Name: Register Number: Class:

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For Marker's Use
80

NAN CHIAU HIGH SCHOOL
PRELIMINARY EXAMINATION 2024
SECONDARY FOUR EXPRESS

BIOLOGY **6093/02**

Paper 2 **26 Aug 2024, Monday**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen.
You may use a 2B pencil for any 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 **one** question.
Write your answers in the spaces provided on the Question Paper.

The use of an approved scientific calculators is expected, where appropriate.

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

The total number of marks for this paper is 80.

Section A [70m]

Answer all questions in the spaces provided.

1 Fig 1.1 shows a cheek cell from the lining of a person's mouth.

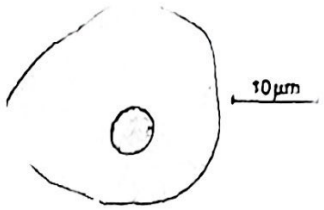

Fig. 1.1

(a) Name the chemical found in the nucleus that controls the production of protein.

.....[1]

Fig. 1.2 shows a sperm cell from the same person.

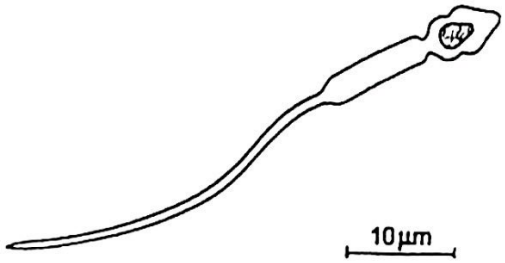

Fig. 1.2

(b) Describe how the two cells differ in appearance.

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.....[3]

(c) A sperm cell as shown in Fig. 1.2 fuses with an ovum and the result of this process produces a male baby.

State the sex chromosomes found in the sperm cell and the ovum. Explain your answer.

sperm cell .....

ovum .....

explanation .....

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..... [3]

(d) The nuclei of gametes contain haploid number of chromosomes.

Define the term *haploid* and explain why it is important for gametes to be haploid in chromosome number.

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..... [3]

[Total:10]

2 An experiment was carried out to investigate the inheritance of flower colour.

In cross 1, a plant with blue flowers (plant G) was pollinated by another plant with blue flowers (plant H). The resulting seeds were collected and labelled 'batch 1'

In cross 2, plant G was pollinated by a plant with white flowers (plant J). The resulting seeds were collected and labelled 'batch 2'.

All the plants were of the same species.

Fifty seeds from each of batch 1 and batch 2 were grown and the number of plants with white flowers was counted.

The results are shown in Table 2.1.

Table 2.1

batch	number of plants with white flowers
1	11
2	24

(a) Name the dominant phenotype in this experiment.

..... [1]

(b) The alleles controlling flower colour in this plant are F (dominant) and f (recessive).

(i) Define the term *dominant*.

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..... [1]

(ii) Define the term *recessive*.

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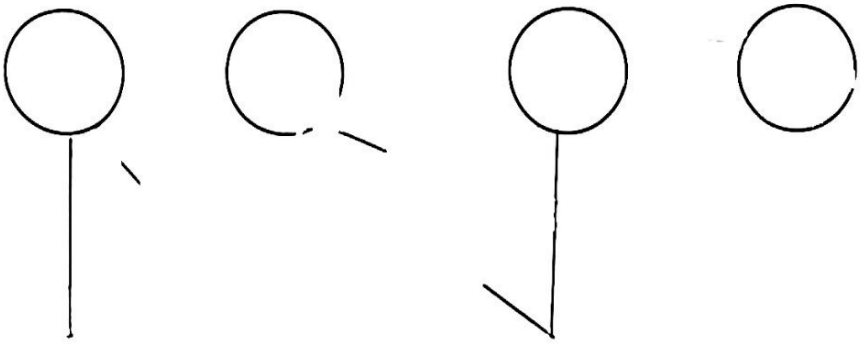
..... [1]

(c) Complete the genetic diagram for cross 1 (between plants **G** and **H**).

	plant **G**	x	plant **H**
parental phenotype	.....		.....
parental genotype	.....		.....
		meiosis	
gametes			
fertilisation			
offspring genotype	.....	.....	....
offspring phenotype	.....	.....	....
genotypic ratio	.....		
phenotypic ratio	.....		

[5]

[Total: 8]

3 Fig. 3.1 shows an experimental set-up using five elongated potato strips in a hydrogen peroxide solution at room temperature

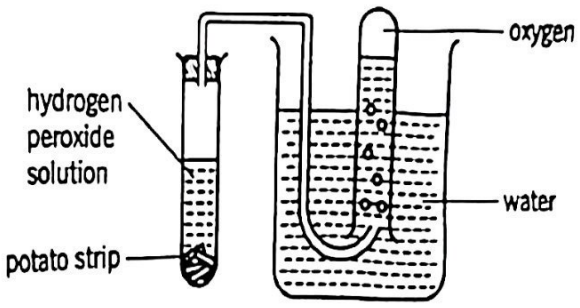


Fig. 3.1

In potato strips, the potato cells contain an enzyme that catalyses the breakdown of hydrogen peroxide to release oxygen gas. The rate of enzyme activity in potato cells is measured by the number of bubbles released per minute.

(a) The solution of hydrogen peroxide was kept in a refrigerator for a day. Explain why there are very few bubbles released initially when the potato strips were added to it.

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..... [3]

(b) Carrot cells contain enzymes. However, when five carrot strips were placed in an identical hydrogen peroxide solution, very few bubbles of oxygen were released throughout the experiment as compared to the set-up with five potato strips. Explain why this is so.

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..... [3]

(c) Suggest a change to the potato strips in **Fig. 3.1** to increase the number of bubbles released per minute. Explain your answer.

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..... [2]

[Total: 8]

4 Surveys were conducted in two different countries to find out the percentage of the population in each blood group.

The results of the surveys are presented as shown in Fig. 4.1.

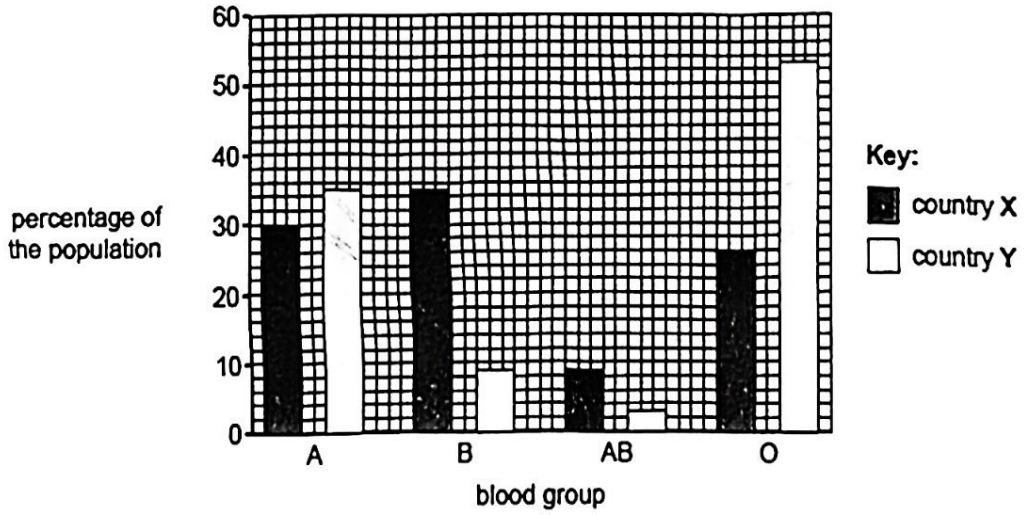

Fig. 4.1

(a) Using Fig. 4.1, describe the patterns of distribution of blood groups for the populations living in country **X** and

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..... [3]

(b) Suggest the type of variation shown in Fig. 4.1 and give a reason for your choice.

type of variation: _____

reason: _____

_____

_____ [2]

(c) State the allele(s) of the blood group that are co-dominant

B

_____ [1]

[Total: 5]

5 (a) Fig. 5.1 shows how pollination takes place in two different species of plant, species P and species Q.

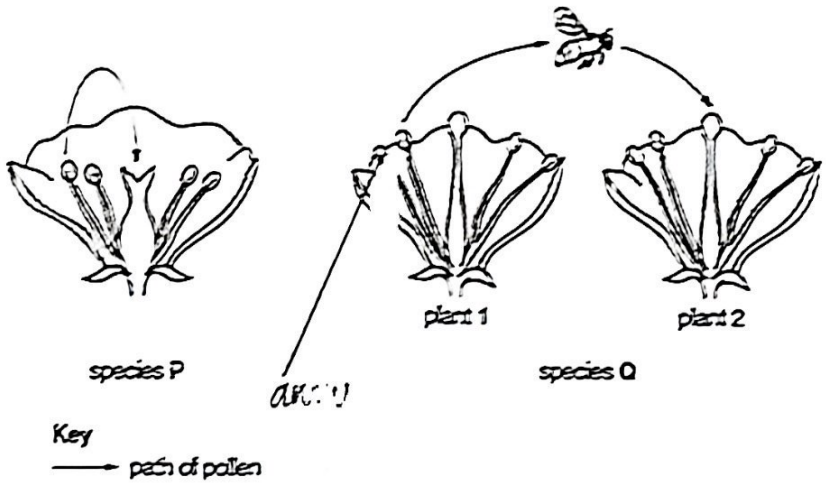


Fig. 5.1

(i) On plant 1 of species Q in Fig. 5.1, label an anther. [1]

(ii) State the type of pollination method used by species P and suggest one advantage for this method.

Type of pollination: _____

_____

_____

_____ [3]

(iii) Describe two similarities between reproduction in flowers and in humans

1.

2

[2]

(b) Describe three differences between an insect-pollinated flower and a wind-pollinated flower.

[3]
[Total: 9]

6 Pneumonia is an infectious disease caused by the pathogen, *Streptococcus pneumoniae*, a pneumococcus bacterium. Azithromycin is an effective antibiotic used to treat pneumonia.

(a) State what is meant by the term *pathogen*.

[2]

(b) Describe how pneumonia is transmitted and state **two** methods to reduce its transmission in a hospital setting.

[3]

(c) State the signs and symptoms of pneumococcal diseases such as pneumonia.

[2]

(d) COVID-19 is an infectious disease caused by the coronavirus.
Suggest why Azithromycin cannot be used to treat COVID-19 infections.

[2]
[Total:9]

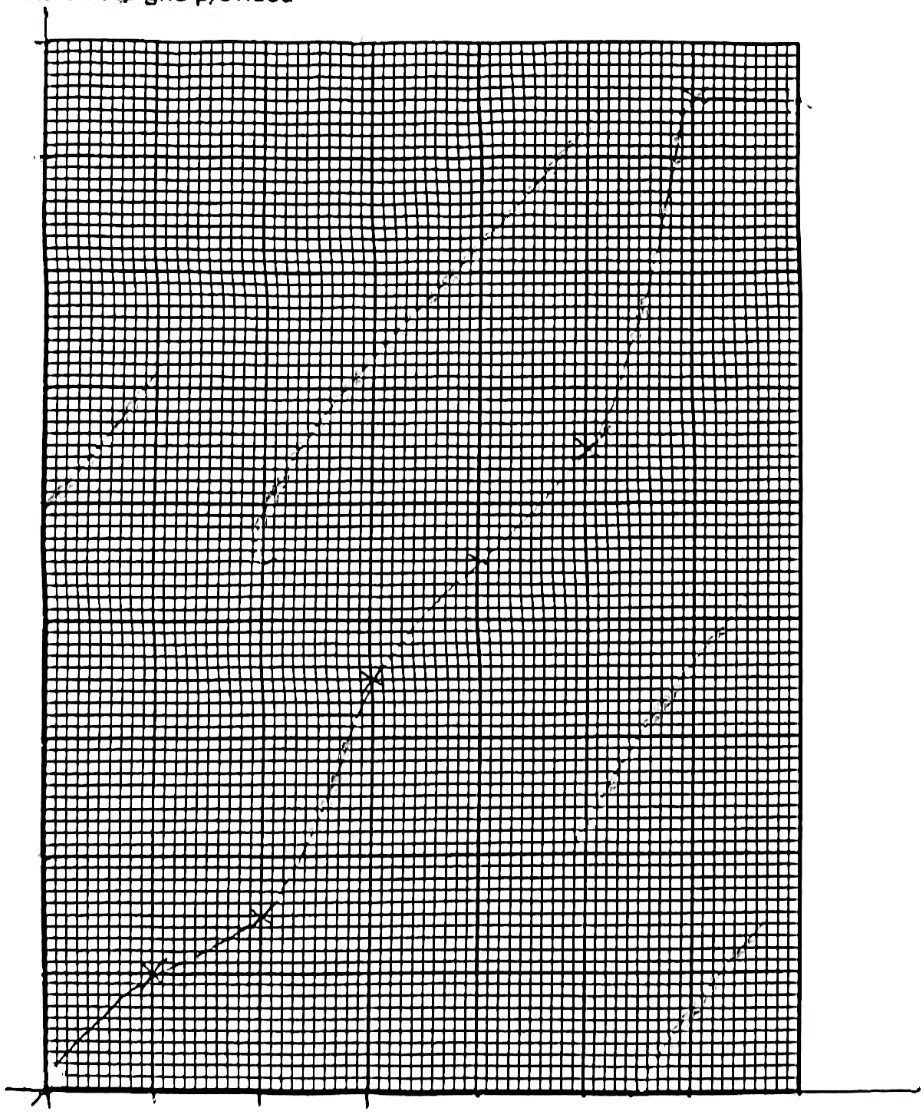
7 In an experimental set-up, a plant is watered with water radioactively labelled with isotope ^{18}O. The plant is then placed in a sealed chamber and the radioactivity of ^{18}O in the chamber is measured over time.

Table 7.1 shows the data that was obtained from the experiment.

Table 7.1

time / h	0	1	2	3	4	5	6	7
radioactivity of ^{18}O / Bq	0.0	10.0	15.0	35.0	45.0	55.0	85.0	85.0

(a) Plot the data on the grid provided



[4]

(b) From Table 7.1, calculate the percentage increase in radioactivity between the first and the sixth hour of the experiment.

..... % [2]

(c) Explain the change in radioactivity as shown in Table 7.1.

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..... [3]

(d) The same plant is placed in a sealed chamber supplied with carbon dioxide that contains radioactively labelled ^{14}C. After one week, the stem of this plant is cut in a transverse section and tested for radioactivity. Fig. 7.2 shows a schematic diagram of the cut stem.

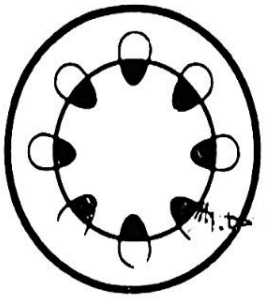

Fig. 7.2

Label on Fig. 7.2 with a label line and letter **H**, one region of the stem section that will have high radioactivity. Give a reason for your answer.

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..... [2]

[Total:11]

8 Portal vein thrombosis is a medical condition where the hepatic portal vein is occluded by a blood clot (thrombus). Fig. 8.1 shows what happens during portal vein thrombosis.

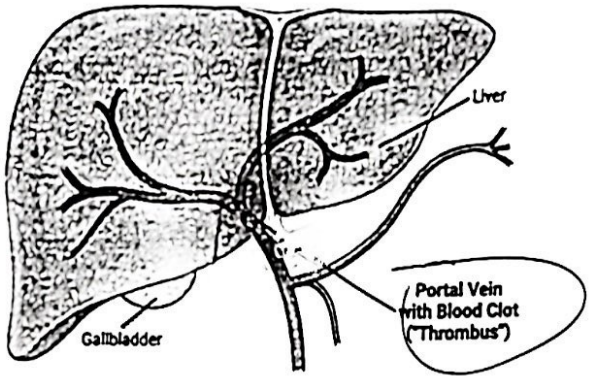

Fig. 8.1

(a) Suggest what might be the possible impacts on the patient with this condition.

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..... [3]

(b) Anti-blood clotting drugs may be administered to patients with this condition. Suggest a possible risk that may be faced by patients on this medication.

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..... [2]

(c) Transvenous intrahepatic portosystemic shunt (TIPS) is a procedure that uses a tube to bypass the occluded portal vein. Indicate on Fig. 8.1 with a line, one possible position of this tube. [1]

(d) Describe the effects of excessive consumption of alcohol on the individual and its impact on the society.

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..... [3]

[Total: 9]

Section B [10m]

Answer **one** question from this section.

9 **(a)** As a person gets older, the lens of the eye loses its elasticity.
Describe and explain how light rays from a near object pass through the eye but may not form a sharply focused image for an older person.

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..... [4]

(b) A baseball is moving at high speed towards a person's face. The person's eye blinked involuntarily at this instance in the form of a reflex action. Describe the events in the nervous system that brought about this eye movement.

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..... [6]

[Total: 10]

10 (a) Describe how human activities can result in global warming.

[4]

(b) Describe three ways that can help maintain the biodiversity and a balanced ecosystem in the context of a tropical rainforest.

[6]
[Total: 10]

END OF PAPER