1. June/2022/Paper_41/No.1(a)

(a) The golden mantella, *Mantella aurantiaca*, is a small terrestrial frog found in Madagascar.

Fig. 1.1 shows a golden mantella.

Fig. 1.1

(i) Name the domain and kingdom to which the golden mantella belongs.

domain .....

kingdom .....

[2]

(ii) The skin of the golden mantella is brightly coloured and contains a toxin.

Suggest a benefit to the frog of being brightly coloured.

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..... [1]

2. June/2022/Paper_41/No.8

(a) Over the past 200 years, many species of animals and plants have become extinct.

Fig. 8.1 shows the changes between the years 1800 and 2000 in:

- the number of species becoming extinct
- the size of the world human population.

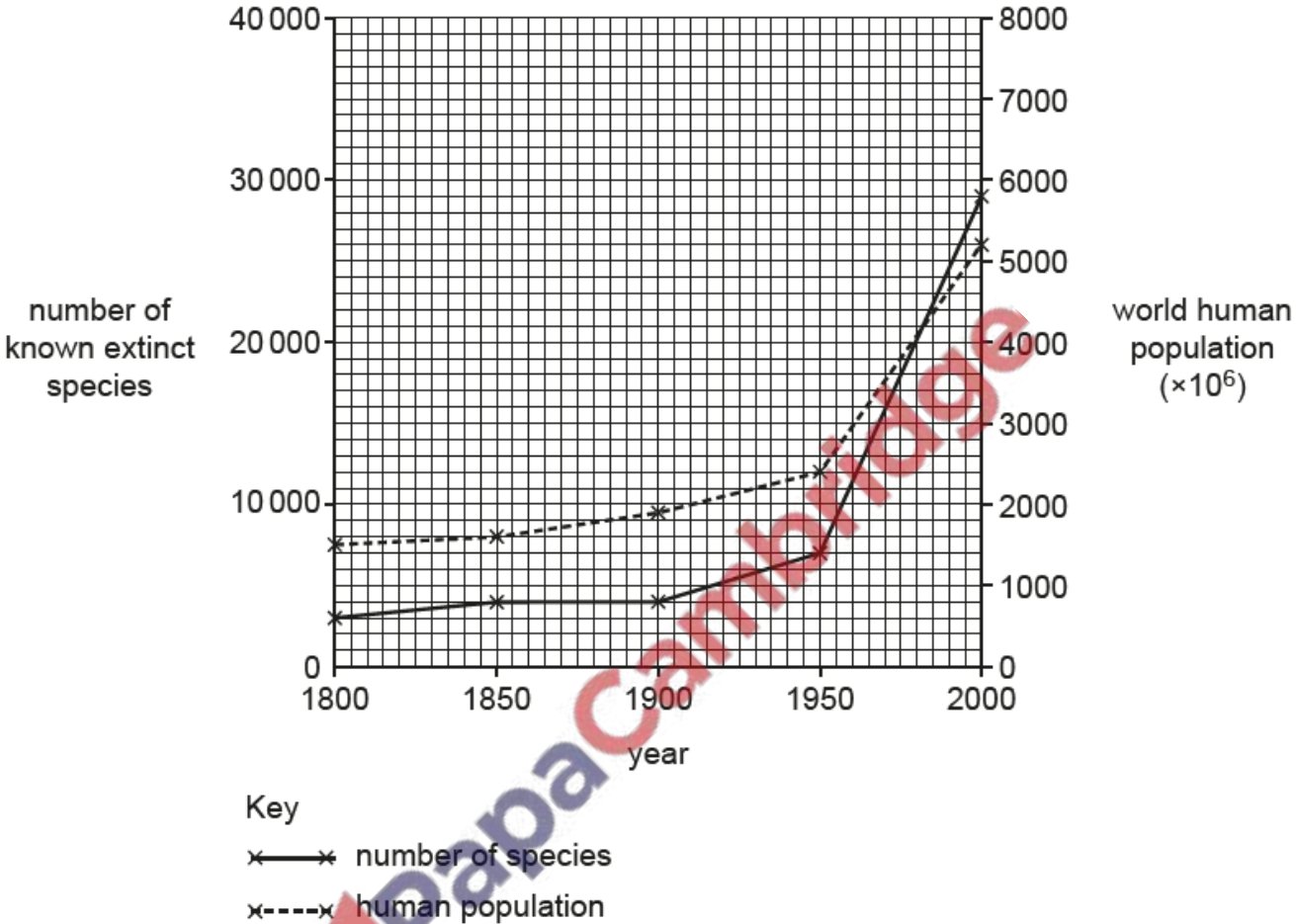

Fig. 8.1

(i) It has been suggested that there is a correlation between the number of species becoming extinct and the size of the world human population.

Suggest reasons for this possible correlation.

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..... [3]

(ii) Calculate the rate of species extinction per year between 1950 and 2000.

Show your working.

answer = ... [2]

(b) Extinction of animal and plant species reduces biodiversity.

Explain why it is important to maintain biodiversity.

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[Total:12]

3. June/2022/Paper_42/No.7

The bacterium, *Escherichia coli*, can use glucose or disaccharides, such as lactose, in its metabolism. Lactose needs to be hydrolysed by the enzyme β-galactosidase to form glucose and galactose, which can then be used by *E. coli*.

The production of β-galactosidase is controlled by a length of DNA called the *lac* operon.

(a) Fig. 7.1 shows the *lac* operon when lactose is **absent**.

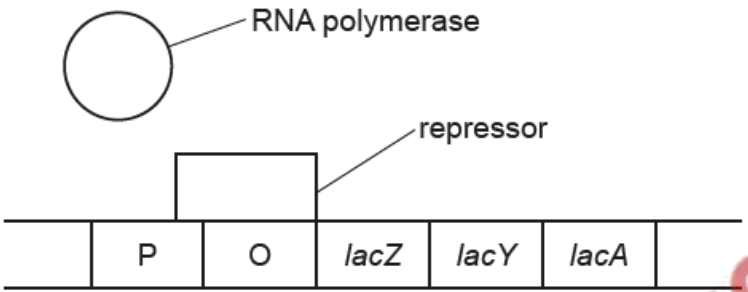

Fig. 7.1

On Fig. 7.2, draw the positions of RNA polymerase and the repressor molecule when lactose is **present**.

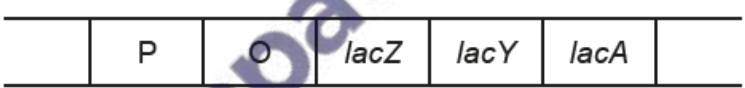

Fig. 7.2 [2]

(b) The protein coded for by *lacY* is not involved in the control of gene expression.

(i) Name the type of gene represented by *lacY*.

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(ii) Name the protein product coded for by *lacY* **and** state the precise role of this protein.

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(c) In an investigation into the growth of *E. coli*, a sample of the bacterium was grown in a medium that contained limited concentrations of glucose and lactose. The population size of *E. coli* was measured at regular intervals.

Fig. 7.3 shows the population growth curve obtained for this investigation.

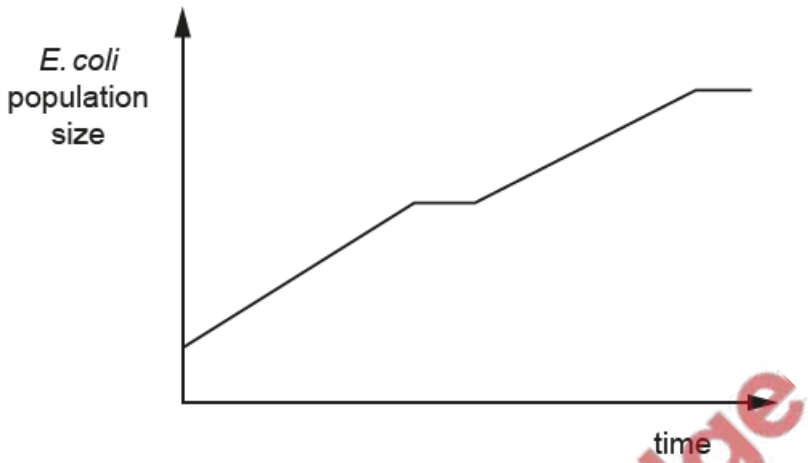

Fig. 7.3

Describe **and** suggest explanations for the population growth curve shown in Fig. 7.3.

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[Total: 9]

(a) The Malayan tapir, *Tapirus indicus*, lives in the rainforest of South East Asia.

Fig. 8.1 shows a Malayan tapir and her calf.

Fig. 8.1

On the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species, the Malayan tapir is categorised as endangered and could become extinct. One problem is the illegal trade in the Malayan tapir.

Apart from illegal trading, suggest **and** explain reasons why the Malayan tapir has become endangered and could become extinct.

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(b) The trade in Malayan tapirs is regulated by the Convention on International Trade in Endangered Species (CITES).

Suggest ways by which CITES attempts to regulate the trade in wild fauna and flora.

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(c) Many endangered species, such as the Malayan tapir, are protected in zoos.

Outline the role of zoos in the conservation of endangered species.

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[Total: 9]