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TRIAL EXAMINATION 2014
LOWER SIX BIOLOGY 964/2 TERM 2
TIME: 1 HOUR 30 MINUTES

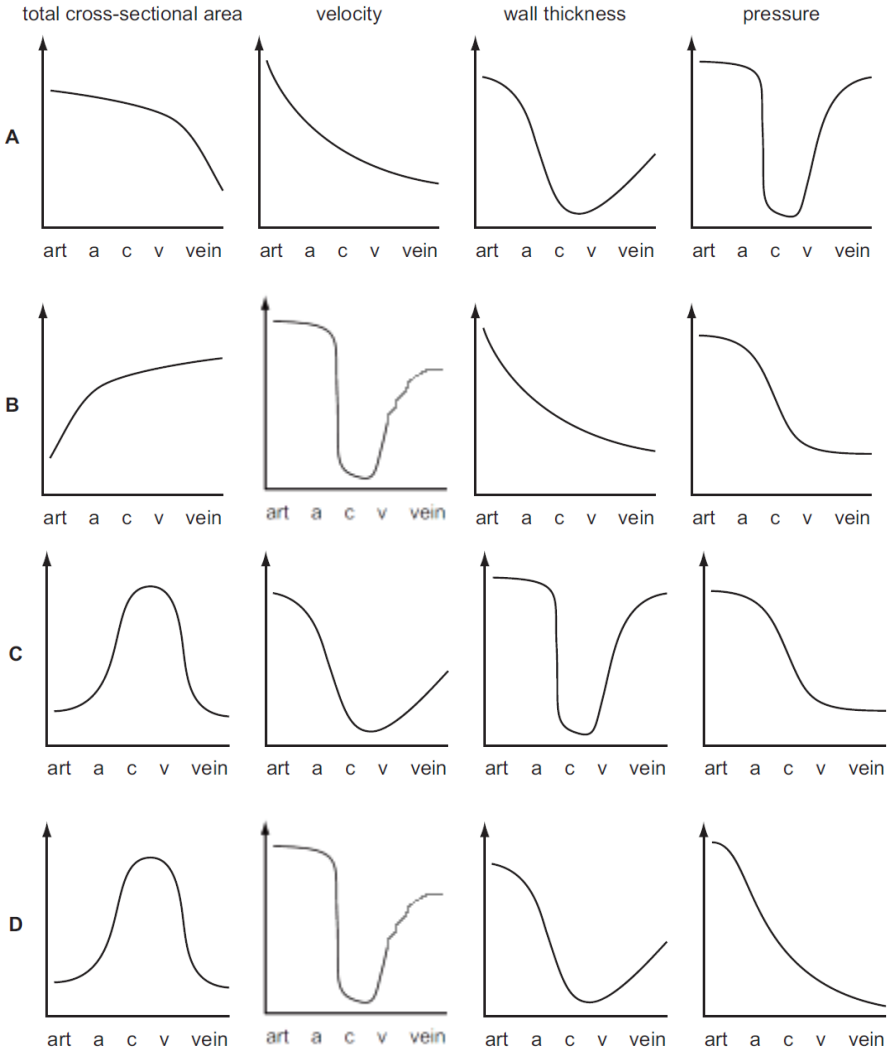
Name: …….. U6S….

Part A: Objective Section
Instructions: This section contains fifteen compulsory multiple choice questions. Answer **all**.

1. Each set of graphs represents data for blood vessels in the sequence:

art	a	c	v	vein
artery	arterioles	capillaries	venules	veins

Which set is correct?



2. An increase in carbon dioxide in human blood shifts the oxyhaemoglobin dissociation curve to the right. What is the explanation for this effect?
   A. An increase in carbon dioxide concentration increases the ventilation rate.
   B. Carbon dioxide is more soluble than oxygen and displaces it.
   C. Increasing the H^+ concentration decreases haemoglobin affinity for oxygen.
   D. Diffusion of carbon dioxide between the alveoli and the blood is more rapid.

3. Which statement explains why the circumference (girth) of a tree is less in the middle of the day than at night?
   A. Mineral uptake by the root hair cells decreases during the night because root pressure has decreased.
   B. Stomata close during the night and there is a build-up of water in the vascular tissue within the stem.
   C. The phloem sieve tubes fill with dissolved solutes because the translocation rate is reduced at night.
   D. There is less tension in the xylem vessels at night because the rate of transpiration is at a minimum.

4. Sucrose is transported in solution in the phloem of plants. Transport takes place from sources to sinks. The process depends on differences in hydrostatic pressure between the sources and the sinks.

   Which tissues are either a source or a sink and what is the hydrostatic pressure at X and Y within the phloem?

	Tissue		Hydrostatic pressure	
	Leaf	Root	High	Low
A.	Sink	Source	Leaf	Root
B.	Sink	Source	Root	Leaf
C.	Source	Sink	Leaf	Root
D.	Source	Sink	Root	Leaf

5. Which is true of the presynaptic membrane?
   A. It has channels for sodium ions.
   B. It is stimulated by acetylcholine.
   C. It has channels for calcium ions.
   D. It contains acetylcholinesterase.

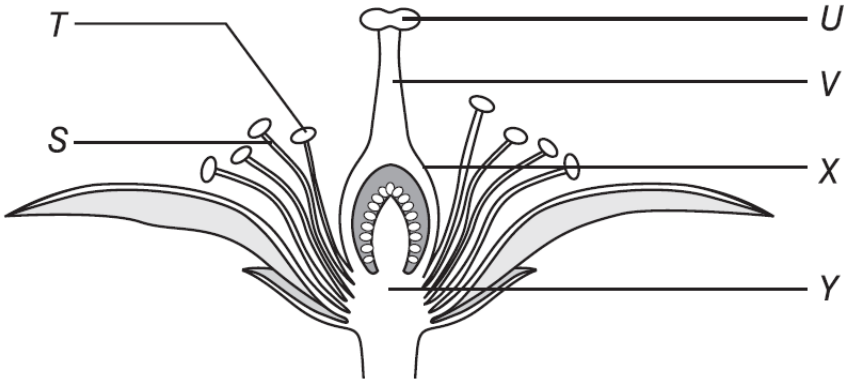
6. During muscle contraction, the calcium ion binds to the
   A. actin
   B. myosin
   C. troponin
   D. tropomyosin

7. Which of the following are true of allantois?

I It develops from the hind-gut of the foetus.
II It forms the placenta together with the chorion.
III It is an extraembryonic membrane that surrounds the foetus.
IV There are blood vessels from the foetus to the placenta within it.

A. I, II and III
B. I, II and IV
C. I, III and IV
D. II, III and IV

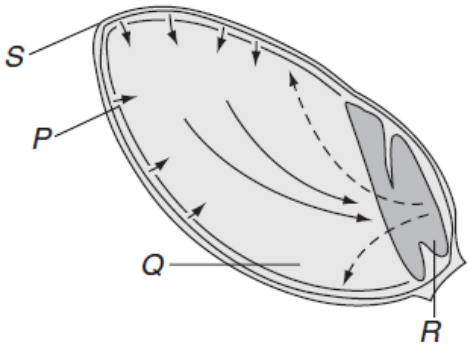
8. The diagram below shows the cross section of a flower.



Which structures constitute the carpel of the flower?

A. S, T and Y
B. S, U and V
C. T, X and Y
D. U, V and X

9. The diagram below shows the structure of a monocot seed.



Which of the following is responsible for producing synthesises and releases gibberellins, which regulates the mobilisation of food resources after imbibition?

A. P
B. Q
C. R
D. S

10. Which structures of plants would have the ploidy levels *n*, *2n* and *3n*?

	n	2n	3n
A.	Antipodal	Synergid	Endosperm
B.	Antipodal	Synergid	Funicle
C.	Ovum	Nucellus	Integument
D.	Ovum	Polar nuclei	Endosperm

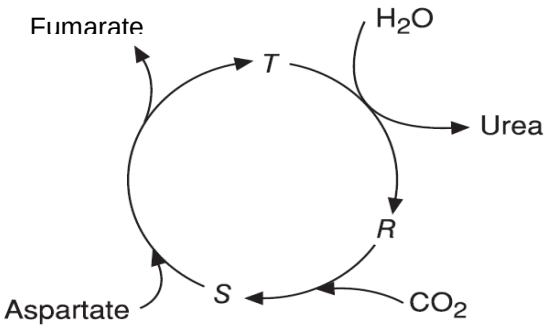
11. The table below shows three classes of organisms and their patterns of growth.

Organism	Pattern of growth
I Perennial plants	P Allometric
II Mammals	Q Unlimited
III Arthropods	R Intermittent
	S Limited

	I	II	III
A.	P	Q	R
B.	Q	P	R
C.	Q	S	R
D.	S	P	R

12. Which of the following parameters is plotted against time to obtain a relative growth rate curve of a plant?
A. The measurement of height
B. The gain as percentage of previous mass
C The reciprocal of the fresh mass
D The actual daily gain of length

13. The diagram below shows the ornithine cycle in liver cells.



What do R, S and T represent?

	R	S	T
A.	Arginine	Citrulline	Ornithine
B.	Citrulline	Arginine	Ornithine
C.	Ornithine	Arginine	Citrulline
D.	Ornithine	Citrulline	Arginine

14. The site on the antigen recognised and attached by the antibody is called
    A. an epitope
    B. an active site
    C. an antigen binding site
    D. a major histocompatibility complex

15. The table shows four infectious diseases and relevant pathogen responsible for the diseases. Which one is the accurate combination?

	Disease			
	Cholera	Malaria	Tuberculosis	AIDS
A.	Bacterium	Bacterium	Virus	Protoctista
B.	Bacterium	Protoctista	Bacterium	Virus
C.	Virus	Protoctista	Protoctista	Virus
D.	Protoctista	Virus	Bacterium	Virus

Part B: Structure Section
Instruction: Answer two compulsory short structured questions below.

Q16.
An investigation was carried out to discover the effect of sickle cell anaemia on the ability of blood to carry oxygen. Blood samples were taken from two groups of people:

- person **L** without sickle cell anaemia
- person **M** with sickle cell anaemia.

Fig. 1 shows oxygen haemoglobin dissociation curves for the two blood samples.

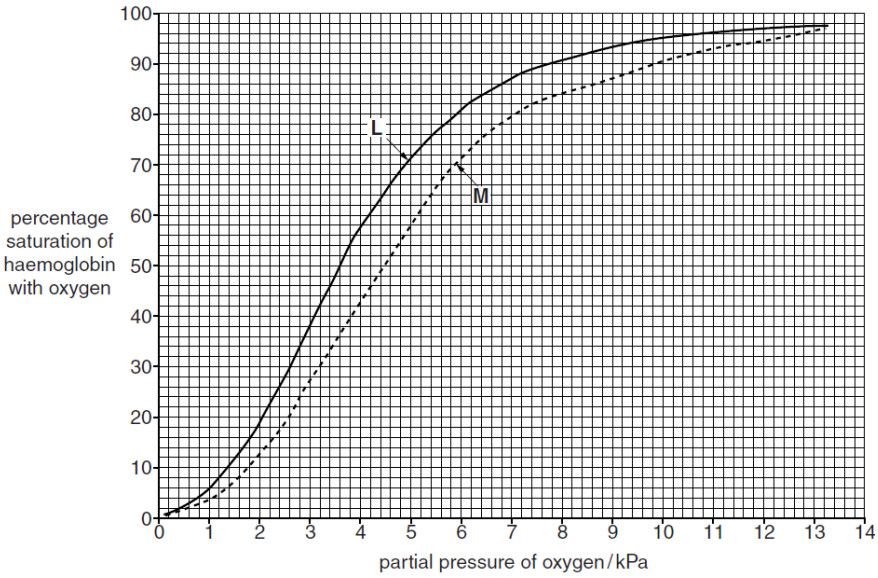


Fig. 1

(a) P50 is the partial pressure of oxygen at which haemoglobin is 50% saturated with oxygen. It is taken as a measurement of the affinity of haemoglobin for oxygen.

(i) State the P50 for the two blood samples, L and M. [1]

L …… M .....

(ii) With reference to Fig. 1, describe how the dissociation curve for person **M differs** from the dissociation curve for person **L**. [3]

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(b) Explain the advantage of the position of the dissociation curve for people with sickle cell anaemia. [2]

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(c) The partial pressure of oxygen in the lungs at sea level is about 13.5 kPa. At an altitude of 3000 metres the partial pressure of oxygen in the lungs is about 7.5 kPa.

When people move from sea level to high altitude they become adapted to the low partial pressure of oxygen.

Describe **and** explain how humans become adapted to the low partial pressure of oxygen at high altitude. [2]

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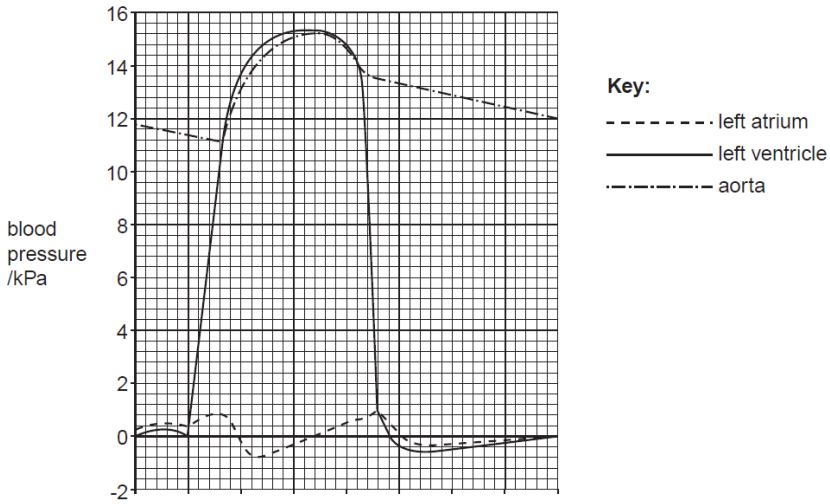
Q17.
Fig. 2 shows the changes in blood pressure in the left atrium, left ventricle and aorta during one complete contraction of the heart. It also shows a recording of the electrical activity of the heart.



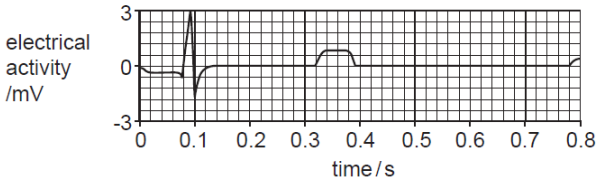


Fig. 2

(a) Name the source of the electrical activity in the heart. [1]

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(b) Explain how the heart is coordinated so that the ventricle contracts after the atrium has contracted. [3]

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(c) With reference to Fig. 2, calculate the heart rate in beats per minute. Show your working and express your answer to the nearest whole number. [2]

Answer = ... beats min^{-1}

(d) Heart transplants and coronary by-pass surgery are used in the treatment of heart disease. State one reason why heart transplants are much less common than coronary by-pass surgery in the treatment of heart disease. [1]

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Part C: Essay Section
Instruction: Choose two out of three essay questions to be answered.

Q18.
(a) The flesh of the puffer fish is considered a delicacy in certain countries. Despite precautions, many cases of neurotoxin poisonings occur after eating the fish prepared by uncertified chefs. This kind of neurotoxin mimics sodium ion and affect impulse transmission. Suggest why the neurotoxin can kill. [4]

(b) Flowering plants can be classified according to the photoperiod. What is phytochrome and photoperiodism? Determine what **cause** plants to flower and explain **how** phytochromes play a crucial role in photoperiodism and flowering in plants. [11]

Q19.
(a) Define homeostasis. State the difference between positive and negative feedback by giving one **example**. [3]

(b) Do you agree that the liver is one of the most vital visceral organs in our human body? Support your arguments with a detailed description about its **structure** (i.e. from the view point of the liver anatomy, blood/bile vessels, as well as its layering), and the **roles** these components can play. [7]

(c) How does hydrogen ion concentration (pH) being regulated in the body fluids? List out three ways with brief **explanation**. [5]

Q20.
(a) In your opinion, explain why smallpox has been eradicated successfully, but not tuberculosis. [5]

(b) What are antibiotics? Suggest **why** it is important for patients to complete a course of antibiotics prescription, even though they may feel better after a few days, to avoid the formation of **superbugs**. [10]

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Student's Answers Sheet
Instruction: Write down your answer in the following table:

1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.	13.	14.	15.

/15

For Examiner's Use

Section		Full Score	Student's Score
A		**15**	
B		**15**	
Q16	7		
Q17	8		
C		**30**	
Q18	15		
Q19	15		
Q20	15		
Total Score		**60**	
Score scaled to 100%			