OCR
RECOGNISING ACHIEVEMENT

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GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE BIOLOGY A

A221/01

Unit 1: Modules B1 B2 B3 (Foundation Tier)

OCE/33400

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)

Thursday 19 May 2011
Afternoon

Duration: 40 minutes

A221010

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. 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.
- Do **not** write in the bar codes.

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 **42**.
- This document consists of **16** pages. Any blank pages are indicated.

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Answer **all** the questions.

1 This question is about chromosomes, genes and alleles.

(a) Complete each sentence by putting ticks (✓) in the boxes next to the correct words.

Human females have

no copies	
one copy	
two copies	

of a **Y** chromosome in each body cell.

Human females have

no copies	
one copy	
two copies	

of all other chromosomes in each body cell.

Human females have

no alleles	
two alleles	
three alleles	

for each gene in each body cell.

[3]

(b) Children may have some similarity to both of their parents.

Explain why.

.....

.....

.....

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

[Total: 5]

2 Huntington's disorder is a genetic disorder.

(a) State two symptoms of Huntington's disorder.

symptom 1 .....

symptom 2 .....

[1]

(b) Height is also inherited through our genes.

Height and Huntington's disorder are inherited in different ways.

Explain the difference.

.....

.....

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

(c) People can be tested to see if they have the allele for a genetic disorder.

(i) A couple are thinking about having children.

What decision will they have to make if they are told that they are both carriers of a genetic disorder?

.....

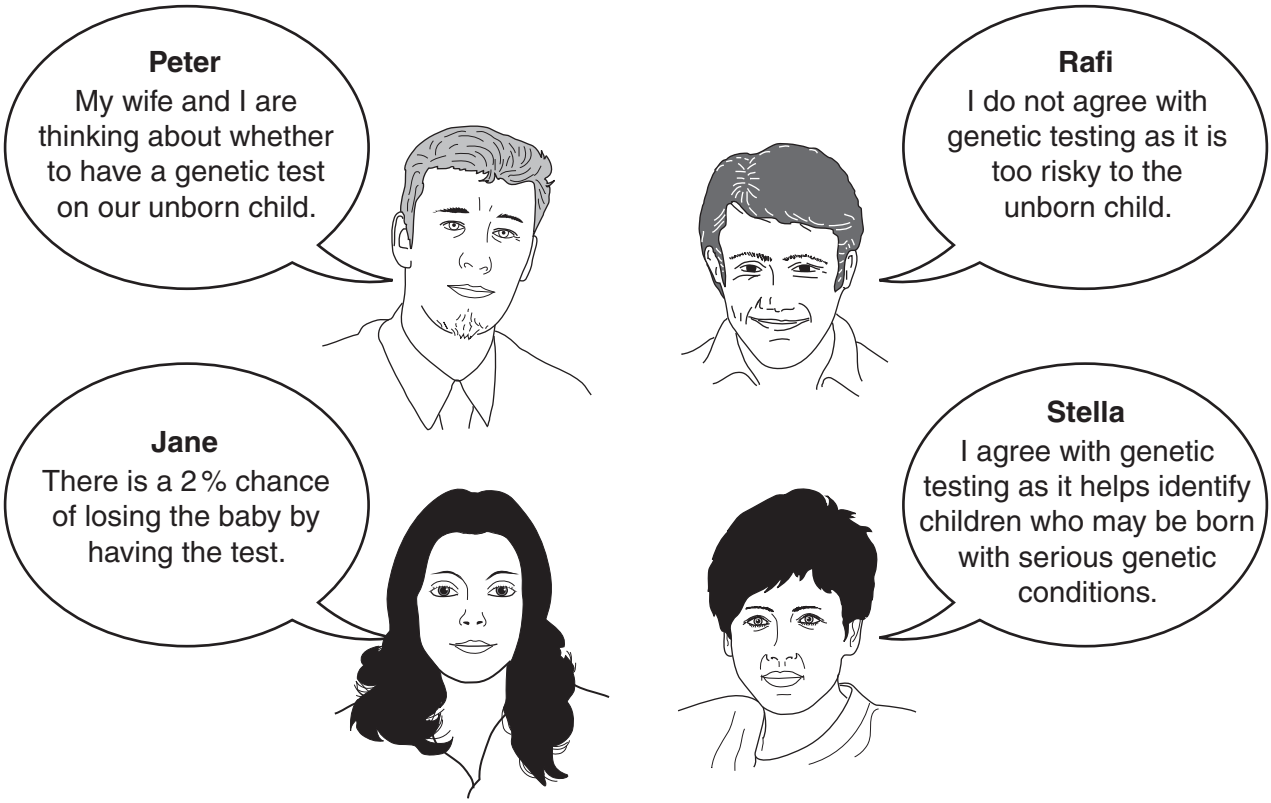
..... **[1]**

(ii) What decision will parents have to make if they are told that their fetus has a genetic disorder?

.....

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

(d) Four friends are having a discussion.



(i) What **issue** is being discussed by the four people?

.....

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

(ii) Who is making a statement that could be tested scientifically?

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

[Total: 7]

3 Our bodies have natural barriers to reduce the risk of harmful microorganisms entering the body.

(a) Which of the following are natural barriers to harmful microorganisms?

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

hair	☐
fingernails	☐
sweat	☐
skin	☐
urine	☐
breath	☐
tears	☐
stomach acid	☐

[2]

(b) Once microorganisms enter the body they can cause diseases.

Symptoms of these diseases then develop.

Complete each sentence by putting a tick (✓) in the box next to each correct choice.

Symptoms are caused by microorganisms producing

antibiotics.	
antibodies.	
toxins.	

Our body responds by

platelets	
red blood cells	
white blood cells	

producing

antibodies.	
antigens.	
toxins.	

These cells

engulf	
increase the reproduction of	
protect	

the invading microorganisms.

[3]

(c) Bacteria can reproduce very quickly.

A single bacterium divides into two, every twenty minutes.

How long will it take for a single bacterium to produce a colony of 256 bacteria?

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

1 hour and 20 minutes	☐
2 hours	☐
2 hours and 40 minutes	☐
85 hours and 20 minutes	☐
256 hours	☐

[1]

[Total: 6]

4 This question is about our blood system and health.

(a) The heart is full of blood but it still needs its own blood supply from the coronary artery.

Explain why.

.....

.....

.....

.....

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

(b) The heart pumps blood through blood vessels.

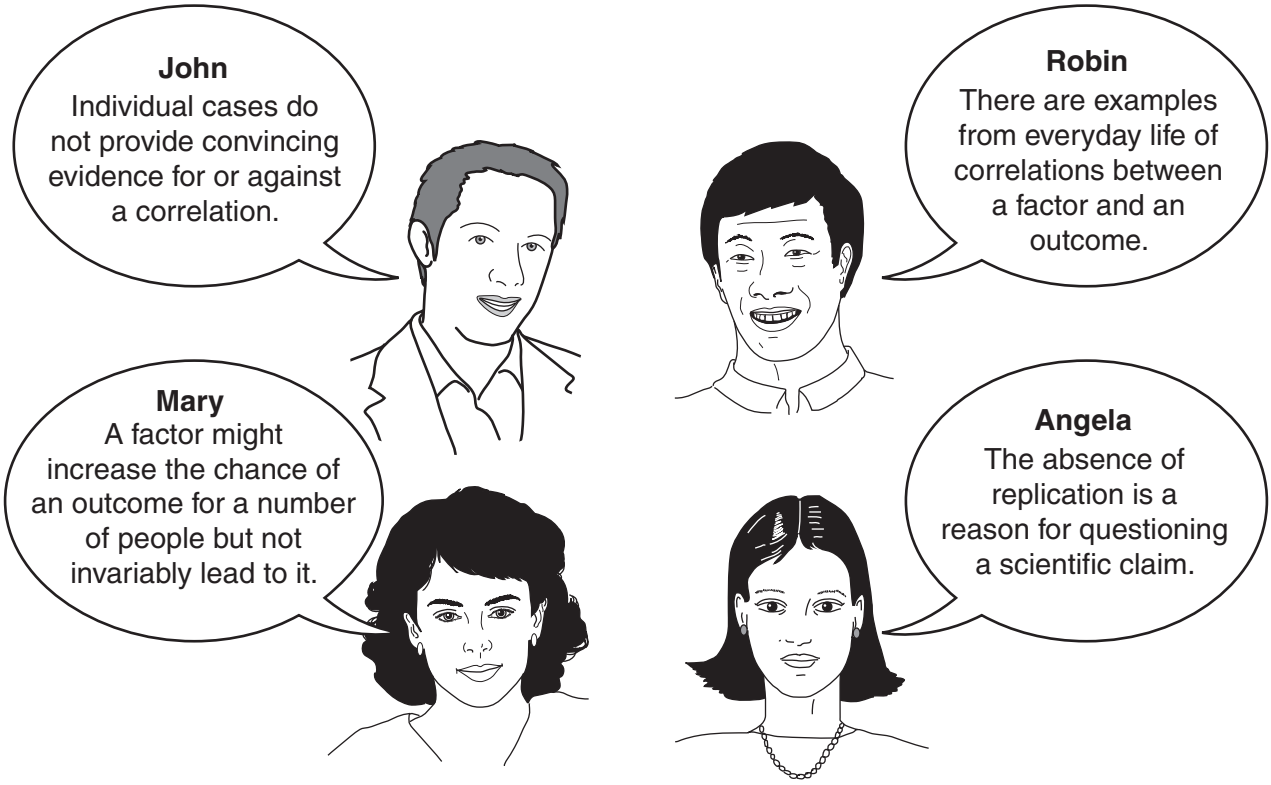
Draw **two** straight lines to link the vein with its correct **features**.

Then draw **two** straight lines to link each of the vein's **features** with their correct **function**.

	feature	**function**
	thick walled	allow blood to flow more easily
vein	large lumen	stop backflow of blood
	valves	allow diffusion

[2]

(c) Four people discuss some ideas about science.



Write the name of the person whose idea about science **best** matches each example in the table.

You may use each person once, more than once, or not at all.

Eating a high fat diet increases the risk of heart disease but not everyone eating a high fat diet will get heart disease.	
The more cigarettes you smoke the greater the risk of getting lung cancer.	
My grandad drank four pints of beer a day. His liver was fine and he died of old age at 93.	
A new report says that eating 'super-foods' will reduce my risk of getting cancer. I am going to wait to see what other scientists think about this before spending money on 'super-foods'.	

[4]

[Total: 9]

5 There is variation in all species on Earth.

(a) Complete the table to show how variation is caused and how it is passed on.

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

	only the environment	**only genes**	**both environment and genes**	**neither environment nor genes**
variation is caused by				
variation is passed on by				

[2]

(b) Variation is important in natural selection.

Explain how the process of natural selection works.

In your answer use ideas about

- competition
- chances of survival
- reproduction.

.....

.....

.....

.....

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

(c) Look at the statements about changes to organisms.

Put a tick (✓) in the correct box for each row to show whether these changes were produced by **natural selection** or **selective breeding**.

	natural selection	**selective breeding**
development of bacterial resistance to antibiotics		
production of rose bushes without thorns		
production of new types of pedigree dogs		

[2]

[Total: 7]

6 This question is about communication systems.

(a) Humans have evolved both a **nervous** communication system and a **hormonal** communication system.

Write down **two** situations when the hormonal communication system is used.

.....

.....

.....

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

(b) Humans have evolved a larger brain than most other animals.

Complete the sentence.

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

A larger brain gave humans …

… a shorter life expectancy. ☐

… an ability to see greater distances. ☐

… fewer opportunities for breeding. ☐

… a better chance of survival. ☐

… the ability to evolve faster. ☐

[1]

(c) The nervous communication system responds to changes in our environment.

It includes the following structures.

A central nervous system

B nerve cells to spinal cord

C receptors

D effectors

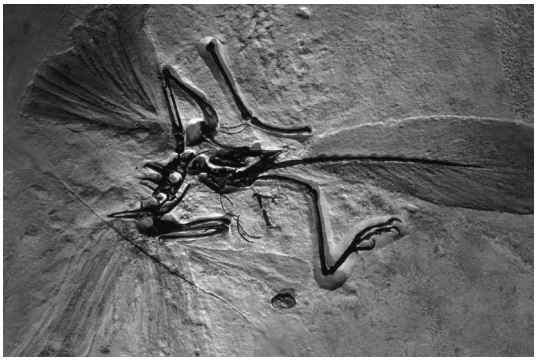
E nerve cells from spinal cord

Write the letters in the correct order to show the structures used when our body responds to a stimulus from the external environment.

[3]

[Total: 6]

7 Darwin published his Theory of Evolution in 1859.



At that time little was known of the fossil record.

A prediction was made that birds had evolved from dinosaurs.

Two years later a fossil of Archaeopteryx was found.

This was a link between the dinosaurs and birds.

Which of these statements are true?

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

The fossil proved the theory of evolution was correct.	☐
The fossil was an observation that agreed with a prediction.	☐
The fossil increased the confidence in the explanation.	☐
The fossil made no difference to Darwin's Theory.	☐
The fossil provided powerful evidence against Darwin's Theory.	☐

[2]

[Total: 2]

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