22086011

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

BIOLOGY
STANDARD LEVEL
PAPER 2

Wednesday 14 May 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.

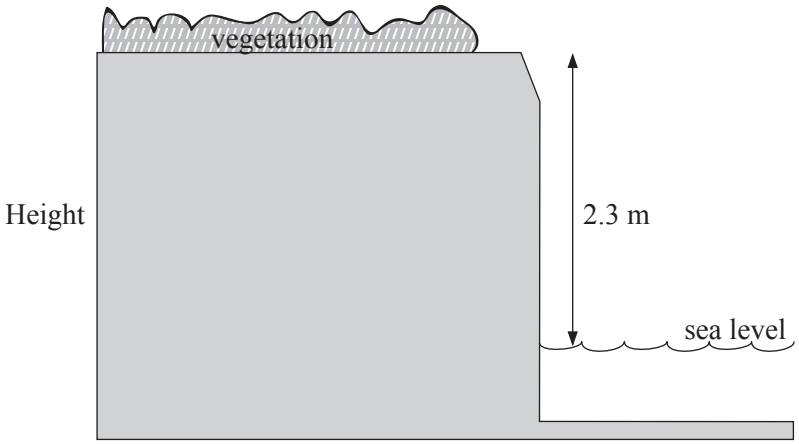
0108

SECTION A

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

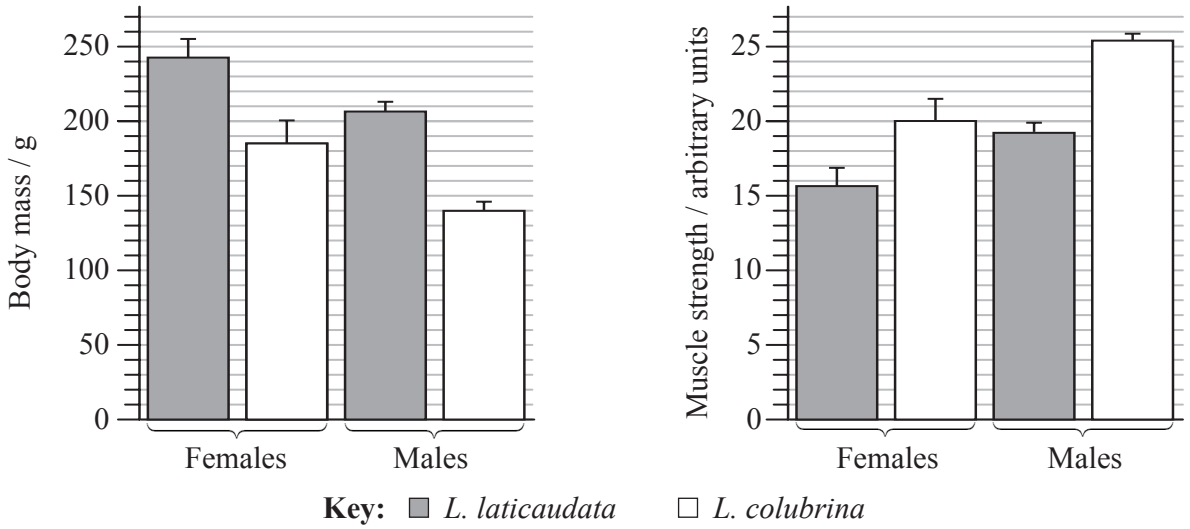
1. Two species of sea snakes, *Laticauda laticaudata* and *Laticauda colubrina*, spend most of their lives living in the sea. They must be able to move, hunt and survive in the water, but for short periods they need to come ashore to breed. They inhabit some of the Pacific islands which have low coral cliffs that the snakes need to climb in order to get onto dry land for courtship, mating and laying eggs.

Figure 1 Diagram to show a cross-sectional view of cliff used in the study



[Source: Terrestrial locomotion in sea snakes: the effects of sex and species on cliff-climbing ability in sea kraits (Serpentes, Elapidae, Laticauda)", X. Bonnet, I. Ineich and R. Shine, Biological Journal of the Linnean Society, August 2005, vol. 85, issue 4, pages 433-41, Wiley-Blackwell. Used with permission.]

The scientists studied the ability of snakes to climb the low cliff. They measured the body mass of the snakes and relative strength of the snakes. The mean results are shown in the bar charts below.



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(This question continues on the following page)

(Question 1 continued)

(a) State which sex of snake has the greater mean mass. *[1]*

. . . . . .

(b) State which species of snake is the strongest. *[1]*

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(c) The error bars represent standard deviation. Deduce which groups of snakes show the greatest variability in body mass. *[1]*

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(d) For *L. colubrina* calculate the difference between the strength of the male and the female snakes. *[1]*

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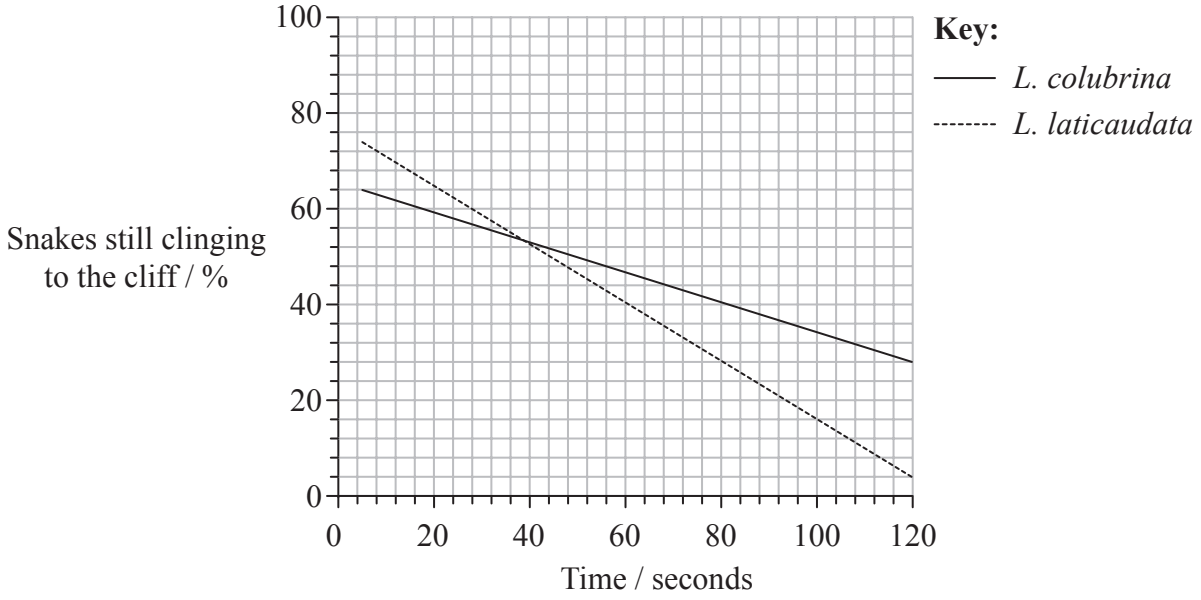
(This question continues on the following page)

(Question 1 continued)

The scientists placed male snakes onto the coral cliff near its base. They measured their ability to hold onto the coral cliff. The *L. colubrina* males climbed much faster than the males of *L. laticaudata*. The graph below shows the ability of snakes to cling to the coral cliff.



[Source: "Terrestrial locomotion in sea snakes: the effects of sex and species on cliff-climbing ability in sea kraits (Serpentes, Elapidae, Laticauda)", X. Bonnet, I. Ineich and R. Shine, Biological Journal of the Linnean Society, August 2005, vol. 85, issue 4, pages 433-41, Wiley-Blackwell. Used with permission.]

(e) (i) Compare the ability of the two species of snake to cling to the cliff. *[2]*

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(ii) Suggest **two** reasons for the difference in the ability of the snakes to cling to the cliffs for 120 seconds. *[2]*

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(Question 1 continued)

(f) Discuss the advantages and disadvantages of body mass in these two species of snake. *[3]*

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2. (a) State the **typical** size of

(i) a bacterium. . . . . *[1]*

(ii) an average eukaryotic cell. . . . . *[1]*

(b) Explain the importance of the surface area to volume ratio in limiting cell size. *[2]*

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3. (a) Define *homeostasis*. *[1]*

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(b) Blood glucose levels are controlled by several hormones.

(i) State the name of **one** of these hormones and the specific site of its production. *[2]*

hormone: . . . . . .

site: . . . . . .

(ii) Outline how the hormone chosen in (b) (i) controls blood glucose. *[2]*

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(Question 3 continued)

(c) Explain the roles of estrogen in regulating change at puberty in young women. *[3]*

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4. (a) State **two** organic compounds used to store energy in animals. *[2]*

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(b) (i) State the principal conversion of energy that occurs in photosynthesis. *[1]*

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(ii) State the molecule necessary for this conversion of energy. *[1]*

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(c) Explain the reason for the shape of a pyramid of energy. *[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) List the characteristics of alveoli that permit efficient gas exchange. *[4]*

(b) Describe the structures of arteries and veins as related to their functions. *[6]*

(c) Explain the process of aerobic cell respiration. *[8]*

6. (a) Draw and label a diagram of the molecular structure of DNA. *[5]*

(b) Outline the significance of complementary base-pairing in DNA. *[5]*

(c) Explain the cause of sickle cell anemia and why it has been selected through natural selection. *[8]*

7. (a) Draw and label a graph showing a typical population growth curve. *[5]*

(b) Outline how sexual reproduction can give rise to genetic variation in a population. *[5]*

(c) Explain **two** examples of the evolution of specific populations of organisms in response to environmental change. *[8]*