INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

N01/410/S(2) A

BIOLOGY
STANDARD LEVEL
PAPER 2

Monday 5 November 2001 (afternoon)

1 hour

Name

Number

INSTRUCTIONS TO CANDIDATES

- Write your candidate name and 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 in a continuation answer booklet, and indicate the number of booklets used in the box below. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.
- At the end of the examination, indicate the number of the Section B question answered in the box below.

QUESTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
SECTION A	ALL	/20	/20	/20
SECTION B QUESTION	. . . . .	/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	. . . . .	TOTAL /40	TOTAL /40	TOTAL /40

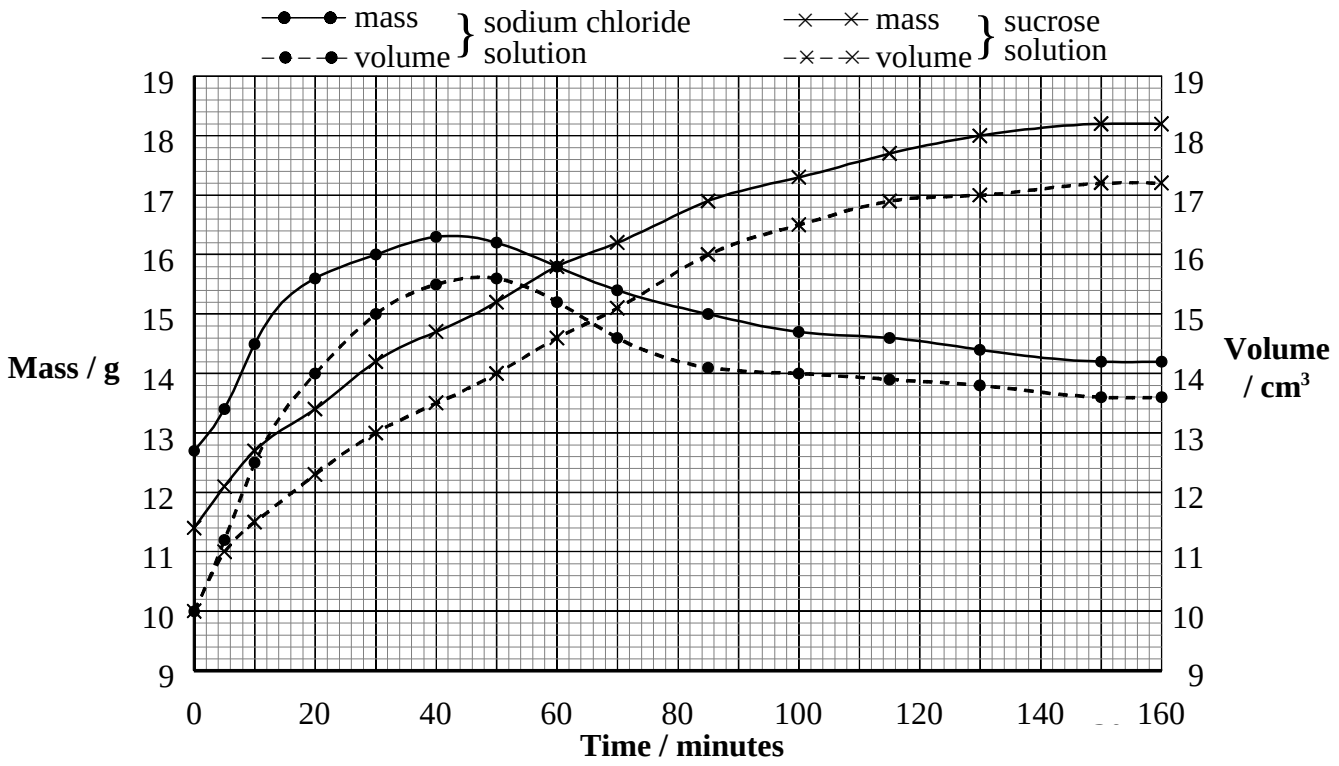
SECTION A

*Candidates must answer **all** questions in the spaces provided.*

1. Diffusion (passive transport) can be studied using bags made of an artificial permeable membrane. In an experiment, equal volumes of each of the following solutions were placed into separate bags:

6 mol dm^{-3} sodium chloride
6 mol dm^{-3} sucrose

The bags, each of the same size, were placed in distilled water at constant temperature. At regular intervals over a period of 160 minutes, both the volume and mass of each bag was measured. The data collected is shown below.



(a) Compare the rates of change in mass and volume for the two bags. *[2]*

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(b) Calculate the rates of increase in mass and in volume for the bag containing sodium chloride solution during the first 30 minutes. *[2]*

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(This question continues on the following page)

(Question 1 continued)

(c) Explain why the volume of both bags increases. *[2]*

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(d) Suggest why for a short time, there is a decrease in mass while the volume is still increasing for the bag containing sodium chloride solution. *[2]*

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Paramecium caudatum is a freshwater protist with contractile vacuoles that expel water. A culture of *P. caudatum* was exposed to different concentrations of salt and the number of vacuole contractions per minute were counted. The data is shown in the table below.

Salt concentration / arbitrary units	**Number of contractions per minute**
0	10
1	8
2	5
3	1
4	0

(e) Suggest a reason for the vacuole responses shown by this data. *[1]*

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(f) If a substance which prevents contractile vacuole activity was introduced into the environment of *P. caudatum*, predict what you would see. *[1]*

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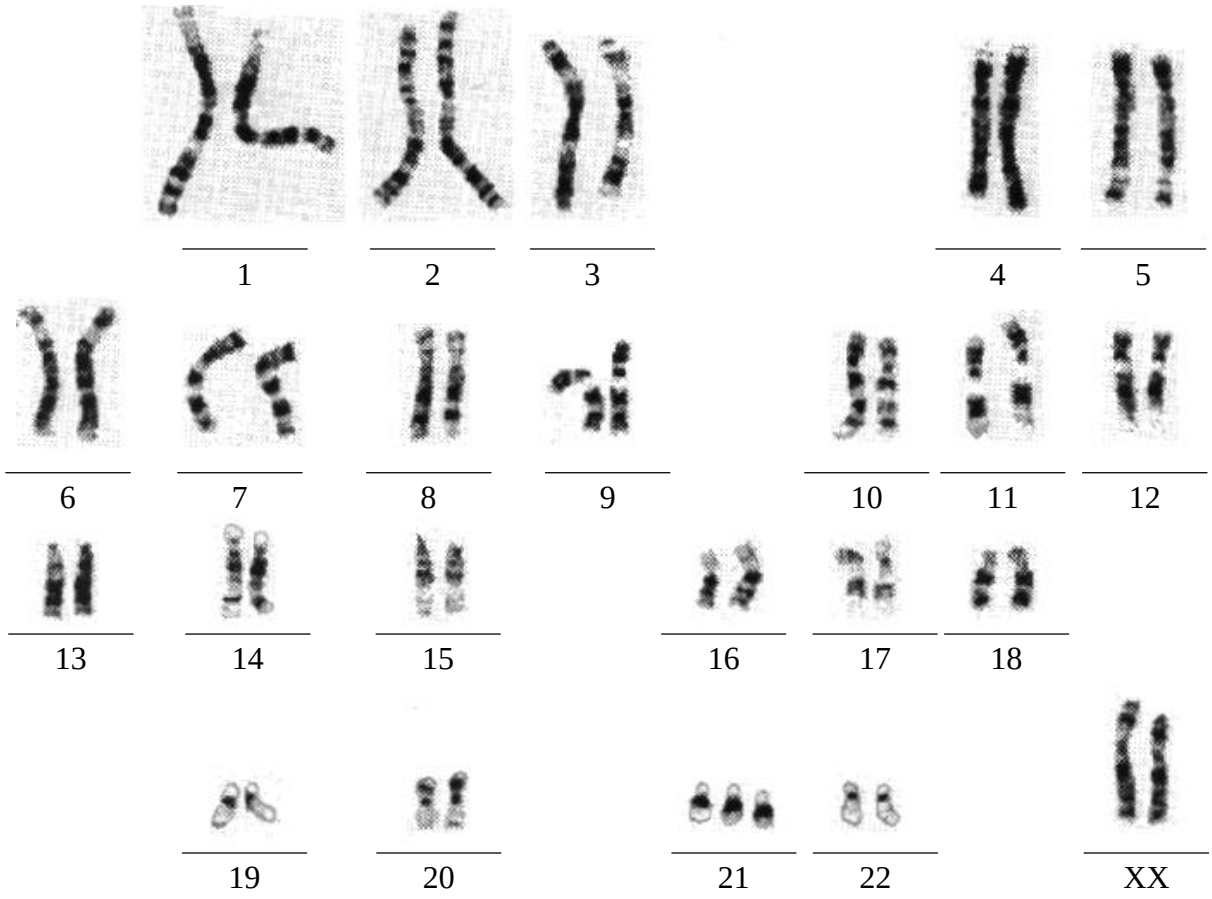
2. Examine the display of human chromosomes shown below.



(a) State the process by which this display is produced. *[1]*

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(b) Outline how this display is prepared. *[2]*

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(c) Using the data above, identify **two** characteristics of this person. *[2]*

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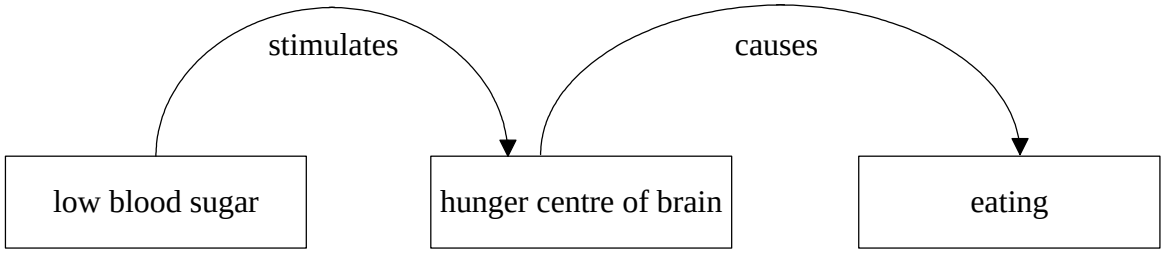
3. Study the incomplete diagram of the feedback mechanism shown below.



(a) Draw and label an arrow to complete this diagram. *[1]*

(b) State **two** systems that are directly involved in controlling homeostasis in humans. *[2]*

1. . . . . .

2. . . . . .

(c) Using a named example other than that shown above, explain the relationship between feedback and homeostasis. *[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 in a continuation answer booklet. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.*

4. (a) List **three** major groups of food macromolecules and the products formed upon complete digestion. *[3]*

(b) Describe where and how the macromolecules listed in (a) are digested. *[8]*

(c) Discuss with examples, the concept of a balanced diet including consequences of unbalanced diets. *[7]*

5. (a) Draw a clearly labelled pyramid of energy for a set of named organisms and explain its shape. *[8]*

(b) Explain how energy enters and leaves an ecological community. *[3]*

(c) Describe how you would measure **three** named abiotic factors of a habitat. *[7]*

6. (a) Outline the relationship between Mendel's Law of Segregation and meiosis. *[3]*

(b) Describe the relationship between meiosis and evolution of species by natural selection. *[7]*

(c) Discuss the advantages and disadvantages of cloning of crops and livestock. *[8]*