P530/2
BIOLOGY
Paper 2
2023
2½ hours

DONGO-SHEMA F. PAPERS

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Version: School ☒ National ☑ Seminar ☒ Textbook ☒

UACE BIOLOGY THEORY

Paper 2

2 hours 30 minutes

INSTRUCTIONS:

This paper consists of sections **A** *and* **B**.

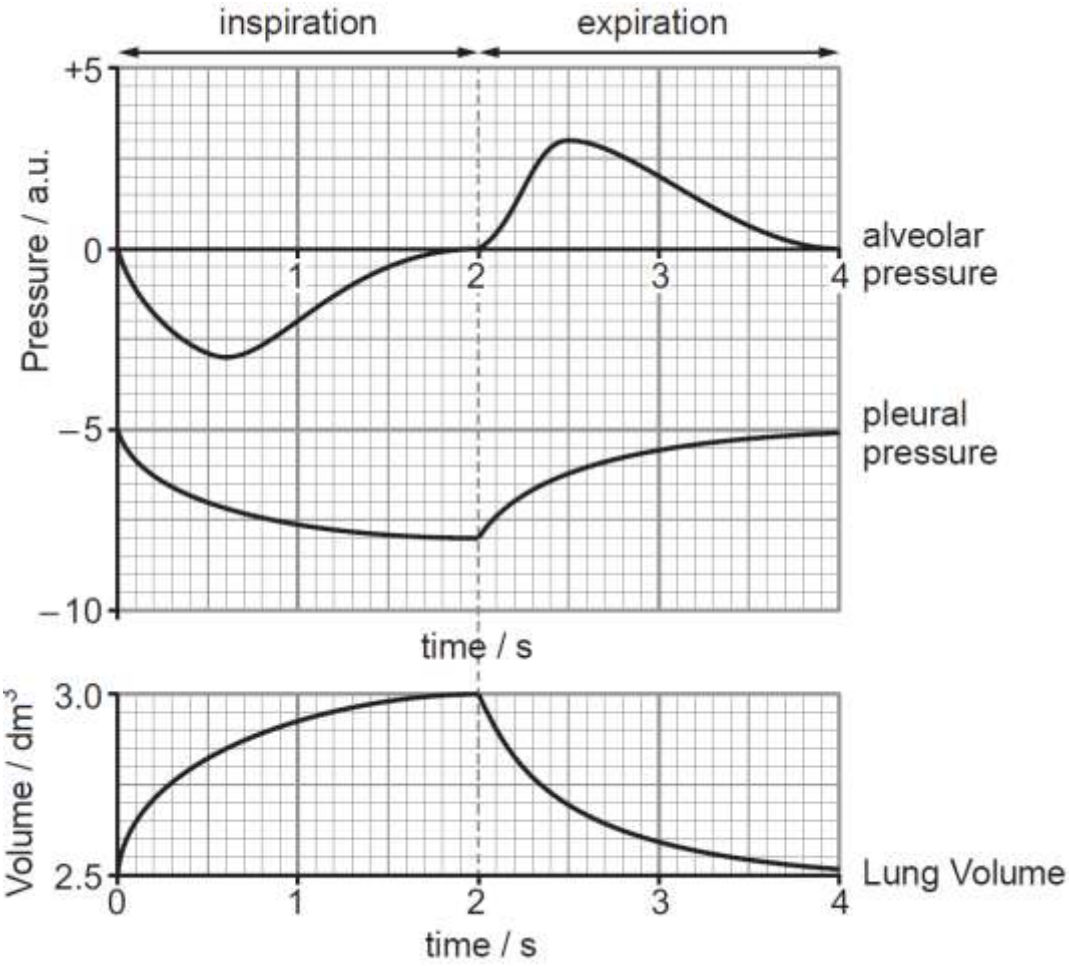
Answer question **one** *in section* **A** *plus* **three** *questions from section* **B**.

Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labelled diagrams where necessary.

SECTION A: (40 MARKS)

Question **1** *is* **compulsory.**

1. The graph below shows the pressure and volume changes during a single ventilation cycle of a healthy human at rest. The pressure is given in arbitrary units and the volume is measured in cubic decimetre (dm^3).



(a) From the graphs, describe the pressure and volume changes shown during

i) Inspiration. (*04 marks*)

ii) Expiration. (*04 marks*)

(b) Explain the changes in the pressure and volume shown during

i) Inspiration. (*08 marks*)

ii) Expiration. (*08 marks*)

(c) Suggest the changes that are expected in these curves during strenuous exercise. (*06 marks*)

(d) What is the role of the human respiratory system in maintaining homeostasis? (*10 marks*)

SECTION B: (60 MARKS)

2. In maize plants, the allele for glossy leaves (G) is dominant to the allele for normal leaves (g), and the allele for branching of ears (B) is dominant to the allele for no branching (b). A cross was carried out between a plant that is heterozygous for glossy leaves and branching of ears and a plant that is homozygous recessive.

(a) Use a genetic diagram to work out the expected phenotypic ratio in the offspring.

(b) The results of the cross are shown below:

- Glossy leaves, lots of branching - 126
- Glossy leaves, no branching - 81
- Normal leaves, lots of branching - 74
- Normal leaves, no branching - 133

What is the observed phenotypic ratio in the offspring?

(c) Suggest why the observed ratio is different from the expected ratio.

3. (a) Explain the concept of energy loss along a food chain. (*09 marks*)

(b) What factors contribute to energy loss in the ecosystem? (*05 marks*)

(c) How do human activities increase energy loss in the ecosystem? (*06 marks*)

4. (a) How do taxonomists classify plants and determine their relationships? (*10 marks*)

(b) What is the importance of plant taxonomy in understanding plant diversity and evolution? (*10 marks*)

5. (a) Compare meiosis and mitosis, highlighting the key features in their purpose, stages, and outcomes. (*10 marks*)

(b) Explain the role of meiosis in human reproduction and the inheritance of genetic traits. (*10 marks*)

6. (a) Compare the skeletal and muscular structures of mammals and birds related to locomotion. (*10 marks*)

(b) Explain how locomotor structures of mammals and birds enable efficient movement in their respective environments. (*10 marks*)

END.

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