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# BIOLOGY

## ORGANISMS EXCHANGE SUBSTANCES

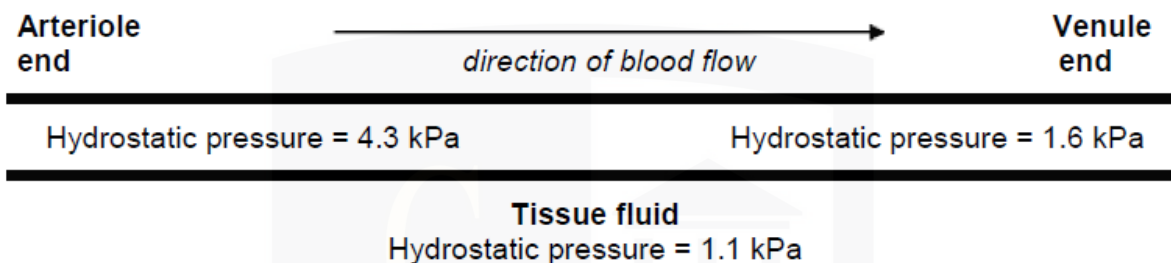
Level & Board	AQA (A-LEVEL)
TOPIC:	SURFACE AREA VOLUME RATIO
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	5
TOTAL MARKS	41

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## Surface Area to Volume Ratio - 2

1.

The capillary encircled by tissue fluid is depicted in the figure below. The hydrostatic pressure readings are displayed.



(a) Explain the production of tissue fluid using the details shown in the preceding graphic. (2)

(b) From the capillary arteriole end to its venule end, the hydrostatic pressure decreases. Describe your reasoning. (1)

(c) Tissue fluid builds up as a result of high blood pressure. Describe how?

(3)



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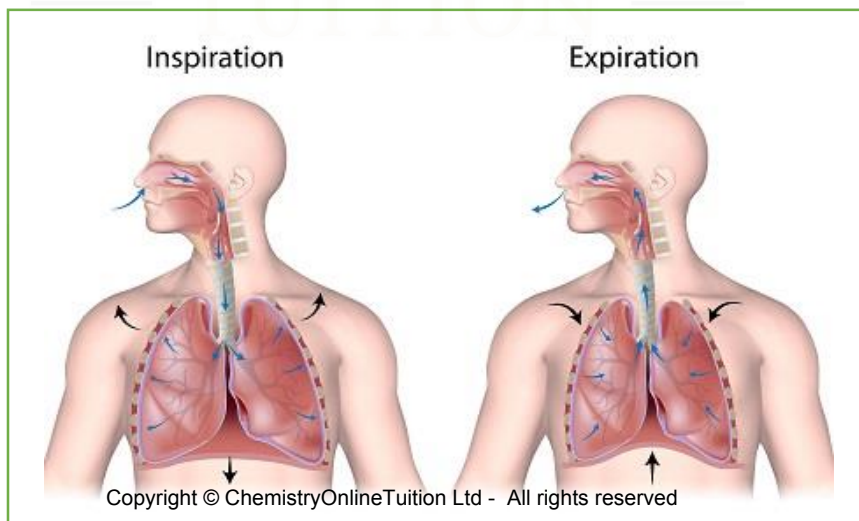
**(d)** At the venule end of the capillary compared to the arteriole end, the blood plasma water potential is more negative. Describe your reasoning. **(3)**



**2.**

Forced expiration is the process of exhaling as forcefully as possible.

**(a)** Describe and elucidate the process by which forced expiration occurs. **(4)**





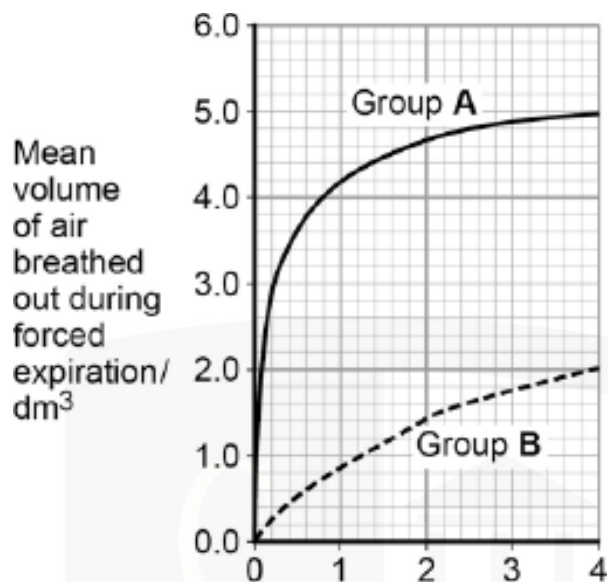
Two sets of individuals offered their time to participate in a study.

Individuals in group B were recuperating after an asthma attack, whereas those in group A were in good condition.

Everyone took the deepest breath they could. Then, they forced themselves to exhale.

A scientist measured how much air each subject exhaled during forced expiration.

The results are shown in the graph below.



**(b)** A person forced expiration volume, or FEV, is the amount of air they can exhale in one second.

Determine the percentage of group B FEV that was lower than group A using data from the first second of forced expiration. **(1)**

Answer = ..... %

**(c)** Group B members were convalescing from an asthma episode. Describe how the decrease in mean FEV seen in the following figure was brought on by an asthma attack. **(4)**

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**3.**

Plants have the ability to transfer organic substances from their leaves to their roots. This movement, known as translocation, takes place in the plant phloem tissue.

**(a)** Organic materials are forced from a high pressure in the leaves to a lower pressure in the roots, according to one translocation idea.

Explain the process by which the leaves generate tremendous pressure.

**(3)**



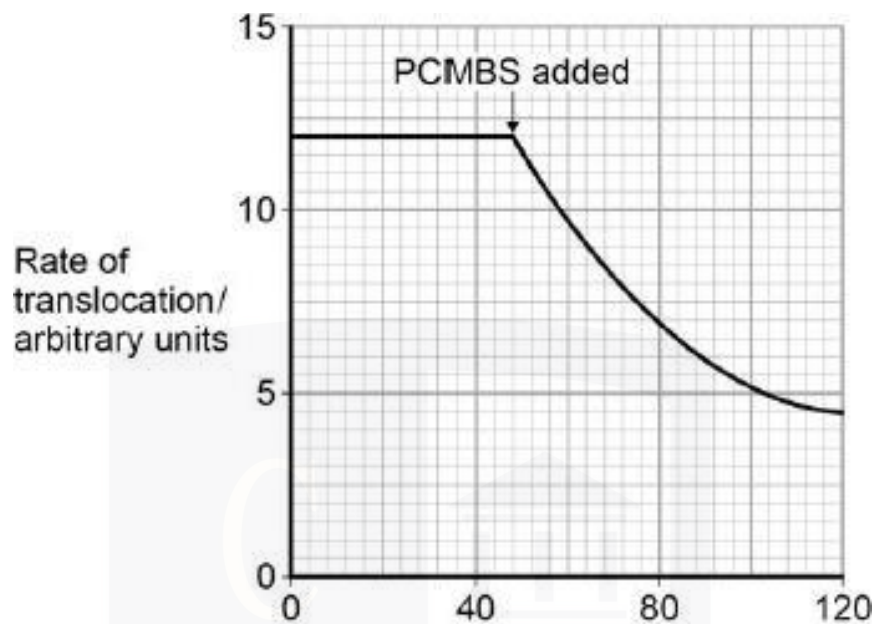
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PCMBS is a chemical that prevents plant cells from absorbing sucrose.

Researchers looked into how PCMBS affected the sugar beet plant rate of translocation. Their results are shown in the image below.

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**(b)** The scientists made sure that their plant rate of photosynthesis didn't change throughout the experiment. Describe the significance of this. **(2)**

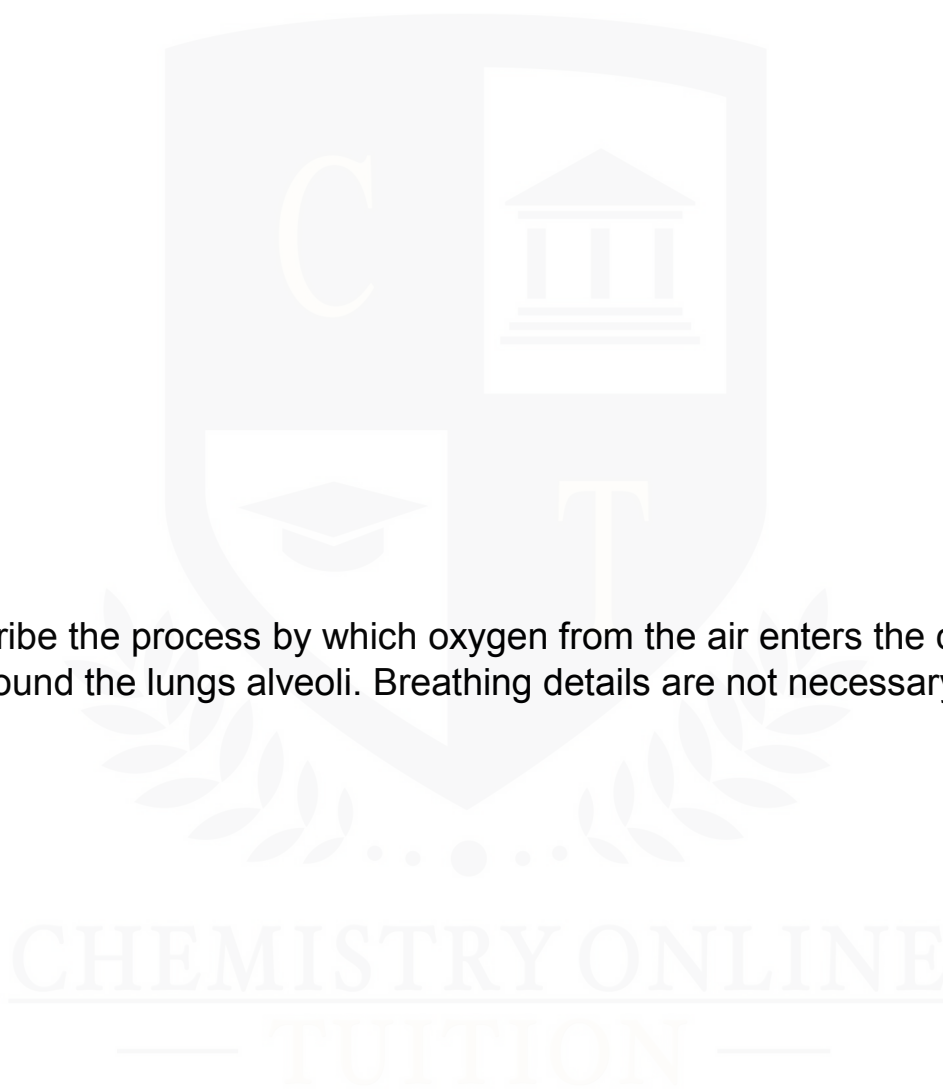
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**(c)** The researchers came to the conclusion that there had to be some translocation taking on in the cell wall gaps. Describe how the data in the aforementioned figure leads to this conclusion. **(2)**

**4.**

**(a)** Describe the process by which oxygen from the air enters the capillaries that surround the lungs alveoli. Breathing details are not necessary. **(4)**

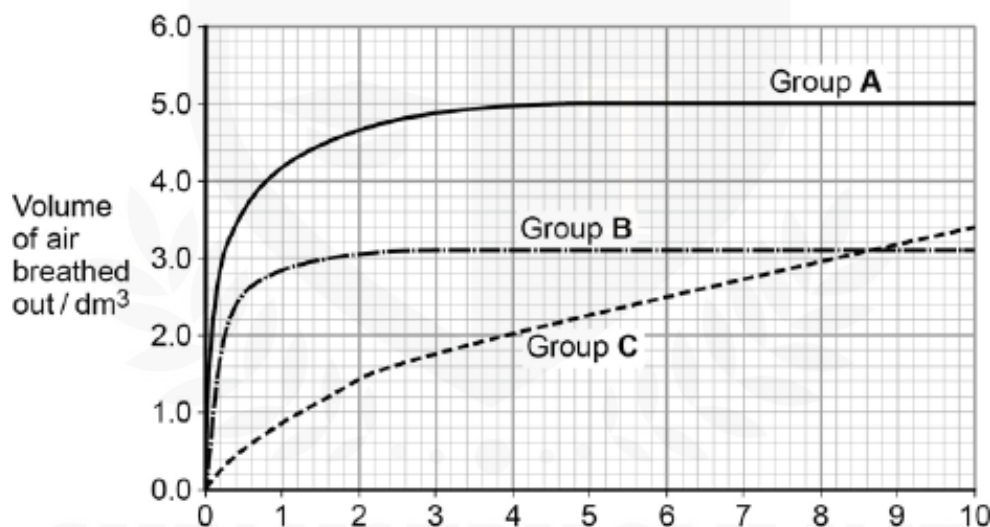


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A person maximum air volume that they can exhale in a single second is known as their forced expiratory volume, or FEV.

A person's forced vital capacity (FVC) is the maximum amount of air they can exhale in a single breath.

The findings of the air volume exhaled by the three groups of individuals, A, B, and C, are displayed in the figure below. Lung health was good in Group A. Different lung diseases that influence respiration were seen in Groups B and C.



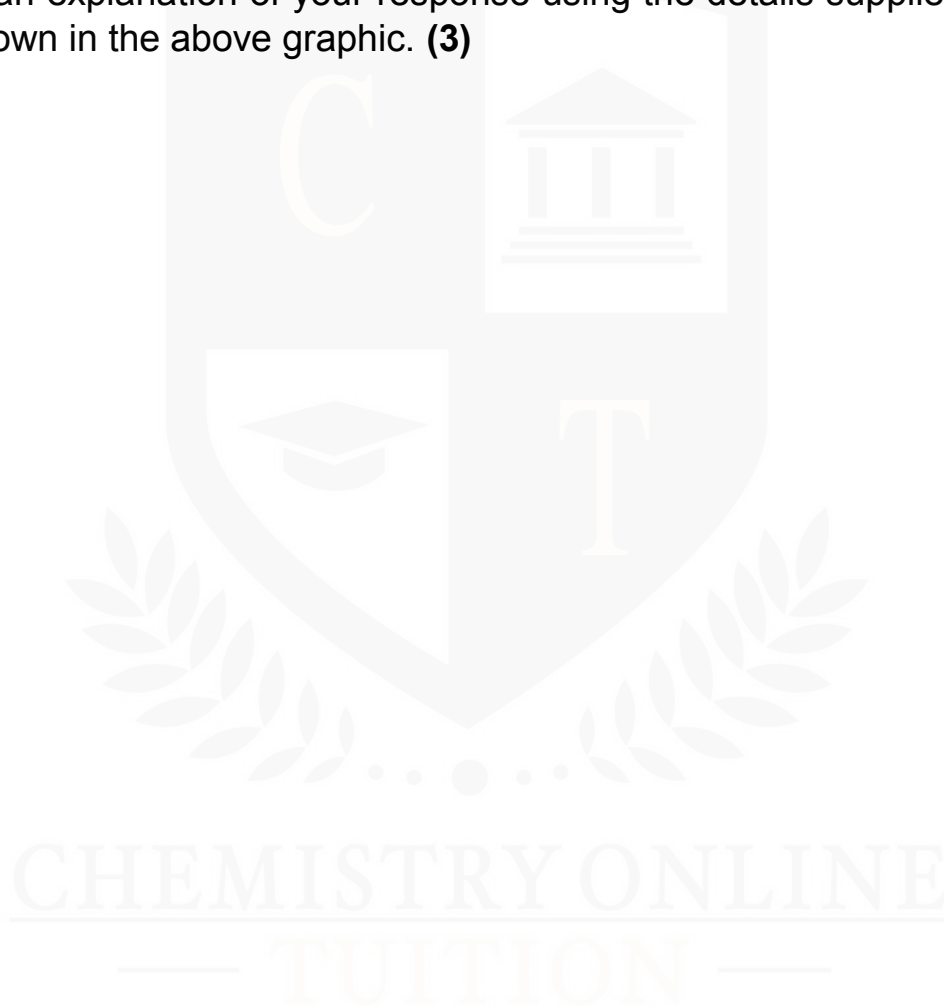
(b) Determine the group C FEV decrease as a percentage of the healthy population. (1)

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Answer = .....

**(c)** Bronchioles are impacted by asthma, which also reduces airflow into and out of the lungs. Fibrosis decreases lung capacity but has no effect on bronchioles.

Which group B or C contained individuals suffering from pulmonary fibrosis? Provide an explanation of your response using the details supplied and the proof shown in the above graphic. **(3)**



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**5.**

**(a)** During intense activity, the hemoglobin oxygen dissociation curve moves to the right. Describe the benefits of this change. **(3)**



Mammals that dive and inhabit frigid climates are called Weddell seals. In **Figure 1**, a Weddell seal is displayed.

**Figure 1**



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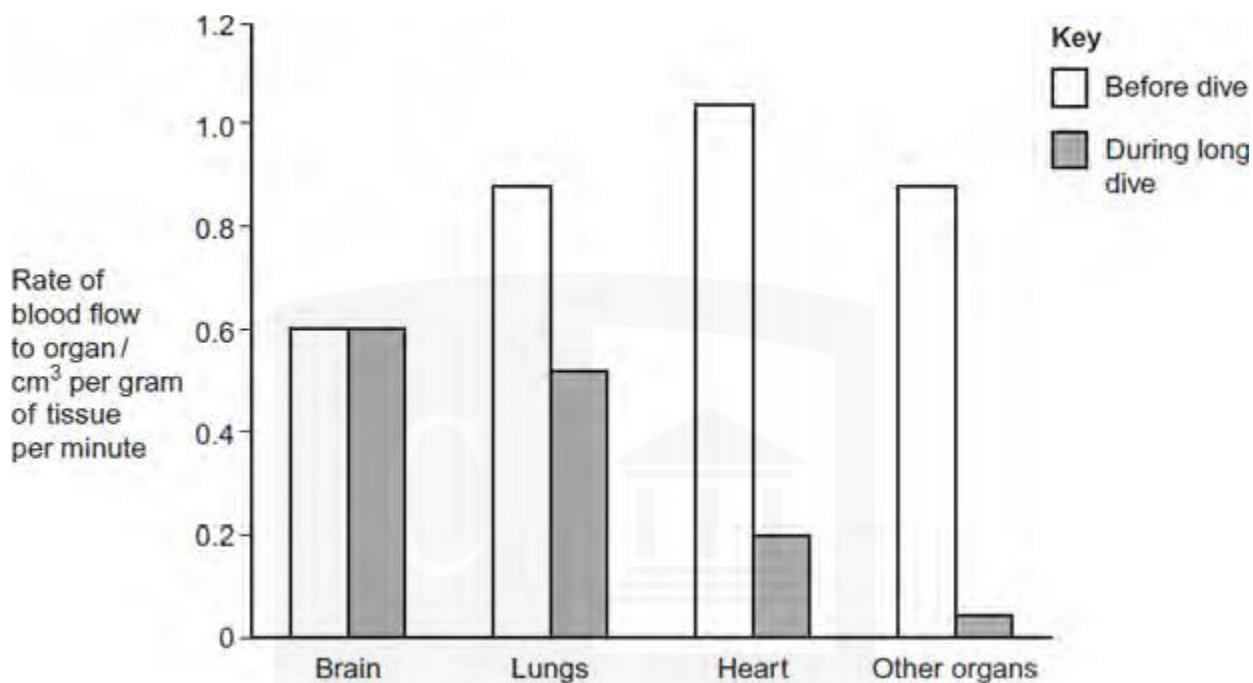
**(b)** Describe how a Weddell seal body form is an adaptation for living in a cold climate. **(2)**

**(c)** Weddell seals have a lengthy underwater lifespan. **Figure 2** depicts the blood flow rate to various organs of a Weddell seal both prior to and during an extended dive.

**Figure 2**

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Explain and describe how a prolonged dive affects the various organs blood flow rates. **(3)**

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