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International Baccalaureate®
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BIOLOGY
STANDARD LEVEL
PAPER 2

Monday 17 November 2008 (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.

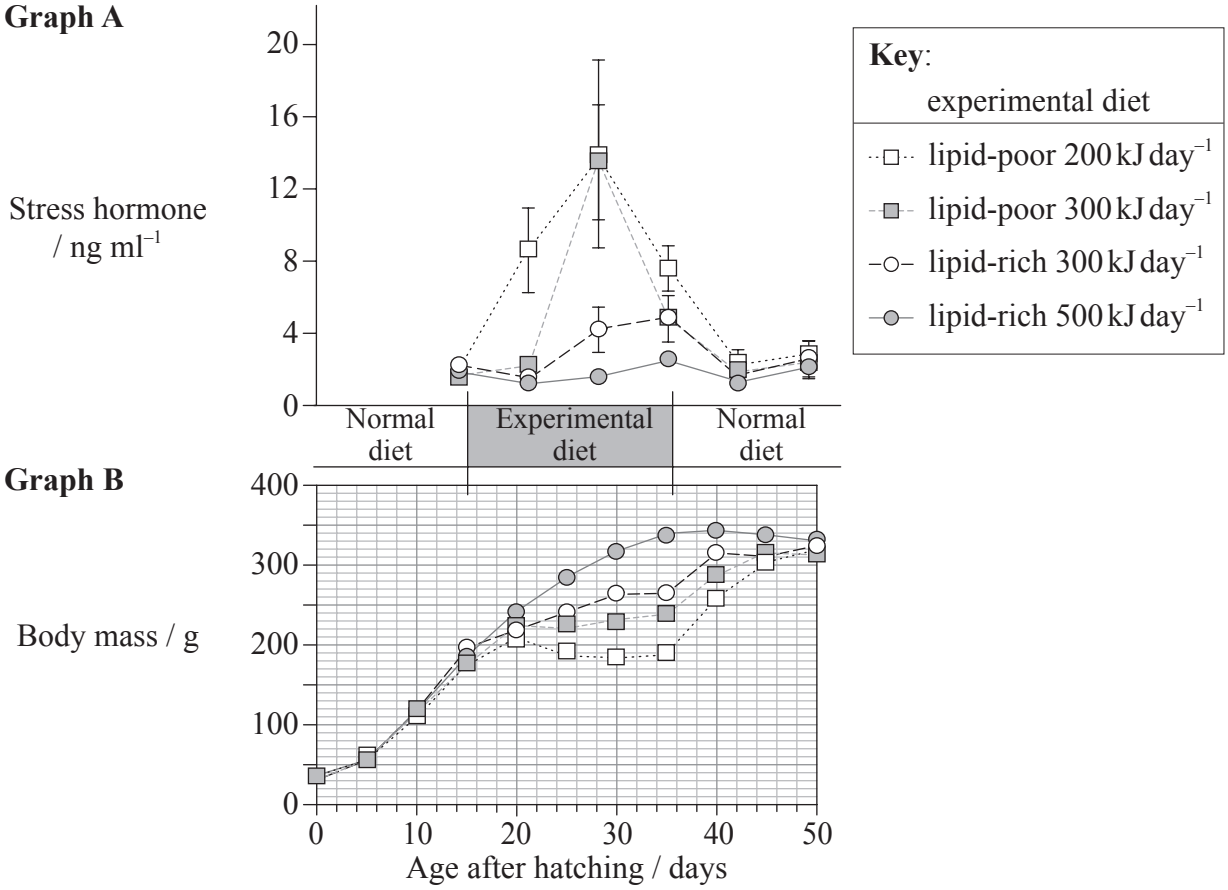
0108

SECTION A

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

1. The kittiwake (*Rissa brevirostris*), a sea bird, feeds on lipid rich fish. Climatic change in the northern Pacific Ocean has reduced the availability of the fish. This has resulted in a dramatic decline in kittiwake numbers on the Pribilof Islands. Scientists investigated how diets of lipid-rich fish or lipid-poor fish affected the development of young kittiwakes after hatching (leaving the egg).

The graphs below show the effects of four different diets together with their energy intakes. Graph A shows the change in plasma concentration of a stress hormone and Graph B shows the change in body mass.



[Adapted from Kitaysky et al., 2006, Proceedings of the Royal Society of Biology, Vol. 273, No. 1585, Feb 22nd, pages 445-450, Figure 1. Reprinted with the permission of Royal Society Publishing.]

(This question continues on the following page)

(Question 1 continued)

(a) State the effect of a lipid-rich 500 kJ day^{-1} diet on the plasma concentrations of stress hormone during the time of the experimental diet. *[1]*

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(b) Calculate the maximum percentage change in body mass due to the lipid-rich 500 kJ day^{-1} diet during the time of the experimental diet. *[1]*

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(c) Discuss the changes in plasma concentrations of stress hormone caused by each of the lipid-poor diets during the time of the experimental diet. *[3]*

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(d) Explain the change in body mass during the time of the experimental diet. *[2]*

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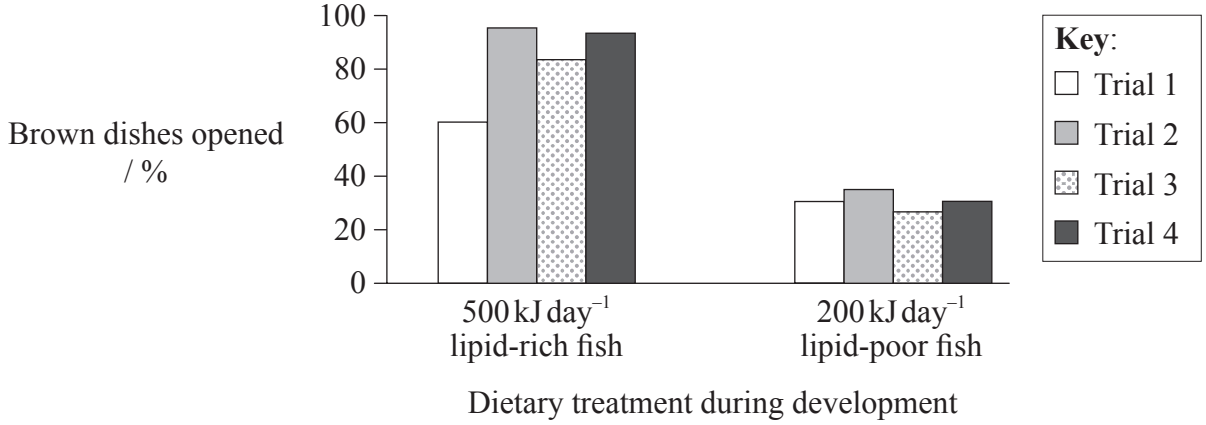
(Question 1 continued)

In nature, kittiwakes leave their nests to feed independently at sea. Their survival depends upon their ability to link visual signals from the ocean (water colour and surface structure) with the presence of fish. Excessive levels of stress hormone can damage learning ability in developing young kittiwakes.

In four trials scientists investigated how different diets affected learning ability in kittiwakes, 50 days after hatching. Before the start of the trials kittiwakes learned to push the lids off closed transparent plastic dishes containing food.

Trials 1, 2 and 3 were completed on consecutive days, followed by trial 4 which was undertaken a week later. Each trial had an equal number of closed brown-coloured dishes (containing fish) and white-coloured dishes (empty) which were presented in a random pattern. The graph below summarizes the results.

Graph C



[Adapted from Kitaysky et al., 2006, Proceedings of the Royal Society of Biology, Vol. 273, No. 1585, Feb 22nd, pages 445-450, Figure 2. Reprinted with the permission of Royal Society Publishing.]

(e) Analyse the graph for the change in kittiwakes' behaviour as related to their diet. *[3]*

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(f) Suggest why **trial 4** was undertaken a week later for both dietary treatments. *[1]*

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(Question 1 continued)

(g) Outline how climatic change is linked to a reduced number of kittiwakes breeding on the Pribilof Islands. *[3]*

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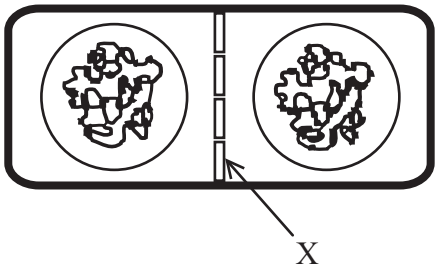
2. The diagram below shows a stage in the cell division cycle.



(a) (i) Identify the structure labelled X in the diagram above. *[1]*

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(ii) Identify the stage and the cell type that is shown in the diagram. *[1]*

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(b) (i) In the space provided below, construct a Punnett grid showing a monohybrid cross between a colour blind man and a heterozygous woman. *[3]*

(ii) Based on your Punnett grid, predict the phenotypes of the offspring. *[1]*

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3. (a) Describe the formation and breakdown of glycerides. *[3]*

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(b) Define the term *ecosystem*. *[1]*

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(c) Outline the role of decomposers in recycling nutrients. *[2]*

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4. (a) Blood plasma is about 90% water. List **two** properties of water that enable blood to perform its role effectively. *[1]*

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(b) Define the term *excretion*. *[1]*

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(c) Explain the action of the diaphragm during ventilation. *[2]*

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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) List **four** different functions of membrane proteins. *[4]*

(b) Explain the relationship between polypeptides and genes. *[8]*

(c) Describe the role of the stomach in digesting proteins. *[6]*

6. (a) Draw a labelled diagram of a generalized animal cell showing the ultra-structure visible using an electron microscope. *[5]*

(b) Explain how reduction division results in genetic variety. *[8]*

(c) Describe the role of estrogen in females. *[5]*

7. (a) Draw a food chain which links **four named** organisms in their identified trophic levels. *[4]*

(b) Draw a diagram and explain the shape of population growth curves. *[8]*

(c) Using a table, compare human skin and mucous membranes as barriers against pathogens. *[6]*