IB · DP · Biology

1 hour 7 questions

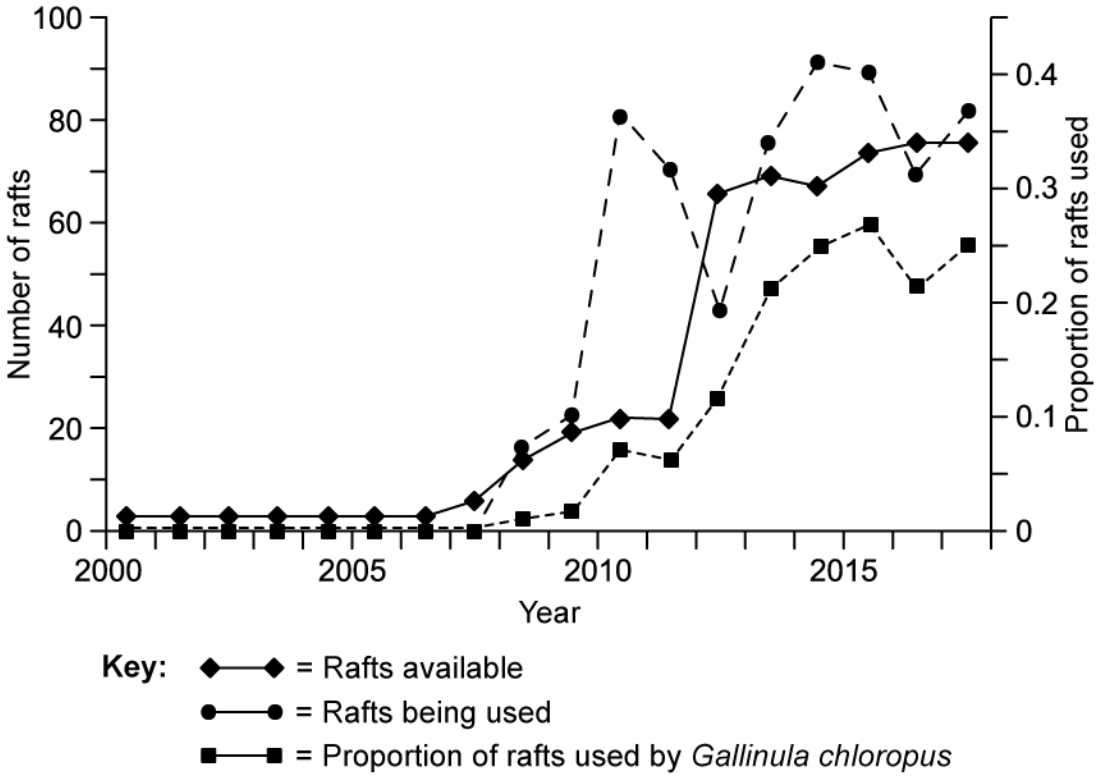
Practice Paper 2

Scan here to return to the course
or visit savemyexams.com

Total Marks /72

1 (a) Artificial floating islands are man-made rafts or platforms that can be introduced to bodies of water to increase existing habitat for a variety of organisms, including invertebrates, amphibians and birds.

As artificial floating islands have been increasingly introduced to ponds and lakes in parks in London, ecologists have studied how many rafts there are available and how many of these are actually being used as nesting sites by birds. In particular, they have monitored the proportion of rafts that are being used by common moorhens (*Gallinula chloropus*). Data was collected halfway through each year.



The number of rafts used by *Gallinula chloropus* changes each year. State the year in which the proportion of available rafts being used by *G.chloropus* was greatest.

.....

(1 mark)

(b) Calculate how many rafts were introduced to ponds and lakes from mid-2011 to mid-2012.

.....

(1 mark)

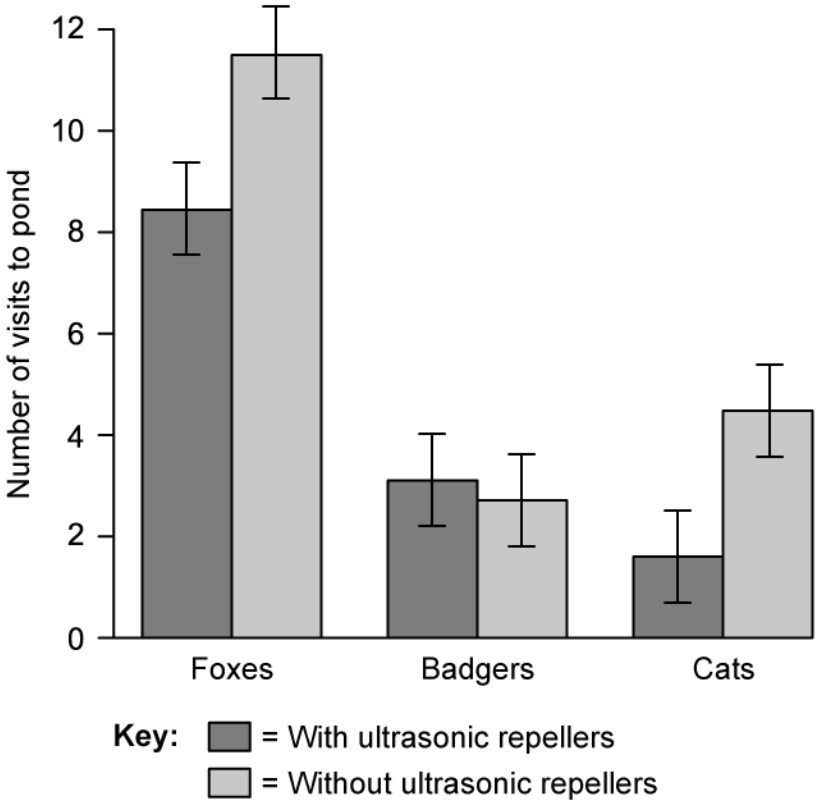
(c) Describe the relationship between the number of rafts available and the number of rafts being used.

.....

.....

(2 marks)

Foxes, badgers and cats are all known to predate on *G.chloropus* chicks. An ecologist conducted an investigation to see if using ultrasonic repellers (usually used to deter and repel cats) could reduce the numbers of these predators visiting a pond where *G.chloropus* were known to be nesting.



(d)

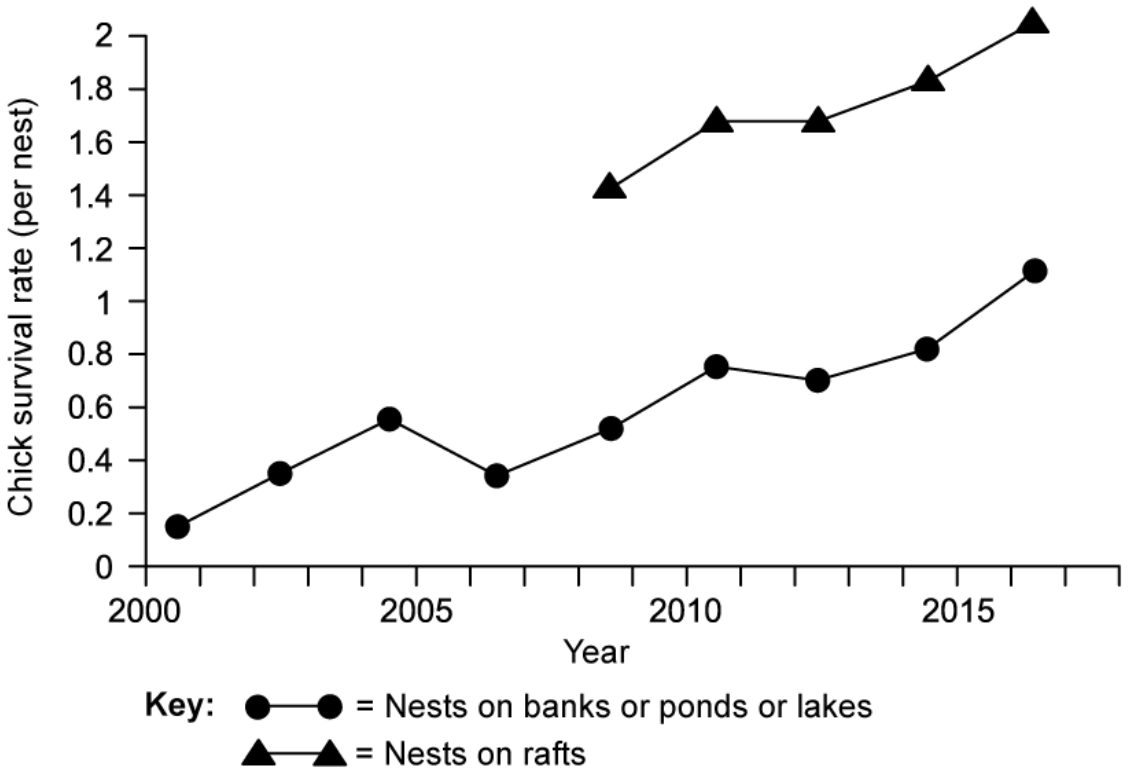
Contrast the number of visits to the pond with and without ultrasonic repellers, for the three different predators.

.....

.....

(3 marks)

(e) Over the same time period and for the same ponds and lakes in London that were studied in part (a), the ecologists monitored *G.chloropus* nests located on the banks of the ponds and lakes and on floating rafts in the centre of those ponds or lakes. Many of the ponds and lakes had ultrasonic repellers placed on their banks over the study period. Every two years, the ecologists measured the average number of chick that survived per nest.



Suggest why data on chick survival rates for nests on rafts were only collected from 2008 onwards.

(1 mark)

(f) Compare and contrast chick survival rates for nests on banks of ponds or lakes with chick survival rates for nests on rafts.

.....

(2 marks)

(g) For the ponds and lakes in question (e), deduce how nest location affects chick survival.

.....

.....

(2 marks)

2 (a) When plants are exposed to extremely high or low temperatures for a continued period of time, they are put under a lot of stress. This stress greatly impacts the rate of photosynthesis, in particular the light-dependent reaction of photosynthesis.

Explain why extreme cold leads to a decrease in the light-independent reaction.

(3 marks)

(b) State the precise location of light-independent reactions in photosynthetic plants.

(1 mark)

(c) Extreme cold can also cause a decrease in rubisco activity.

Explain why a decrease in the activity of the enzyme rubisco limits the rate of photosynthesis.

(2 marks)

(d) Describe the exact role of ribulose bisphosphate (RuBP) in the Calvin cycle.

(1 mark)

3 (a) Methane (CH_4) is a simple hydrocarbon gas present in the atmosphere or underground as part of natural gas fossil fuel. A group of single-celled organisms, called archaeans, can produce methane by means of different mechanisms.

State the name of the process by which methane is produced.

.....

(1 mark)

(b) Archaeans can produce methane in a range of different environments.

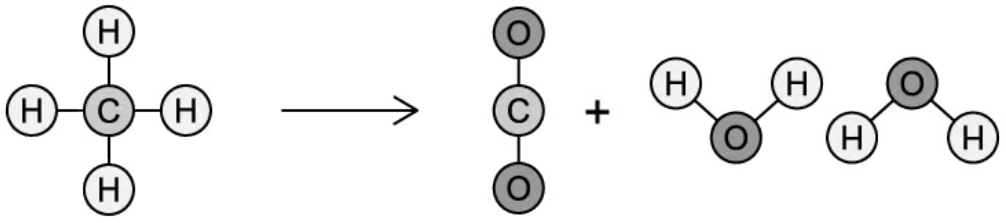
List **two** of these environments where methane can be produced.

.....

.....

(2 marks)

(c) When methane is released into the atmosphere, it is involved in the following reaction:



Identify the type of reaction that is illustrated above.

.....

(1 mark)

(d) Carbon compounds, such as methane, can become trapped in peat which can be burned as fuel.

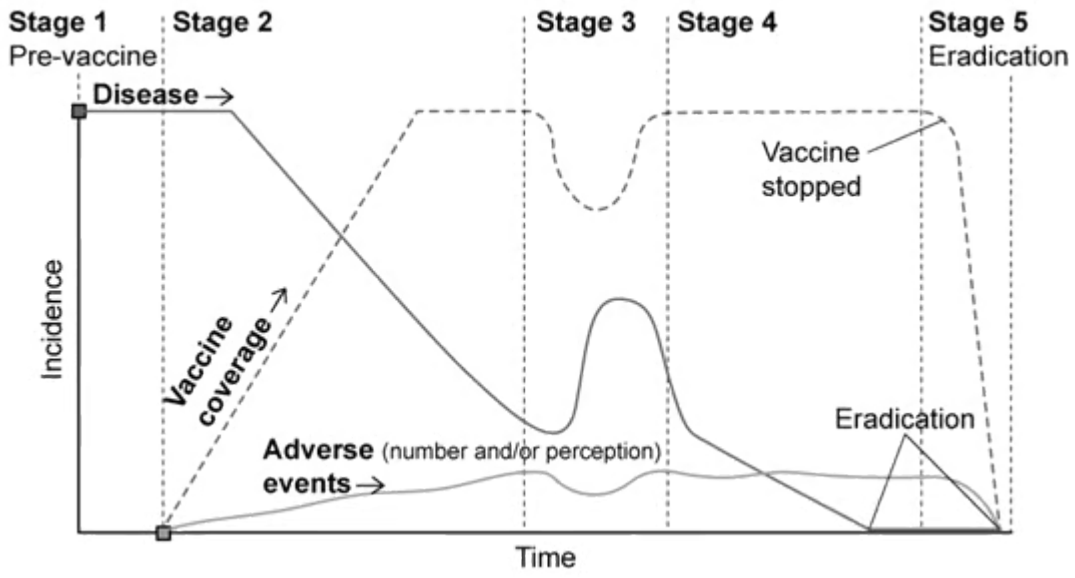
Briefly describe how peat is formed.

.....

.....

(2 marks)

4 (a) The graph below shows the events that take place during the progression of a vaccination program



Suggest an explanation for the events seen in stage 3 of the vaccination program.

(4 marks)

(b) Towards the end of **stage 4** in the graph from part **a)**, the disease incidence drops to zero.

Explain what needs to happen within the vaccination programme to reach a disease incidence of zero.

(3 marks)

5 (a) Bile salts bind to fat droplets and break them down into smaller fat droplets.

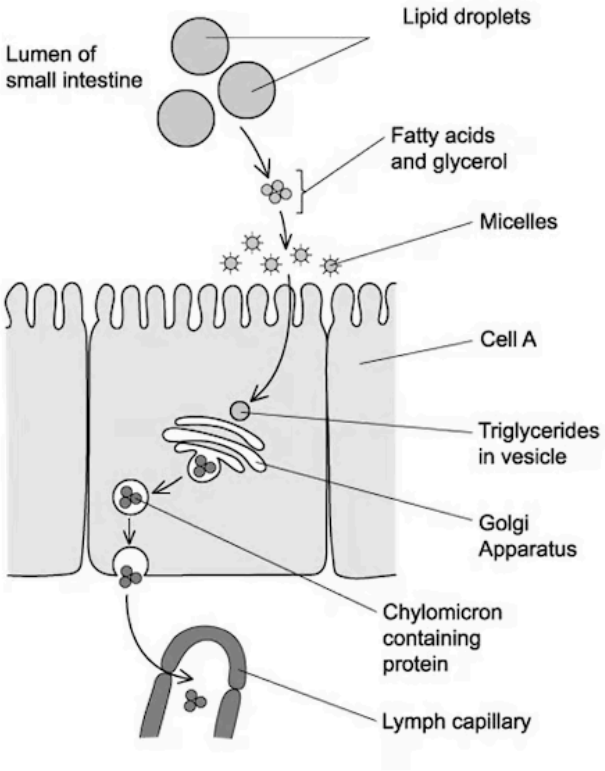
Explain how this process makes lipid digestion more efficient.

.....

.....

(2 marks)

(b) The diagram below outlines the mechanism of lipid digestion and absorption.



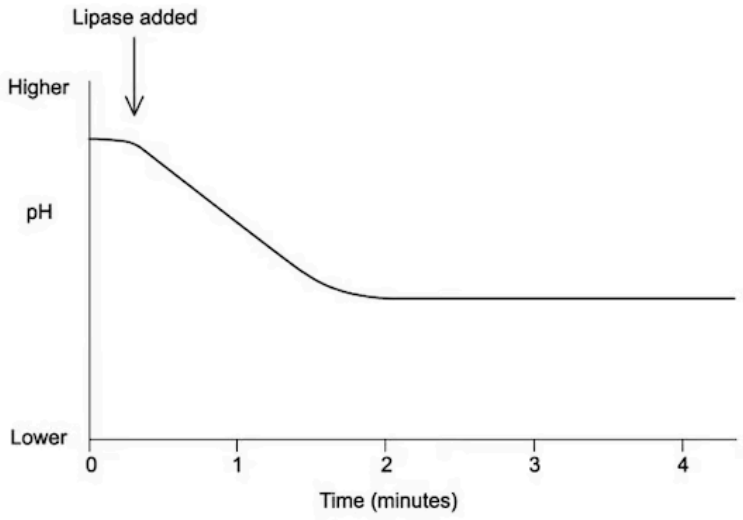
State what type of cell **A** is

.....

(1 mark)

(c) A student wanted to investigate the breakdown of triglycerides in cow milk by human lipase at 20 °C.

They recorded the pH of a sample of cow's milk before and after adding human lipase, using a pH meter to measure the pH. Their results are shown in the graph below.



Describe and explain the changes in pH after human lipase is added.

(4 marks)

(d) The student carried out his experiment at a controlled temperature of 20 °C. They repeated the experiment at 25 °C.

Draw a line on the graph in part **(c)** to show the results you would expect at 25 °C.

(2 marks)

6 (a) *One mark is available for clarity of communication throughout the last two questions.*

A student describes a gene pool as "all the genes that can be found in a particular species".

Explain why the student's definition is incorrect.

(3 marks)

(b) The evolution of some species can be driven by female preferences.

This has occurred in a species of birds called the long-tailed widowbird. The ancestors of the long-tailed widowbird had very short tails. This changed when females developed a behaviour causing them to preferentially mate with the males with the longest tails. However, if their tail is too long the male is weighed down by it and cannot fly, causing it to die prematurely.

Describe the type of selection that has occurred to the long-tailed widowbird.

(5 marks)

(c) Since the first human genome was sequenced in 2003, scientists have spent a lot of time studying human genomes around the world.

One aspect of genome study that scientists can learn a lot from is the study of the frequencies of different alleles in different populations around the world.

Explain some of the benefits of studying and comparing allele frequencies in different human populations, as well as some of the limitations of this process.

(7 marks)

7 (a) *One mark is available for clarity of communication throughout the last two questions.*

Explain the effect of inhibitors on the activity of enzymes.

(8 marks)

(b) Outline how bioinformatics has been used to identify anti-malarial drugs.

(4 marks)

(c) Distinguish between an enzyme catalysed reaction and a non enzymatic reaction.

(4 marks)