PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 4: EXCHANGE AND TRANSPORT

SURFACE AREA TO VOLUME RATIO

SCORE	PERCENTAGE
/20	%

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Q1.

A scientist investigated the oxygen consumption of four different mammals.

The table shows the results of this investigation.

Mammal	Body mass / kg	Oxygen consumption / $dm^3\ h^{-1}$	Oxygen consumption / $dm^3\ kg^{-1}\ h^{-1}$
Shrew	0.002	0.0216	1.08×10^{1}
Cat	3	1.5	5.00×10^{-1}
Human	80	24	3.00×10^{-1}
Elephant	4000	50	

(i) Calculate the oxygen consumption of the elephant.

Convert your answer into standard form.

(2)

Answer ..... dm3 kg^{-1} h^{-1}

(ii) Explain the relationship between body mass and oxygen consumption in these mammals.

(4)

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(Total for question = 6 marks)

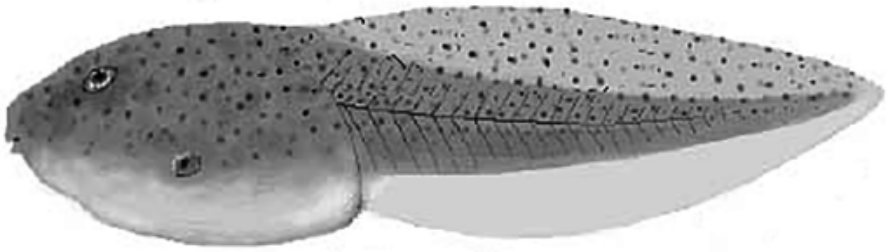
Q2.

The adult American bullfrog, *Rana catesbeiana*, can live in water or on land.

Adult frogs lay eggs in water where they are fertilised.

The fertilised eggs develop into tadpoles that live only in water.

The photograph shows a tadpole.



Adult frogs use lungs for gas exchange but tadpoles use gills.

Explain how gills are adapted for gas exchange.

(3)

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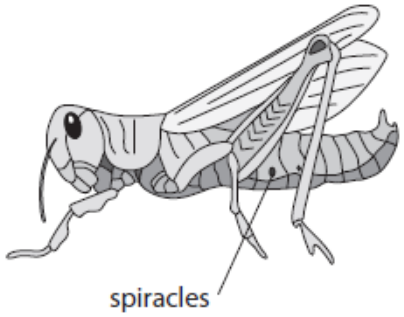
(Total for question = 3 marks)

Q3.

Insects such as locusts do not breathe through the mouth.

The gas exchange system of a locust includes air sacs, tracheae and tracheoles.

The diagram shows a locust before dissection.



Locusts have a complex gas exchange system because they are multicellular organisms.

Explain why single-celled organisms do not have a gas exchange system.

(2)

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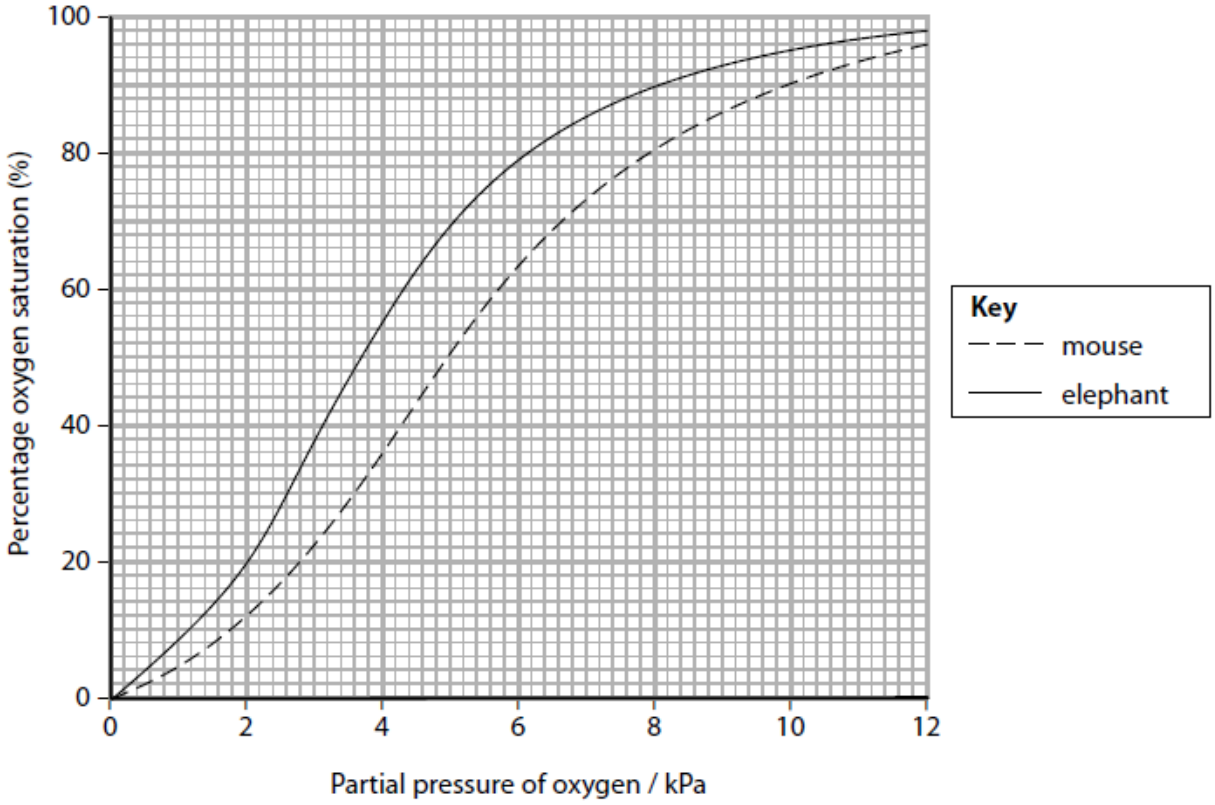
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(Total for question = 2 marks)

Q4.

The graph below shows the oxygen haemoglobin dissociation curves for a blood sample from an elephant and a mouse.



(a) Use the information in the graph to determine the difference in percentage saturation between elephant haemoglobin and mouse haemoglobin at a partial pressure of oxygen of 4 kPa.

(1)

Answer .....

*(b) Explain the effect that body size has on the metabolic rate of these two mammals.

(6)

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(Total for question = 7 marks)

Q5.

Water is needed for the transport of mineral ions through a plant.

Farmyard manure contains many mineral ions.

(i) Calcium ions in manure promote the growth of plants by increasing

(1)

☒ **A** amino acid synthesis

☒ **B** the production of chlorophyll

☒ **C** the strength of the middle lamella between cells

☒ **D** water loss by the leaves

(ii) Which of the following is the mechanism by which these calcium ions are transported from soil water into plants?

(1)

☒ **A** active transport

☒ **B** exocytosis

☒ **C** osmosis

☒ **D** transpiration