Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1072/01

BIOLOGY – BY2

P.M. TUESDAY, 14 January 2014

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**12**	
3.	**12**	
4.	**11**	
5.	**12**	
6.	**9**	
7.	**10**	
Total	**70**	

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INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use pencil or gel pen. Do not use correction fluid.
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.

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1. The table below shows certain characteristics of four kingdoms. If the characteristic is present in members of the kingdom this is shown with a tick (✓). If the characteristic is not present this is shown with a cross (**X**).

Complete the table below by giving the name of each kingdom. [4]

		Kingdom			
		.....	.....	.....	.....
Characteristic	Eukaryotic	✓	✓	**X**	✓
	Chloroplast	✓	**X**	**X**	some species
	Cell wall	✓	**X**	✓	some species
	Nucleus	✓	✓	**X**	✓

4

2. The atrio-ventricular node (AVN), bundle of His and Purkyne (Purkinje) fibres are specialised cardiac muscle tissues which are involved in the control of heartbeat.

(a) State the function of the following structures in the functioning of the heart.

(i) atrio-ventricular node (AVN); [2]

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(ii) bundle of His and Purkyne fibres. [2]

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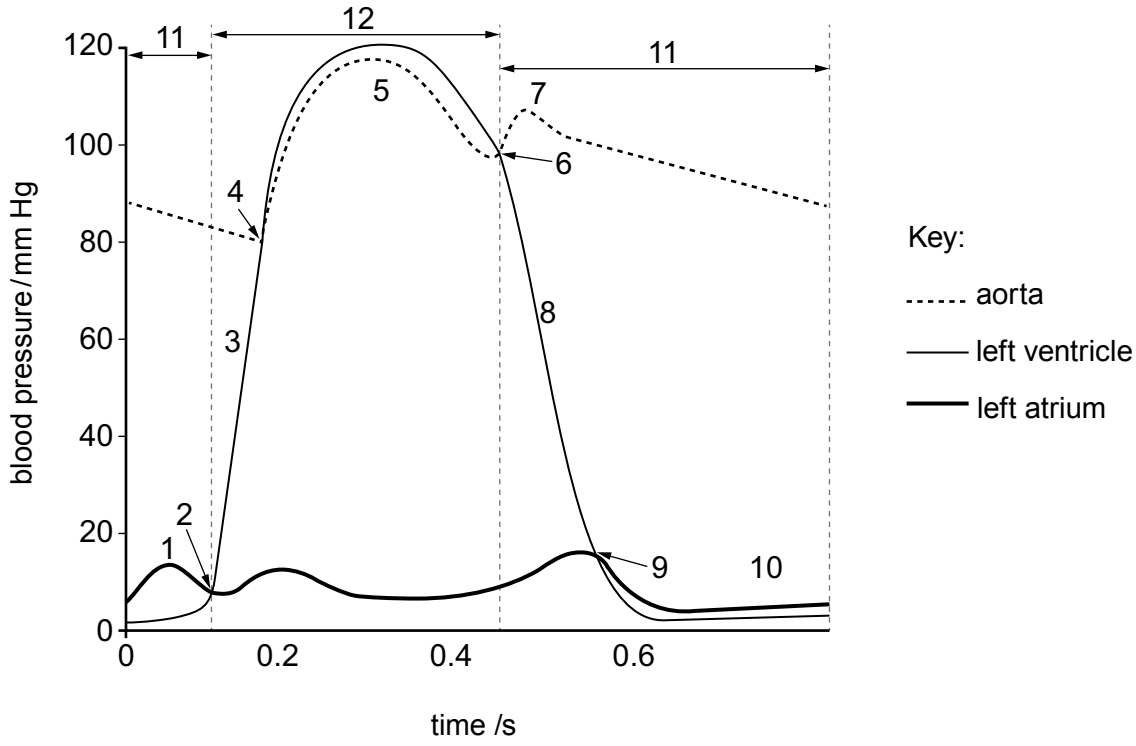
The graph below shows the pressure changes in the left ventricle, left atrium and aorta during one cardiac cycle.



(b) The following statements list events or phases that occur during a cardiac cycle. State the numbers indicated on the graph above that correspond to **each** of the following statements. [8]

(i) ventricular diastole (ventricles are relaxing) .....

(ii) recoil of aorta .....

(iii) atrial systole .....

(iv) closing of semi-lunar valves .....

(v) opening of semi-lunar valves .....

(vi) atrio-ventricular valves close .....

(vii) ventricular systole (ventricles are contracting) .....

(viii) passive filling of atrium by venous return .....

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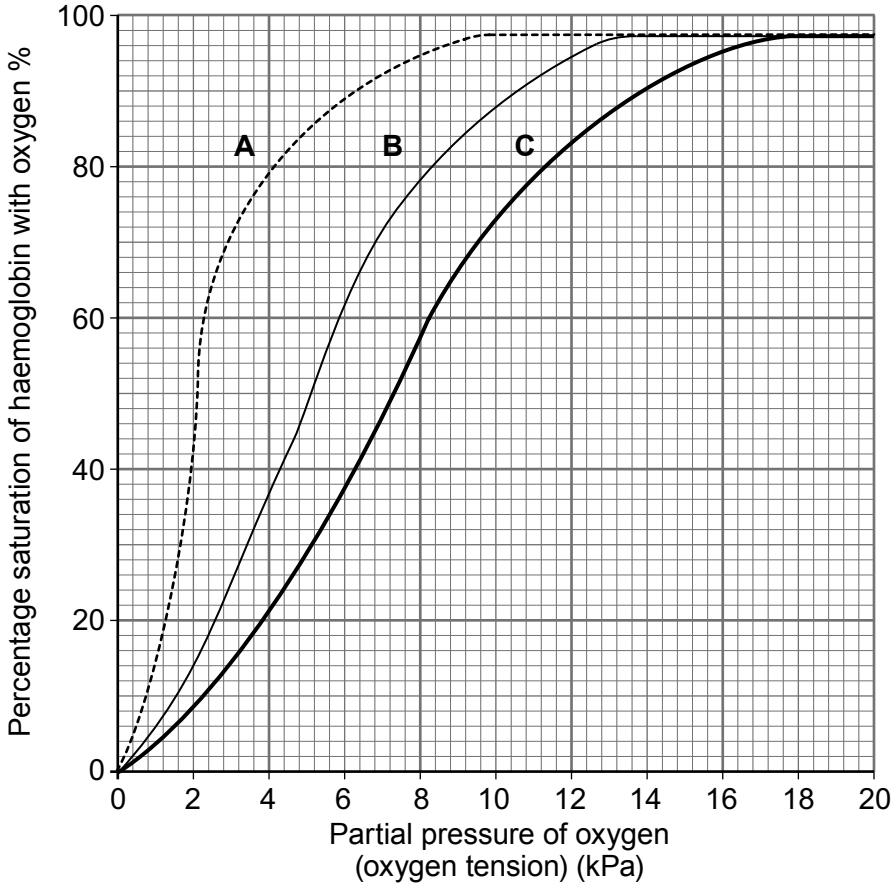
3. *(a)* The graph below shows the oxygen dissociation curve for three mammals.

Graph **A** is the curve for a llama which is a mammal that lives at high altitudes. Graph **B** is the curve for a domestic cat and graph **C** is the curve for a mouse which is a small mammal with a high metabolic rate.



Key:

A = llama
B = domestic cat
C = mouse

(i) What is the percentage saturation of the cat's haemoglobin with oxygen when the partial pressure of oxygen in the muscle tissue of a cat is 3.0kPa.? [1]

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(ii) Explain the circumstances under which the partial pressure of oxygen may fall to 3.0kPa in muscle tissues. [2]

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(b) State which of the three curves represents the haemoglobin with the lowest affinity for oxygen at 3.0kPa. [1]

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(c) If the pH of the blood became more acidic, the position of curve **C** for the mouse would change.

(i) Draw on the graph opposite the new position of curve **C** when the blood becomes more acidic. [1]

(ii) Explain the benefits to the mouse of this change in position of curve **C**. [3]

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(d) Explain how curve **A** for the llama shows that its haemoglobin is well adapted for its environment. [3]

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(e) State which of the three curves could represent the oxygen dissociation curve of a lugworm. [1]

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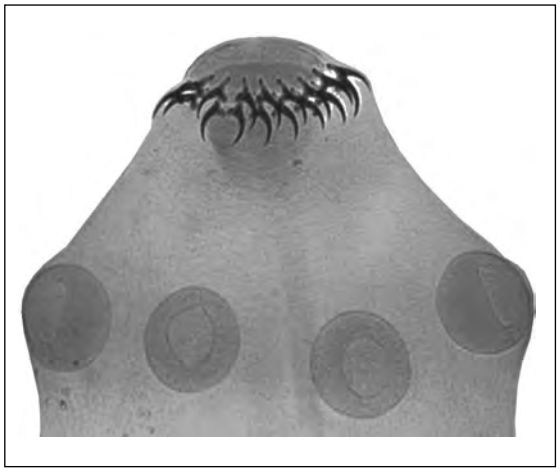
4. The diagrams below show the gut parasites *Taenia solium* and *Echinococcus granulosus* (**A**) and the skull of a mammal (**B**).

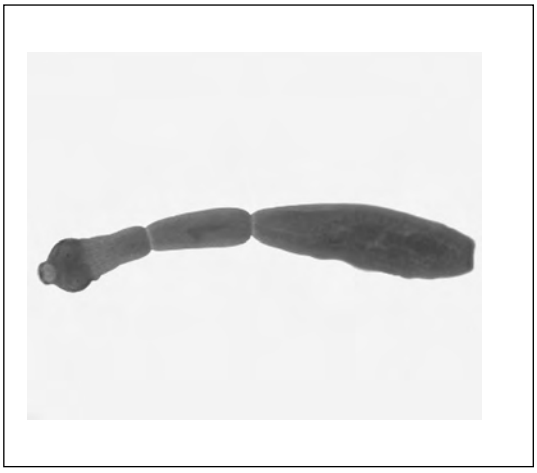
A

Taenia solium



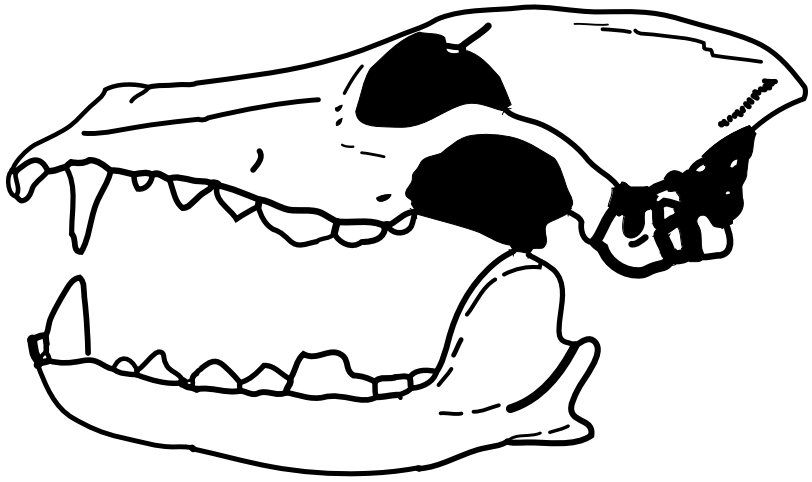
http://www.k-state.edu

Echinococcus granulosus



http://bioweb.uwlax.edu

B



(a) (i) State what is meant by the term *parasite*. [2]

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(ii) Using the photographs in **A** opposite, and your own knowledge, state **three** features of the gut parasites that are adaptations to their parasitic way of life. [3]

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(iii) State the type of diet eaten by the animal shown in diagram **B** opposite. Give reasons for your answer. [3]

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(b) Explain how a parasitic mode of nutrition is

(i) similar to the mode of nutrition used by the mammal in diagram **B** opposite, [1]

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(ii) different from the mode of nutrition used by the mammal in diagram **B** opposite.[2]

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5. *(a)* Four Pea *(Pisum sativum)* leaves **A, B, C** and **D** were removed from a healthy plant and treated by applying a thin layer of grease to their upper and lower surfaces.
The leaves were then placed in an incubator at 60°C and weighed every two hours until there was no further change in mass.

The results are shown in the table below.

leaf	grease application (surface)	starting mass of leaf (g)	final mass of leaf (g)	change in mass (g)	percentage change in mass (%)
A	upper and lower	12.4	11.9	− 0.5	4.0
B	upper only	13.6	11.2		
C	lower only	13.8	12.7	− 1.1	8.0
D	neither	9.3	6.2	− 3.1	20.5

(i) Complete the table above by calculating the change in mass and percentage change in mass for leaf **B**.
Use the space below for your calculation. [2]

(ii) What does the data reveal about the distribution of stomata on the surfaces of the leaves? [3]

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(iii) Why were the leaves re-weighed *'until there was no further change in mass'*? [1]

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Examiner only

(b) The table below gives the stomatal densities of three other plant species.

	number of stomata/cm^2	
species	upper epidermis	lower epidermis
potato *(Solanum tuberosum)*	5 100	16 100
bean *(Phaseolus vulgaris)*	4 000	28 100
marram grass *(Ammophila sp)*	1 200	0

(i) Marram grass is adapted to grow in dry conditions. State the term used to describe plants that are adapted for dry conditions. [1]

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(ii) Marram grass exhibits leaf rolling. With reference to the **data** in the table above, suggest how Marram grass has adapted its distribution of stomata to conserve water. [3]

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(iii) State **two** further structural adaptations shown by Marram grass which help it to survive in dry conditions. [2]

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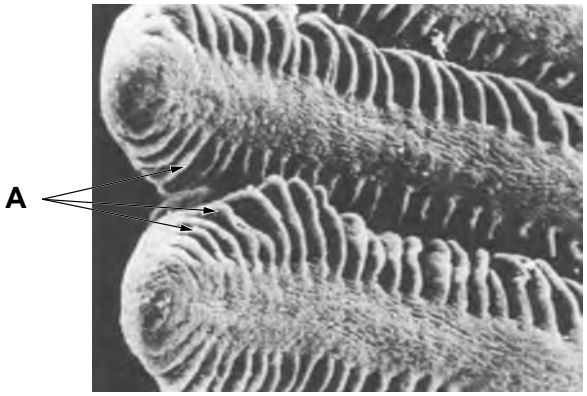
6. The photograph below shows a scanning electron micrograph of fish gills.



http://ars.els-cdn.com/content/image

(a) Name the structures labelled **A** in the photograph above. [1]

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(b) Describe how a bony fish ventilates its gills and absorbs oxygen from water. [4]

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(c) Using the photograph above and your own knowledge, describe **four** similarities in the adaptations of the gill for gaseous exchange and a mammalian villus for the absorption of digested products. [4]

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7. Answer **one** of the following questions.
Any diagrams included in your answers must be fully annotated.

Either, *(a)* Describe the structural and reproductive characteristics of Angiosperms (flowering plants) that have led to their successful colonisation of land. [10]

Or *(b)* Describe the advantages and disadvantages of asexual reproduction. [10]

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END OF PAPER

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