



22106011



**BIOLOGY**  
**STANDARD LEVEL**  
**PAPER 2**

Monday 17 May 2010 (afternoon)

1 hour 15 minutes

Candidate session number

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**INSTRUCTIONS TO CANDIDATES**

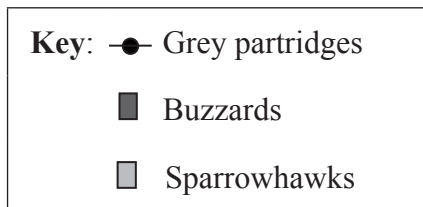
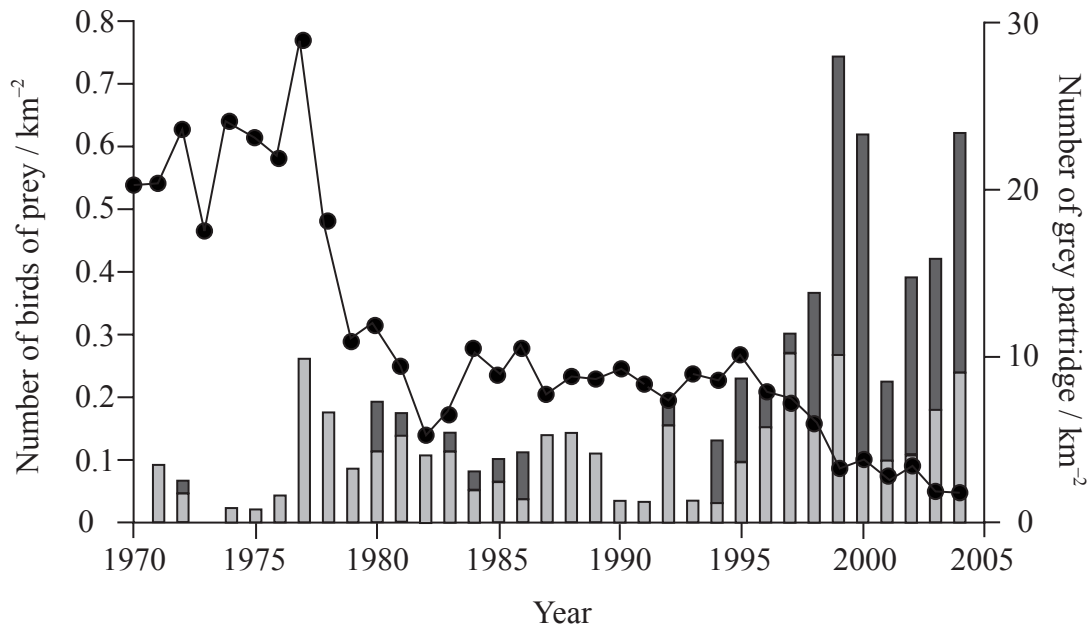
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all of Section A in the spaces provided.
- Section B: answer one question from Section B. Write your answers on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the numbers of the questions answered in the candidate box on your cover sheet and indicate the number of sheets used in the appropriate box on your cover sheet.



SECTION A

Answer **all** the questions in the spaces provided.

1. The grey partridge (*Perdix perdix*) is a species of bird that is found on farmland. Sparrowhawks (*Accipiter nisus*) and buzzards (*Buteo buteo*) are birds of prey that kill and feed on birds, including grey partridge. The number of grey partridges in a region of southern England was monitored from 1970 to 2004. The numbers of sparrowhawks and buzzards, seen from sampling positions during regular observation periods, were counted. The results are shown in the graph below.



[Source: M Watson, *et al.*, “The relative effects of raptor predation and shooting on overwinter mortality of grey partridges in the UK”, (2007), *Journal of Applied Ecology*, 44 (5), pages 972–982. Used with the permission of Wiley-Blackwell.]

(This question continues on the following page)



*(Question 1 continued)*

- (a) Outline the trends, over the period of time shown in the graph, in the number of grey partridges, buzzards and sparrowhawks. [3]

Grey partridges: .....

Buzzards: .....

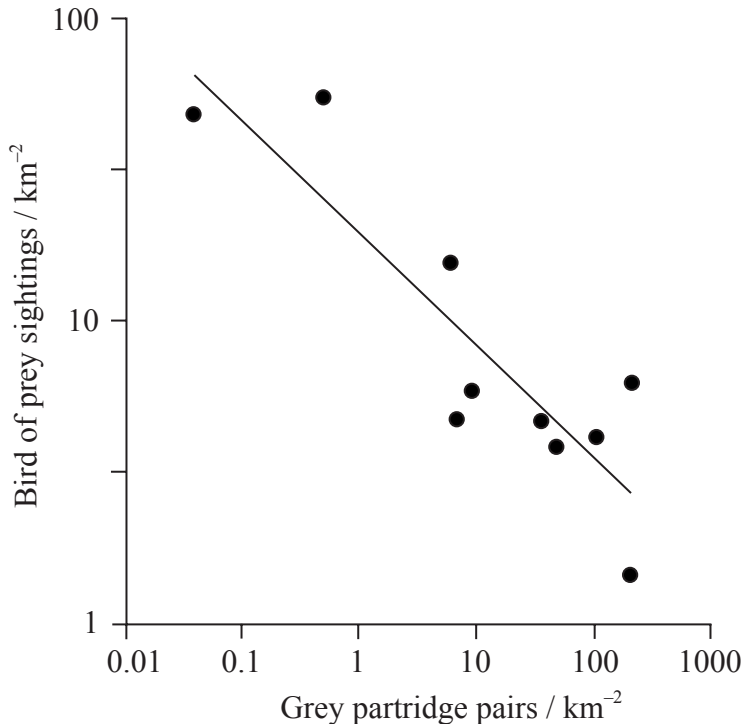
Sparrowhawks: .....

*(This question continues on the following page)*



(Question 1 continued)

The density of grey partridge (number per square kilometre) varied considerably in different areas within the study region. The graph below shows the correlation between the density of grey partridges and the density of birds of prey.



[Source: M Watson, *et al.*, “The relative effects of raptor predation and shooting on overwinter mortality of grey partridges in the UK”, (2007), *Journal of Applied Ecology*, 44 (5), pages 972–982. Used with the permission of Wiley-Blackwell.]

(b) (i) Identify the correlation between the density of grey partridges and birds of prey. [1]

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(ii) Suggest a hypothesis to account for this correlation. [2]

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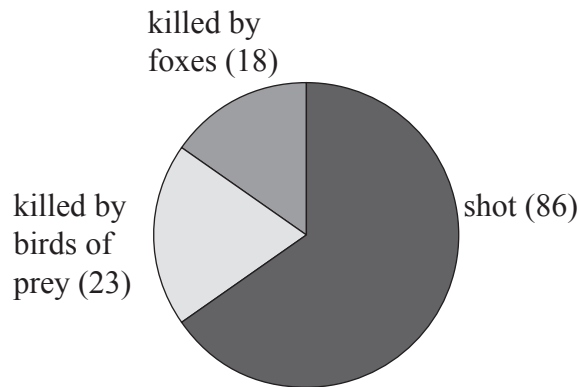
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(Question 1 continued)

The highest density of birds of prey was found in areas used for recreational shooting. In these areas, other species of partridge were bred and released. Food and shelter were provided for the released birds. These measures tended to increase the number of both released and wild birds.

The causes of death of grey partridge were investigated in one of the areas that was used for recreational shooting. The pie chart below shows the causes of death.



(c) (i) Calculate the percentage of deaths due to birds of prey. [1]

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(ii) Using the data provided, discuss the causes of the correlation between the density of grey partridges and the density of birds of prey. [3]

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(d) Suggest a conservation measure that would be most likely to prevent the extinction of grey partridges from southern England. [1]

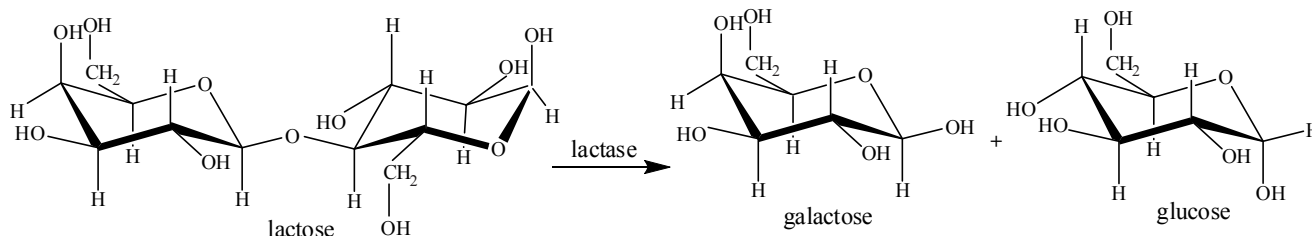
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2. (a) Glucose and galactose are examples of monosaccharides. State **one** other example of a monosaccharide. [1]

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(b) The equation below shows the production of glucose and galactose from lactose.



(i) There are several different types of carbohydrate. State which type of carbohydrate lactose is. [1]

.....

(ii) State the type of chemical reaction that occurs when lactose is digested into glucose and galactose. [1]

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(c) Lactase is widely used in food processing. Explain **three** reasons for converting lactose to glucose and galactose during food processing. [3]

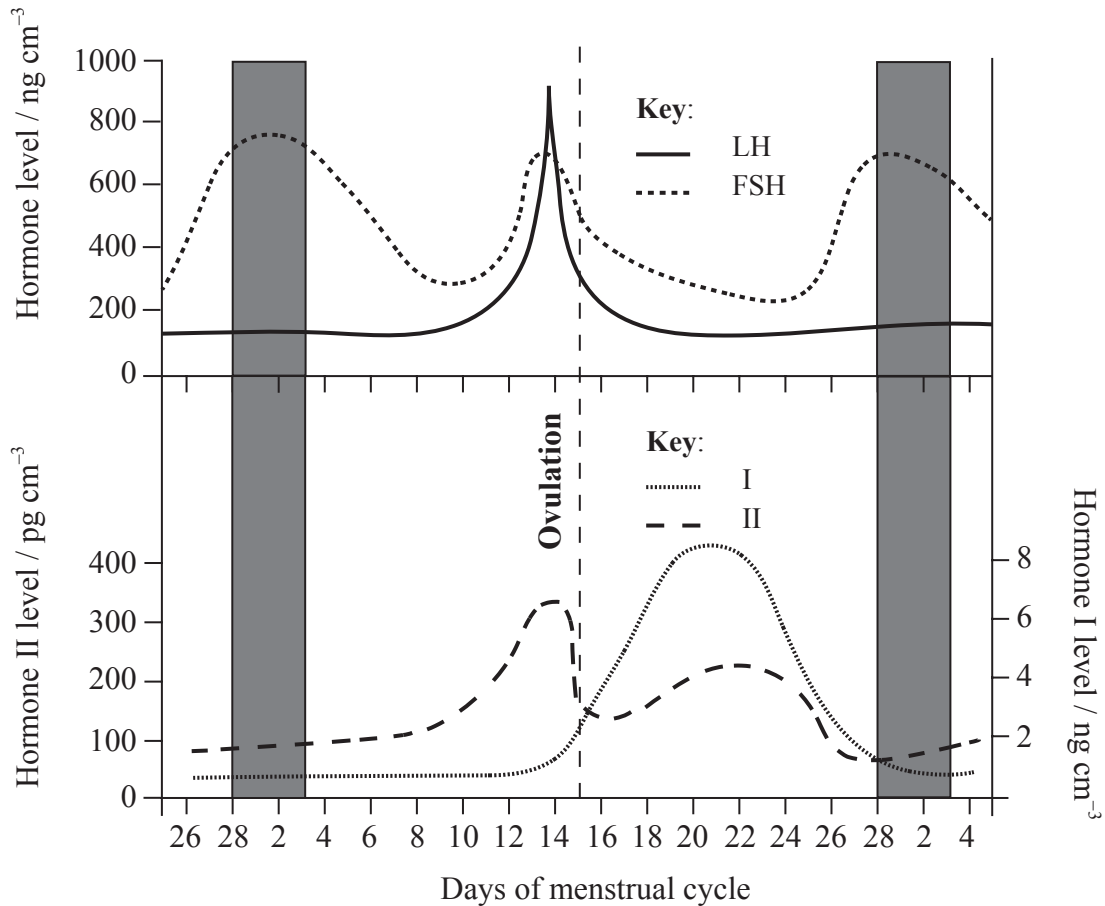
- 1. ....
- 2. ....
- 3. ....

(d) Simple laboratory experiments show that when the enzyme lactase is mixed with lactose, the initial rate of reaction is highest at 48 °C. In food processing, lactase is used at a much lower temperature, often at 5 °C. Suggest reasons for using lactase at relatively low temperatures. [2]

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3. The graph below shows the levels of hormones during the menstrual cycle.



(a) Identify hormones I and II. [2]

I: .....  
II: .....

(b) Outline the roles of FSH in the menstrual cycle. [2]

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(c) FSH is secreted by the pituitary gland. During pregnancy, FSH secretion is inhibited. Suggest how FSH secretion could be inhibited during pregnancy. [1]

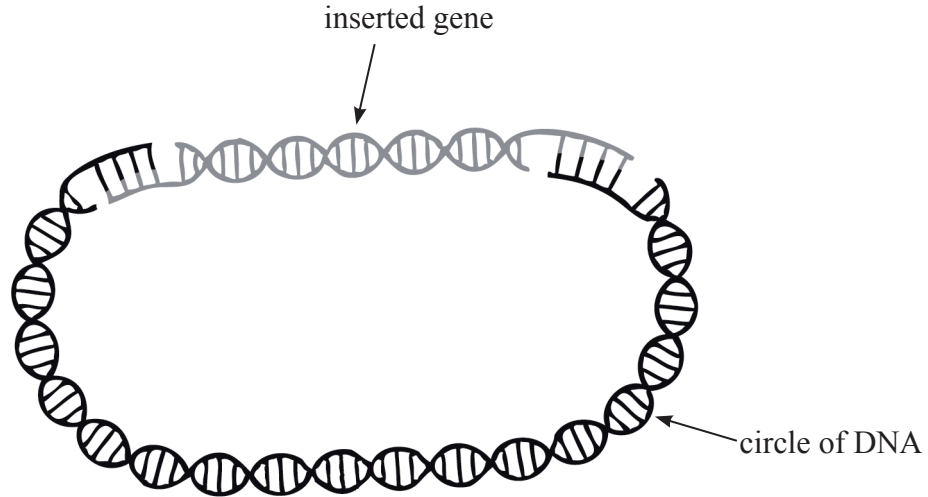
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4. (a) Gene transfer to bacteria often involves small circles of DNA into which genes can be inserted. State the name of a small circle of DNA, used for DNA transfer, in bacteria. [1]

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(b) The diagram below shows a cut circle of DNA into which a gene is being inserted. Before it can be transferred into a bacterium, the ring must be altered, using an enzyme.



Outline what must be done next to complete the process of gene insertion into the DNA circle, including the name of the enzyme that is used. [2]

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(c) Discuss the potential benefit and possible harm of **one named** example of gene transfer between species. [3]

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**SECTION B**

*Answer **one** question. Up to two additional marks are available for the construction of your answer. Write your answers on the answer sheets provided. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.*

5. (a) Explain why DNA must be replicated before mitosis and the role of helicase in DNA replication. [4]
- (b) Explain how the base sequence of DNA is conserved during replication. [5]
- (c) Describe the events that occur during mitosis. [9]
6. (a) The pumping of blood is a vital process. Explain the roles of the atria and ventricles in the pumping of blood. [4]
- (b) Explain how the structure of an artery allows it to carry out its function efficiently. [5]
- (c) Describe the inheritance of ABO blood groups. [9]
7. (a) Plants are a diverse group of eukaryotic organisms. Describe the different characteristics of the bryophyta, filicinophyta, coniferophyta and angiospermophyta. [9]
- (b) Plants store carbohydrate in the form of starch. Explain the reasons for starch being digested by the human digestive system. [4]
- (c) Compare the structure of prokaryotic and eukaryotic cells. [5]
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