INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

N00/410/S(2)

BIOLOGY
STANDARD LEVEL
PAPER 2

Wednesday 15 November 2000 (afternoon)

1 hour

Name

Number

INSTRUCTIONS TO CANDIDATES

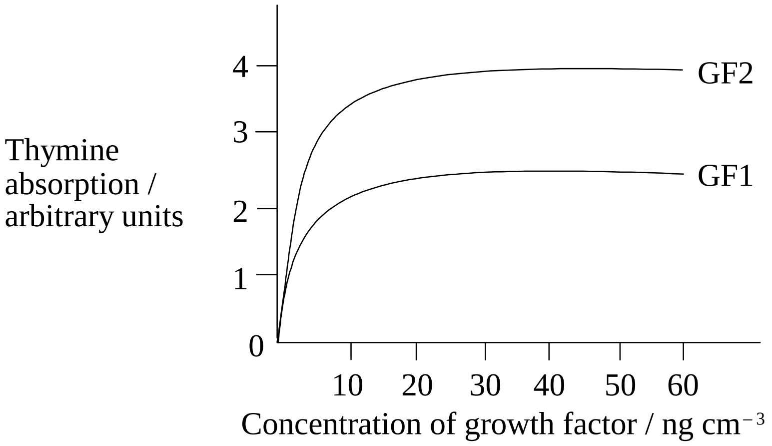
- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: Answer all of Section A in the spaces provided.
- Section B: Answer one question from Section B. You may use the lined pages at the end of this paper or continue your 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. Two identical groups of cells were grown in culture and were treated with a growth factor, either GF1 or GF2. Scientists measured the amounts of thymine absorbed into the cells. The results are shown in the graph.



(a) Using only the data in the graph, compare the effects of the two growth factors. *[3]*

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(b) In this experiment the amount of thymine absorption was used as a measure of the rate of DNA replication by the cell.

Suggest a reason why thymine was chosen in this experiment. *[1]*

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(c) Each growth factor acts by binding to a specific protein on the outside of the cell surface membrane. When a growth factor binds to this membrane, it stimulates changes inside the dividing cell.

Using this information, suggest reasons for the shape of the two curves on the graph. *[2]*

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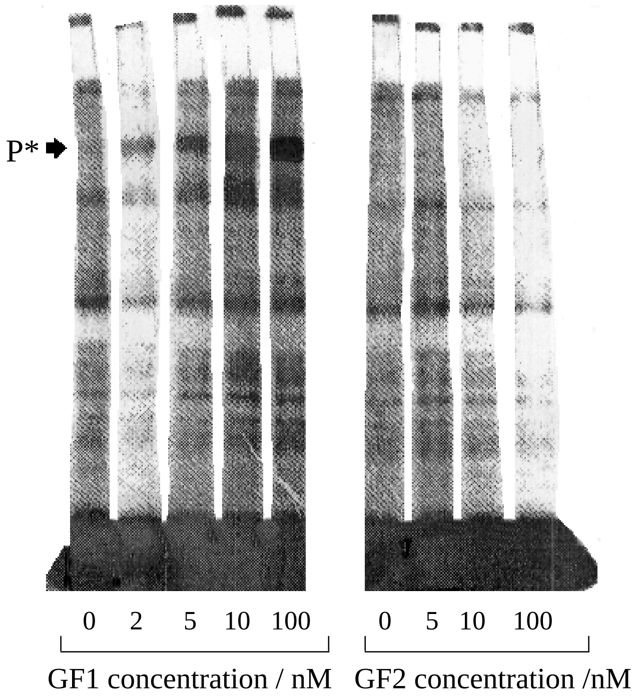
(This question continues on the following page)

(Question 1 continued)

One hypothesis is that the binding of the growth factors activates an enzyme (a kinase) attached to the inside of the membrane. This kinase enzyme uses phosphate as one of its substrates in reactions that eventually lead to cell division.

Cells growing in different concentrations of the two growth factors were treated with labelled phosphate (P*). The cells' membrane proteins were then separated by gel electrophoresis. The results are shown in the photograph below. Each dark band represents a protein. The band corresponding to the kinase enzyme with labelled phosphate is marked by P* on the photograph.



[Source: adapted from Yarden and Schlessinger, *Growth Factors in Biology and Medicine*, CIBA Foundations Symposium, Pitman Publ. Ltd., 1985]

(d) Compare the amounts of kinase labelled with phosphate in cells treated with different concentrations of the two growth factors. *[2]*

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(e) Use all of the data in the question to deduce the effects of the two growth factors. *[2]*

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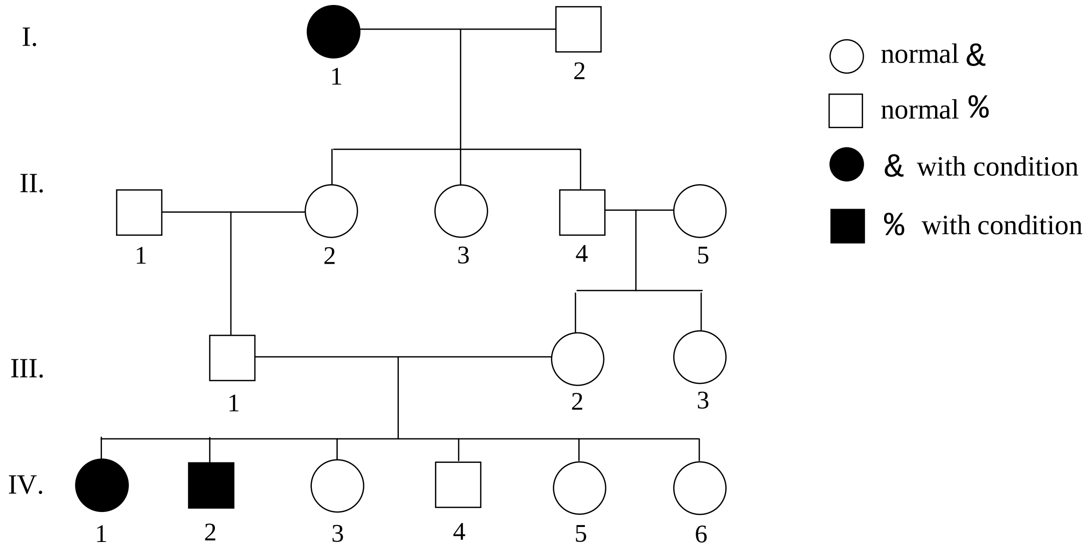
2. Using the table below outline **two** differences between the structure of arteries and veins, and explain a reason for each difference. *[4]*

Difference in structure between artery and vein	**Reason for difference**
1.	. . . .
2.	. . . .

3. The pedigree below shows the inheritance of a condition.



(a) (i) Deduce with a reason whether the condition is caused by a dominant or recessive allele. *[2]*

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(ii) Deduce with a reason whether the condition is sex-linked. *[2]*

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(b) Annotate the pedigree to show which people **must** be heterozygous. *[2]*

SECTION B

*Answer **one** question. Up to **two** additional marks are available for the construction of your answer. You may use the lined pages at the end of this paper or continue 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) Draw a diagram of the human female reproductive system. *[4]*

(b) Outline the stages in birth and the hormonal control, in the mother, of the birth process. *[6]*

(c) Explain how sexual reproduction promotes variation in a species and the advantages of variation to a species. *[8]*

5. (a) List what a plant needs in order to carry out photosynthesis and what the products of the process are. *[7]*

(b) Compare the energy content of **three** major classes of organic compounds. *[3]*

(c) Explain how energy is transferred and transformed in food chains. *[8]*

6. (a) Draw a generalised prokaryotic cell. *[5]*

(b) Outline a basic technique used to transfer genes between species. *[5]*

(c) Discuss the issues involved in genetic screening. *[8]*

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