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Friday 10 June 2016 – Morning

GCSE TWENTY FIRST CENTURY SCIENCE BIOLOGY A/ADDITIONAL SCIENCE A

A162/01 Modules B4 B5 B6 (Foundation Tier)

5956111840

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

A162201

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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- 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 **20** pages. Any blank pages are indicated.

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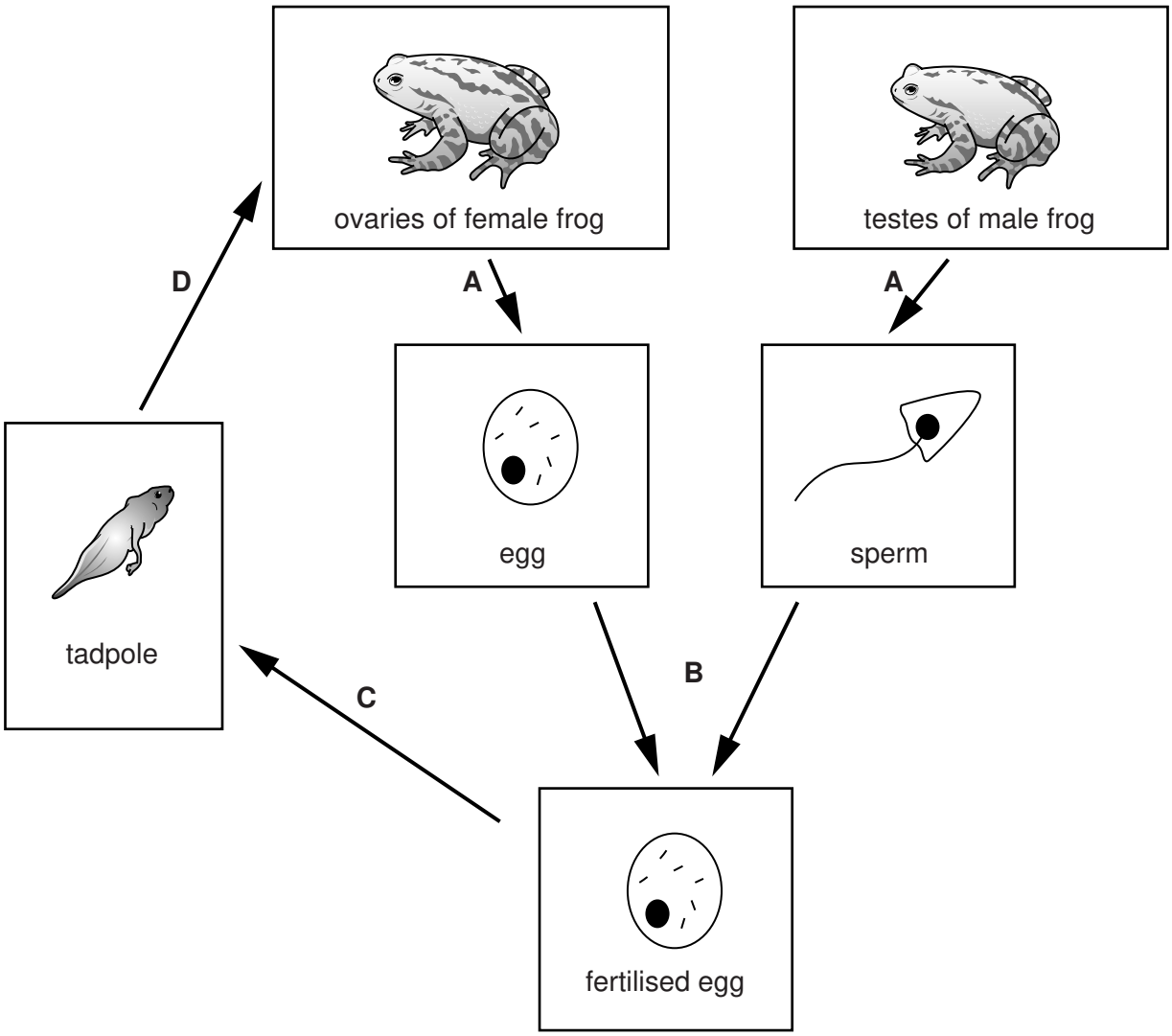
2

Answer **all** the questions.

1 The diagram below shows the life cycle of a frog.



(a) Look at the diagram of the life cycle.

(i) At which part of the life cycle, stage **A**, **B**, **C** or **D**, will meiosis take place?

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

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(ii) A cell taken from the eye of a frog has 26 chromosomes.

How many chromosomes will there be in a cell taken from a leg of the same frog?

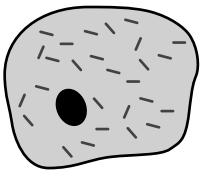
Place a tick (✓) in the box next to the correct answer.

13	☐
26	☐
46	☐
52	☐

[1]

(iii) Chromosomes are located in the nucleus of the cell.

Draw a labelled line to the nucleus on the diagram of the cell. **[1]**



(iv) Only 4% of the eggs produced by a frog will be fertilised and become tadpoles.

If the frog produces 2100 eggs, how many of these eggs would you expect to develop into tadpoles?

Show your working.

number of tadpoles ..... **[2]**

(b) When the nucleus from a sperm cell and egg cell fuse, a zygote is formed.

Which statement describes what the zygote will contain?

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

a set of chromosomes from each parent	☐
only chromosomes from the female parent	☐
more chromosomes from the mother than from the male parent	☐
no chromosomes from either parent	☐

[1]

[Total: 6]

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2 After fertilisation in humans, the cell divides and an embryo develops.

(a) (i) After which cell stage do the cells in a human embryo stop being identical?

Draw a (ring) around the correct answer.

2 4 8 16 32

[1]

(ii) Cells found in an early embryo are called stem cells.

Scientists think these stem cells could be used to treat some diseases.

Which of the following statements explain why scientists think this?

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

Stem cells are the same as an egg cell. ☐

Stem cells are unspecialised cells. ☐

Stem cells cannot specialise. ☐

Stem cells can become any type of cell. ☐

Stem cells must be fertilised to become specialised. ☐

[2]

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(b) Type 1 diabetes is a condition where the body's blood glucose concentration is too high.

Blood glucose is controlled by a hormone called insulin.

Insulin is produced by some cells in the pancreas.

People with Type 1 diabetes have cells that have stopped producing insulin. They can be given injections of insulin.

(i) Scientists plan to use stem cells to treat people with Type 1 diabetes.

Suggest how this might work.

.....

.....

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

(ii) Stem cells can be taken from the following sources:

- embryos
- adult bone marrow.

Scientists have decided to use stem cells from adult bone marrow.

Suggest **two** reasons why.

Reason 1 .....

.....

Reason 2 .....

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

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(iii) Working with embryos is regulated because many ethical decisions need to be made.

Who is responsible for this regulation?

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

the publishers of research	☐
the Government	☐
the people who donate cells	☐
the scientists	☐

[1]

(c) In mitosis one cell divides to form two new cells.

In a human embryo this doubling time is approximately 30 hours.

How long would it take for a fertilised egg cell to become an 8 cell embryo?

Draw a (ring) around the correct answer.

30 hours **60 hours** **90 hours** **120 hours**

[1]

(d) What is the name given to a group of specialised cells that perform a particular job?

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

tissue	☐
organ	☐
organ system	☐
organism	☐

[1]

[Total: 10]

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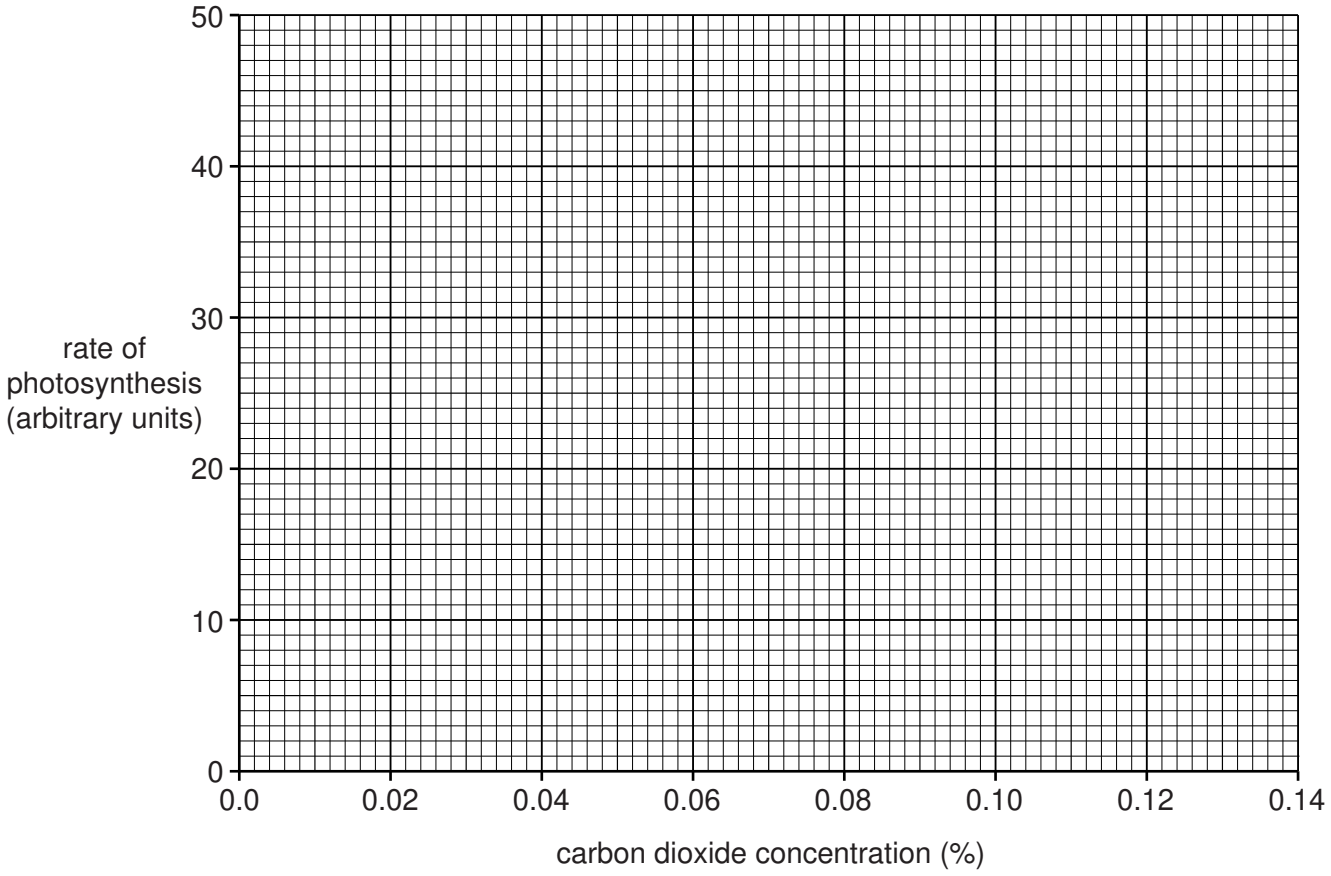
3 **(a)** Paresh does an experiment to investigate the effect of carbon dioxide on the rate of photosynthesis.

His results are shown below.

Carbon dioxide concentration in the air (%)	Rate of photosynthesis (arbitrary units)
0.00	0
0.02	20
0.04	28
0.06	35
0.08	40
0.10	
0.12	43
0.14	43

(i) Plot the data on the grid below. **[2]**



(ii) Use the points to draw an appropriate line of best fit. **[1]**

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(iii) The table does not show the rate of photosynthesis when the concentration of carbon dioxide was 0.10%.

Use the graph to find the rate of photosynthesis when the carbon dioxide concentration was 0.10%.

rate of photosynthesis ..... **[1]**

(iv) What conclusions can be made about the effect of carbon dioxide concentration on the rate of photosynthesis?

.....

.....

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

(v) Paresh measures the rate of photosynthesis at 0.13%.

The rate of photosynthesis was 22 (arbitrary units).

He decides **not** to include this in the data set.

Suggest why.

.....

.....

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

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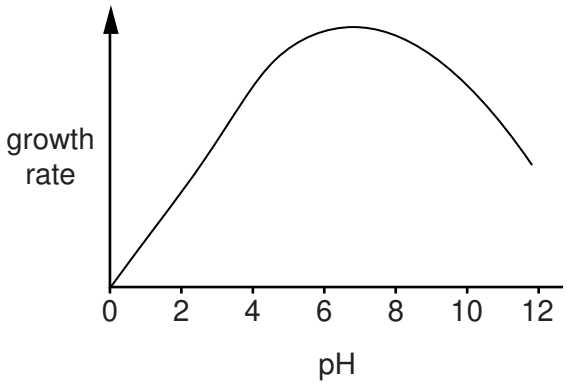
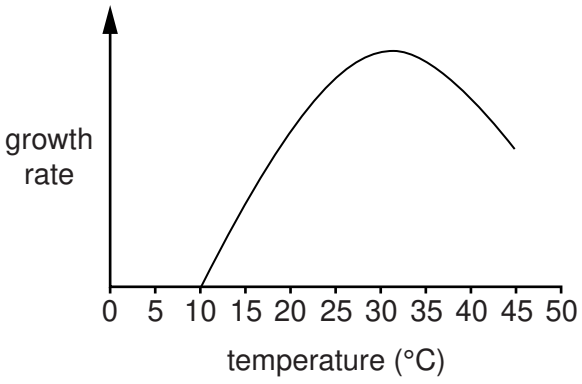
(b) Paresh is a keen gardener. He wants to improve the growth rate of his tomatoes.

To do this he needs to provide the optimum conditions for growth.

Paresh read the information below in a gardening magazine. It shows the effects of pH and temperature on the growth rate of tomatoes.





Describe what conditions he should provide to grow his tomatoes. Use the information above and your biological knowledge in your answer.

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

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

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(c) Carbon dioxide enters the leaf and is used in photosynthesis.

Which of the following is the correct name for this type of movement?

Put a (ring) round the name of the process by which carbon dioxide enters the leaf.

diffusion **osmosis** **phototropism** **respiration**

[1]

[Total: 15]

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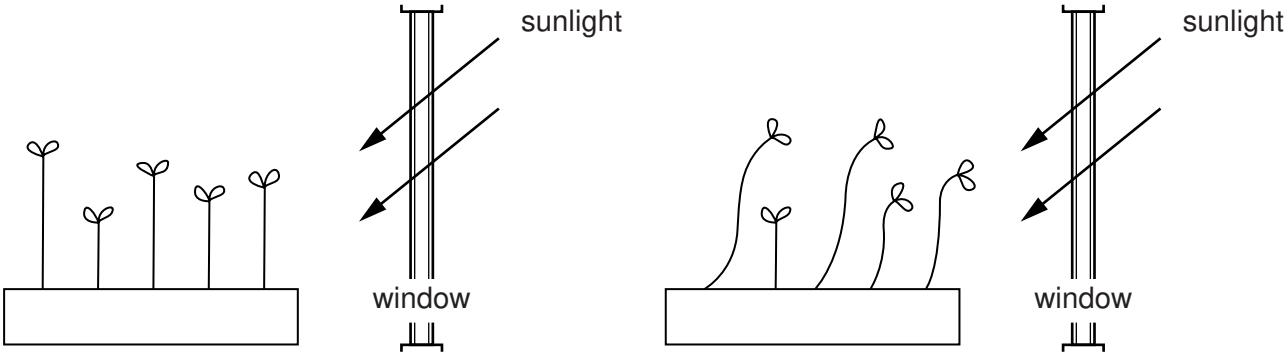
4 James investigates the effect of light on shoot growth.

He places a tray of 5 cress seedlings on a windowsill and leaves them for 5 days.

He notes the appearance of the seedlings at the start of the experiment and again 5 days later.



all cress seedlings grow upright

only 1 cress seedling is growing upright

James concludes that the seedlings have grown towards the sunlight.

James thinks that there are problems with his experimental design.

(a) Evaluate the experimental design. In your answer you should:

- identify some of the problems
- suggest how the experiment could be improved.

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

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

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(b) If a plant only receives light from one direction, then it will grow towards the light.

This is called phototropism.

Phototropism increases the plant's chance of survival.

Explain why.

.....

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

(c) Cell division by mitosis only happens in certain regions of a plant.

What are these regions called?

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

leaves ☐

phloem ☐

meristems ☐

xylem ☐

[1]

[Total: 9]

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5 The human nervous system consists of the central nervous system (CNS) and the peripheral nervous system (PNS).

(a) Name the **two** main parts of the **CNS**.

1 .....

2 .....

[2]

(b) The nervous system has receptors to detect changes in the environment and effectors to carry out responses.

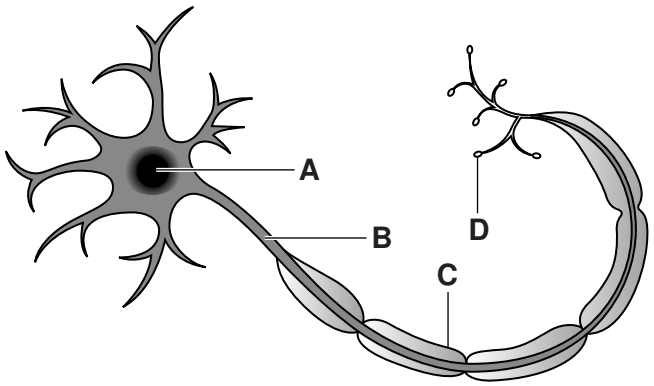
(i) Decide if the following statements are **true** or **false**.

Put a tick (✓) in **one** box in each row.

Statement	True	False
Light sensitive cells in the retina are effectors.		
Hormone-secreting cells in a gland are receptors.		
Muscle cells in a muscle are effectors.		

[2]

(ii) The diagram below shows a motor neuron.



Which of the labels, **A**, **B**, **C** or **D** is the fatty sheath?

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

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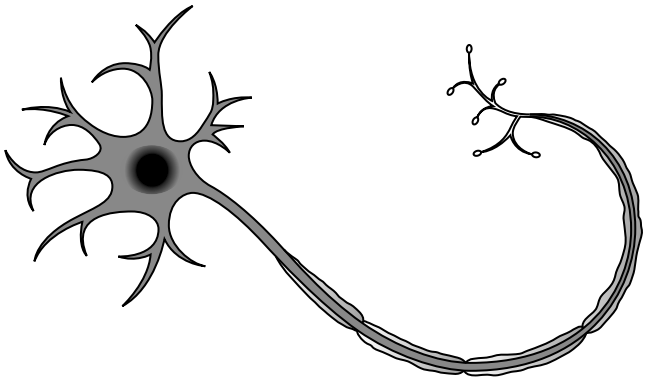
(iii) In some diseases motor neurons are damaged as shown in the diagram.



Damaged motor neuron

Three friends talk about the effect this will have on people.

I think it will affect how the synapses work and will stop impulses being passed from one neuron to the next.

Kavita

I think electrical impulses will travel faster and cause muscles to contract quicker.

Oliver

I think the electrical impulses will travel more slowly and this will affect how the body moves.

Tomas

Which friend is correct? ..... **[1]**

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(c) The nervous system and hormonal system allow humans to respond to their environment.

Each system has special features. These include:

- the type of messenger
- the route it travels
- the speed of the effect and how long it lasts.

Compare these features in the hormonal system and the nervous system.

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

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

[Total: 12]

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6 Dementia is caused by damage to the brain.

(a) People with dementia often have difficulty remembering things they have just done. However, they can clearly remember things from many years ago.

Which part of their memory is still functioning well and which part is not?

.....

.....

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

(b) Name a technique that could be used to find the area of the brain that is damaged.

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

(c) Emma is trying to remember a phone number but is finding it difficult.

Suggest a method that she could use to help her remember it.

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

[Total: 4]

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7 This question is about respiration in yeast.

Complete the sentences by choosing words from this list.

aerobic **anaerobic** **energy** **enzymes**

glucose **hormones** **lactic acid**

Yeast contain ..... which are needed for the stages in respiration.

Yeast can be used to make alcohol in the process of fermentation.

Fermentation involves ..... respiration.

All types of respiration release ..... from ..... .

[4]

[Total: 4]

END OF QUESTION PAPER

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ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

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