often causes it to have breathing problems.

Some people think that breeding bulldogs should be banned because of these health problems.

Write about whether breeding bulldogs should be banned or not.

In your answer use information from the question as well as your own knowledge and ideas.

.....

.....

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

[Total: 8]

END OF QUESTION PAPER

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