Cambridge Assessment International Education

SECOND PREDICTED PAPER 4 MAY/JUNE 2025

Cambridge IGCSE™

CANDIDATE NAME: Solved by Anubha Roberts

CENTRE NUMBER | | | | | |

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BIOLOGY **0610**

Paper 4 Theory (Extended)

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

For any further queries please contact on email below-

Email ID- anubharoberts@gmail.com
Contact no. - +97455012107.

NS — CNS
— PNS

1 (a) Complete the sentence about the nervous system.

The brain and spinal cord form the ..... Central ..... nervous system and the nerves coming into and out of the spinal cord are part of the ..... Peripheral ..... nervous system. [1]

(b) Fig. 1.1 shows part of a human eye and three neurones that conduct electrical impulses between the eye and the brain. These neurones are involved in the pupil reflex.

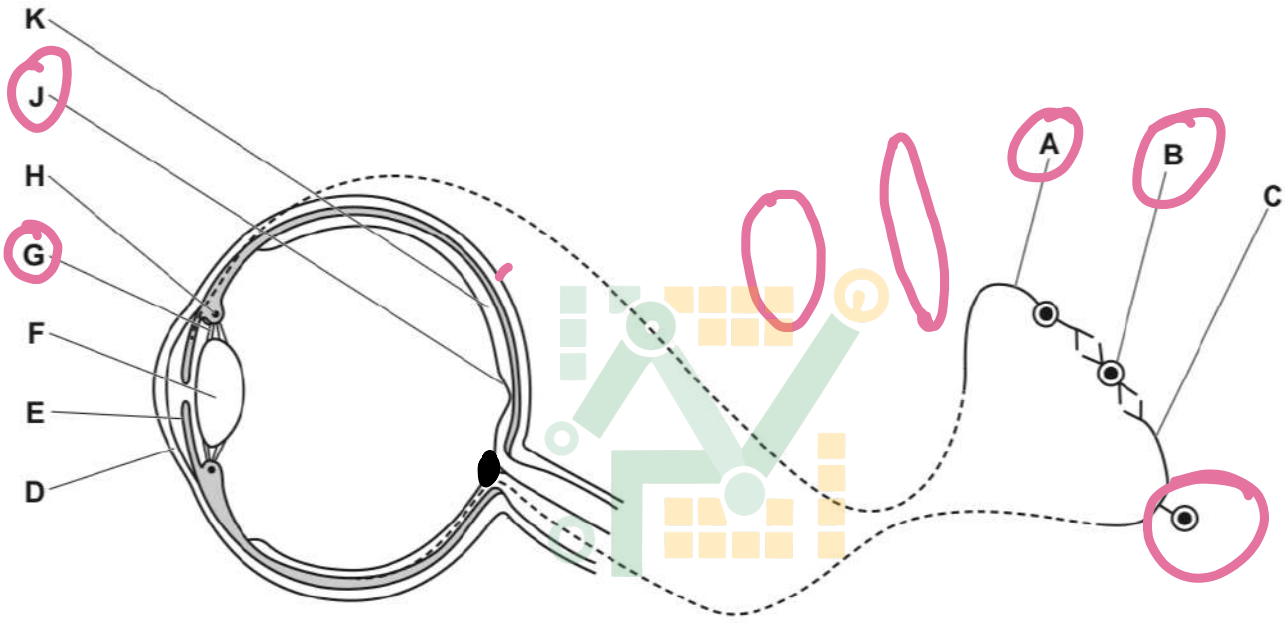


Fig. 1.1

(i) State the type of neurones identified in Fig. 1.1.

A ..... Motor neurone .....

B ..... Relay neurone ..... [2]

(iii) Write the correct letters to complete the reflex arc.

J	C	B	A	E

[1]

(iv) Table 1.1 shows the names of some parts of the eye, their functions and the letters in Fig. 1.1 that identify the parts of the eye.

Complete Table 1.1.

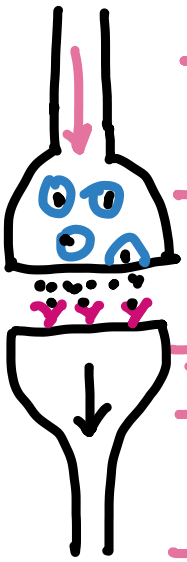
Table 1.1

part of the eye	function	letter in Fig. 1.1
suspensory ligament	Slacken to make lens thick or more convex.	G
Circular muscles	contracts in response to a bright light	E
cornea	Refracts the light	D
Fovea	contains a high density of cones for colour vision	J

[4]

(c) Impulses travel within the neurones through electrical impulses.

Explain how impulse travels in between two neurones.



→ Neurotransmitter filled vesicles fuse with pre-synatic neurone.

→ Neurotransmitters are released in synaptic gap

→ They diffuse in the gap and.

→ bind to receptors on the receptors on post-synaptic neurone.

→ This causes impulse to be generated in next neurone.

→ Receptors are complementary to neurotransmitters.

[5]

[Total: 13]

2 (a) A group of students investigated the digestion of fat in milk.

- They added an alkaline solution to the milk.
- They divided the milk into four test-tubes.
- They added lipase and bile salts to some of the test-tubes, as shown in Table 5.1. They did this at the same time for each test-tube.
- They kept all test-tubes at 40 °C.
- After 5 minutes, they added Universal Indicator solution to each test-tube.

Table 5.1

test-tube	contents	colour of pH indicator after 5 minutes at 40 °C
A	milk, alkaline solution, lipase and bile salts	orange
B	milk, alkaline solution, bile salts and water	blue
C	milk, alkaline solution, lipase and water	yellow
D	milk, alkaline solution and water	blue

Fig. shows the colour of the indicator at different pH values.

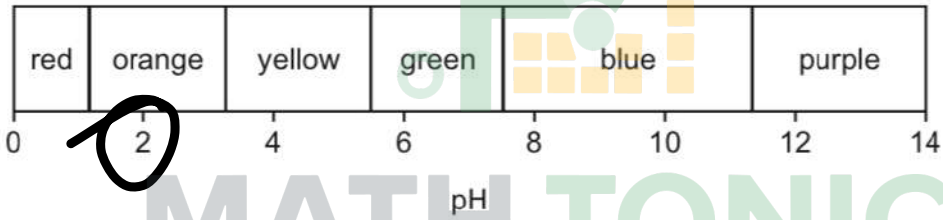


Fig.

Bile

(i) Explain why test-tube **D** was included in the investigation.

→ D is a control.

→ To compare that lipase is responsible to breakdown fats in milk. [2]

(ii) Explain why the colour in test-tube **A** was orange.

→ Test tube A has lipase & bile
→ Bile emulsifies fat
→ Lipase breaks down fats into fatty acids and glycerol.
→ Fatty acids reduce the pH to acidic and cause colour change. [3]

(iii) Explain the results for test-tubes **B** and **C**.

→ test-tube **B** Has no lipase so there is no fatty acid formation.
→ and no colour change due to no pH change.
→ test-tube **C** No Bile so no emulsification
→ so lipase activity is slower so less fatty acids are formed. [4]

(b) Enzymes have a specific three dimensional shape.

Explain why the shape of an enzyme is important.

→ Enzyme have an active site which is complementary to shape of substrate.
→ Enzyme binds with only specific substrate.
→ Substrate will bind with enzyme on active site to form enzyme-substrate complex. [3]

[Total: 12]

3 Fig. is a diagram of the human female reproductive system.

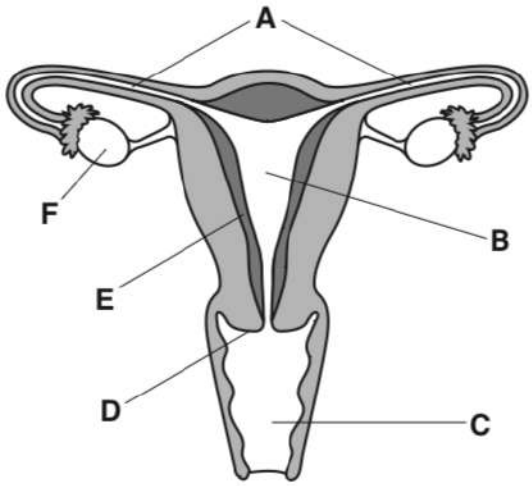


Fig.

(a) Complete Table 4.1 to show the letter and the name of each of the structures that perform these functions.

Table 4.1

function	letter	name
releases oestrogen	F	ovaries
site of fertilisation	A	oviduct/Fallopian tubes
site of implantation	E	spongy wall of uterus
site of sperm deposition	C	vagina

[2]

(b) Fertilisation is the fusion of the nuclei of a male gamete and a female gamete resulting in a zygote.

State the number of chromosomes present in a human:

female gamete ..... 23 .....

zygote ..... 46 .....

[2]

(c) Chlamydia is a sexually transmitted infection (STI). It is caused by a bacterium *Chlamydia trachomatis*.

Fig. 4.2 shows the number of reported cases of chlamydia in females in each age group in one country.

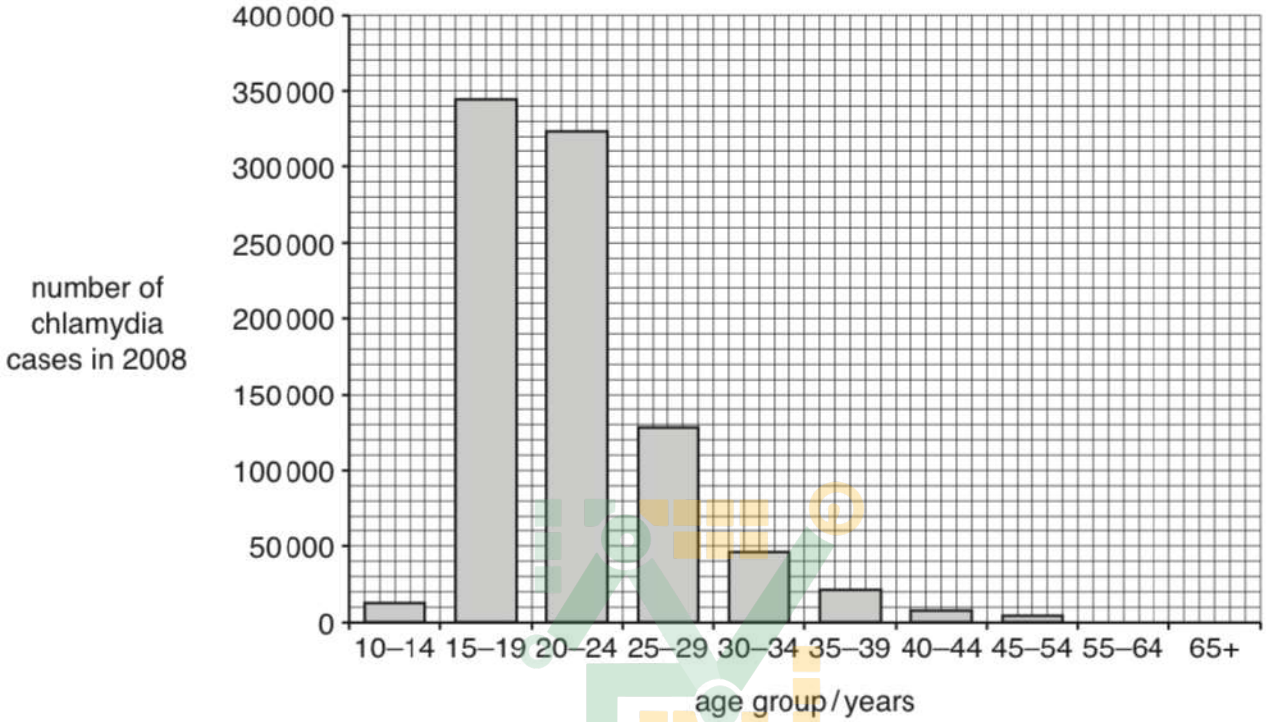


Fig. 4.2

Describe the results shown by the data in Fig. 4.2.

→ The number of cases increases from 10 to 19 years and then decreases from 20 to 54 years.

→ Peaks at 15-19 years at 345000 females.

→ No cases from 55 to 65+ years.

→ Steep decline above 20-24 years. [3]

(d) Chlamydia is caused by a bacterium.

(i) Suggest a treatment for chlamydia.

Antibiotics [1]

(ii) State the name of **one other** STI.

HIV [1]

(iii) Complete the sentences about the spread of STIs. contaminated.

STIs are transmitted through the transfer of ..body fluids..... during sexual contact. One way individuals can avoid the spread of STIs is to use a type of barrier contraception. One example of this type of contraception is ..Condoms..... .

[2]

(iv) Outline two ways in which the spread of STI can be reduced.

1. Avoid unknown sexual partners
2. Use of condoms. [2]
3. Educating people
4. Testing before blood transfusion [Total: 13]

4 The four o'clock plant, *Mirabilis jalapa*, can have flowers of three different colours as shown in Fig. 4.1.

Fig. 4.1

(a) A student crossed some crimson-flowered plants with some yellow-flowered plants (cross 1). She collected the seeds and grew them. All of the plants that grew from these seeds had orange-red flowers.

Complete the genetic diagram to explain the result of cross 1.

parental phenotypes	crimson flowers	×	yellow flowers
parental genotypes	A^CA^C	×	A^YA^Y
gametes	A^C	+	A^Y
offspring genotype	A^CA^Y		
offspring phenotype	Orange-Red flower.		

[3]

(b) Flower colour in M. jalapa is produced by proteins pigments called carotenoids

Explain in brief how these carotenoids are produced in plants.

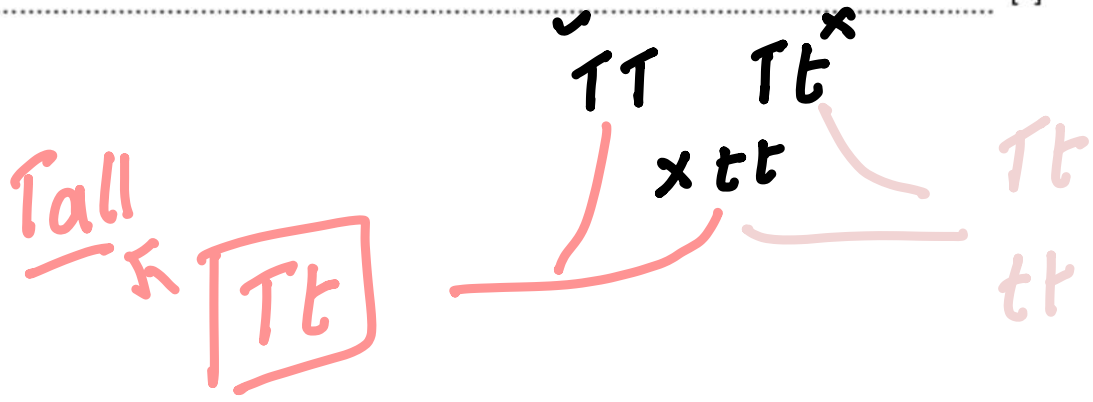
→ A copy carotenoids gene is made in the form of m-RNA.
→ m-RNA moves out of nucleus on ribosomes.
→ Ribosomes assemble and join
→ amino acids based on the base sequence of m-RNA. [3]

(c) Farmer grow tall wheat plants to ensure good yield. Tall height is dominant over recessive.

How will a farmer ensure that a plant is homozygous dominant before crossing it for producing other varieties.

→ Test cross
→ Crossing it with recessive parent.
→ If the progeny is all tall, parent is homozygous and if it is 50% tall or 50% dwarf it is heterozygous.

[2]



Flowers from *M. jalapa* were cross-pollinated.

(d) Explain the difference between self-pollination and cross-pollination.

SELF Transfer of pollen grains from anther to stigma of same plant.

CROSS Transfer of pollen grains from anther to stigma of different plant of same species. [2]

(e) Some species of plants are self-pollinated.

Discuss the advantages of self-pollination over cross pollination.

Self pollination

- requires only one parent
- no external pollinator is required.
- no nectar is produced.
- less pollen grains are produced.

[4]

[Total: 14]

5 Exercise that occurs over a longer period of time than weightlifting often involves aerobic respiration as well as anaerobic respiration.

Fig. shows the oxygen consumed by an athlete during and after a 5000 metre race.

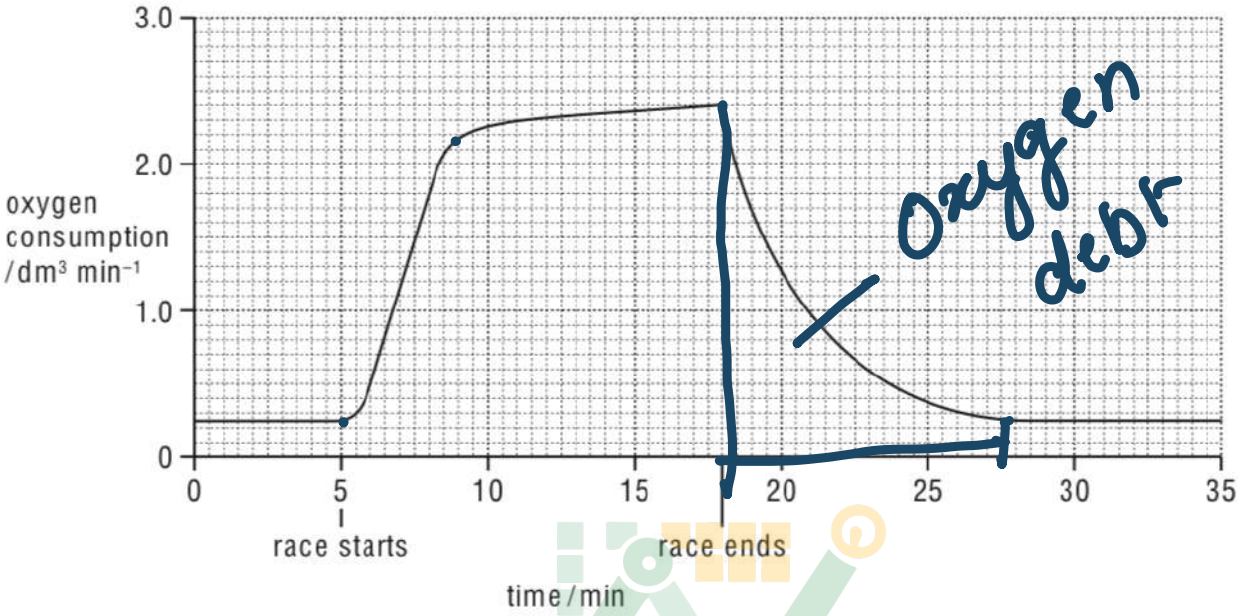


Fig.

(a) Describe the athlete's oxygen consumption during **and** after the race as shown in Fig. 4.2.

You will gain credit for using the figures in the graph to support your answer.

during Rate of Oxygen consumption increases when race starts to 2.2dm³ min⁻¹ at 9 minutes. It stays constant till race ends at 18 minutes.

after It decreases gradually to 0·25 dm⁻³ min at 27.5 minutes and stays constant.

[4]

(b) Explain how this change during exercise is coordinated and why the oxygen consumption does not return back to normal immediately after the exercise is finished.

→ Increased muscle contraction, increased aerobic respiration
→ more CO_2 in blood decreases
→ pH which is detected by brain
→ Brain sends impulses to heart
→ and lungs for faster heart beat and breathing rate. to remove
→ more CO_2 and supply more O_2.
→ less O_2 concentration leads to lactic acid formation by
→ anaerobic respiration. [5]
→ lactic acid is transported to liver where it is broken down
→ by aerobic respiration into CO_2 and water.

[Total: 9]

6 This question is about transport in plants.

(a) Two pea plants, **D** and **E**, were supplied with substances containing the radioactive isotopes, carbon-14 (^{14}C) or phosphorus-32 (^{32}P), as shown in Fig. 4.1.

A leaf of plant **D** was exposed to radioactive carbon dioxide.

Plant **E** was placed into a solution containing radioactive phosphate ions.

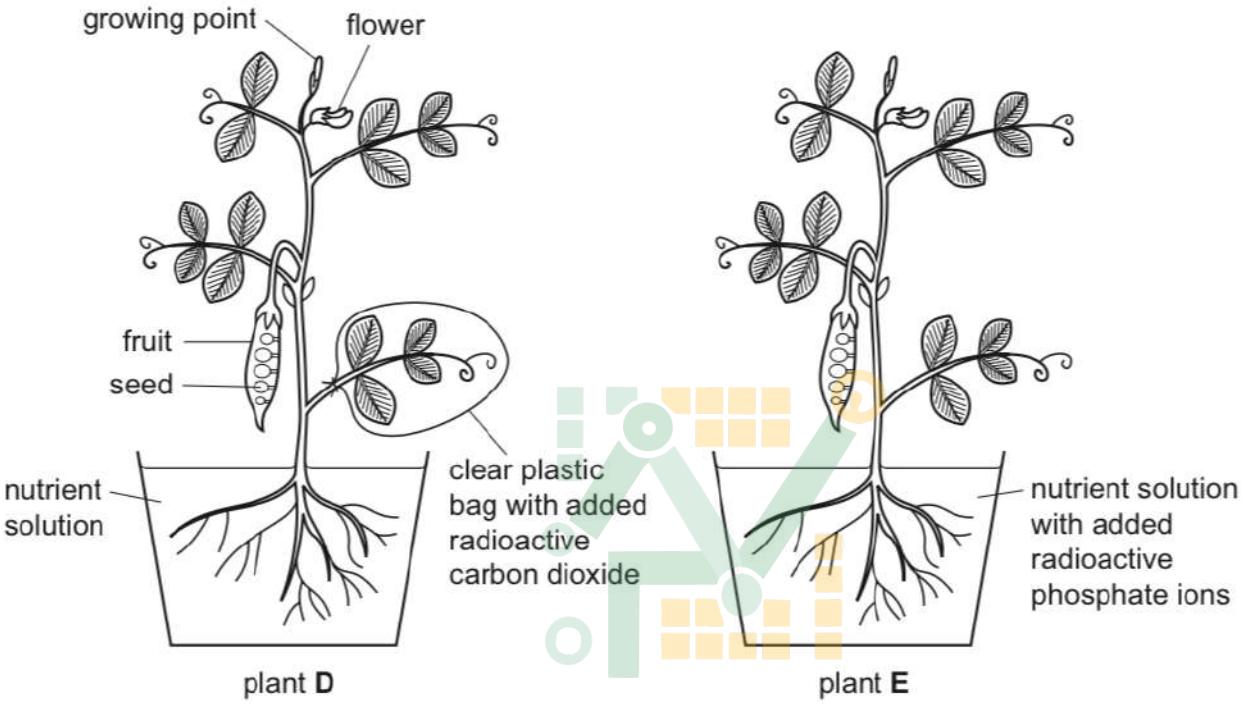


Fig. 4.1

After several hours the plants were analysed for the presence of the radioactive isotopes.

Sucrose containing ^{14}C was found throughout plant **D**.

Compounds containing ^{32}P were found throughout plant **E**.

Complete Table 4.1 to show:

- the tissue in which each substance is transported;
- **one** possible sink for each substance.

Table 4.1

pea plant	D	E
substance transported	sucrose	phosphate ions
transport tissue	Phloem	xylem
sink	roots	leaves

[2]

(b) State **one** substance, **other than sucrose**, that is produced in leaves and translocated to other parts of the plant.

Amino acids [1]

(c) Explain how sucrose can be transported in the phloem upwards and downwards.

When plant is able to photosynthesis leaves are acting as source and roots are sink. Sucrose is transported downwards from source to sink. When plant is not able to do photosynthesis roots are acting as source and leaves are sink. Sucrose is transported upwards [4]

(d) State two uses of water within a pea plant.

1 Transport ions dissolved in xylem

2 Site for metabolic reactions in cytoplasm [2]

[Total: 9]

3. Photosynthesis.

7 Fig. shows the Calayan rail, *Gallirallus calayanensis* a flightless bird that lives in Calayan Island in the Philippines. This species of bird was discovered in 2004.

Fig.

(a) State the name of the genus of the Calayan rail.

Gallirallus ..... [1]

Many bird species are threatened by deforestation.

(b) Suggest three reasons why deforestation occurs.

1 to grow crops

2 to build houses

3 to obtain wood / paper ..... [3]
for mining

(c) Suggest the likely effects of deforestation on populations of bird species.

- Habitat loss
- fewer nest sites
- More exposed to predators
- More competition for food.

..... [3]

(d) Some species of birds, such as the Calayan rail, are endangered.

Outline the reasons why it is important to conserve species.

→ Imbalance in food chain

→ to maintain biodiversity.

→ Each species is dependent on others so less food for predators of Calayan rail. [3]

[Total: 10]