

Candidate Name	Centre Number	Candidate Number
		2



**GCE AS/A level**

1072/01

**BIOLOGY – BY2**

A.M. TUESDAY, 8 June 2010

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	9	
3	10	
4	9	
5	10	
6	17	
7	10	
<b>Total</b>	<b>70</b>	

1072 01 01

**INSTRUCTIONS TO CANDIDATES**

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

1. (a) State the term for the following:

(i) a group of organisms which can interbreed to produce fertile offspring. [1]

.....

(ii) the process of moving the respiratory medium over the respiratory surface. [1]

.....

(iii) plants adapted to grow submerged in water. [1]

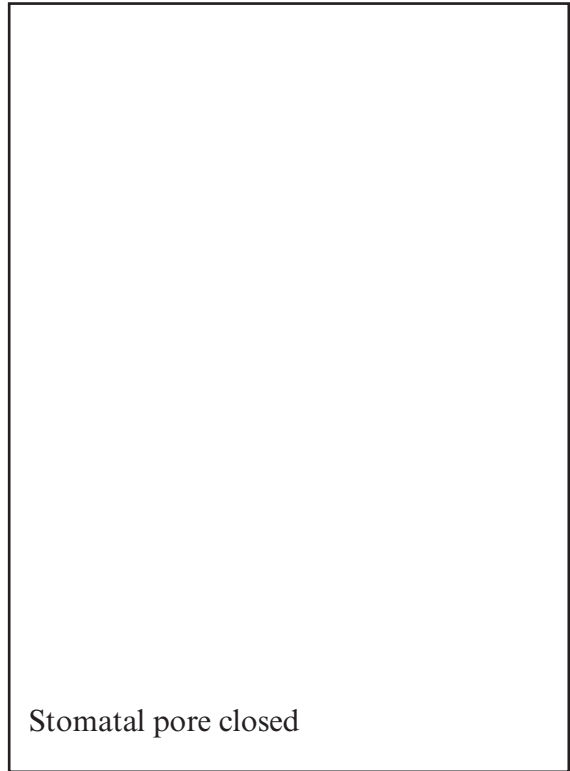
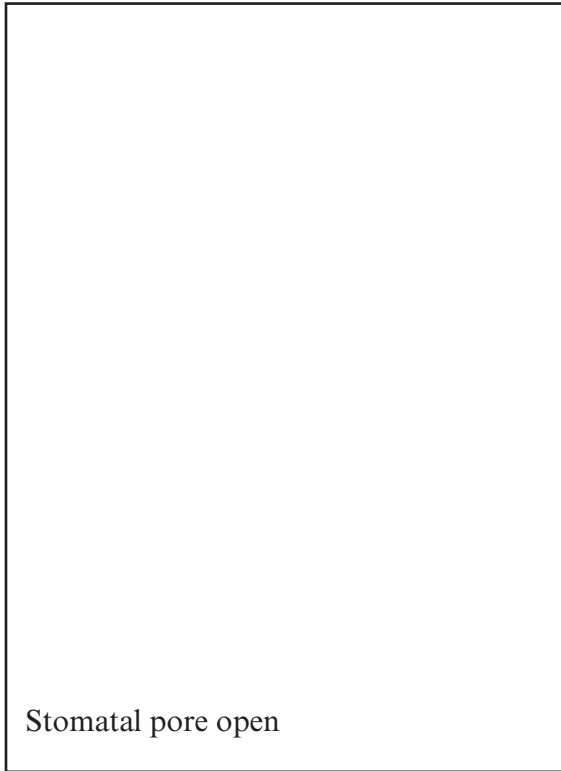
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(b) Distinguish between *apoplast* and *symplast* pathways. [2]

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**(Total 5 marks)**

2. (a) (i) Draw two diagrams to show the shape and relative thickness of the cell walls of guard cells in stomata when open and closed. [2]



- (ii) What organelles are present in guard cells but not in the other epidermal cells of a leaf? [1]

.....

- (b) What is the advantage of stomata opening during the daytime and closing at night? [2]

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 .....  
 .....

- (c) Explain the mechanism by which light causes the opening of stomatal pores. [4]

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**(Total 9 marks)**

3. (a) In mammals, haemoglobin is carried within red blood cells.

(i) Describe **one** unusual feature of these cells. [1]

.....

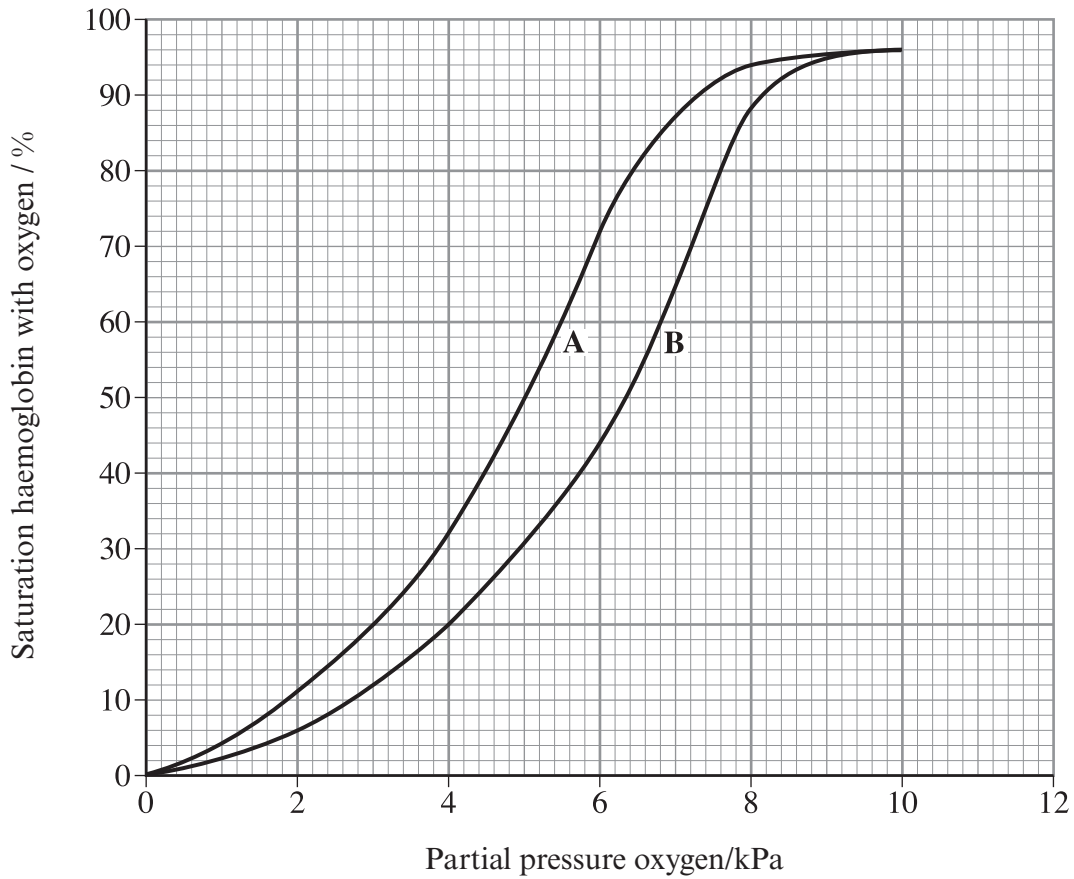
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(ii) What is the advantage of this feature of red blood cells? [1]

.....

.....

The diagrams below show oxygen dissociation curves prepared using human blood.



(b) Use the dissociation curves to determine the percentage saturation of haemoglobin and complete the following table: [1]

	<i>Haemoglobin Saturation (%)</i>	
Oxygen partial pressure (kPa)	Curve A	Curve B
10	96	.....
4	32	.....

(c) (i) What environmental factor could account for the displacement of the curve from A to B? [1]

.....

(ii) Name this displacement of the curve. [1]

.....

(iii) What is the significance of this effect? [1]

.....

.....

(d) (i) Draw another curve on the diagram to show the relative position of the haemoglobin dissociation curve for the blood of llamas which live in the high Andes of South America. [1]

(ii) Explain the significance of the relative position of the curve you have drawn. [2]

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(iii) Suggest **one** change which could be observed in the blood of an athlete who had been training at high altitude? [1]

.....

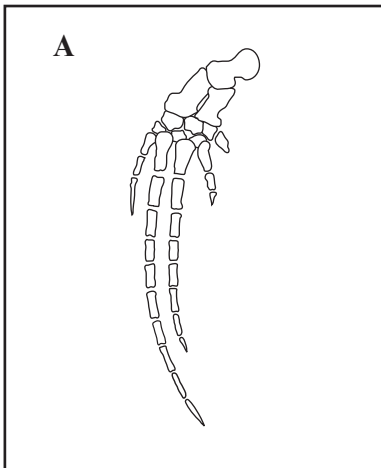
**(Total 10 marks)**

4. (a) To which phylum do mammals belong? [1]

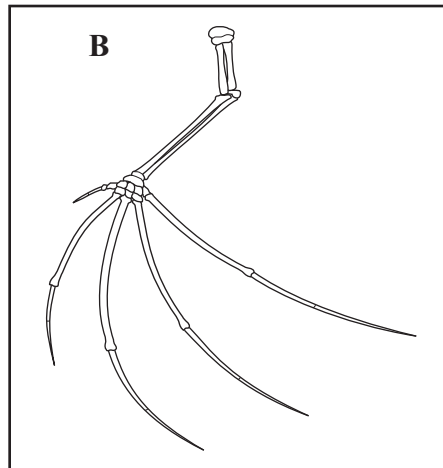
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- (b) The drawings below show the bones in the limbs of three different mammals.

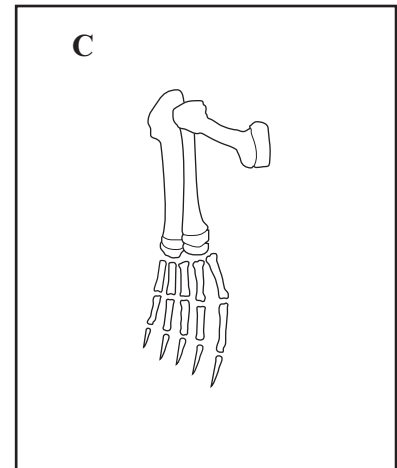
[not to scale]



*Balaenoptera acutorostrata*



*Macroderma gigas*



*Phoca vitulina*

- (i) What name is given to limbs with the pattern of bones shown in the drawings? [1]
- .....
- (ii) Suggest which of limbs **A**, **B** or **C** is best adapted for flight. [1]
- .....
- (iii) Give the genus of the mammal with limb **C**. [1]
- .....
- (c) (i) The limbs of these mammals are similar in structure but serve quite different functions. What term is used to describe such structures? [1]
- .....
- (ii) How are such structures used as evidence for evolution? [1]
- .....
- .....

(d) The sequence of amino acids in the haemoglobin molecules of the three species has been used to determine their evolutionary relationships. The results below show the same sections of the haemoglobin molecules of the three mammals, each letter represents one amino acid.

*M. gigas*                    ...G E E K A A V T G L W G K V N V E... D S... S  
*P. vitulina*                ...G E E K S A V T A L W G K V N V D... D S... S  
*B. acutorostrata*        ...A E E K S A V T A L W A K V N V E... E A... T

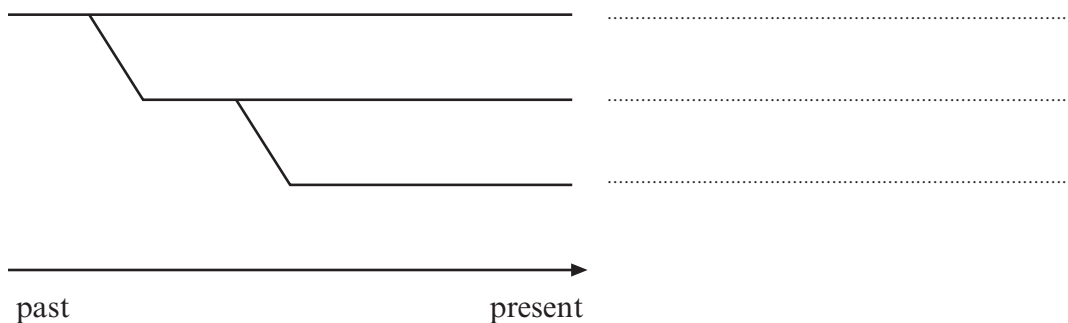
(i) There are 7 differences between *B. acutorostrata* and *M. gigas*.  
 There are 3 differences between *P. vitulina* and *M. gigas*.  
 How many differences are there between *P. vitulina* and *B. acutorostrata*? [1]

.....

(ii) Which species is more closely related to *Phoca vitulina*? [1]

.....

(e) Use your answers to part (d) to complete the following (phylogenetic) evolutionary tree. [1]

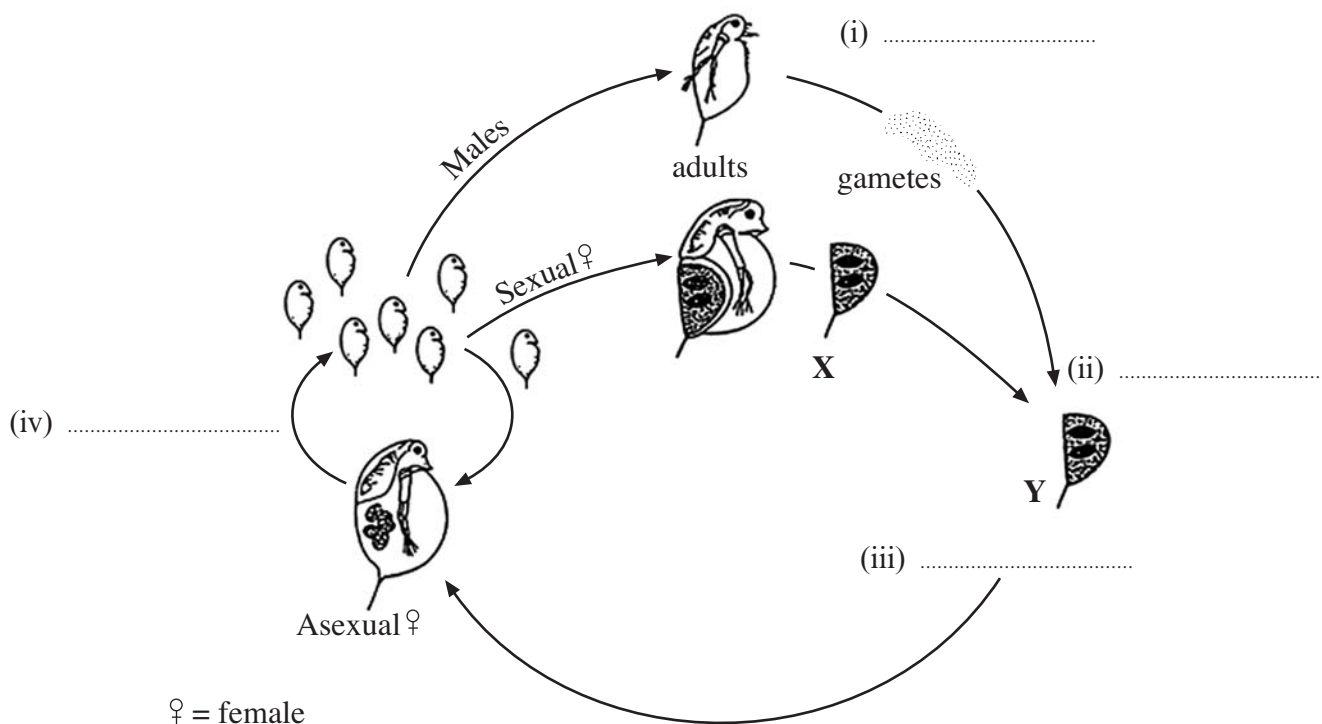


(Total 9 marks)

5. Some organisms combine cycles of asexual reproduction with periods when they reproduce sexually. The sexual phase is induced when environmental conditions become unfavourable. The diagram shows the life cycle of the water flea, *Daphnia pulex*.

(a) Use the following words to complete the labelling of the diagram: [2]

zygote, fertilisation, mitosis, meiosis.



♀ = female

(b) State whether structures X and Y are haploid or diploid. [1]

X ..... , Y .....

(c) (i) Give **one** potential advantage of reproducing asexually. [1]

.....  
 .....

(ii) Suggest why organisms such as *Daphnia* are stimulated by certain environmental conditions (eg. crowding, food shortage, temperature) to enter a sexual phase of reproduction. [2]

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



(d) (i) Explain what is meant by the term *internal* fertilisation. [1]

.....  
.....

(ii) Give **three** advantages of internal fertilisation and development to terrestrial animals. [3]

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**(Total 10 marks)**

6. The drawings show the skulls of two mammals.



(a) (i) Identify the mode of nutrition for each animal. [1]

**P** ..... **Q** .....

(ii) For each animal, describe **one** adaptation of its dentition to its diet. [2]

**P** .....

.....  
 .....

**Q** .....

.....  
 .....

(b) The table below compares the gut of animal **P** with that of animal **Q**.

<i>Gut Region</i>	<i>Animal P</i>	<i>Animal Q</i>
Stomach	Very large, divided into four chambers	Smaller than in <b>P</b> , but quite large compared to the volume of the rest of the gut.
Small intestine	Long	Short
Caecum	Short	Apparently absent
Colon	Medium length	Very short

(i) Explain the significance of relative lengths of the gut in the two animals. [1]

.....  
 .....

(ii) Describe how the stomach of **P** is adapted to its diet. [4]

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(iii) Suggest why **Q** has a large stomach, even though the rest of its gut is reduced in length. [1]

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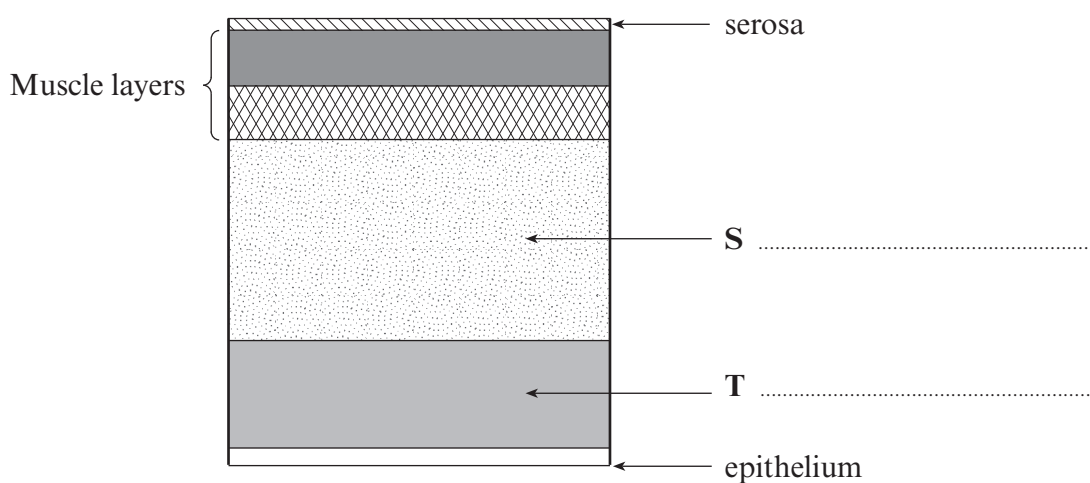
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(iv) What evidence is there in the table to suggest that animal **P** is more able to absorb water than animal **Q**? [1]

.....

.....

(c) The diagram below shows the arrangement of layers in a gut wall.



(i) How does the arrangement of fibres differ in the two muscle layers? [1]

.....

.....

(ii) What term is used for the process by which the muscle layers push food along the gut? [1]

.....

(iii) Label layers S and T. [1]

(iv) Name **two** structures found in layer S and give their functions in nutrition. [4]

<i>Structure</i>	<i>Function</i>
.....	..... .....
.....	..... .....

**(Total 17 marks)**





