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BIOLOGY

ORGANISMS EXCHANGE SUBSTANCES

Level & Board	AQA (A-LEVEL)
TOPIC:	GAS EXCHANGE
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	6
TOTAL MARKS	36

Gas Exchange - 2

1.

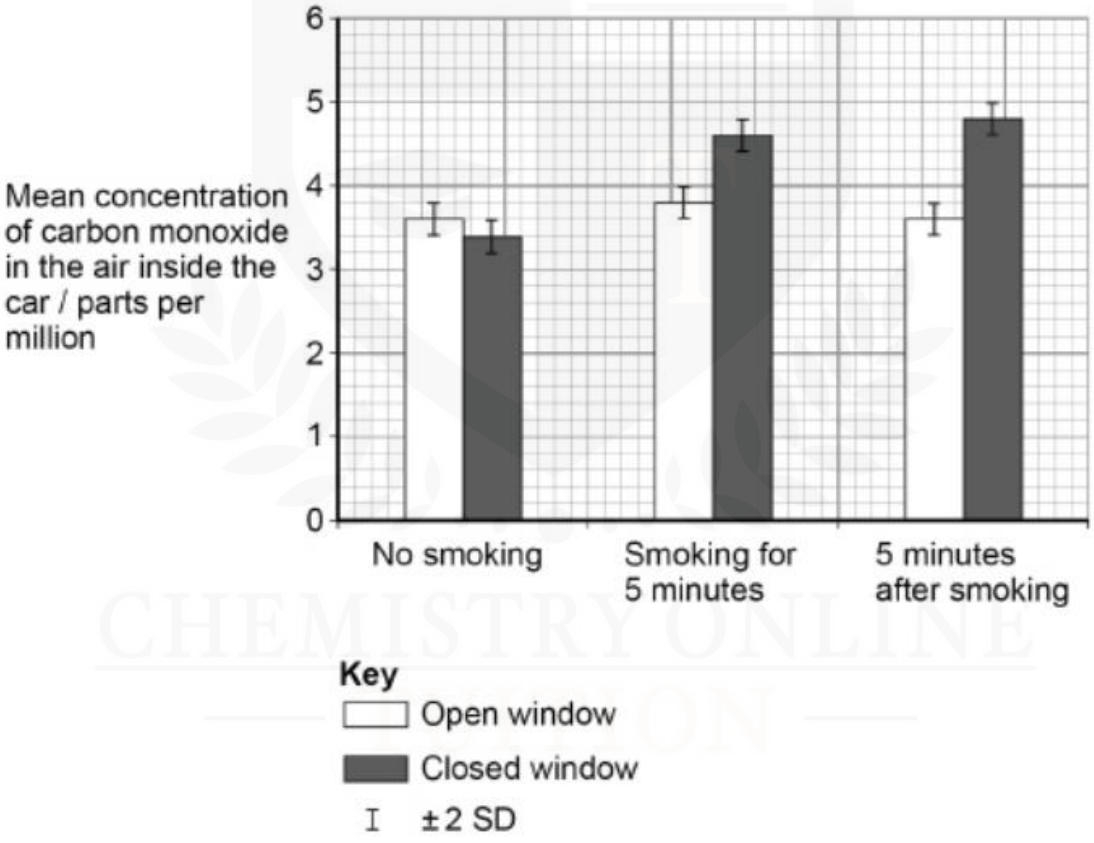
(a) Explain how an oxygen molecule travels from an alveolus to the blood.

(2)

(b) Describe a characteristic of an alveolus that makes efficient gas exchange possible. **(2)**

Cigarette smoke contains a toxic gas called carbon monoxide. It is possible for this carbon monoxide to enter the bloodstream and attach itself to hemoglobin.

Researchers looked into the amount of carbon monoxide present in cars, whether or not the occupants were smokers. The car windows were both open and closed when they took the concentration reading. The scientists' results are displayed on the graph exactly as they were given. Over 95% of the data falls within a range of ± 2 standard deviations from the mean.



(c) In October 2015, a law was introduced in England that outlawed smoking in cars containing individuals under the age of eighteen.

A lawmaker declared after the law's introduction that smoking in a car with a child inside is risky. Even on brief travels, higher concentrations of lethal toxins can accumulate, and since children breathe more quickly than adults do, they inhale more of the toxins.

Assess the politician's claims using the data in the graph and the information supplied. **(4)**

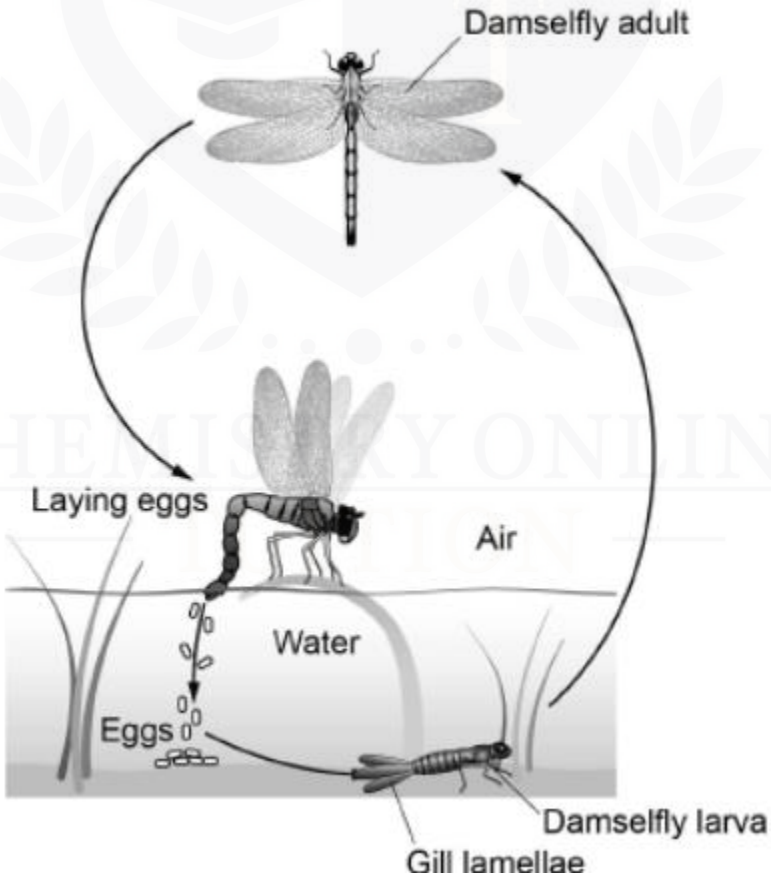
2.

(a) Explain the general layout of the human gas exchange system and the inhalation and exhalation processes. **(6)**

3.

(a) The stages of development of a damselfly insect are depicted in Figure 1.

Figure 1



(a) The tracheal system is used by adult damselflies to exchange gases.

Describe three adaptations made to an insect's tracheal system to facilitate effective gas exchange. **(3)**

1.

2.

3.

(b) The larva of the damselfly is an active hunter and carnivore. It takes in oxygen from water through its gills.

Similar in size and form to damselfly larvae, the larvae of certain other insect species also reside in water. These larvae lack gills and do not actively pursue prey.

Describe how the damselfly gills allow it to adapt to its environment. **(2)**

(c) Forty damselfly larvae were examined, and the size of each gill lamella was measured by a scientist.

His findings are displayed in the table.

Mean width / mm (± uncertainty / mm)	1.61 (± 0.19)
Mean width / mm (± uncertainty / mm)	6.12 (± 0.41)

Determine the average surface area of a single gill lamella. Assuming a rectangular gill lamella, respond with the appropriate number of significant figures.

Add the surface area error (uncertainty) percentage to your response.

Display your work. **(3)**

Mean surface area = _____

Percentage error (uncertainty) of surface area = _____

4.

(a) Describe two ways that fish gill structure has been modified to facilitate effective gas exchange. **(2)**

1

2

(b) Describe how the fish gills countercurrent mechanism makes sure that as much oxygen as possible enters the blood passing through the gills. (3)

5.

I am Sorry !!!!!

(a) Describe and explain how a fish gills exchange gases efficiently thanks to the countercurrent system. **(3)**

(b) Certain fish species gills are home to a parasite that causes amoebic gill disease (AGD). The illness results in the lamellae thickening and fusing together.

Fish gas exchange efficiency is decreased by AGD. Give two explanations for this. **(2)**

1

2

6.

(a) Identify the mechanism through which oxygen enters the bloodstream from an alveolus in the lungs. (1)

(b) Describe two modifications made to the alveolar structure to facilitate effective gas exchange. **(2)**

1

2

(c)

A fire-breather is seen in the picture forming a ball of fire. This is accomplished by fire-breathers by misting a flame with a thin layer of paraffin oil. It is possible to breathe in some of this mist, which could eventually cause fibrosis.

Many times, people who have been fire breathers for a long time discover that their exhalation is improper. Describe your reasoning. **(2)**

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