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

A221/02

**TWENTY FIRST CENTURY SCIENCE
BIOLOGY A**

Unit 1: Modules B1 B2 B3 (Higher Tier)

THURSDAY 19 MAY 2011: Afternoon

DURATION: 40 minutes

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 42.**

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Answer ALL the questions.

1 This question is about genes.

(a) Genes are codes for assembling particular substances.

Put ticks (✓) in the boxes next to the substances genes code for.

carbohydrates

fats

proteins

vitamins

enzymes

urea

glucose

[2]

(b) Put ticks (✓) in the boxes next to the statements about genes that are true.

Genes are made up of chromosomes.

Genes are sections of DNA.

All genes are found outside the nucleus of a cell.

Sex cells have only one copy of each gene.

Genes have different versions called alleles.

A pair of chromosomes carry the same genes in different places.

[2]

(c) Sex determination is controlled by a gene.

(i) Which chromosome carries the gene for determining sex?

answer _____ [1]

(ii) Explain the role of this gene in the determination of sex.

_____ **[2]**

[Total: 7]

2 Huntington's disorder is a genetic disorder.

(a) Height is also inherited through our genes.

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

Explain the difference.

[2]

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

(b) 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]

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

_____ [1]

(ii) Describe one FACTOR that might influence their decision.

_____ [1]

[Total: 5]

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.	<input type="checkbox"/>
antibodies.	<input type="checkbox"/>
toxins.	<input type="checkbox"/>

Our body responds by

platelets	<input type="checkbox"/>
red blood cells	<input type="checkbox"/>
white blood cells	<input type="checkbox"/>

producing

antibodies.	<input type="checkbox"/>
antigens.	<input type="checkbox"/>
toxins.	<input type="checkbox"/>

These cells

engulf	<input type="checkbox"/>
increase the reproduction of	<input type="checkbox"/>
protect	<input type="checkbox"/>

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.

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

Explain why.

[3]

[Total: 3]

5 This question is about antibiotics.

(a) Antibiotics are effective in killing two types of microorganisms.

Write down the names of these two types.

1 _____

2 _____

[1]

(b) Over a period of time, some microorganisms may become resistant to antibiotics.

Explain how this happens.

[3]

(c) Before antibiotics are made generally available, they are tested on healthy human volunteers.

Explain why.

[1]

[Total: 5]

6 This question is about biodiversity.

(a) Species can become extinct.

Explain WHY each of the following can bring about the extinction of a species.

(i) The removal of a species from the food web.

_____ [1]

(ii) The introduction of a new species into the food web.

_____ [1]

(iii) A rapid change in the environment.

_____ [2]

(b) Extinction can be caused by both direct and indirect human activity.

State one example of a species that has been made extinct due to DIRECT human activity and one that has been made extinct due to INDIRECT human activity.

You must explain the cause of extinction for each example.

extinction by DIRECT human activity

extinction by INDIRECT human activity

[2]

[Total: 6]

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TURN OVER FOR QUESTION 7

7 Four people discuss some ideas about science.

PETER

There are scientific questions for which there is not yet an agreed answer.



MARY

Imagination and creativity are needed in the development of an experiment.



ROBIN

Some scientists are reluctant to change their mind even when new data conflicts with their original ideas.



ANGELA

Sometimes data or observations can conflict with an explanation.



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

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

A scientist realised that trace elements found only in rocks from the time of the dinosaur extinction were usually found only on asteroids. He concluded that an asteroid impact caused the extinction of the dinosaurs. Other scientists were not convinced.	
A team of research scientists are working on the problem of how life on Earth began.	
A new fossil was found that made scientists realise that humans had evolved upright walking much earlier than previously thought.	
Despite strong evidence for humans evolving upright walking much earlier than previously thought some scientists did not accept that the earlier date was correct.	

[4]

[Total: 4]

8 This question is about life on Earth.

(a) There is variation in the life on Earth.

Complete the table opposite to show how variation is CAUSED and how it is PASSED ON.

Put ticks (✓) in the correct boxes for each row.

ENVIRONMENT	GENES	MUTATIONS IN THE INDIVIDUAL'S BODY CELLS	MUTATIONS IN THE INDIVIDUAL'S SEX CELLS
variation in an individual is CAUSED by			
variation is PASSED ON by			

[2]

(b) Some of the following are involved in the production of new species.

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

	INVOLVED IN THE PRODUCTION OF NEW SPECIES	NOT INVOLVED IN THE PRODUCTION OF NEW SPECIES
mutations		
environmental change		
natural selection		
number of species already present		

[2]

[Total: 4]

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TURN OVER FOR QUESTION 9

9 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]

END OF QUESTION PAPER

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