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OVERMUGGED
O Level Mock Paper

BIOLOGY **6093/02**

Paper 2

September 2021
1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Write in dark blue or black pen.
You may use an HB pencil for diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer **all** questions, the last question is in the form either/or.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.

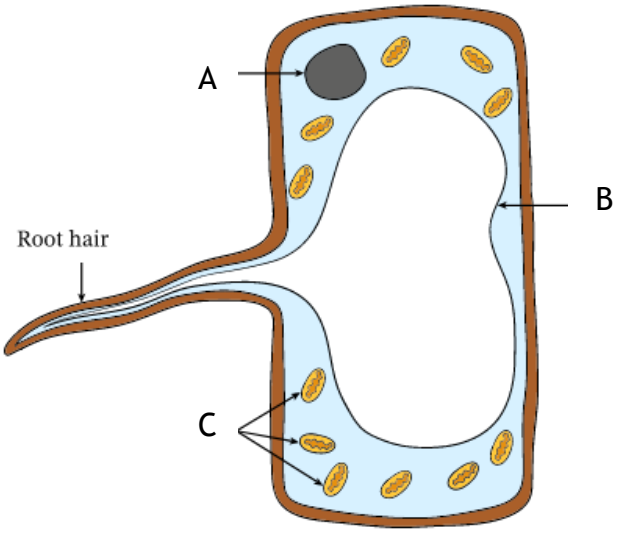
You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.
The number of mark is given in brackets [] at the end of each question or part question.

Section A

Answer **all** questions.

Write your answers in the spaces provided.

1. Figure 1.1 shows a root hair cell.



(a) State the name of A, B and C as shown in figure 1.1.

A .....

B .....

C ..... [3]

(b) How is the cell in figure 1.1 different from conventional plant cell?

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..... [1]

(c) Root hair cells have many mitochondria. Suggest why root hair cells have a large number of mitochondria.

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..... [2]

(d) There are many other type of cells that require a large number of mitochondria.

(i) Suggest another example of plant cells that have a large number of mitochondria

…… [1]

(ii) Suggest an example of human cells that also have a large number of mitochondria

…… [1]

(ii) Describe the function of cells from d(ii)

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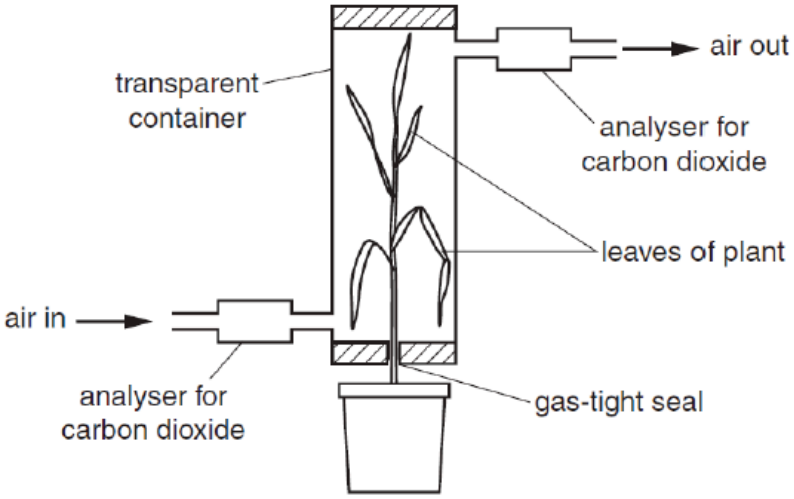
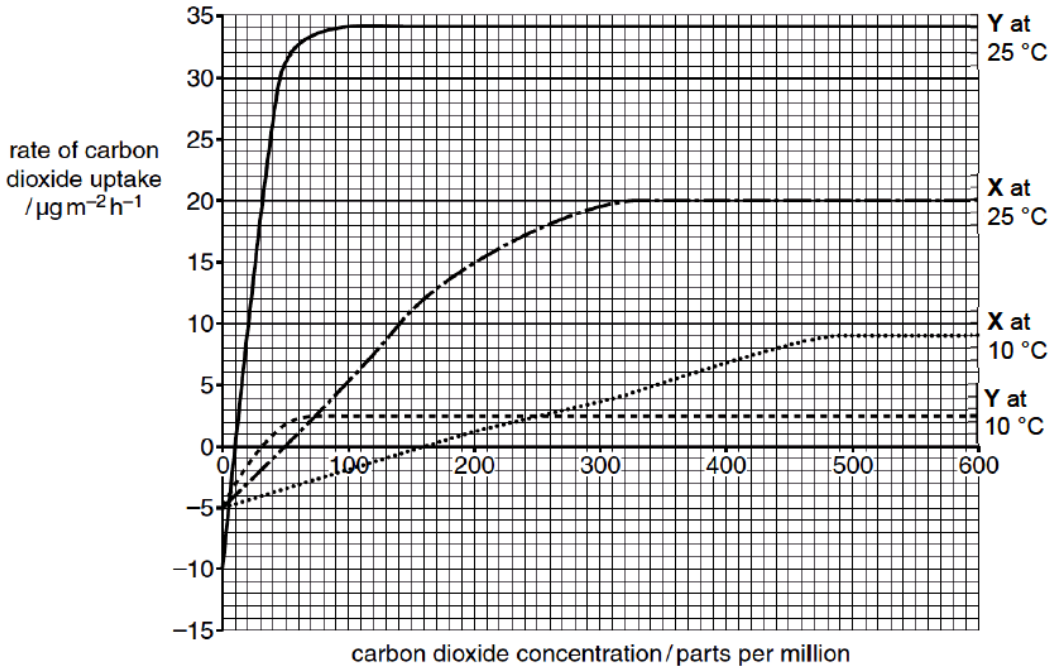
…… [2]

[Total:10]

2. The rate of carbon dioxide uptake at a range of carbon dioxide concentrations by two types of plants, X and Y, were compared at two temperatures using the apparatus shown in Fig 2.1.



The results of the experiment are presented in Fig 2.2



(a) Describe the general trend shown in figure 2.2.

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…… [3]

(b) With reference to the graph for plant X at 25 °C in Fig 2.2, explain the term limiting factor.

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…… [2]

(c) Explain how wilting occurs.

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…… [2]

[Total:7]

3. An experiment was carried out to determined the effect of temperature on the rare of oxygen consumption for a species of lizard when it is at rest and when it is running. Lizards are reptiles that depend on external temperatures to help them regulate their internal temperatures.

Temperature (°C)	Oxygen consumptions (units)	
	At rest	Running
15	0.01	0.16
20	0.03	0.22
25	0.04	0.29
30	0.07	0.35
35	0.09	0.43
40	0.12	0.57
45	0.15	0.64
50	0.17	0.71

TABLE 3.1

(a) (i) State the equation for aerobic respiration, in symbols.

…… [1]

(ii) Account for the difference in the rates of oxygen consumption in Lizard A when it is at rest and running

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…… [3]

(iii) In another experiment, the oxygen debt of the lizards was also measured during running.

Explain how is an oxygen debt formed, and how is oxygen debt paid back.

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…… [4]

(b) Explain how is lung adapted for its role to obtain oxygen and remove carbon dioxide

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…… [3]

(c) The same experiment is conducted on human.

With reference to table 3.1, suggest how would you expect the effect of temperature on the oxygen consumption to be different in human.

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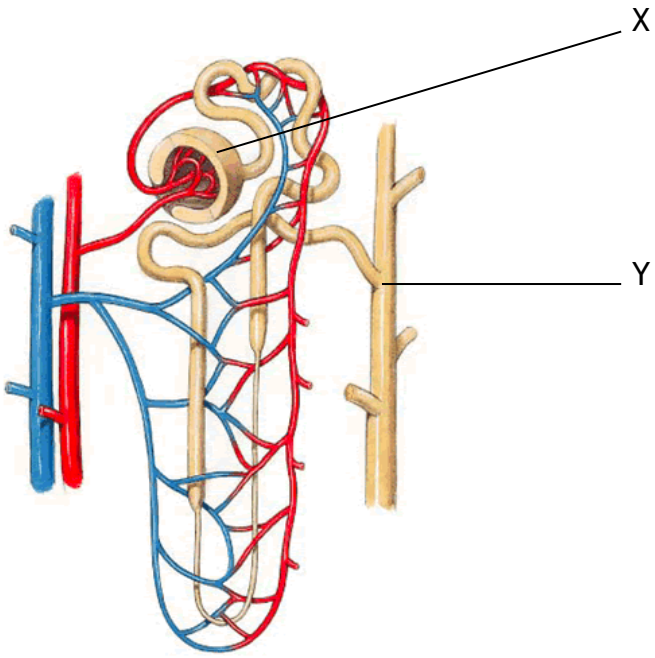
…… [2]

[Total:13]

4. Figure 4.1 shows a nephron



(a) Define excretion

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..... [1]

(b) State the name of X and Y as shown in figure 4.1.

X .....

Y ..... [2]

(c) Amy went to hike Bukit Timah Hill on a Sunday noon time. It is very hot and she forgot to bring her water bottle, so she didn't drink much water.

With reference to figure 4.1 and your knowledge about the homeostasis, describe the events her body would react to the situation

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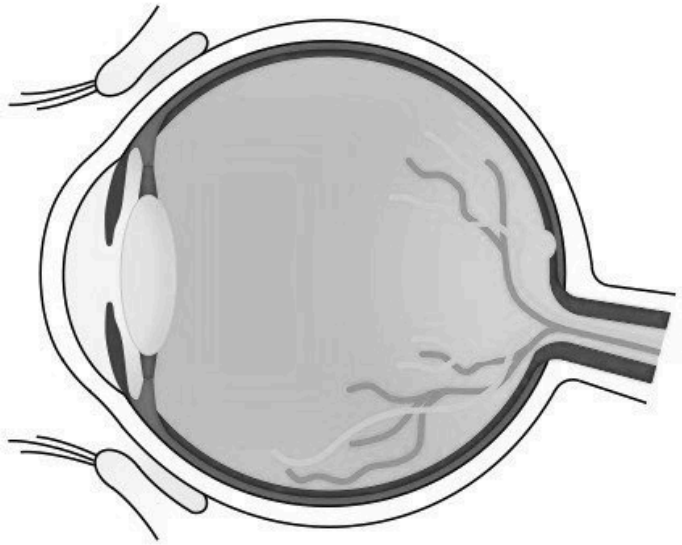
..... [5]

[Total:8]

5. Figure 5.1 shows a horizontal section of the human eye



(a) The change in appearance of the pupil when entering an area of bright light is a reflex action.

(i) Define reflex action.

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…… [2]

(ii) Label the effector of pupil reflex as X on the diagram [1]

(b) It is recommended that students should not read too close to books or look too close to screens for a long period of time. Suggest why is that so.

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…… [3]

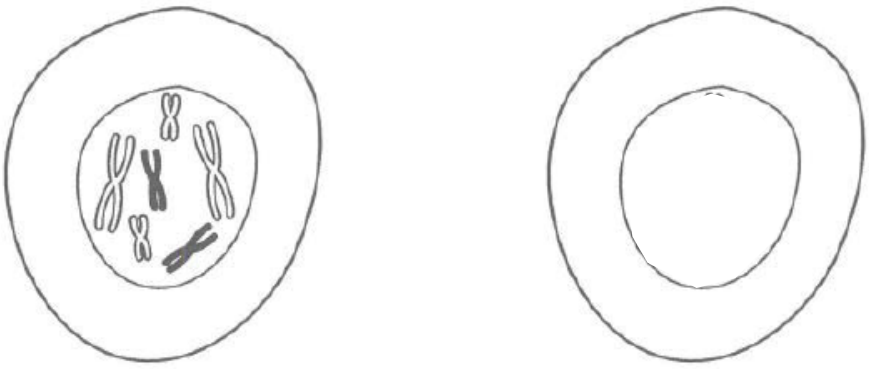
[Total:6]

6. The table 6.1 shows the number of chromosomes and the mass of DNA in different nuclei from the same animal at different stage of cell.

Nucleus	Number of chromosomes	Mass of DNA / arbitrary units
Prophase of mitosis	34	80
Telophase of mitosis		
From a sperm cell		

(a) Complete this table. [4]

(b) Figure 6.2 shows a cell containing three pairs of chromosomes at early stage of prophase I of meiosis.



(i) Draw in figure 6.2 how the daughter cells would look like after telophase II. [1]

(ii) Describe how what happens to the cell shown in figure 6.2 during prophase I of meiosis.

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..... [3]

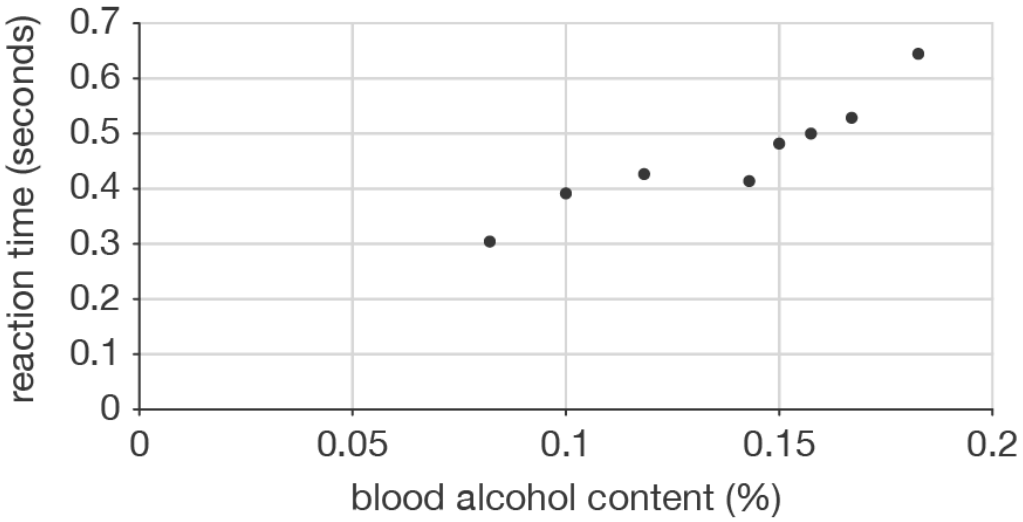
[Total:8]

Section B

Answer **three** questions

Question **9** is in the form of **Either/Or** question. Only one part should be answered.

7. Figure 7.1 shows how blood alcohol content would affect reaction time



(a) Draw a best fit line on figure 7.1. [1]

(b) With reference to figure 7.1, why is drink-driving extremely irresponsible?

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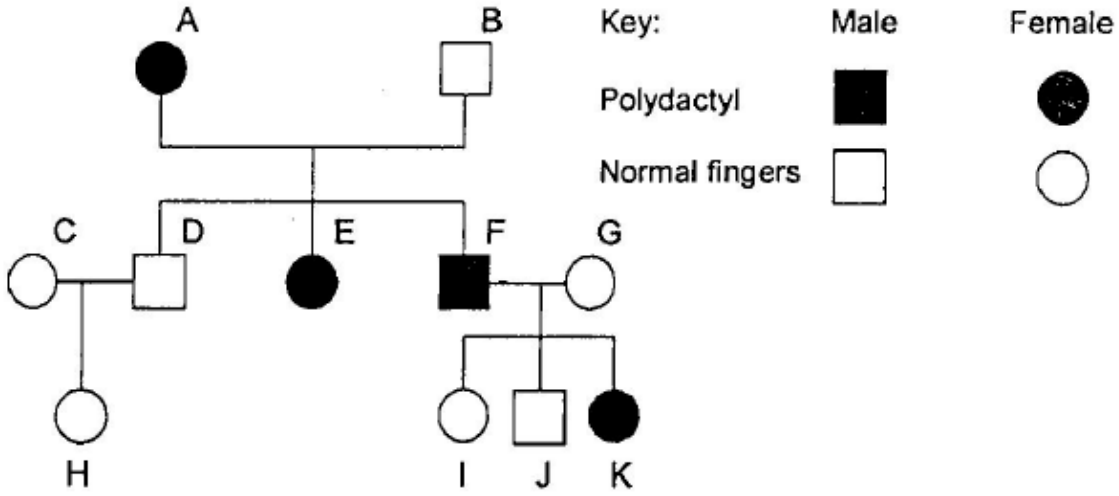
…… [2]

(c) Specific genetic variants affect alcohol metabolism, helping determine whether drinking is a pleasant or unpleasant experience.

Is alcohol metabolism is continuous variation or discontinuous variation.

…… [1]

(d) Polydactyl is a rare condition that causes the development of extra fingers. The



condition is caused by a dominant allele. Figure 7.2 shows the inheritance of polydactyl in a family.

Using N as the dominant allele, n as the recessive allele

(i) State the genotype of individual F

..... [1]

(ii) With the help of a genetic diagram, explain the probability of the fourth kid of individual F and individual G to be a normal fingers, male child. [5]

8. (a) When administering antibiotics, doctors and pharmacists will instruct patients to finish the entire course of treatment, even if you are feeling better. Some bacteria have evolved to be resistant to antibiotics

Explain how some bacteria evolved to become resistant.

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(b) Explain, with named example, how biotechnology has helped mankind to improve the quality of crops thus improve food production

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Either

9. (a) Describe the role of the amniotic fluid and umbilical cord during pregnancy

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…… [5]

(b) Compare an insect pollinated and a wind-pollinated flower, and describe the disadvantages of cross pollination.

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…… [5]

Or

9. (a) Describe the fate of glucose that was just digested in the small intestine.

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…… [4]

(b) Describe the route taken by a molecule of carbon dioxide after it is released by the respiring tissue in the kidney to when it is expelled out of the body.

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