OCR
RECOGNISING ACHIEVEMENT

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A221/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

BIOLOGY A

Unit 1: Modules B1 B2 B3 (Foundation Tier)

MONDAY 23 JUNE 2008

Morning

Time: 40 minutes

CUP/T43778

Candidates answer on the question paper.
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **42**.

FOR EXAMINER'S USE		
Qu.	**Max**	**Mark**
1	**5**	
2	**8**	
3	**8**	
4	**9**	
5	**4**	
6	**4**	
7	**4**	
TOTAL	**42**	

This document consists of **14** printed pages and **2** blank pages.

[Turn over

Answer **all** the questions.

1 Philip and Sharon have a child called John.
John has cystic fibrosis.

(a) Their doctor is describing John's symptoms.

Put a tick (✓) in the boxes next to the **two** correct symptoms of cystic fibrosis.

clumsy	☐
forgetful	☐
short of breath	☐
muscles twitch	☐
many chest infections	☐

[2]

(b) Cystic fibrosis is a genetic disorder.
It is caused by a single gene.
This gene has two different versions, **D** and **d**.
D = normal version
d = cystic fibrosis version

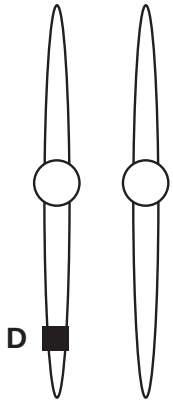
Complete the table to show the combinations of **D** and **d** in three different people.
One has been done for you.

person	**combination**
has cystic fibrosis	
is a carrier of cystic fibrosis	Dd
hasn't got cystic fibrosis and isn't a carrier	

[2]

(c) Genes are found on chromosomes.
Chromosomes occur in pairs.

The diagram shows a pair of chromosomes for a **carrier** of cystic fibrosis.
The position of **D** is marked.
On the diagram mark the position of **d**.



[1]

[Total: 5]

2 This question is about gene therapy.

SCID is an inherited disorder.

Children with SCID cannot make a particular protein.

Without this protein the immune system does not work properly.

The stages of the gene therapy are:

1. Blood stem cells are removed from bone marrow.
2. The stem cells are infected with a harmless virus carrying the 'working gene'.
3. The modified cells are put back.
4. The modified cells reproduce causing the immune system to work.

(a) How does gene therapy make the immune system work properly?

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

The modified cells …

… are larger than the old stem cells. ☐

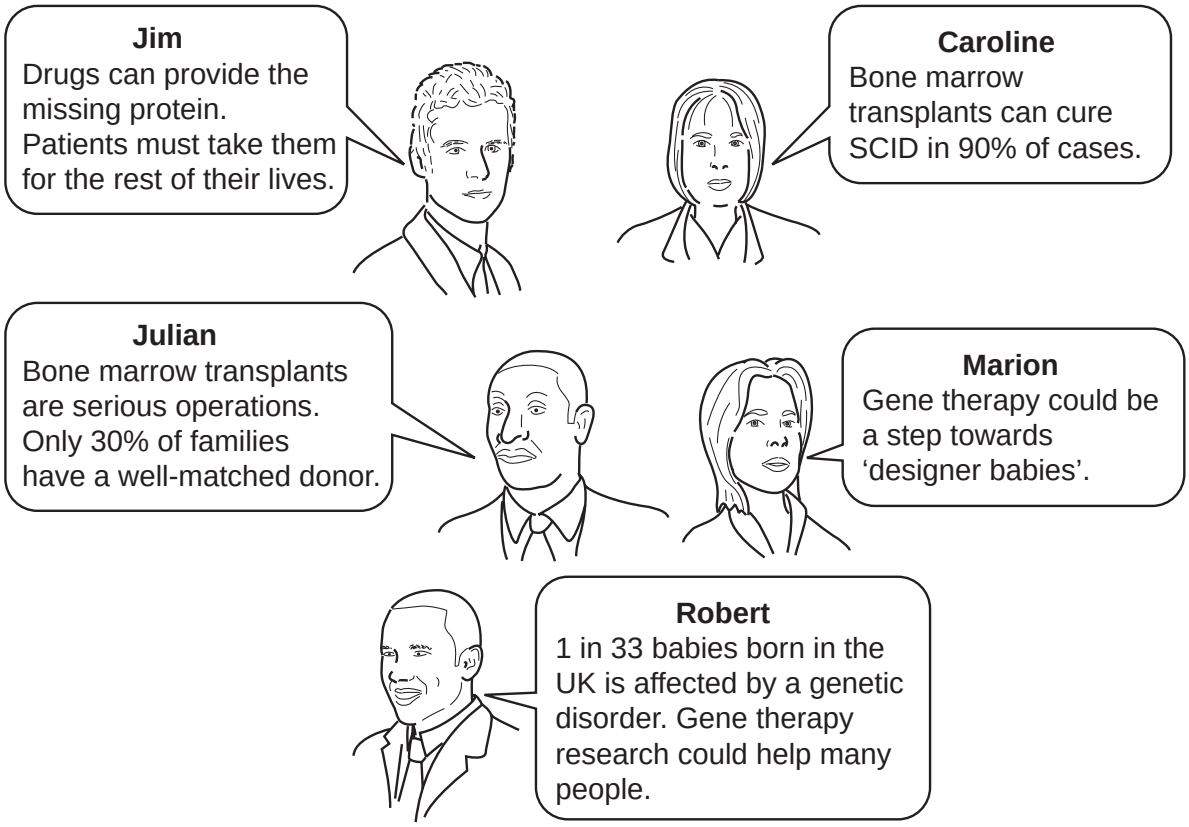
… make the missing protein. ☐

… are made from the missing protein. ☐

… only last for a short time. ☐

[1]

(b) Gene therapy is not the only available treatment for SCID.
Some doctors are discussing the treatment of patients with SCID.



(i) Which doctor is describing a treatment which is **not** a cure?

answer ..... [1]

(ii) Which **two** doctors are talking about the ethics of gene therapy?

…… and …… [2]

(iii) Draw a straight line from each **treatment** to the correct **statement** about the treatment.

treatment	statement
bone marrow transplant	provides missing protein directly
drugs	needs a well-matched donor
gene therapy	could lead to 'designer babies'

[2]

(c) Embryonic stem cells may soon be used to treat many diseases.

Put ticks (✓) in the boxes next to the **two** correct statements about embryonic stem cells.

They are specialised.	☐
They are unspecialised.	☐
They can develop into identical twins.	☐
They can develop into any kind of cell.	☐

[2]

[Total: 8]

3 Karen is pregnant.

She reads this newspaper story about vaccination.

> # Flu-jabs for pregnant women
>
> If a woman gets flu during pregnancy, it may double the risk of her child having leukaemia.
>
> Flu vaccine may be offered free of charge to pregnant women next winter.
>
> Flu vaccine does not cause flu.
>
> Vaccination has a risk of side effects.

(a) Karen is deciding whether or not to be vaccinated against flu.

Vaccination has risks and benefits.

(i) Put a tick (✓) in the correct box for each statement.
One has been done for you.

	benefit	**risk**	**neither**
Karen is less likely to get flu.	✓		
Flu vaccine may cause severe allergic reactions.			
Vaccination may prevent her child getting leukaemia.			
Flu vaccinations need to be given every year.			

[3]

(ii) Karen wants to know why the vaccine will not give her flu.

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

The vaccine contains live flu virus. ☐

Karen has had flu before. ☐

The vaccine contains a safe form of the virus. ☐

Karen has never had flu before. ☐

[1]

(b) The research showing a link between flu and leukaemia is new.

Scientists usually report new findings in **peer reviewed** journals.

Draw **one** straight line from the **reason** for using peer review to the best **description**.

reason	**description**
	work checked by scientists who study other areas of biology
so the findings will be accepted by other scientists	work checked by brothers and sisters of the author
	work checked by other scientists who study vaccination and childhood disease

[1]

(c) In the UK:

- The population is 60 000 000.
- 15 000 people a year die from flu.
- 14 000 000 people are vaccinated against flu every year.
- There is a 1 in 1 000 000 chance of a serious side effect from a flu vaccination.

(i) How many people each year in the UK are likely to suffer a serious side effect from a flu vaccination?

answer ..... [1]

(ii) Calculate the percentage of the UK population that dies from flu every year.

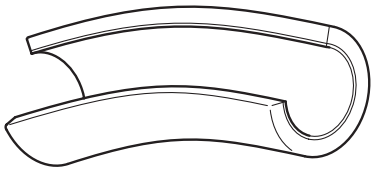
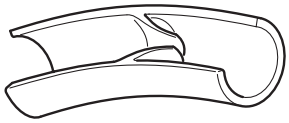
Show your working.

answer ..... % [2]

[Total: 8]

4 **(a)** The diagrams show two types of blood vessel.

Draw a straight line from each **cross-section diagram** to its correct **name** and then from the **name** to its correct **function**.

cross-section diagram	name	function
	artery	carries blood at high pressure away from the heart
	vein	transmits nerve impulses
	capillary	carries blood at low pressure back towards the heart

[4]

(b) Fat may build up in blood vessels.
This can lead to a heart attack.

The statements describe what happens to cause a heart attack.

They are in the wrong order.

A The heart beats irregularly; this is a heart attack.

B A blood clot forms on the fatty lump.

C Fat builds up in the blood vessels.

D Heart cells start to die.

E Blood flow to the heart is reduced.

Fill in the boxes to show the right order. The second one has been done for you.

	B			

[3]

(c) Read the information on gum disease and heart attacks.

Gum disease and heart attacks

There is a correlation between gum disease and heart attacks.

One investigation showed that twice as many people with gum disease died of heart attacks compared with people who had no gum disease.

In their investigation, scientists allowed for age, diet, exercise, smoking and alcohol use.

Put a tick (✓) in the box next to the statement which is the **best** conclusion.

People with gum disease …

… will get heart attacks. ☐

… are at no risk of heart attacks. ☐

… are at greater risk of heart attacks. ☐

… are at lower risk of heart attacks. ☐

[1]

(d) Why did the scientists allow for age, diet, exercise, smoking and alcohol use?

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

They all cause gum disease. ☐

They all cause heart attacks. ☐

They all have a correlation with heart attacks. ☐

[1]

[Total: 9]

5 Look at this headline.

Microbes survive space shuttle disaster

(a) Microorganisms were sent into space on board a space shuttle in 2003.
When returning to Earth the shuttle broke up and crashed.
Some microorganisms on board the shuttle survived the crash.

(New Scientist p6 4th March 2006)

Put a tick (✓) in the box next to the idea supported by these events.

Life must have originated on Earth.	☐
Life could have arrived from space.	☐
Life could not have originated on Earth.	☐

[1]

(b) Many scientists think that life started on Earth.

Complete the sentences describing these scientists' ideas.

Choose from this list.

3500
5000
14 000
breathe
copy
data
destroy
imagination

Life on Earth started about …… million years ago.

At this time the conditions on Earth produced molecules which could

…… themselves.

Scientist may disagree about how life on Earth started because they don't have

enough …… . [3]

[Total: 4]

6 Read the information about dodos.

1. Dodos were large flightless birds found on the island of Mauritius.
2. Dodos lived in the forests of Mauritius.
3. Humans first visited Mauritius in 1507.
4. Humans cut down the forests to make homes and farms.
5. With humans came dogs, pigs, cats and rats.
6. Humans hunted dodos.
7. By 1693, dodos were extinct.
8. Of 45 species of birds found on Mauritius in 1507, only 21 species have survived.

Finish the table by writing down the sentence number that describes each statement.

statement	**number**
Humans may have **directly** caused the extinction of the dodo.	
Humans may have **indirectly** caused the extinction of the dodo.	
Competition with a new species may have caused the extinction of the dodo.	
There is now less biodiversity.	

[4]

[Total: 4]

7 Read the information about fossil fish.

Scientists find missing link

Scientists think that millions of years ago some fish moved from water onto land.

These 'missing link' fish would have had fins like feet. Scientists had no fossils to prove this.

Their theory told them how long ago these fish should have lived.

The scientists examined rocks of this age and found this 'missing link'.

(New Scientist editorial 09.09.06. "Now that's what you'd call an intelligent theory")

Finish the sentences. Choose words from this list.

confident

doubtful

evolution

natural selection

prediction

statement

Most scientists agree that living things have changed over time.

This is called …… .

Most scientists also agree that this change is due to …… .

The scientists in the article used these ideas to make a …… .

They found a new fossil species. This finding agreed with their ideas and made scientists more

…… about their ideas.

[4]

[Total: 4]

END OF QUESTION PAPER

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