

13 RESPIRATION **KEY**

I. Behavioural objectives:

1. inspiration, oxygen transfer (into blood), carbon dioxide transfer (out of blood), expiration.
2. Path of air = nasal passages (warm and moisten the air), pharynx, trachea, bronchus, bronchiole, alveolus (oxygen-carbon dioxide transfer).
3. Inspiration triggered by high CO₂ levels in blood. These trigger diaphragm and rib muscles to contract, drawing air into the lungs because of the reduced air pressure. Once lungs are filled, alveolar walls stretch and send message to brain to STOP inhalation and relax diaphragm and rib muscles. Air is forced out by the relaxation.
4. External respiration: Occurs in the alveoli of the lungs and is the transfer of oxygen INTO the blood and the transfer of CO₂ out of the blood.
Internal respiration: Occurs in the body cells and is the opposite transfer (oxygen OUT OF the blood and the transfer of CO₂ INTO of the blood).
5. Hemoglobin is well suited to carry oxygen because each molecule of haemoglobin can carry 4 molecules of oxygen and this is REVERSIBLE. Once one molecule of oxygen is bound to haemoglobin (at the lungs), it is easier to pick up the other 3. Also once one molecule of oxygen is dropped off at the cells, it is easier to drop off the other 3. Hemoglobin LOSES oxygen most easily in a more acidic environment (like the cells) and GAINS oxygen most easily in a less acidic environment (like the lungs)
6. Research emphysema, chronic bronchitis, pneumonia, and asthma.
7. Smoking covers the lungs with tar. This tar, and other compounds in the smoke, are initiators and promoters for lung cancer. Also, cause emphysema.

II. Pretest

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|-------------------|----------------------------|
| 1. respiration, | 5. diffusion |
| 2. bronchi, | 6. bicarbonate |
| 3. out; down | 7. higher ; lower |
| 4. carbon dioxide | 8. oxygen , carbon dioxide |

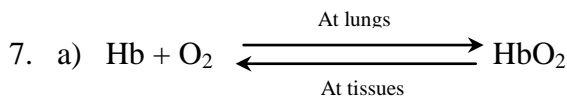
III. Definitions: See index of your own text or use the ones, below, from

1	Breathing	The process, during which air is inhaled into the lungs through the mouth or nose due to muscle contraction, and then exhaled due to muscle relaxation.
2	Ext. respiration	O ₂ into blood, CO ₂ out of blood, at lungs.
3	Int. respiration	O ₂ out of blood (and into cells), CO ₂ out of cells and into blood, at body cells.
4	Cellular respiration	O ₂ + glucose → CO ₂ + H ₂ O + 38 ATP
5	Inspiration	Breathing in
6	Expiration	Breathing out
7	Vocal cords	Fold of tissue in larynx which makes sound when vibrates
8	Trachea	Windpipe – goes from larynx to bronchi. Tube for air to get to lungs.
9	Bronchi	What the trachea 1 st divides into to take air to each individual lung.
10	Bronchioles	The smaller branches that each bronchus divides into before ending at alveoli.
11	Alveoli	Smallest division of a lung – the tiny air sac
12	Ventilation	Movement of air in and out – the process of breathing.
13	Ribs	Bones that surround chest cavity and protect lungs. Have muscles between them that flex to bring rib cage up and cause air to enter lungs.

14	Diaphragm	Dome shaped horizontal sheet of muscle and connective tissue that divides the thoracic cavity from the abdominal cavity. Flexion of this muscle causes it to flatten out and drop down, causing air to enter lungs (due to lower air pressure inside thoracic cavity than outside it).
15	Pleural membranes	Membranes that enclose each lung. Two layers – (1) membrane around each lung, (2) membrane around inner chest wall. Three functions: (1) reduce friction (lubrication), (2) keep difference in pressures, (3) compartmentalize each lung so that if one gets infected the other does not.
16	Hemoglobin	The iron containing pigment (coloured chemical) found in red blood cells that combines with and transports oxygen.

IV. Study questions

- Path of air: nasal passages, trachea, bronchi, bronchioles, then alveoli. (Alveoli are where gas exchange actually occurs).
- Soft palate moves over to close nasal passages. Trachea closed off by epiglottis.
- skull
 - nasal passage
 - hard palate
 - pharynx
 - soft palate
 - epiglottis
 - trachea
 - larynx
 - IGNORE*
- a) insp, b) exp, c) exp, d) insp, e) insp.
- b, d, f, g, a, c, e.
- alveoli of the lungs, b) tissues, c) tissues, d) alveoli of lungs, e) systemic arteries, pulmonary veins, [umbilical vein] f) systemic veins, pulmonary artery, [umbilical artery].



b) 70% of CO₂ is carried the following way:



7. (1) carbonic anhydrase (2) Buffers. (The H⁺ ion is carried/absorbed by haemoglobin)
- binds reversibly
 - CO binds **IRREVERSIBLY** with haemoglobin
 - Hemoglobin carries 23% of the CO₂ on the amino groups of the proteins.

9. (a) Diffusion of gases occurs in the lungs **AND** in the tissues
- (b) The trachea is held open by cartilaginous rings so that **AIR** can pass down more readily.
- (c) The glottis **CLOSES TIGHT** during swallowing.
- (d) An alveolus is a thin-walled air sac surrounded by a layer of **HIGHLY** vascularized tissue.
- (e) The intrathoracic cavities are lined by membranes and **NOT** open to the abdominal cavity.
- (f) The respiratory center is sensitive to **HIGH CO₂** content in the blood.
- (g) When the alveoli are **STRETCHED (DURING INHALATION)**, the breathing centre is inhibited by nerve impulses from the alveolar walls.
- (h) A person can **NOT** commit suicide by holding his/her breath
- (i) The direction in which gases move between the lungs and the blood is determined by **PARTIAL PRESSURE**.
- (j) When hemoglobin is combined with oxygen, it tends to be **RED**.
10. (a) thickening of bronchial cells
 (b) appearance of cells with atypical nuclei
 (c) cancer in situ (cancer confined to lung tissues only)
 (d) metastasis

V. POSTTEST

1. - A
 2. - C
 3. - D
 4. - E
 5. - E
 6. - E

7. - B
 8. - D
 9. - A
 10. - B
 11. - C
 12. - B

13. - C
 14. - A
 15. - D
 16. - Pleura
 17. - Dead space
 18. - diaphragm

