

Gas Exchange

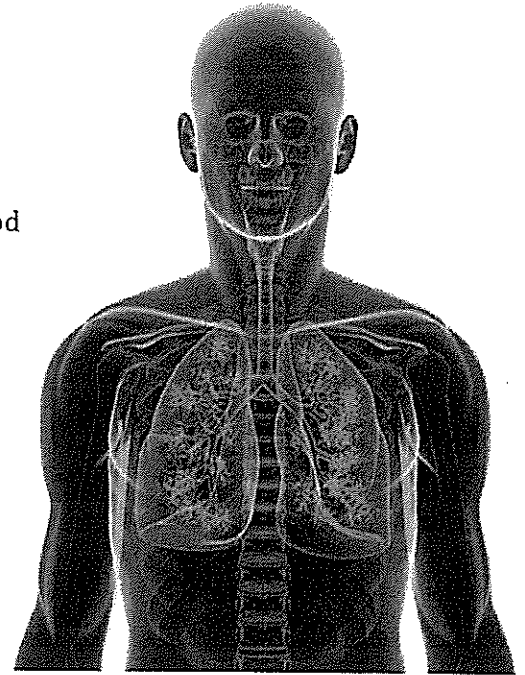
A) Human Respiration

1. Function:

- To exchange gases between the environment and the blood
- To bring O₂ into the body needed by the cells
- To remove CO₂, heat, & water from the body

2. Parts and their functions

- See diagram 1 and 2



3. Pathway of Air through the Respiratory System

- Nasal cavity - Air is warmed, moistened, & filtered through the cilia (tiny hairs) in the nose. Air can also enter through the mouth.
- Pharynx (throat) - Air passes through the pharynx into the windpipe (trachea). (Food & water also passes through the pharynx but enters the food tube instead...a special flap of tissue, called the epiglottis, closes over the windpipe when you swallow.)
- Larynx (voice box) - Voice box & vocal cords located just above the entrance to the trachea.
- Trachea (windpipe) - It is covered by rings of cartilage and mucus to keep it from collapsing.
- Bronchi - The trachea branches into 2 tubes called the bronchi. Each bronchus extends into one of the lungs. (lungs are the main organ of the respiratory system.)
- Bronchioles - Smaller branches that extend throughout each of the lungs to the alveoli (air sacs).
 - There are millions of Alveoli in each lung.
 - Alveoli are surrounded by capillaries.
 - This is where gas exchange occurs (diffusion)

High to low
→

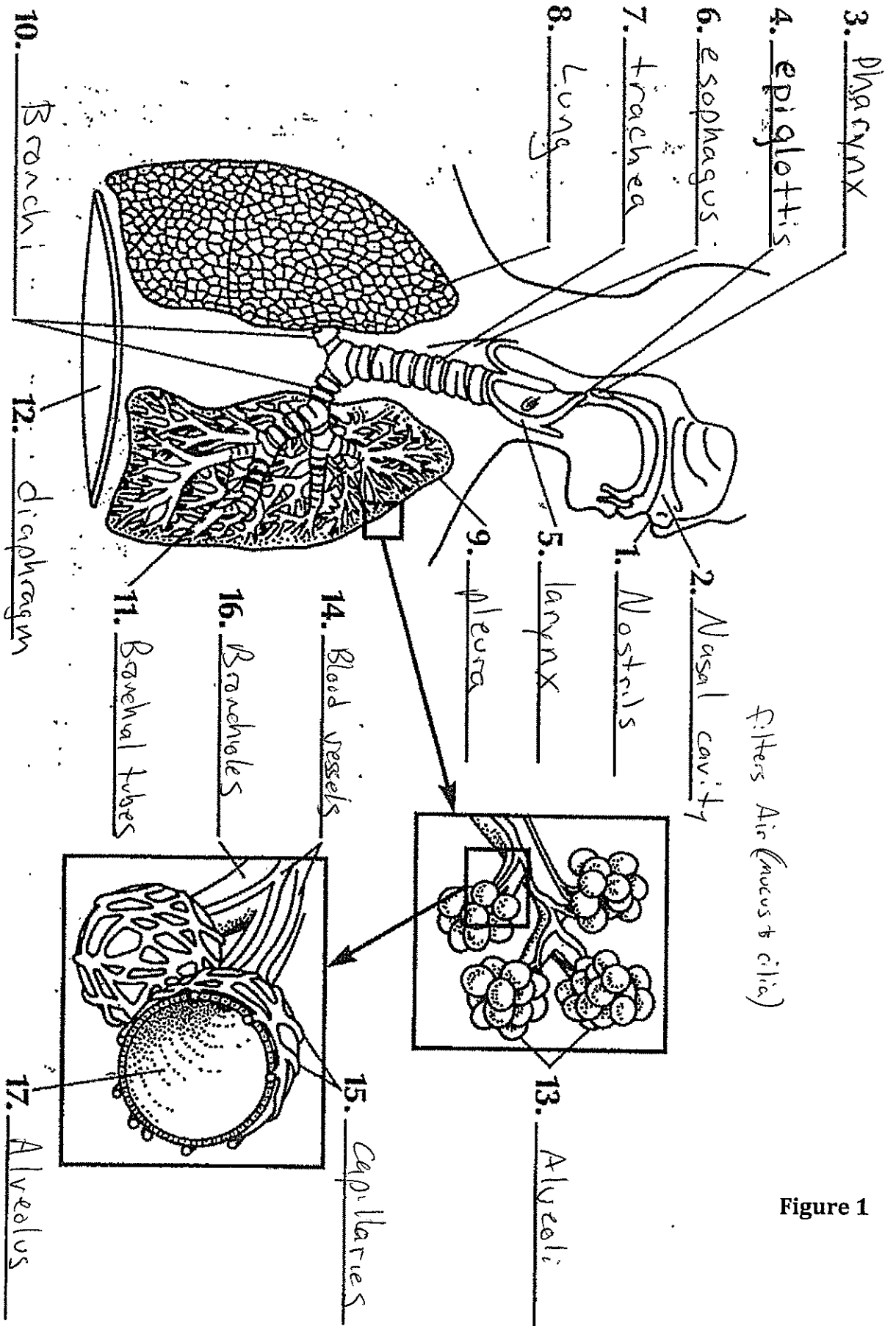


Figure 1

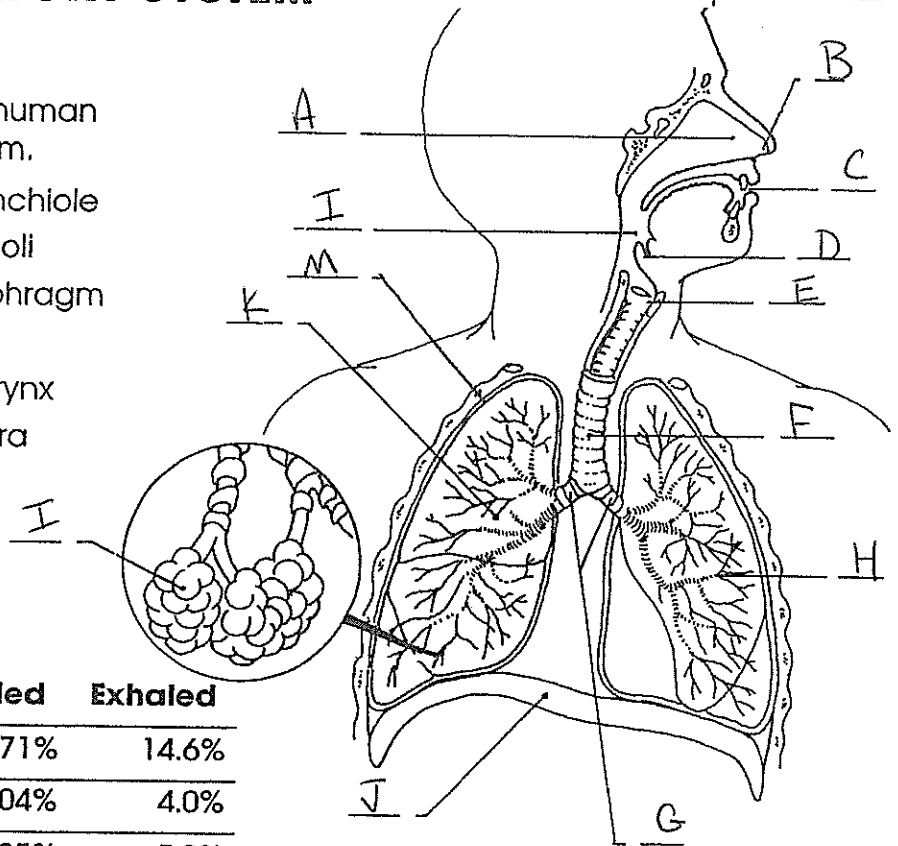
THE HUMAN RESPIRATORY SYSTEM

Name KEY

Respiratory System

Label the following parts of the human respiratory system on the diagram.

- | | |
|------------------|---------------|
| a. nasal passage | h. bronchiole |
| b. nostrils | i. alveoli |
| c. mouth | j. diaphragm |
| d. epiglottis | k. lung |
| e. larynx | l. pharynx |
| f. trachea | m. pleura |
| g. bronchi | |



Gas Exchange

The table shows what happens to the air we inhale.

Gas	Inhaled	Exhaled
oxygen (O ₂)	20.71%	14.6%
carbon dioxide (CO ₂)	0.04%	4.0%
water (H ₂ O)	1.25%	5.9%

1. What gas is removed from inhaled air? Oxygen
2. What gases are added to inhaled air and then exhaled? CO₂ and H₂O
3. Which gas shows the greatest difference in percent between inhaled and exhaled air? Oxygen 6.11%

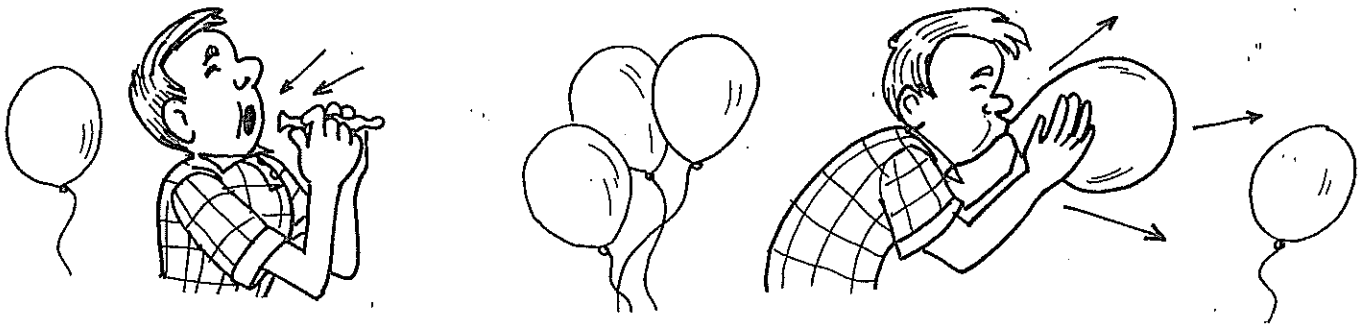
Fill in the blanks below with the correct answers.

Inspired air rich in Oxygen enters the body through the nose/mouth or nostrils. It passes through the pharynx and larynx, or voice box, and into the trachea. Air then enters each bronchi, which branches into bronchial tubes (bronchioles), and finally into the air sacs or alveoli of the lungs. The lungs are housed in the chest cavity that is bound on the bottom by a thin layer of muscle, the diaphragm. Each lung is covered by a very thin pleura membrane. In the alveoli, Carbon dioxide is exchanged for oxygen.

Answer the questions to describe how the respiratory system of Nurse Rex Hale is functioning as he breathes in and out to blow up balloons.

BREATHING IN

1. What do the hairs in his nose and the mucus in his nose and throat accomplish when he inhales?
filter the air
2. Where does air travel after it is taken into his mouth? pharynx
3. What happens to his ribs when he inhales? expand
4. What does his diaphragm do when he inhales? contracts (moves downward)
5. What happens to the volume of his chest cavity when he inhales? increases
6. How does oxygen that he breathes in with the air get into his blood? diffusion
7. What does his epiglottis do when he inhales? allows air to enter the trachea



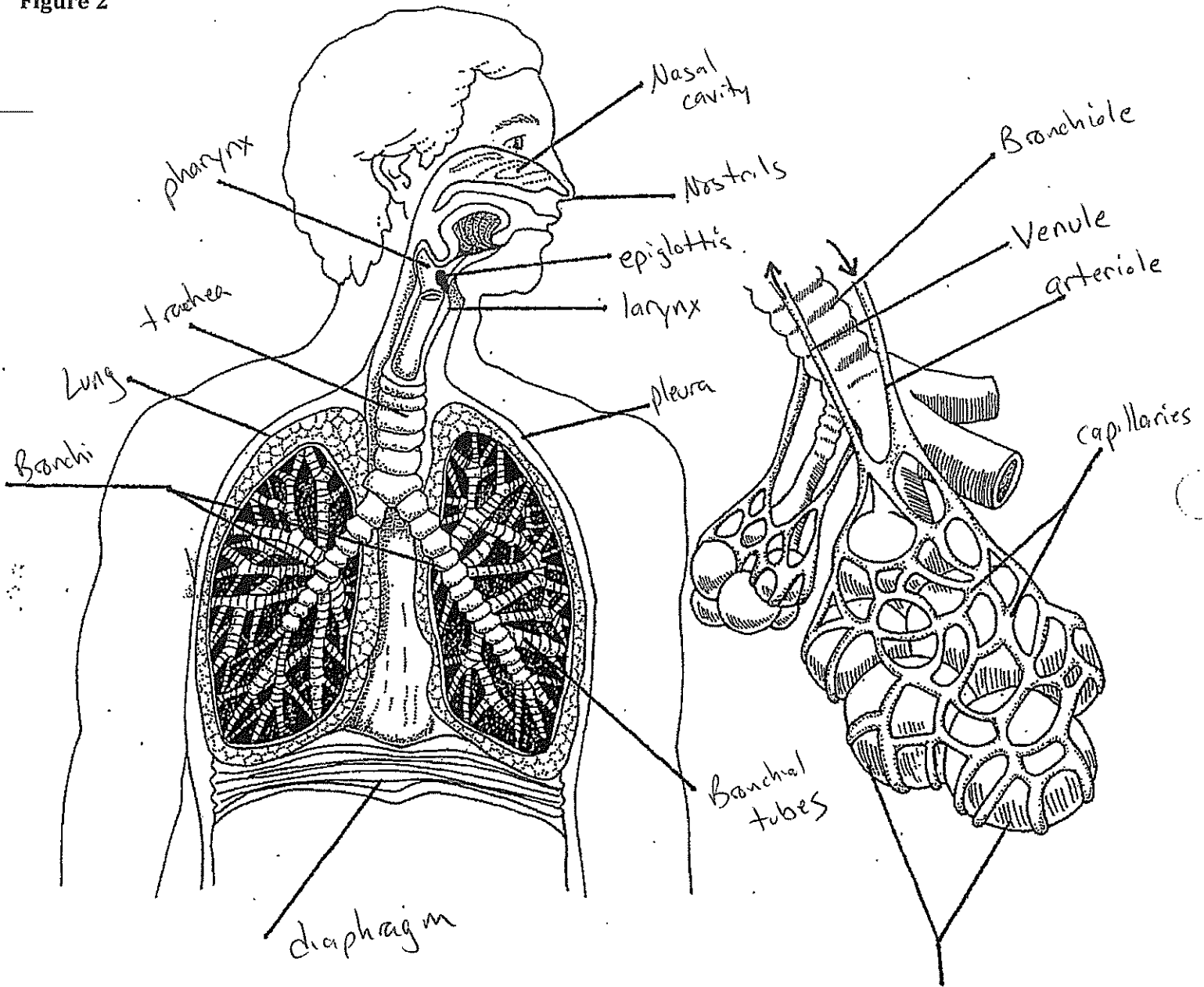
BREATHING OUT

8. How does the carbon dioxide get out of the bloodstream back into his lungs to be breathed out?
diffusion
9. What path does the air with wastes follow to leave his body? same as the way air enters, just in reverse
10. What happens to his ribs when he exhales? return to normal
11. What does his diaphragm do when he exhales? relax, moves up
12. What happens to the volume of his chest cavity when he ~~exhales?~~ exhales? decreases

Use with page 30.

Name _____

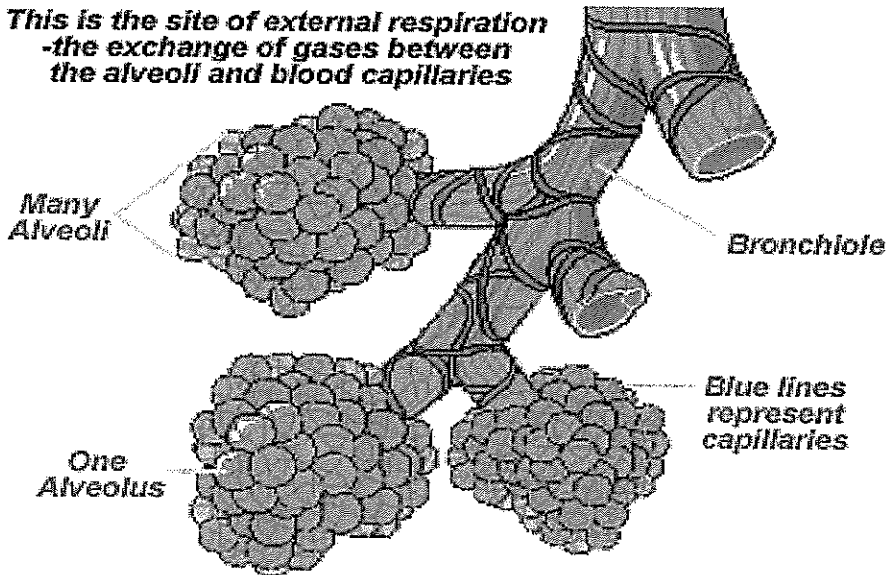
Figure 2



Bronchiole with Alveoli
(each sphere is an individual alveolus)

Alveoli

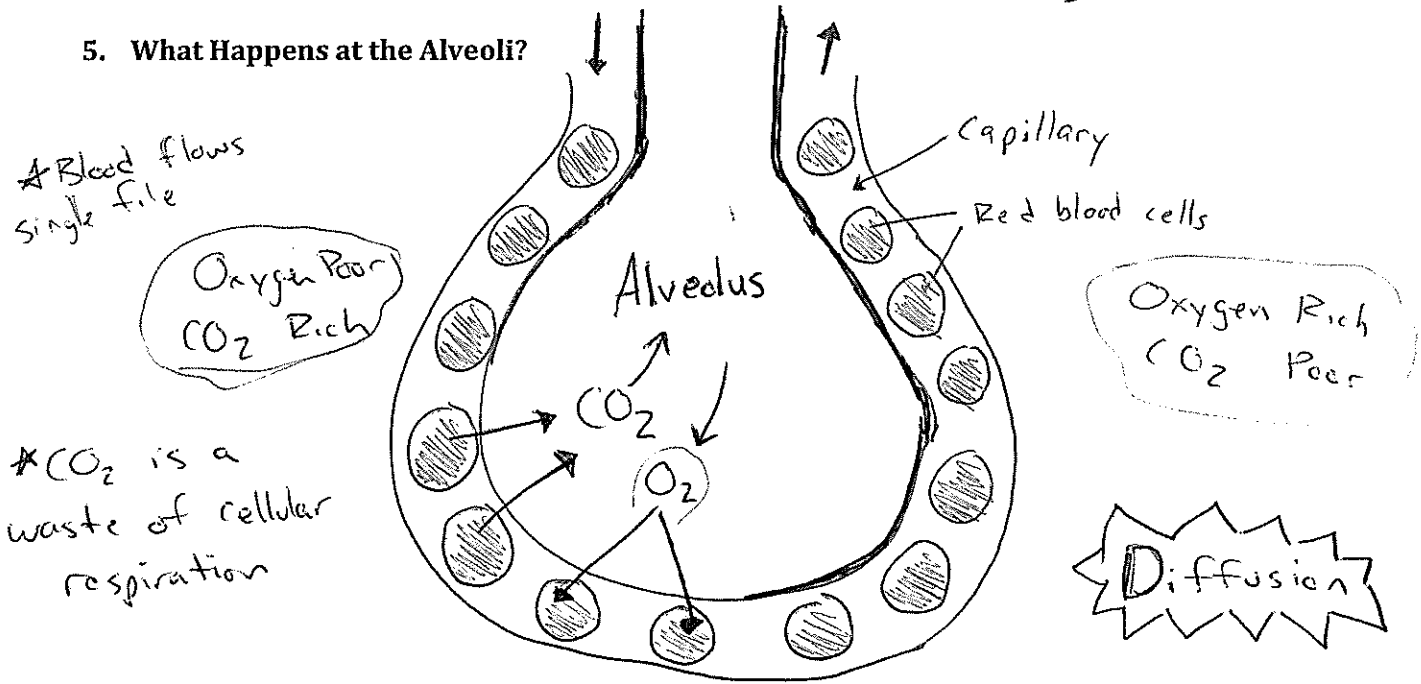
This is the site of external respiration
-the exchange of gases between
the alveoli and blood capillaries



B. Gas exchange in the Lungs

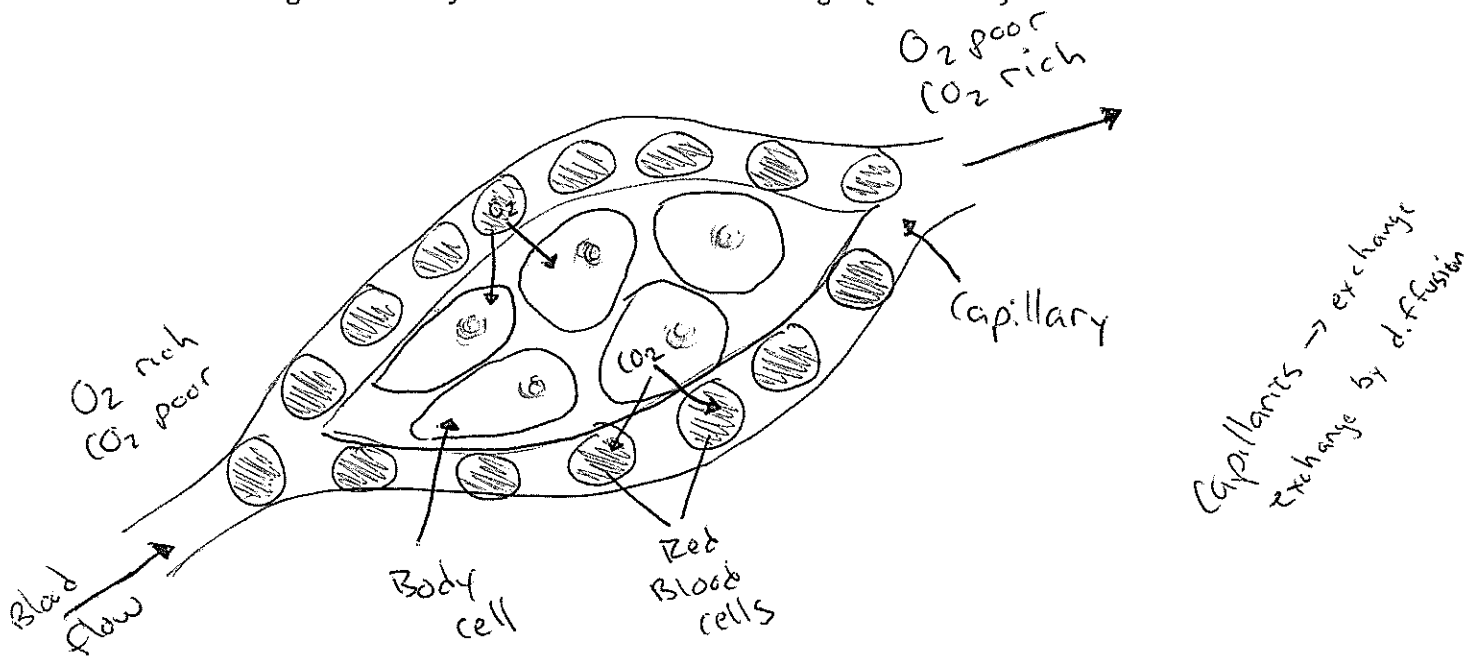
- The alveoli inside of the lungs are the sites of Gas exchange. Therefore the lungs are the "respiratory surface" in humans
- There is a large number of Alveoli and they are microscopic.
- This creates a large surface Area for gas exchange
- Respiratory surfaces must be MOIST.
 - Diffusion of gases occurs best across MOIST surfaces

5. What Happens at the Alveoli?



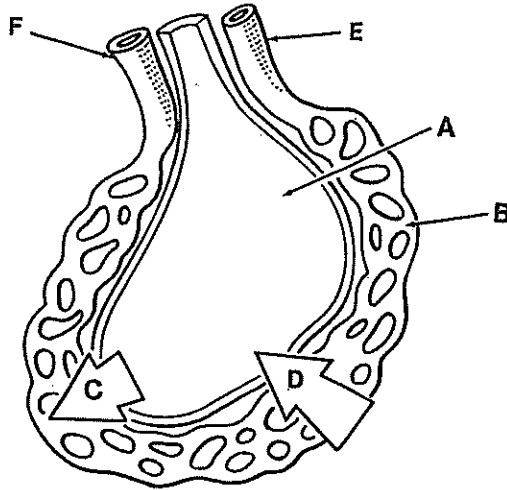
C. Gas exchange at the Body Cells

- Gas exchange at the body cells is **OPPOSITE** of the lungs. (see below)



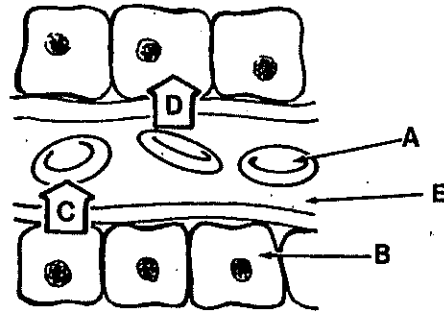
GAS EXCHANGE

Examine the diagram below and then answer the questions.



1. What is the structure labeled A? Alveolus
2. What is the structure labeled B? capillary
3. What gas moves in the direction shown by arrow C? O₂
4. What gas moves in the direction shown by arrow D? CO₂
5. By what process does gas move from A to B? diffusion
6. By what process does gas move from B to A? diffusion
7. Structure E is leaving the lungs and carrying what gas to the body?
O₂
8. Structure F is entering the lungs carrying what gas from the body?
CO₂

Examine the diagram below and then answer the questions.

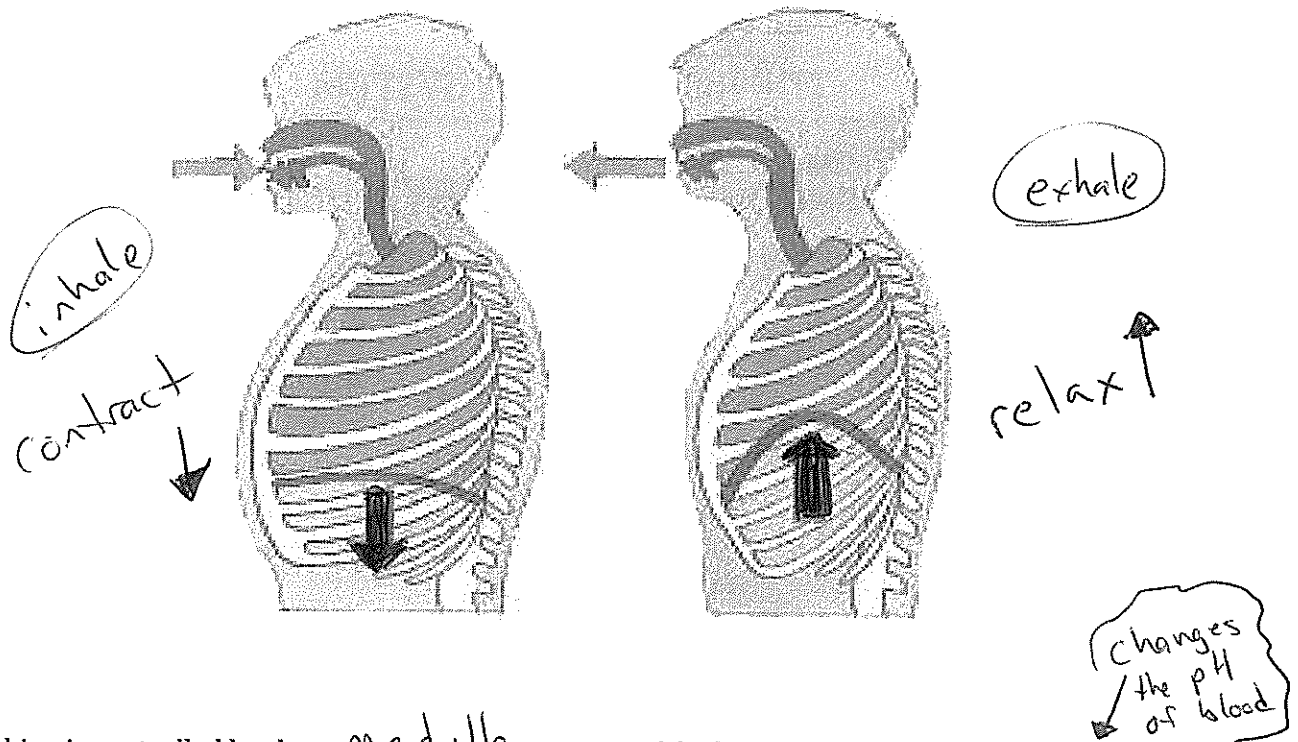


9. Identify structure A Red blood cell
10. Identify structure B Body cell
11. What gas moves in the direction of arrow C CO₂
12. What gas moves in the direction of arrow D O₂
13. By what process are these gases moving? diffusion
14. What process will gas D be used for?
Respiration

D) Breathing

1. Movements of the diaphragm and rib cage cause pressure changes in the chest.
2. When the diaphragm contracts, air flows into the lungs - inhale
3. When the diaphragm relaxes, air flows out of the lungs - exhale

Breathing Mechanism



4. Breathing is controlled by the medulla of the brain. When CO_2 levels in the blood increase, the medulla sends impulses to the diaphragm that increase breathing rate

CO_2 becomes carboxylic Acid in high doses

E) Internal vs External respiration

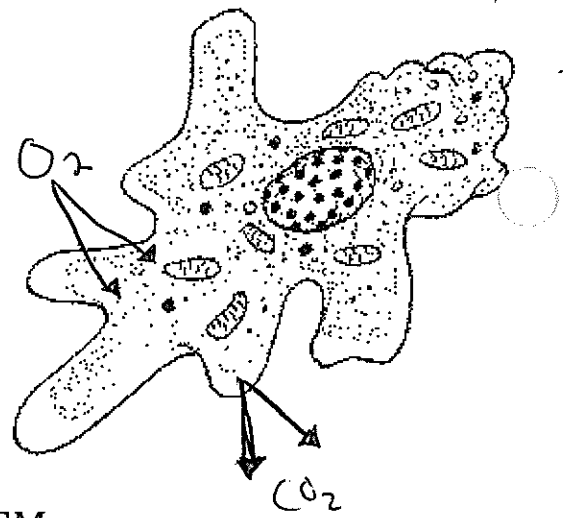
1. External respiration is exchange of gases between atmosphere & blood
2. Internal respiration is exchange of gases between the blood & body cells

F) MALFUNCTIONS of the HUMAN RESPIRATORY SYSTEM disruption of homeostasis

1. Bronchitis - inflammation of the bronchioles
2. Asthma - allergic reaction - causes bronchiole to ^{constrict}
3. Emphysema - Alveoli break down & lose elasticity
4. Pneumonia - infection causing mucus to build up in alveoli

G) GAS EXCHANGE in PROTISTS

1. Protista are in direct contact with a watery environment.
2. Gas Exchange occurs by simple diffusion



THE RESPIRATORY SYSTEM

Breathing moves air into lungs, giving the body the oxygen that cells need to carry out Cellular Respiration. **Cellular respiration** is the process of creating ATP using glucose (from food) and oxygen.

