OCR
Oxford Cambridge and RSA

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Friday 5 June 2015 – Afternoon

GCSE TWENTY FIRST CENTURY SCIENCE BIOLOGY A/ADDITIONAL SCIENCE A

A162/01 Modules B4 B5 B6 (Foundation Tier)

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

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

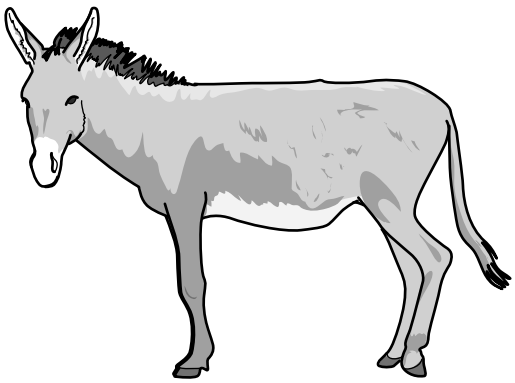
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting 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

- The 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 **60**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 The offspring of a male donkey and a female horse is called a mule.



A horse has 64 chromosomes in each body cell. A donkey has 62 chromosomes in each body cell.

(a) (i) Complete the table below to show how many chromosomes would be found in the gametes (sex cells) of these two species.

	Female horse	**Male donkey**
Body cell	**64**	**62**
Sperm cell		
Egg cell		

[2]

(ii) How many chromosomes are there in a body cell of a mule?

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

(b) What is the name of the type of cell division that produces gametes?

Put a (ring) around the correct name.

fertilisation **meiosis** **mitosis** **replication** **specialisation**

[1]

(c) The **cell cycle** consists of two stages, cell growth and cell division.

Put ticks (✓) in **four** boxes to indicate when the processes occur.

Process	**Cell growth**	**Cell division**
nucleus splits into two	☐	☐
numbers of organelles increase	☐	☐
chromosomes are copied	☐	☐
copies of the chromosomes separate	☐	☐

[4]

[Total: 8]

2 Paul's cat has injured its leg.

He takes the cat to the vet.

The vet explains that the cat has an infected leg, probably caused by a puncture wound.

(a) The vet advises Paul to bathe the wound with a saline solution to help keep it clean. A saline solution contains salt dissolved in water.

Complete these sentences to explain why the vet has given this advice.
Choose the best words from this list.

around	**diffusion**	**evaporation**
into	**osmosis**	**out of**
salt	**starch**	**water**

The saline solution contains a lot of salt.

This will cause the ..... to move ..... the bacteria.

This process is called ..... .

The bacteria are killed. **[3]**

(b) The bacteria in the wound are respiring anaerobically.

Under what conditions will the bacteria respire anaerobically and **not** aerobically?

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

(c) Anaerobic respiration releases less energy than aerobic respiration.

The energy from respiration is used to make molecules of a substance called ATP.

For every molecule of glucose respired during aerobic respiration, the energy released produces **36** molecules of ATP.

For every molecule of glucose respired during anaerobic respiration, the energy released produces only **2** molecules of ATP.

How many molecules of glucose need to be respired **anaerobically** to produce 36 molecules of ATP?

Put a (ring) around the correct answer.

2 **18** **34** **38** **72**

[1]

[Total: 5]

3 Chromosomes contain a molecule called DNA.

Describe the structure of DNA and its job in the cell.

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

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

[Total: 6]

4 Coral reefs are found in tropical seas.

They are made by living organisms called reef-building corals.

Reef-building corals have a symbiotic relationship with microscopic algae. Algae are single-celled plants.

In a symbiotic relationship both organisms **benefit** from each other.

(a) (i) Using your knowledge of photosynthesis, what are the benefits for the organisms in this symbiotic relationship?

Put a tick (✓) in the **three** correct boxes.

Algae give carbon dioxide to the coral.	☐
Algae give chlorophyll to the coral.	☐
Algae give glucose to the coral.	☐
Algae give oxygen to the coral.	☐
Coral gives carbon dioxide to the algae.	☐
Coral gives chlorophyll to the algae.	☐
Coral gives glucose to the algae.	☐
Coral gives oxygen to the algae.	☐

[3]

(ii) Algae can convert glucose into other substances.

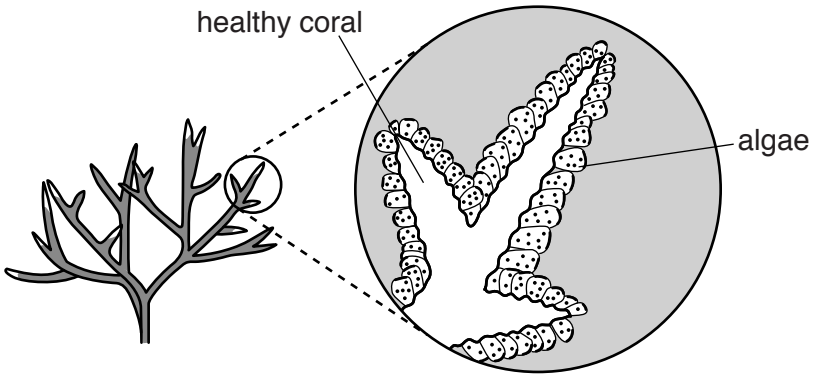
Put a (ring) around **two** substances that the algae can make from glucose.

calcium **carbon** **cellulose** **nitrogen** **starch**

[2]

(b) Scientists have found that some algae in the coral are dying.

This is thought to be caused by increases or decreases in sea temperature.



Photosynthesis is controlled by enzymes.

Explain how changes in the sea temperature can result in the algae dying.

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

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

(c) Some scientists think that temperature changes are killing the algae.

Other scientists think that increased UV light could be the cause.

How would scientists show whether UV light or temperature change is the cause of the algae dying in their natural habitat?

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

(d) Scientists publish their findings in peer-reviewed journals.

Which statements about peer review are correct?

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

Peer review is when the public evaluate the data.	☐
Peer review is when scientists evaluate the data of other scientists.	☐
Peer review is when both the public and scientists evaluate the data.	☐
Peer review allows the public to keep up to date with the latest findings.	☐
Peer review gives greater confidence in the findings.	☐
Peer review means the scientists get paid.	☐

[2]

[Total: 16]

5 Jean grows geranium plants. Her favourite geranium has purple flowers.

She takes a cutting from her favourite plant.

After 10 days, roots start to develop.

(a) Explain why Jean takes a cutting from the geranium and does not grow the plant from a seed.

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

(b) As Jean's cutting grows, unspecialised plant cells become specialised.
These specialised cells form different types of tissues and organs.

Decide whether each structure is a tissue or an organ.

Put ticks (✓) in the four correct boxes.

Structure	Tissue	Organ
Flowers	☐	☐
Leaves	☐	☐
Roots	☐	☐
Xylem	☐	☐

[2]

[Total: 5]

6 Helen has a biology exam next month. She starts her revision.

She has difficulty learning and remembering information.

Describe **how** learning takes place and suggest **ways** that could help Helen remember the information.

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

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

[Total: 6]

7 Antidepressants are drugs prescribed by doctors to treat depression.

(a) The table gives information about drugs **A**, **B**, **C** and **D** that are used to treat depression.

Drug	Information
A	Some people respond to this drug better than other drugs. Do not take if you have high blood pressure.
B	Causes fewer side effects than other drugs. Overdose not likely to be fatal. Do not take if you have epilepsy, diabetes or kidney disease.
C	Unpleasant side effects. Do not take if you have liver disease or heart disease.
D	Need to avoid red wine. Can lead to high blood pressure.

Fiona has depression and high blood pressure.

Her doctor prescribes drug **B**.

Suggest why her doctor makes this choice.

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

(b) Antidepressant drugs usually have side effects.

Which **two** statements explain why Fiona is willing to risk side effects?

Put ticks (✓) in the boxes next to the **two** best explanations.

The drugs are very expensive. ☐

The benefits of taking the antidepressants outweigh the risks. ☐

The risk of serious side effects is low. ☐

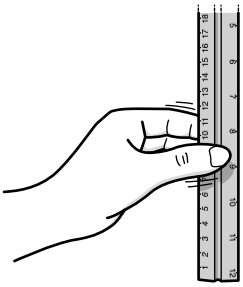
All of the side effects are serious. ☐

Overdoses are always fatal. ☐

[2]

[Total: 5]

8 Owen and Tamson do an investigation on reaction times.



Owen holds the top of a 1 m ruler and drops it.

Tamson reacts and catches it.

They measure how far the ruler falls before Tamson catches it.

They repeat the investigation with Tamson holding the ruler and Owen catching it.

Here are their results.

Name	Trial	Distance ruler drops (cm)	Mean (cm)
Owen	1	69.0	67.5
	2	80.3	
	3	53.2	
Tamson	1	32.5	
	2	26.8	
	3	24.7	

(a) Calculate the mean value for Tamson's data.

Show your working.

mean = ... cm **[2]**

(b) What conclusions can Owen and Tamson make from their results?

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

Tamson has the faster reaction times. ☐

Owen's reaction time gets faster with each trial. ☐

The ranges of Owen's and Tamson's reaction times overlap. ☐

Owen had the greater range of reaction times. ☐

The range was the same for both Tamson's and Owen's data. ☐

[2]

(c) Three trials were done for each person.

Explain why.

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

(d) Suggest **three** sources of error in this investigation.

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

[Total: 9]

END OF QUESTION PAPER