| Centre Number | | | | | | Candidate Number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Surname | | | | | | | | | | |
| Other Names | | | | | | | | | | |
| Candidate Signature | | | | | | | | | | |

| For Examiner's Use | |
|---|---|
| Examiner's Initials | |
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
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| 8 | |
| 9 | |
| TOTAL | |

General Certificate of Secondary Education
Foundation Tier
June 2012

# Additional Science BL2FP

**Unit Biology B2**

**F**

# Biology

**Unit Biology B2**

**Monday 21 May 2012 9.00 am to 10.00 am**

**For this paper you must have:**
- a ruler.

You may use a calculator.

**Time allowed**
- 1 hour

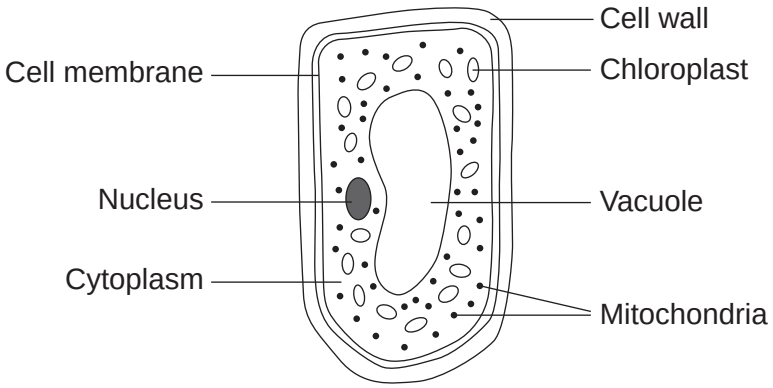
**Instructions**
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8(b) should be answered in continuous prose. In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

**Advice**
- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

**1** The diagram shows a cell from a plant leaf.




**1 (a)** Name the part of this cell that:

**1 (a) (i)** controls the passage of substances in and out of the cell

.....

*(1 mark)*

**1 (a) (ii)** is filled with cell sap.

.....

*(1 mark)*

**1 (b)** Give the names of **two** parts of the leaf cell that would **not** be found in a human liver cell.

..... and .....

*(2 marks)*

**1 (c)** The chloroplasts produce oxygen.

Draw a ring around the correct answer to complete the sentence.

The oxygen produced by the chloroplasts passes out of the cell by

| |
|---|
| diffusion. |
| digestion. |
| respiration. |

*(1 mark)*

**5**

**2** In a living organism, the cells are organised into organs, systems and tissues.

**2 (a)** Use words from the box to complete the list of these structures in order of size.

| **organs** | **systems** | **tissues** |
|---|---|---|

The smallest structure is at the top of the list and the largest is at the bottom.

1 **cells** (smallest)

2 .....

3 .....

4 .....

5 **organism** (largest)

*(1 mark)*

**2 (b)** **List A** gives three tissues found in the human body.
**List B** gives four functions of tissues.

Draw a straight line from each tissue in **List A** to its correct function in **List B**.

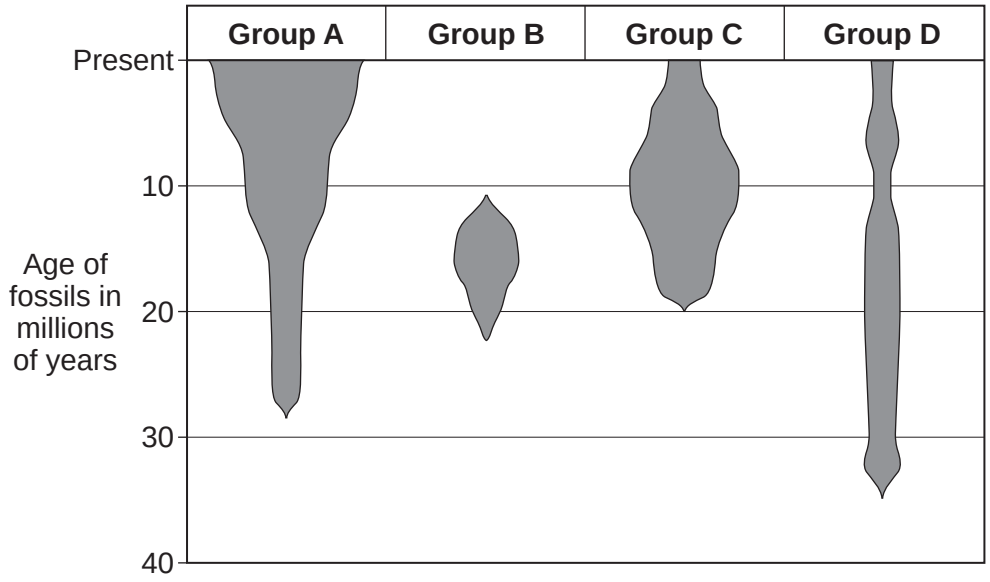
| **List A – Tissue** | **List B – Function** |
|---|---|
| | Covers many parts of the body |
| Muscular tissue | |
| | Contracts to cause movement |
| Glandular tissue | |
| | Divides by meiosis |
| Epithelial tissue | |
| | Releases hormones or enzymes |

*(3 marks)*

4

**Turn over ▶**

**3** In the Grand Canyon, scientists have found fossils of several different groups of organisms.
The diagram shows the number and age of the fossils that the scientists found.
The width of each shaded area shows the number of fossils found.




**3 (a)** What is a fossil?

.....

.....

.....

.....

*(2 marks)*

**3 (b) (i)** Which group of organisms, **A**, **B**, **C** or **D**, was the first to evolve? ☐

*(1 mark)*

**3 (b) (ii)** Which group of organisms, **A**, **B**, **C** or **D**, is now extinct? ☐

*(1 mark)*

**3 (b) (iii)** Give **one** environmental factor that might have caused this group of organisms to become extinct.

.....

.....

*(1 mark)*

**3 (c)** Scientists suggested that, 10 million years ago, organisms of **Group C** were more common than organisms from any of the other groups.

What is the evidence for this in the diagram?

.....

.....

*(1 mark)*

**3 (d)** The scientists suggested that the four groups of fossilised organisms evolved from a common ancestor.

Which of the following would provide the best evidence that their suggestion is correct?

Tick (✓) **one** box.

| Statement | Tick (✓) |
|---|---|
| All the groups lived in the same area. | |
| Fossils from each group were found in the same rock layer. | |
| Members of the groups have similar physical structures. | |

*(1 mark)*

7

**Turn over for the next question**

**There are no questions printed on this page**

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**ANSWER IN THE SPACES PROVIDED**

**4 (a)** Human body cells contain 46 chromosomes.

**4 (a) (i)** How many chromosomes are there in a human sperm cell? ☐

*(1 mark)*

**4 (a) (ii)** Name the part of the sperm cell that contains the chromosomes.

.....

*(1 mark)*

**4 (b)** Draw a ring around the correct answer to complete each sentence.

**4 (b) (i)** In human females, the sex chromosomes are

**X** and **X**.

**X** and **Y**.

**Y** and **Y**.

*(1 mark)*

**4 (b) (ii)** In human males, the sex chromosomes are

**X** and **X**.

**X** and **Y**.

**Y** and **Y**.

*(1 mark)*

**4 (c)** A man might release 300 million sperm cells at a time.

How many of these sperm cells would contain an **X** chromosome?

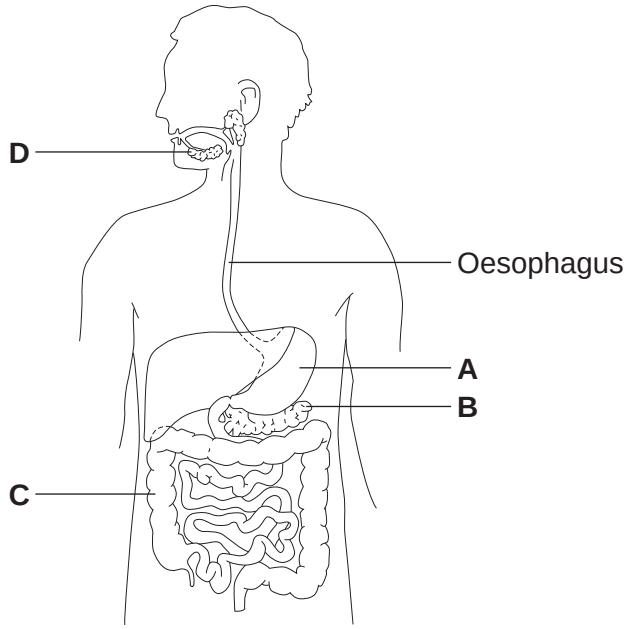
.....

*(1 mark)*

5

**Turn over for the next question**

**5** The diagram shows the human digestive system.




**5 (a)** *Heartburn* is a burning feeling caused when acid enters the oesophagus. The acid comes from the stomach.

**5 (a) (i)** Which letter on the diagram shows the stomach? ☐

*(1 mark)*

**5 (a) (ii)** Name the acid the stomach produces.

.....

*(1 mark)*

**5 (a) (iii)** Medicines taken to treat *heartburn* contain chemicals that neutralise excess stomach acid.

What type of chemical will neutralise stomach acid?

.....

*(1 mark)*

**5 (b)** Use words from the box and your own knowledge to describe how carbohydrates are digested.

| | | |
|---|---|---|
| **amylase** | **starch** | **sugars** |

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

*(5 marks)*

**5 (c)** Where in the body are the products of digestion absorbed?

.....

*(1 mark)*

9

**Turn over for the next question**

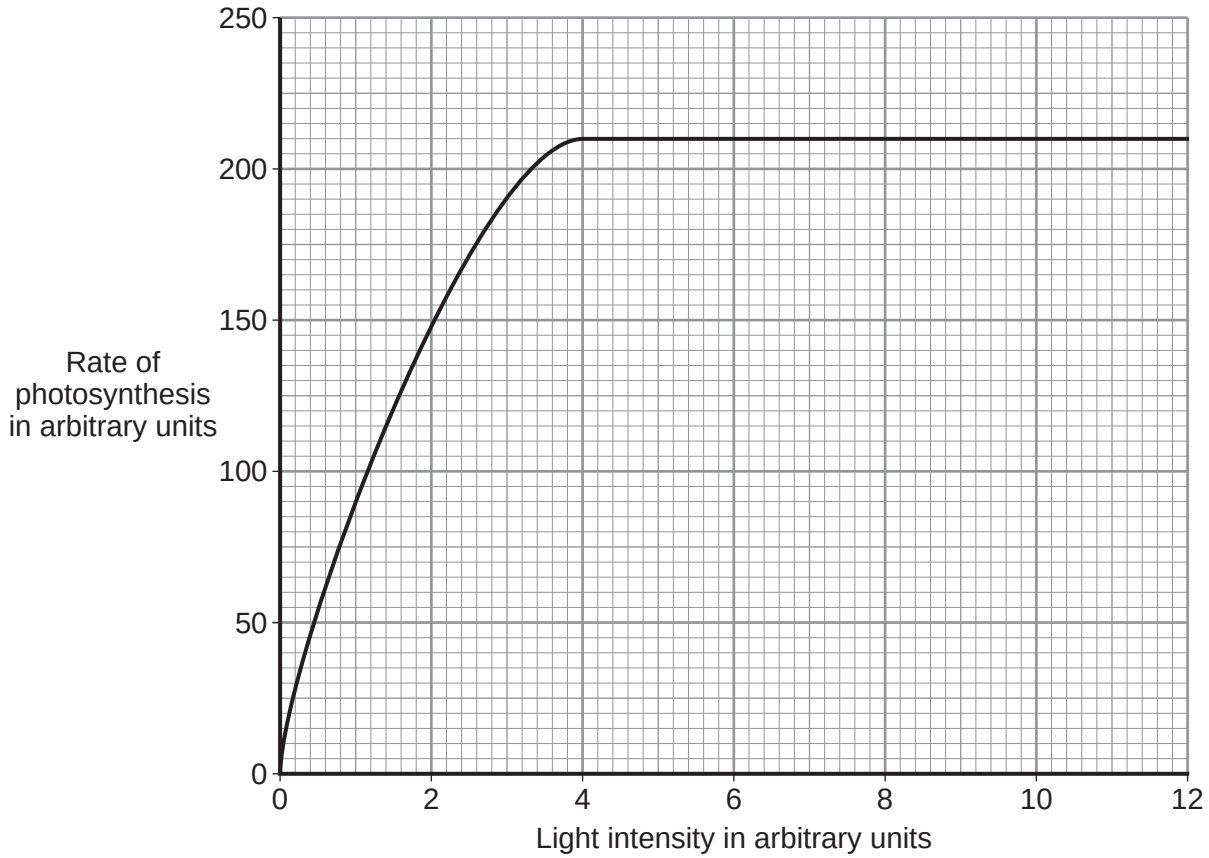
**6 (a)** Complete the equation for photosynthesis.

Carbon dioxide + ..... $\xrightarrow{\text{light energy}}$ ..... + oxygen

*(2 marks)*

**6 (b)** A farmer grew tomato plants in a greenhouse.

The graph shows the effect of light intensity on the rate of photosynthesis in the tomato plants growing in the greenhouse.




**6 (b) (i)** At which light intensity was light a limiting factor for photosynthesis?

Tick (✓) **one** box.

1 arbitrary unit ☐

4 arbitrary units ☐

10 arbitrary units ☐

*(1 mark)*

**6 (b) (ii)** What was the highest rate of photosynthesis?

..... arbitrary units

*(1 mark)*

**6 (b) (iii)** The farmer wants to increase the rate of photosynthesis in his tomato plants.

Apart from light intensity, name **one** factor that the farmer could change to increase the rate of photosynthesis in his tomato plants.

.....

*(1 mark)*

5

**Turn over for the next question**

**7** Cystic fibrosis is an inherited disorder.

Mr and Mrs Brown do **not** have cystic fibrosis but they have a child with cystic fibrosis.

**7 (a)** Draw a ring around the correct answer to complete each sentence.

**7 (a) (i)** The allele for cystic fibrosis is a

carrier allele.

dominant allele.

recessive allele.

*(1 mark)*

**7 (a) (ii)** Mr and Mrs Brown are both

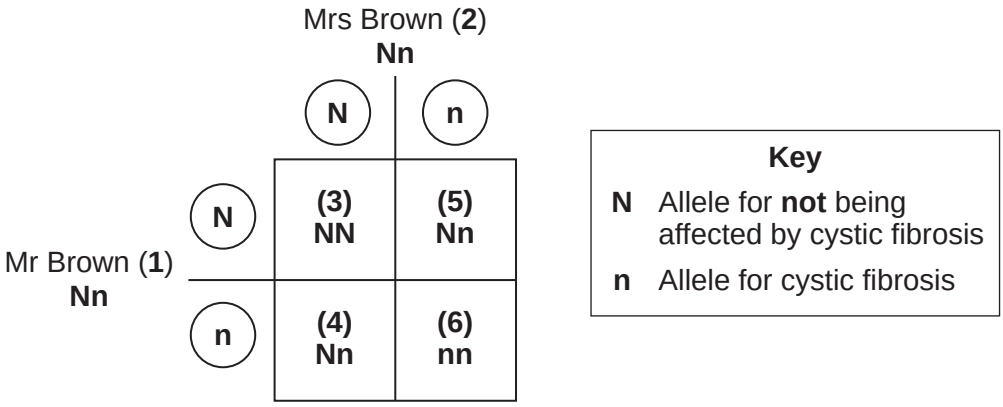
carriers.

immune.

infected.

*(1 mark)*

**7 (b)** The diagram shows how the allele for cystic fibrosis can be inherited by Mr and Mrs Brown's children.




**7 (b) (i)** Give the number of **one** person in the diagram who has cystic fibrosis. ☐

*(1 mark)*

**7 (b) (ii)** The chance that Mr and Mrs Brown's next child will have cystic fibrosis is

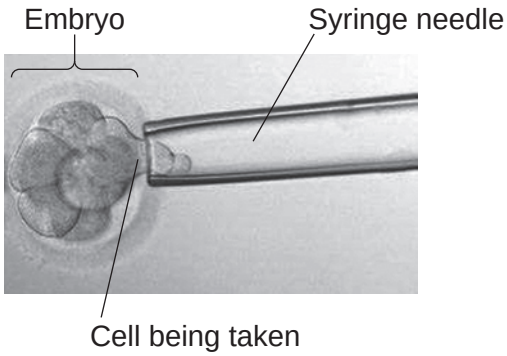
..... .

*(1 mark)*

**7 (c)** A genetic counsellor describes to Mr and Mrs Brown one way of screening embryos for cystic fibrosis.

- Some eggs are collected from Mrs Brown.
- The eggs are then fertilised in a dish.
- Several embryos may start to develop.

The photograph shows how doctors take one cell from each embryo when it is only 3 days old.




Source: © Pascal Goetgheluck/Science Photo Library

- The DNA in the cell from each embryo is tested for cystic fibrosis.
- Doctors select one embryo that is unaffected and place it in Mrs Brown's uterus.
- The embryo then develops into a baby.

Use the information to suggest **one** advantage and **one** disadvantage of screening embryos in this way.

Advantage .....

.....

Disadvantage .....

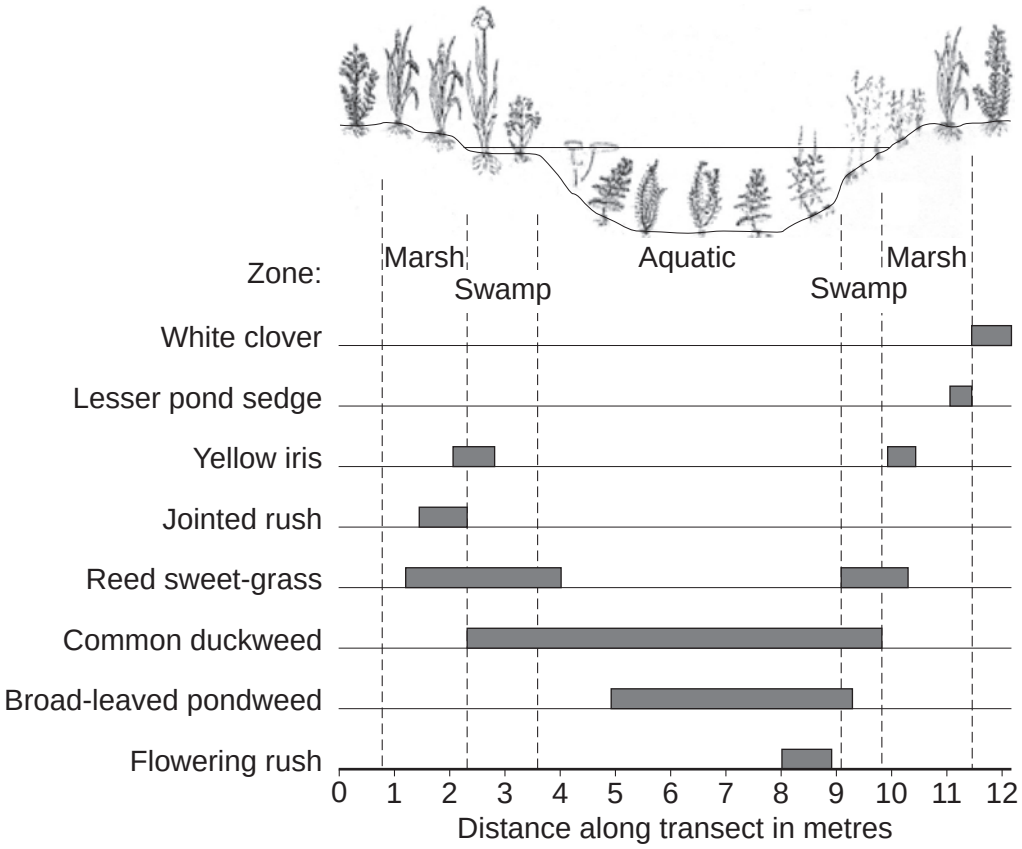
.....

*(2 marks)*

6

**8** Some students investigated the distribution of some of the plants growing in and around a shallow stream. They sampled along a transect line.

The diagram shows their results.




**8 (a) (i)** Name the **one** species that grew only in the driest conditions.

.....

*(1 mark)*

**8 (a) (ii)** Only **one** species grew in the marsh, the swamp and in the aquatic zones.

Which species?

.....

*(1 mark)*

**8 (a) (iii)** Duckweed grows floating in water. What evidence is there for this in the students' results?

.....

.....

*(1 mark)*

**8 (b)** *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Describe how you would use a $\frac{1}{2}$-metre $\times$ $\frac{1}{2}$-metre quadrat frame and a 30-metre tape measure to obtain data similar to the data shown in the diagram.

You should include details of how you would make sure that you would obtain valid results.

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*(6 marks)*

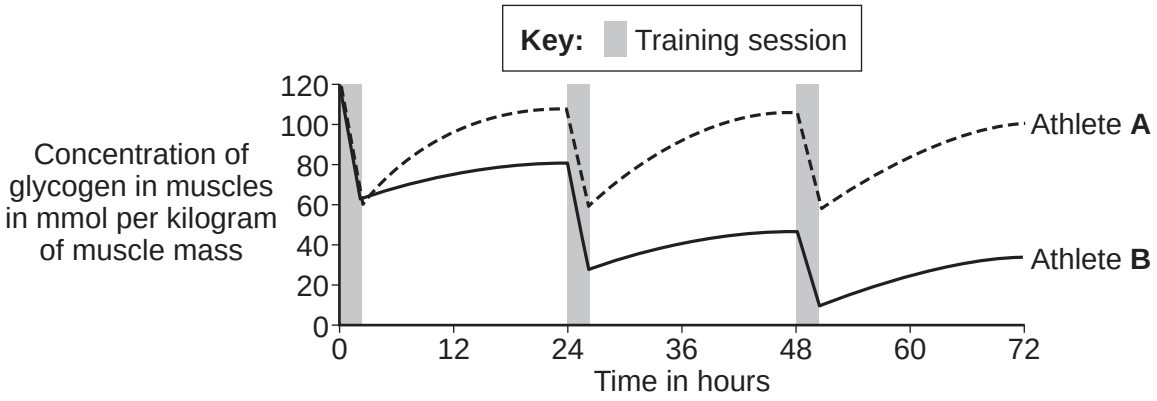
9

**9** Glycogen is stored in the muscles.

Scientists investigated changes in the amount of glycogen stored in the muscles of two 20 year-old male athletes, **A** and **B**.
Athlete **A** ate a high-carbohydrate diet. Athlete **B** ate a low-carbohydrate diet.

Each athlete did one 2-hour training session each day.

The graph shows the results for the first 3 days.




**9 (a) (i)** Give **three** variables that the scientists controlled in this investigation.

.....

.....

.....

.....

.....

.....

*(3 marks)*

**9 (a) (ii)** Suggest **two** variables that would be difficult to control in this investigation.

.....

.....

.....

.....

*(2 marks)*

**9 (a) (iii)** Describe **one** way in which the results of Athlete **B** were different from the results of Athlete **A**.

.....

.....

*(1 mark)*

**9 (b)** Both athletes were training to run a marathon.

Which athlete, **A** or **B**, would be more likely to complete the marathon?

Use information from the graph to explain your answer.

.....

.....

.....

.....

.....

.....

.....

.....

*(4 marks)*

**10**

**END OF QUESTIONS**

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