

# 6.4 Gas Exchange

## Question Paper

Course	DP IB Biology
Section	6. Human Physiology
Topic	6.4 Gas Exchange
Difficulty	Hard

**Time allowed:** 10  
**Score:** /5  
**Percentage:** /100

### Question 1

During a gas exchange investigation, measurements were recorded from four animals that were observed as they breathed normally over a period of 5 minutes. Note that the efficiency of gas exchange was the same in all four animals and that tidal volume refers to the volume of air that moves into the lungs with each normal breath.

Which animal had the highest oxygen intake during five minutes of normal breathing?

Animal	Tidal volume / dm <sup>3</sup>	Breathing rate / breaths per minute
A.	0.2	10
B.	0.6	20
C.	0.5	18
D.	0.33	24

[1 mark]

### Question 2

Which row of the table contains five correct statements about forced expiration?

	Ribs	Diaphragm	Pressure in thorax	External intercostal muscles	Internal intercostal muscles
A.	Move down and inwards	Contracts	Increases	Relax	Relax
B.	Move down and inwards	Relaxes	Increases	Relax	Contract
C.	Move down and inwards	Relaxes	Decreases	Recoil	Contract
D.	Move up and outwards	Contracts	Decreases	Contract	Contract

[1 mark]

### Question 3

Four patients, all male and in the age range 60–65, visited their family doctor complaining of breathing difficulties. The doctor asked each man a series of questions about his symptoms and lifestyle.

Based upon the men's lifestyles and their lists of symptoms, which patient is at the highest risk of lung cancer?

Patient	Smoker / how many cigarettes?	Coughing?	Fatigue?	Appetite?	Other
A.	Yes - 20 per day since age 18	Yes - sometimes with blood	Every day	Poor	Worked with asbestos in his 20s
B.	Yes - 5 per day since age 18	Yes - frequent	No	High	BMI = 39
C.	No	Yes - especially at night	Occasionally	Normal	Dry, flaky skin
D.	40 years at 20 per day but quit smoking completely 5 years ago	Yes - persistent colds and coughs	Occasionally	Poor	Chest pains

[1 mark]

### Question 4

Anti-smoking groups have conducted a long-running campaign to link smoking to lung cancer in a causal relationship. This relationship was finally proved in the British Doctors Study that ran from 1951–2001.

Which is **not** a factor that contributed to this causal link being proven?

- A. High response rates from patients were seen in the study.
- B. Epidemiological data was gathered over a long period of time.
- C. Many confounding variables were taken into account and then eliminated.
- D. Many experiments were carried out to increase the experimental data available.

[1 mark]

### Question 5

Some of the effects of smoking are given below.

1. Alveolar walls become less elastic.
2. Increased nerve impulse transmission occurs in parts of the brain.
3. Heart rate increases.
4. The risk of changes to genes involved in controlling the cell cycle increases.

Which row of the table contains the smoking-related causes of effects 1–4? Note that 'tar' in this context is a term used for the combination of insoluble and viscous chemicals found in tobacco smoke.

	1.	2.	3.	4.
<b>A.</b>	Increased activity of phagocytes	Increased activity of phagocytes	Nicotine in tobacco binds to acetylcholine receptors	Stimulation of the glands that secrete epinephrine/adrenaline
<b>B.</b>	Stimulation of the glands that secrete epinephrine/adrenaline	Inhalation of tar	Stimulation of the glands that secrete epinephrine/adrenaline	Increased activity of phagocytes
<b>C.</b>	Increased activity of phagocytes	Nicotine in tobacco binds to acetylcholine receptors	Stimulation of the glands that secrete epinephrine/adrenaline	Inhalation of tar
<b>D.</b>	Inhalation of tar	Inhalation of tar	Nicotine in tobacco binds to acetylcholine receptors	Stimulation of the glands that secrete epinephrine/adrenaline

[1 mark]