Write your name here

Surname		Other names

Centre Number

Candidate Number

Edexcel GCSE

Biology/Additional Science
Unit B2: The Components of Life

Higher Tier

Monday 10 June 2013 – Afternoon
Time: 1 hour

Paper Reference
5BI2H/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

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Answer ALL questions

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then
mark your new answer with a cross ☒.

Proteins

1 Proteins are made up of amino acids.

   (a) The table shows the DNA bases that code for some of the amino acids found in
       proteins.

DNA bases	AAA	AAC	CAA	TAC	TTC
Amino acid	phe	leu	val	met	lys

   Part of the DNA coding for a protein is:

   T A C C A A T T C

   (i)   State the order of amino acids coded for by this sequence of DNA.
         (1)

   ....

   (ii) These amino acids will be joined together during protein synthesis.

         During which stage of protein synthesis will this take place?
         (1)

   ....

   (iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

         Amino acids are joined together
         (1)

   ☒ **A** at the membrane

   ☒ **B** in the mitochondria

   ☒ **C** in the nucleus

   ☒ **D** at the ribosome

(b) DNA can code for the amino acids in the active site of an enzyme.

Explain the role of the active site of an enzyme.

(2)

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(c) Mutations can occur in DNA.

Describe what effect a mutation could have on the action of an enzyme.

(3)

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(Total for Question 1 = 8 marks)

Cells

2 Yeasts are microorganisms that are used in the brewing and baking industries.

The diagram shows a yeast cell.
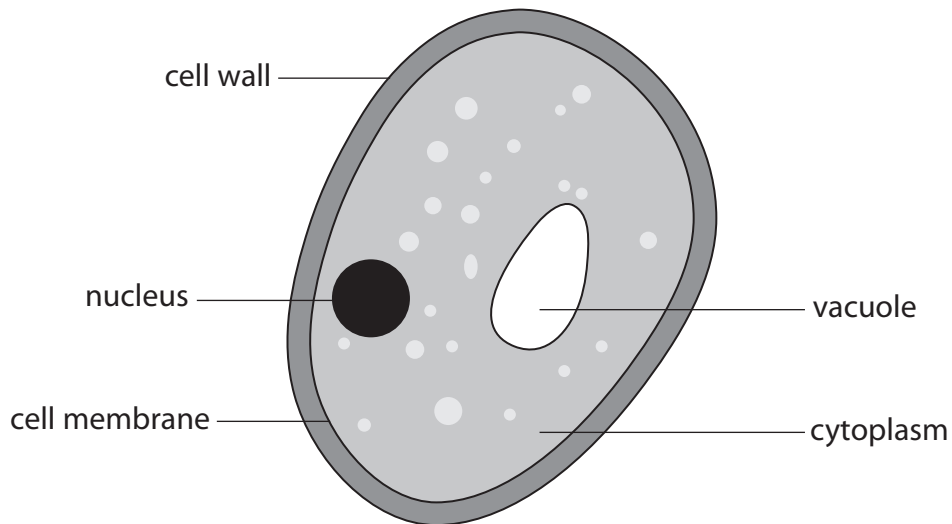
(a) (i) State **two** ways in which the structure of this yeast cell differs from the structure of a bacterial cell.

(2)

1 ....

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2 ....

....

(ii) Plant cells can produce glucose.

Suggest why yeast cells cannot produce glucose.

(1)

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(b) The table shows the number of different components found in the blood of a healthy person and the blood of two other people.

	number of components per dm³ of blood		
component of blood	healthy person	person A	person B
red blood cells	5×10^{12}	6×10^{12}	3×10^{12}
white blood cells	7×10^{9}	5×10^{10}	8×10^{10}
platelets	3×10^{11}	3×10^{11}	3×10^{11}

(i) Calculate the difference in the number of white blood cells per dm³ of blood between the healthy person and person A.

(2)

answer = ...

(ii) Describe the functions of white blood cells.

(2)

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(iii) Person B has a low number of red blood cells compared to the healthy person.

Suggest an effect this may have on person B.

(1)

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(Total for Question 2 = 8 marks)

Evidence for evolution

3 The diagrams show the limbs of six organisms.

human   lizard   cat   whale   bat   frog

humerus

ulna

carpal — radius

not to scale
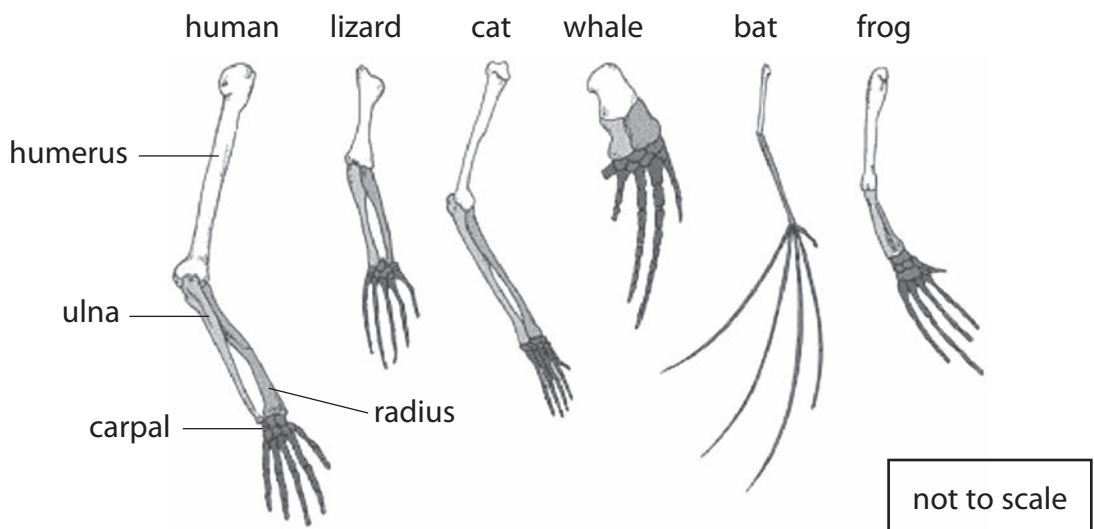
(a) Many scientists believe that these six organisms evolved from one common ancestor.

Describe the evidence shown in the diagrams that supports this belief.

(3)

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(b) Fossils can provide evidence for evolution.

Explain why the fossil record is incomplete.

(2)

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(c) The graph suggests that the level of oxygen in the atmosphere was important for the evolution of many living organisms.
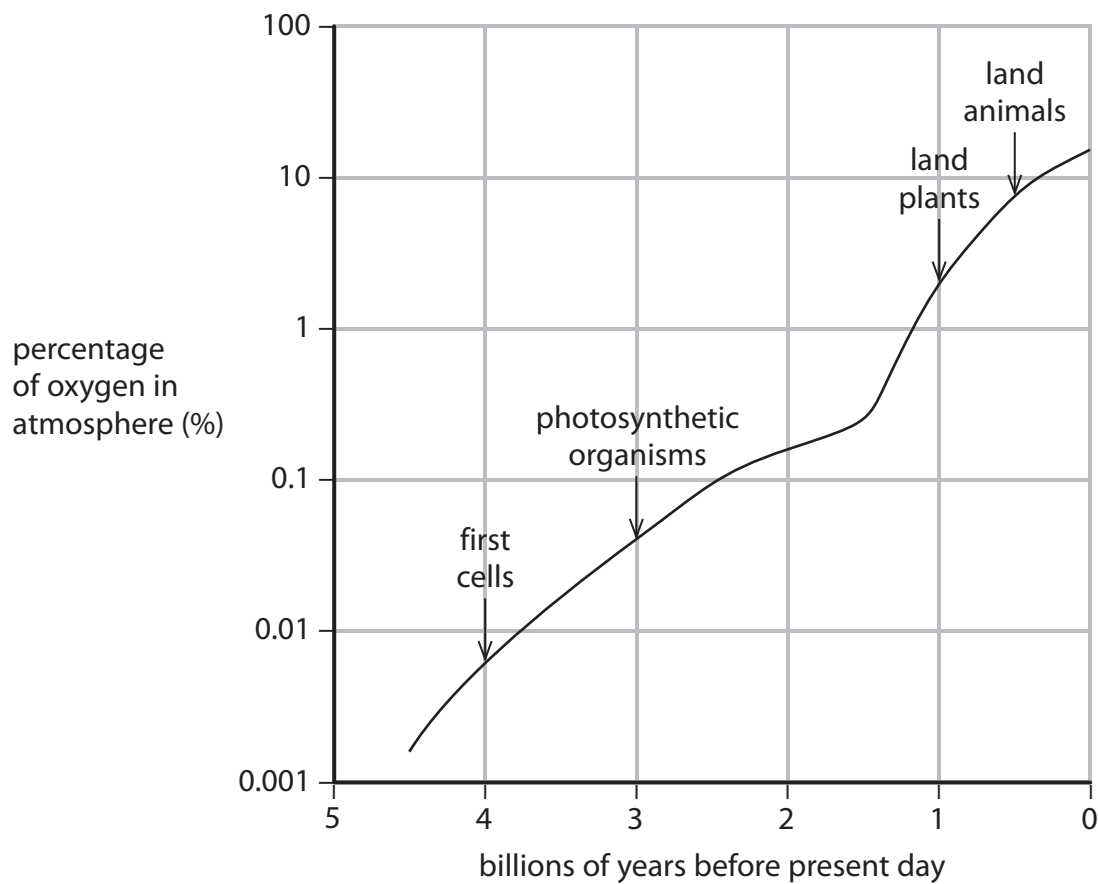
(i) How much oxygen was needed in the atmosphere for the evolution of land animals?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** 0.009%

☒ **B** 0.09%

☒ **C** 0.9%

☒ **D** 9.0%

(ii) Suggest how photosynthesis could have changed the gas content of the atmosphere.

(2)

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(iii) Suggest why such a high percentage of oxygen in the atmosphere was
needed for large land animals to evolve.

(2)

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(Total for Question 3 = 10 marks)

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Question 4 is on the next page

P 4 1 9 3 3 A 0 9 2 0

Sexual reproduction in coral

4 Corals are animals that live on the sea bed.

The photograph shows some species of coral.

(a) Corals can reproduce sexually, releasing sperm cells into the water.

The mass of DNA in one sperm cell from a species of coral is 0.5 picogram.

(i) Suggest the mass of DNA that would be present in an unfertilised egg cell of the same species.

(1)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The term used to describe the number of chromosomes in an egg or sperm cell is

(1)

☒ **A** diploid

☒ **B** gamete

☒ **C** haploid

☒ **D** zygote

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The base pairs in DNA are

(1)

☒ **A** thymine with adenine, cytosine with guanine

☒ **B** thymine with guanine, adenine with cytosine

☒ **C** uracil with adenine, guanine with cytosine

☒ **D** uracil with thymine, guanine with cytosine

(iv) Name the bond that joins the base pairs together.

(1)

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(b) After fertilisation, mitosis takes place to form an embryo.

The embryo develops into new coral.

(i) Describe mitosis.

(3)

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(ii) Describe how the embryo develops into new coral.

(3)

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(Total for Question 4 = 10 marks)

Using visking tubing

5   Visking tubing is made of a plastic material through which small molecules can pass.

The diagram shows how the equipment for an investigation using visking tubing was set up.
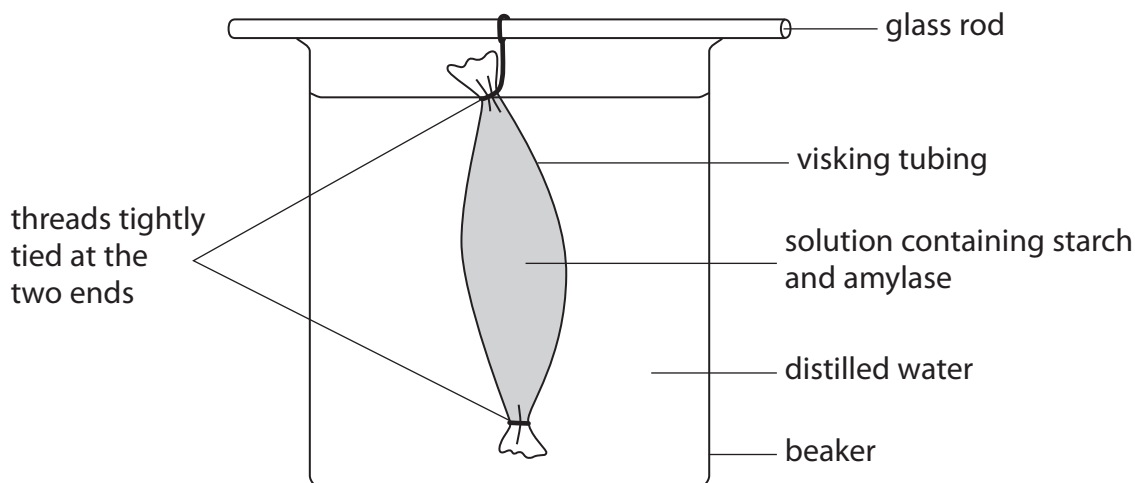
(a) In this investigation, the concentration of glucose in the distilled water was measured at the start and then every five minutes.

The results are shown in the table.

time of measuring the glucose concentration in the distilled water / mins	concentration of glucose in the distilled water / g cm⁻³
0	0.00
5	0.07
10	0.39
15	0.52
20	0.79
25	0.79

(i)   Describe the results of this investigation.

(2)

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(ii) Explain the results of this investigation.

(3)

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*(iii) The diagram shows how visking tubing can be used to model the small intestine.

This model does not fully represent the structure and functions of the small intestine.

Evaluate the strengths and weaknesses of this model.

(6)

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(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

The function of the gall bladder is to

(1)

☒ **A** make bile

☒ **B** make lipase

☒ **C** store bile

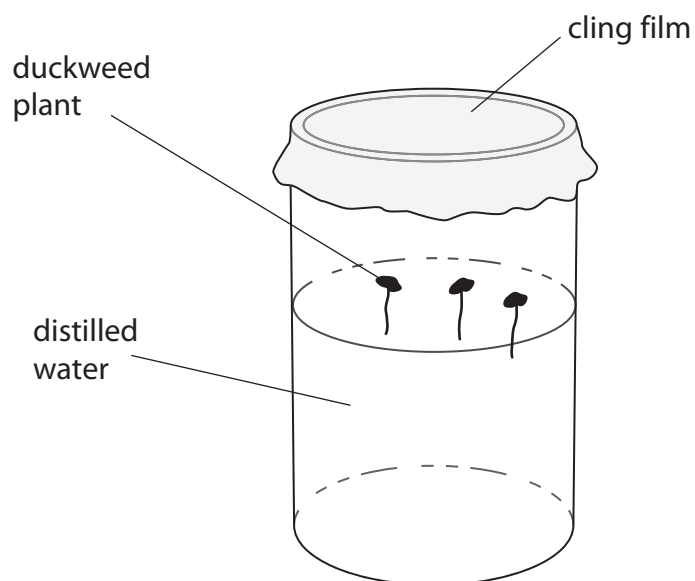☒ **D** store lipase

(Total for Question 5 = 12 marks)

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Question 6 is on the next page

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Water transport

6 The diagram shows three duckweed plants in a beaker of distilled water.

cling film

duckweed
plant

distilled
water

(a) (i) Explain how the water moves into these plants.

(3)

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(ii) Salt was added to the water in the beaker to form a salt solution.

Explain how the salt solution would affect the movement of water into and
out of the plant.

(2)

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(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

When the concentration of mineral ions in the soil is greater than in the root hair cell, mineral ions are transported into the root hair cells by

(1)

☒ **A** diffusion

☒ **B** osmosis

☒ **C** respiration

☒ **D** transpiration

*(b) Explain how water, glucose and mineral salts are transported through a plant.

(6)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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