

INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Cand ref no

Paper 2

Tuesday, 8 November 1988 (morning)

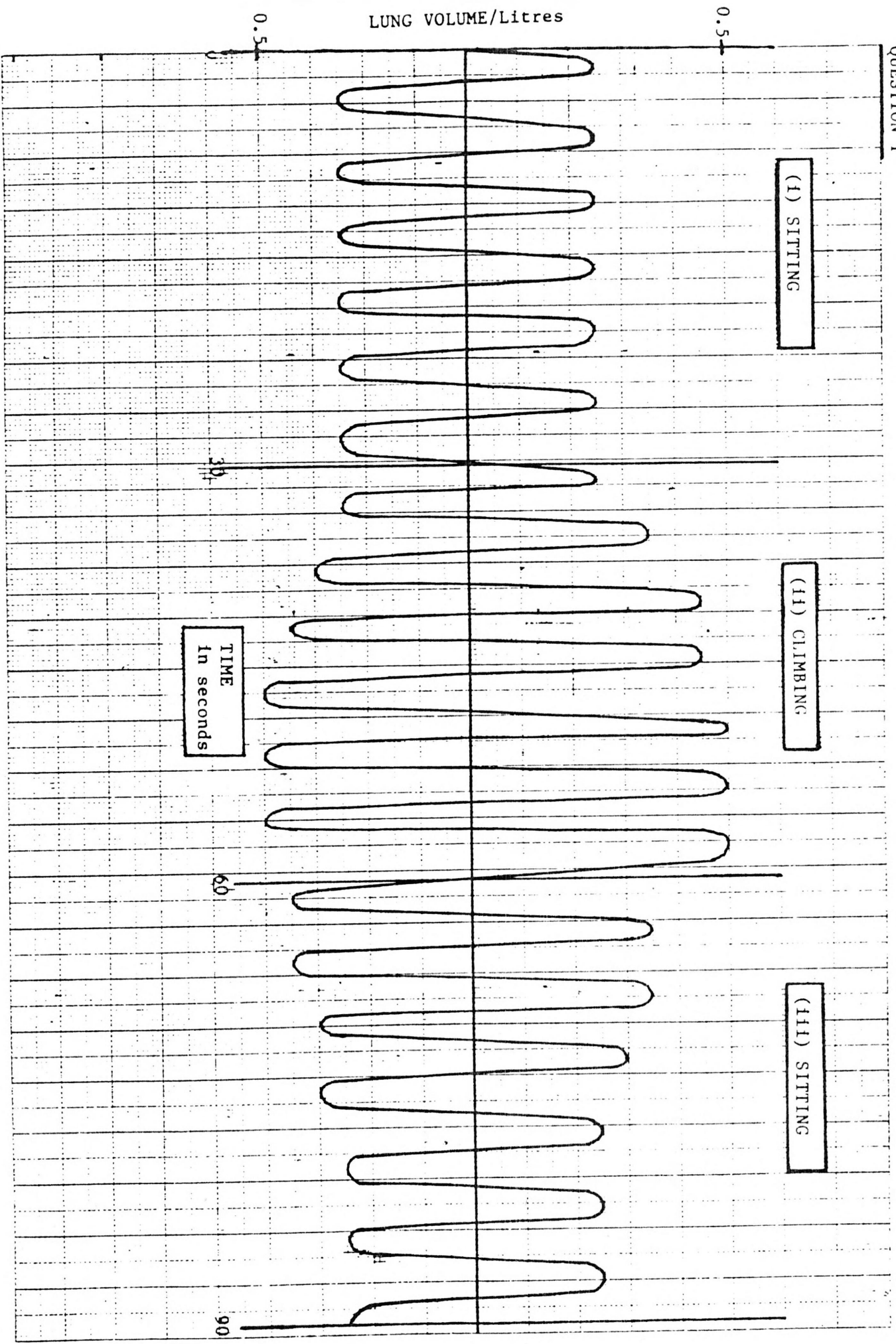
45 minutes

INSTRUCTIONS

*This Paper contains TWO questions, and you should attempt them both.
Write your answers in the spaces provided in this question book.*

QUESTION 1

Graph showing rate and depth of breathing in a man over a period of 90 secs



Question 1

The graph provided shows the depth and rate of breathing of a man who i) from sitting ii) climbs two flights of stairs and then iii) sits down again. Use the graph, together with your own knowledge of gas exchange and respiration to answer the questions. In answering the questions you are advised to show your working.

- (a) In i) sitting, what is the man's rate of breathing in breaths per minute? (1 mark)

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- (b) In i) sitting, what is the total volume of air breathed per minute? (1 mark)

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- (c) In ii) climbing, what is the man's rate of breathing in breaths per minute? (1 mark)

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- (d) In ii) climbing, what is the total volume of air breathed per minute. (1 mark)

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(e) Explain the difference between the amount of air breathed while

(i) sitting and

(ii) climbing.

(1 mark)

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(f) After climbing [iii) sitting] the man continues to breath more deeply than before [i) sitting]. Why? (2 marks)

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(g) How much air did the man breath for the purpose of climbing the stairs? (2 marks)

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(h) Approximately how much oxygen did the man use for the purpose of climbing the stairs? (1 mark)

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Question 2

In the fruit fly Drosophila:-

- (i) Black body (b) is recessive to the normal body colour (B).
- (ii) Short wing (λ) is recessive to the normal long (L) wing.
- (iii) Brown eyes (r) are recessive to red eyes (R).

These genes are linked on chromosome II.

- (a) Write out the genotype of a fly with normal body colour and red eyes heterozygous for both traits. (1 mark)

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In a test cross between a female heterozygous for body colour and eye colour and a black bodied, brown eyed male the following flies were produced:

- 20% normal body, red eyes
- 30% black body, red eyes
- 30% normal body, brown eyes
- 20% black body, brown eyes

- (b) Briefly explain these results. (2 marks)

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- (c) What is the map distance between the gene for body colour and the gene for eye colour? (2 marks)

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A second test cross between a female heterozygous for body colour and short wings and a black bodied short winged male gave the following results.

- 40% normal body, normal wings
- 10% black body, normal wings
- 10% normal body, short wings
- 40% black body, short wings

- (d) What is the map distance between the genes for body colour and wing length? (1 mark)

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- (e) On the 10 cm lines below construct two possible chromosome maps for the 3 genes. (2 marks)

line for Map 1 _____

line for Map 2 _____

- (f) What further breeding experiment is necessary to identify the correct map sequence of the 3 genes? (2 marks)

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