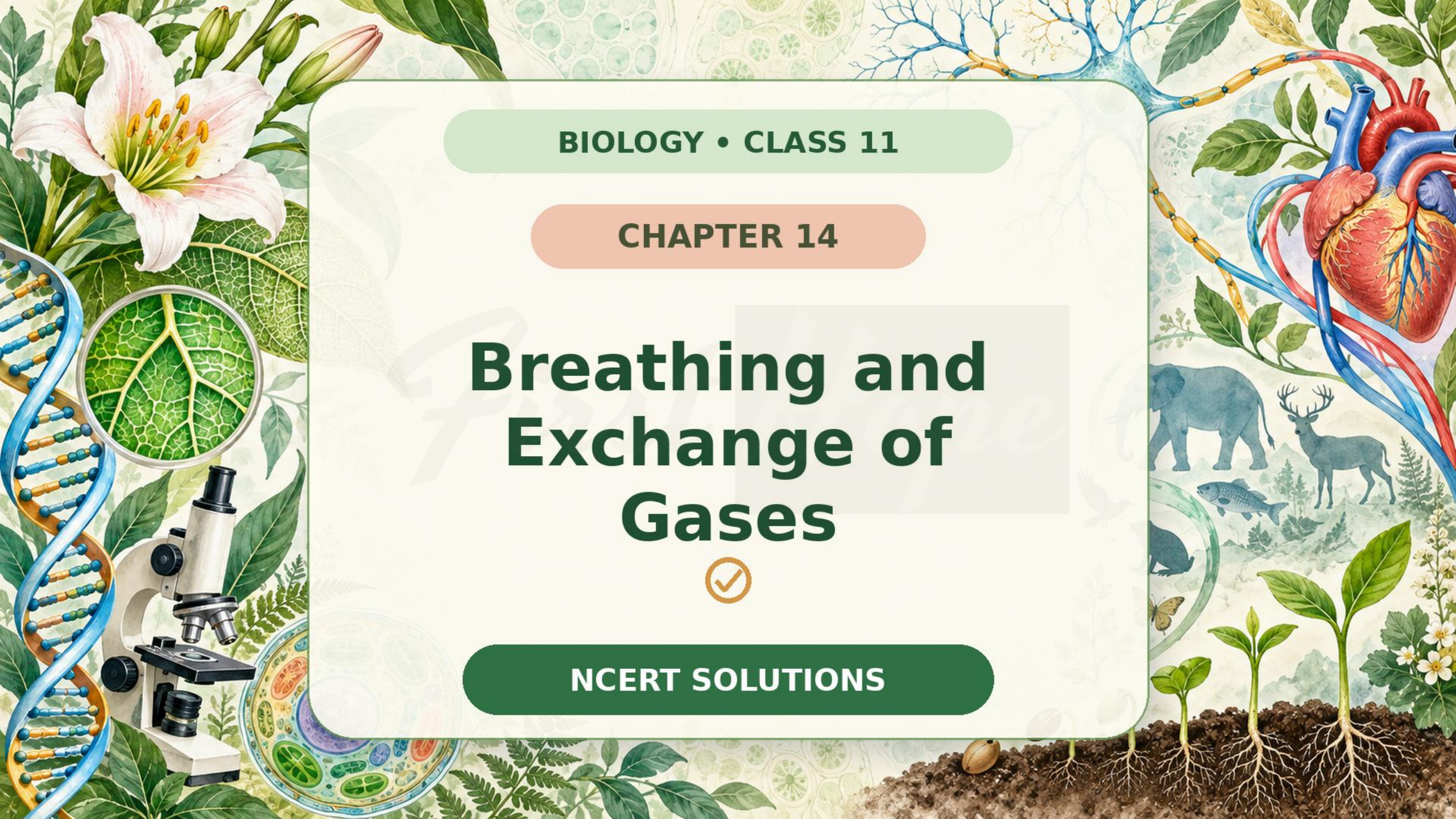


A vibrant collage of biological illustrations. On the left, a pink lily flower is in bloom, with green buds and leaves. Below it, a blue and orange DNA double helix is visible. A magnifying glass focuses on a green leaf's vein structure. A microscope is positioned in the lower-left corner. The background is filled with various green leaves and plant patterns. On the right, a detailed illustration of a human heart with red and blue blood vessels is shown. Below the heart, there are silhouettes of an elephant, a deer, and a fish. At the bottom, a small green plant with roots is growing out of a mound of brown soil.

BIOLOGY • CLASS 11

CHAPTER 14

Breathing and Exchange of Gases



NCERT SOLUTIONS

EXERCISE SOLUTIONS: QUESTIONS 1-2

1. Define vital capacity. What is its significance?

Answer:

Vital capacity (VC) is the maximum volume of air a person can breathe out after a forced inspiration, or breathe in after a forced expiration.

$$VC = IRV + TV + ERV$$

Significance of vital capacity:

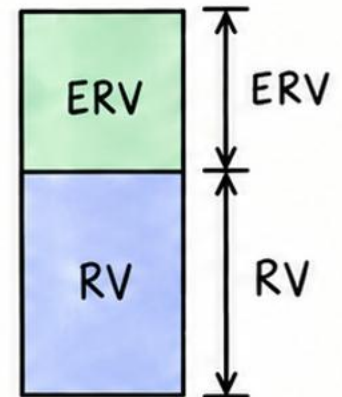
- shows the maximum ventilating capacity of the lungs.
- helps assess pulmonary function and respiratory health.
- is generally greater in trained athletes.

2. State the volume of air remaining in the lungs after normal breathing.

Answer:

After a normal expiration, the air left in the lungs is the functional residual capacity (FRC).

$$FRC = ERV + RV \approx 2100-2300 \text{ mL (about 2.3 L)}$$



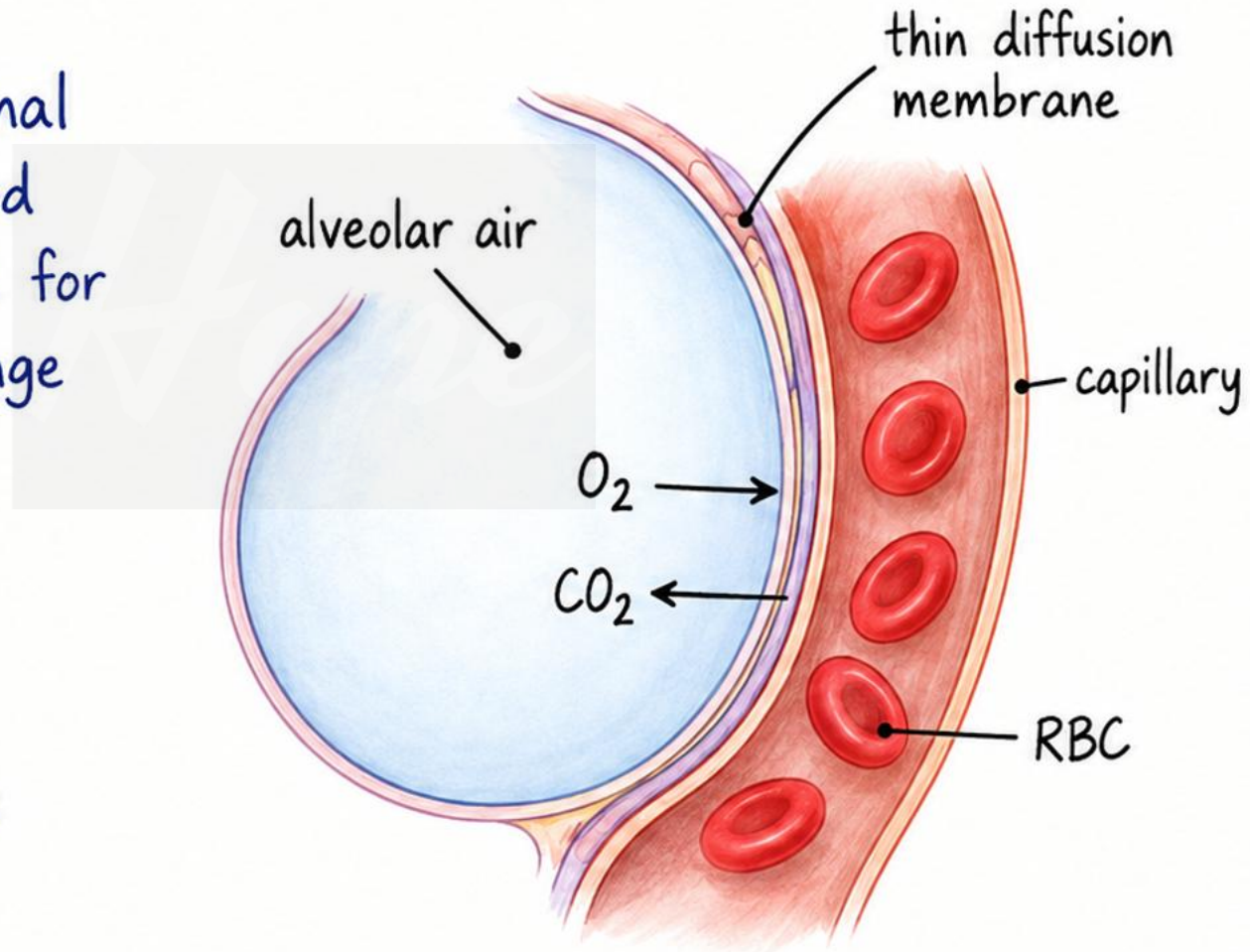
EXERCISE SOLUTION: QUESTION 3

3. Diffusion of gases occurs in the alveolar region only and not in other parts of the respiratory system. Why?

Answer:

The conducting part, from nostrils to terminal bronchioles, mainly carries, filters, warms and humidifies air. Its walls are not specialised for rapid gas exchange. Alveoli form the exchange part because they provide:

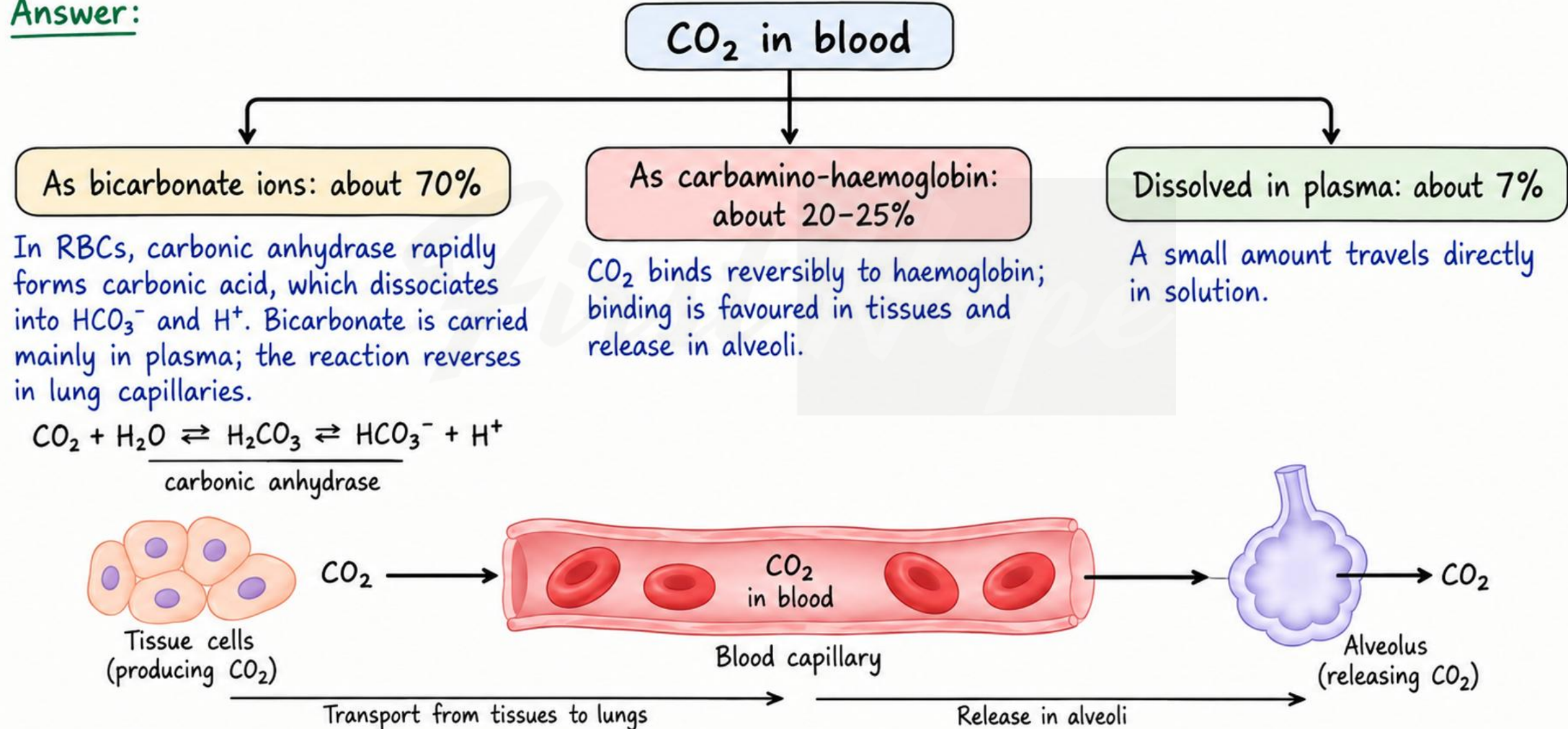
- a very large surface area
- an extremely thin diffusion membrane
- a moist surface
- a dense network of pulmonary capillaries with suitable pO_2 and pCO_2 gradients.



EXERCISE SOLUTION: QUESTION 4

4. What are the major transport mechanisms for CO_2 ? Explain.

Answer:



EXERCISE SOLUTIONS: QUESTIONS 5–6

5. What will be pO_2 and pCO_2 in atmospheric air compared with alveolar air?

Answer:

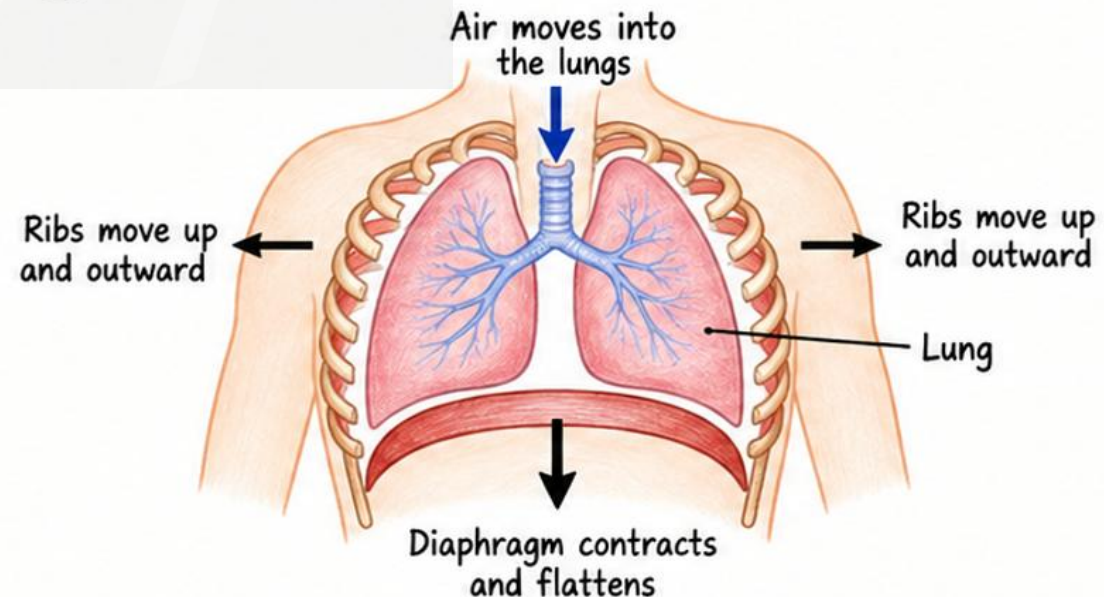
Correct option: (ii) pO_2 higher, pCO_2 lower.

Parameter	Atmospheric air	Alveolar air
pO_2	159 mm Hg	104 mm Hg
pCO_2	0.3 mm Hg	40 mm Hg

6. Explain inspiration under normal conditions.

Answer:

- ① Diaphragm contracts and flattens.
- ② External intercostal muscles contract; ribs and sternum move up and outward.
- ③ Thoracic volume and pulmonary volume increase.
- ④ Intrapulmonary pressure falls below atmospheric pressure.
- ⑤ Air moves into the lungs.





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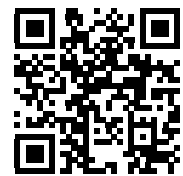


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