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1. These athletes are long distance runners.



(a) Explain why their heart rates increase as they run.

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.....  
.....  
.....

(2)

(b) Complete the following word equations for respiration in athletes.

(i) aerobic respiration

glucose + oxygen  $\longrightarrow$  .....

(1)

(ii) anaerobic respiration

glucose  $\longrightarrow$  .....

(1)

Q1

(Total 4 marks)



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2. A recent news report stated that scientists had taken skin cells from patients and turned the skin cells into stem cells. The report suggests that it will only be a few years before embryonic stem cells will not be needed for treatments.

(a) Explain why embryonic stem cells are useful to scientists.

.....  
.....  
.....

(1)

(b) Give **two** medical benefits that could result from stem cell research.

1 .....

.....

2 .....

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(2)

(c) Explain why some people think that it is wrong to use embryonic stem cells for research.

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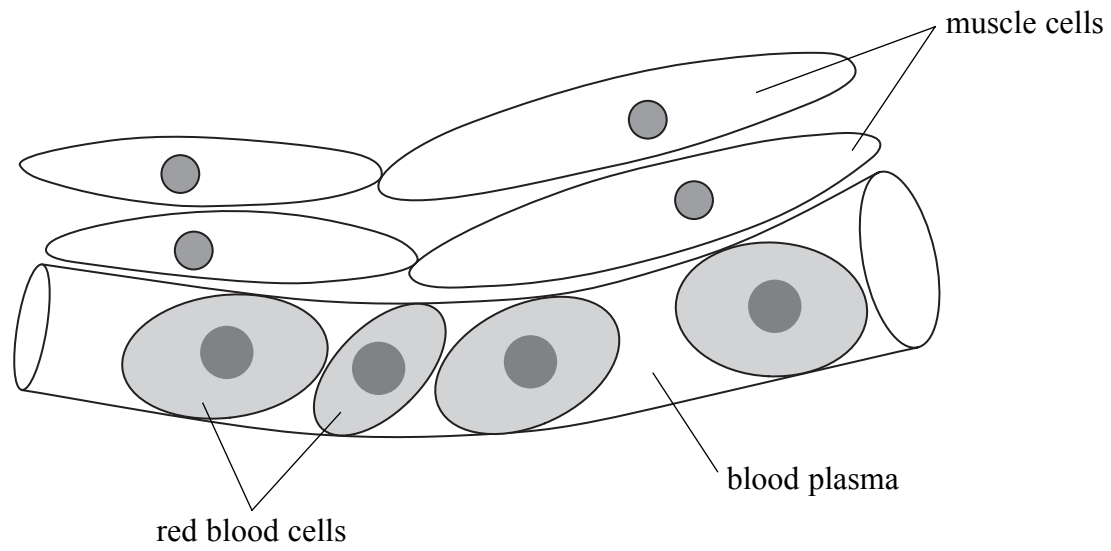
(2)

Q2

(Total 5 marks)



3. The diagram shows muscle cells and a blood capillary.



(a) Name the gas that leaves the muscle cell and enters the blood.

..... (1)

(b) Explain how glucose moves from the blood plasma into a muscle cell.

.....  
.....  
.....  
.....  
..... (2)

(Total 3 marks)

Q3



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**TURN OVER FOR QUESTION 4**



4. The photograph shows two different varieties of wheat.  
The dwarf wheat plants on the left have been produced by selective breeding.



- (a) Describe the process of selective breeding to produce dwarf wheat plants from normal size wheat plants.

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(2)

- (b) Dwarf wheat plants produce a higher yield of wheat grains than plants with longer stems, even when grown under identical conditions.

Suggest **one** reason why the dwarf wheat plants produce a higher yield of wheat grains per plant.

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(1)



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(c) The dwarf wheat plants have higher tolerance to disease and drought than the normal size wheat plants.

Suggest **two** benefits to the farmer, apart from higher yield, of growing dwarf wheat plants.

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(2)

Q4

(Total 5 marks)

7



Turn over

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5. Root hair cells absorb mineral ions from the soil.



(a) Explain how mineral ions from the soil are absorbed into root hair cells.

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.....  
.....  
.....

(2)

(b) Complete the table.

| mineral ion absorbed by the roots | how it is used by the plant |
|-----------------------------------|-----------------------------|
| potassium                         |                             |
|                                   | to make chlorophyll         |
| phosphorus                        |                             |

(3)

Q5

(Total 5 marks)



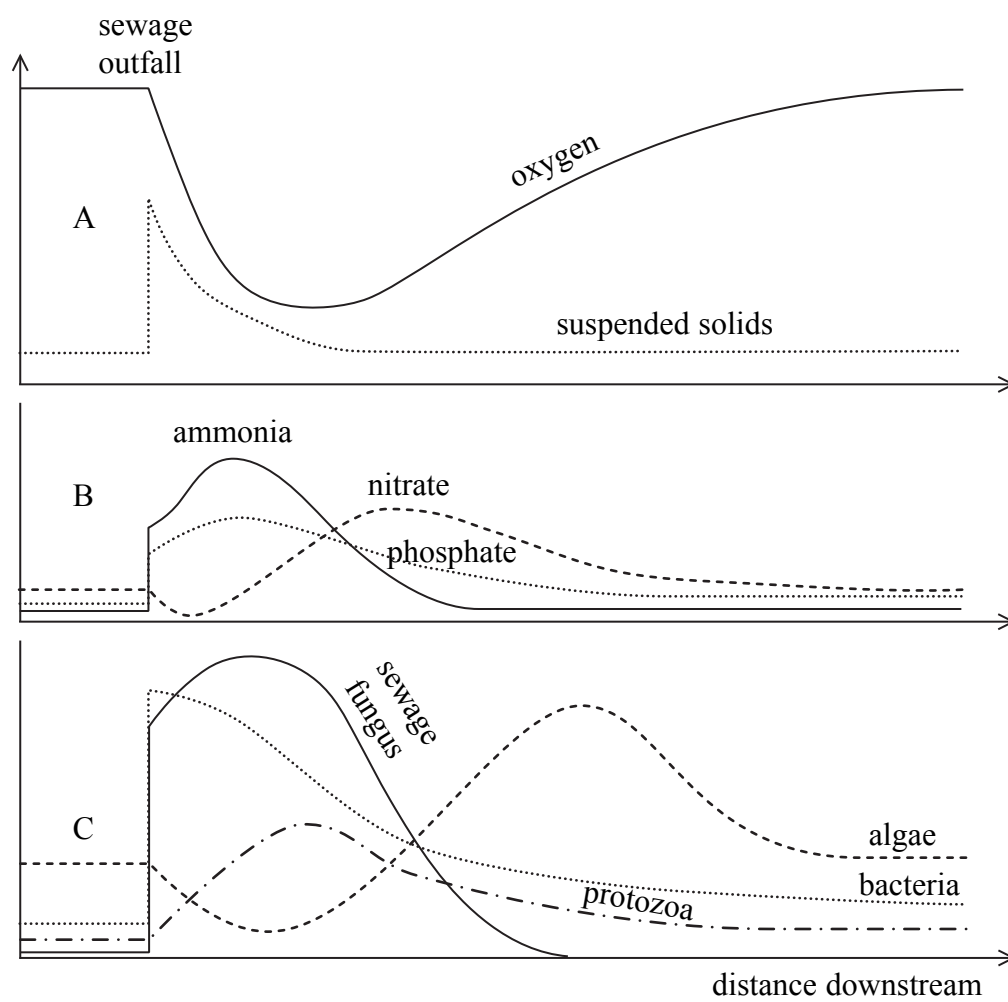
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**TURN OVER FOR QUESTION 6**



6. A sewage outfall allowed untreated sewage to flow into an unpolluted river. Water quality was measured just above the sewage outfall into the river and then downstream for several hundred metres.

Graph A shows amounts of oxygen and suspended solids in the river water.  
 Graph B shows amounts of ammonia, nitrate and phosphate in the river water.  
 Graph C shows numbers of different living organisms in the river water.



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The ammonia in the sewage is converted into other substances in a similar way to the action of nitrifying bacteria.

Use the graphs to help you explain what happens to the ammonia in the water and the consequences of this for the organisms living in the water.

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**(Total 4 marks)**

**Q6**



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7. Human sperm are produced by cell division in the testes.



(a) Name the type of cell division used to produce sperm.

..... (1)

(b) Describe how this type of cell division to produce sperm is different from the cell division to produce normal body cells.

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.....  
.....  
.....  
.....  
..... (3)

(Total 4 marks)

Q7

**TOTAL FOR PAPER: 30 MARKS**

**END**

