

**Chapter 8 – Respiration p. 151-167**

4 Gases in **Air** – oxygen, nitrogen, carbon dioxide and water vapour.

- also dust, pollen, pollutants

Body wants only \_\_\_\_\_

**Respiratory System**- organs and tissues that move \_\_\_\_\_ in & out of body.

Breathing is also called \_\_\_\_\_

Breathe in \_\_\_\_\_haling. Breathe out \_\_\_\_\_haling

Body uses \_\_\_\_\_ to release energy stored in food molecules.

**Cellular Respiration**

**Cellular respiration**- the process by which your cells use \_\_\_\_\_ to release energy in your \_\_\_\_\_

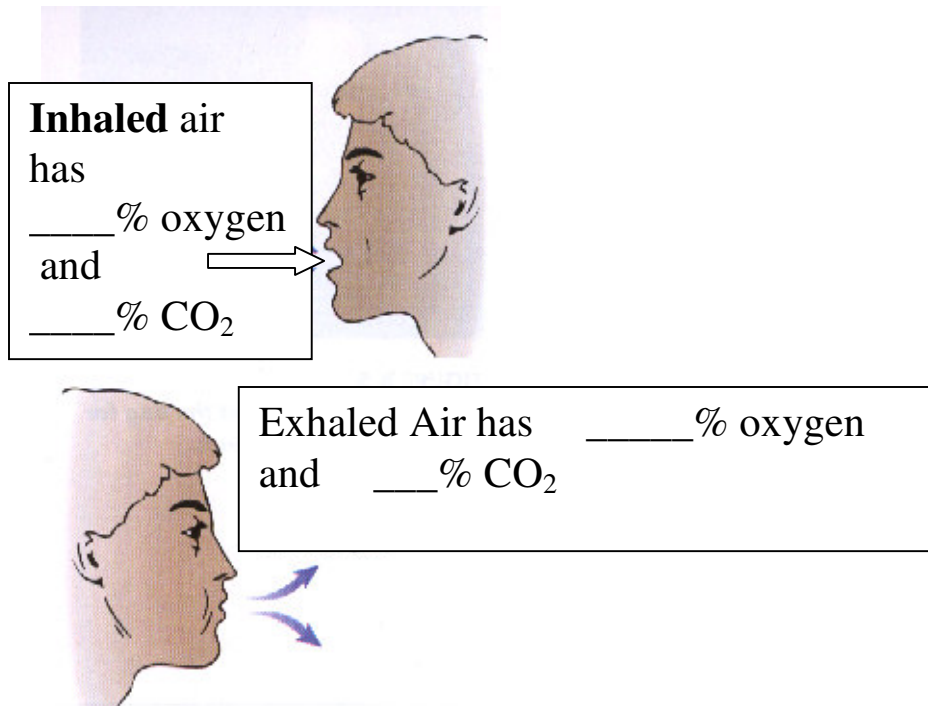
Word Equation for **Cellular Respiration** (see p. 152)

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**Excretion** –getting rid of excess \_\_\_\_\_

Excretion takes place in the lungs, \_\_\_\_\_ and \_\_\_\_\_.

Blood carries excess  $\text{CO}_2$  to your \_\_\_\_\_ & gets rid of it when you breathe \_\_\_\_\_.



When active, body cells use more \_\_\_\_\_ and produce more Carbon Dioxide (goes into \_\_\_\_\_)

Breathing Rate is the number of breaths you take in one \_\_\_\_\_

Nervous system checks level of \_\_\_\_\_ in the blood.

When CO<sub>2</sub> is HIGH, breathing rate \_\_\_ creases

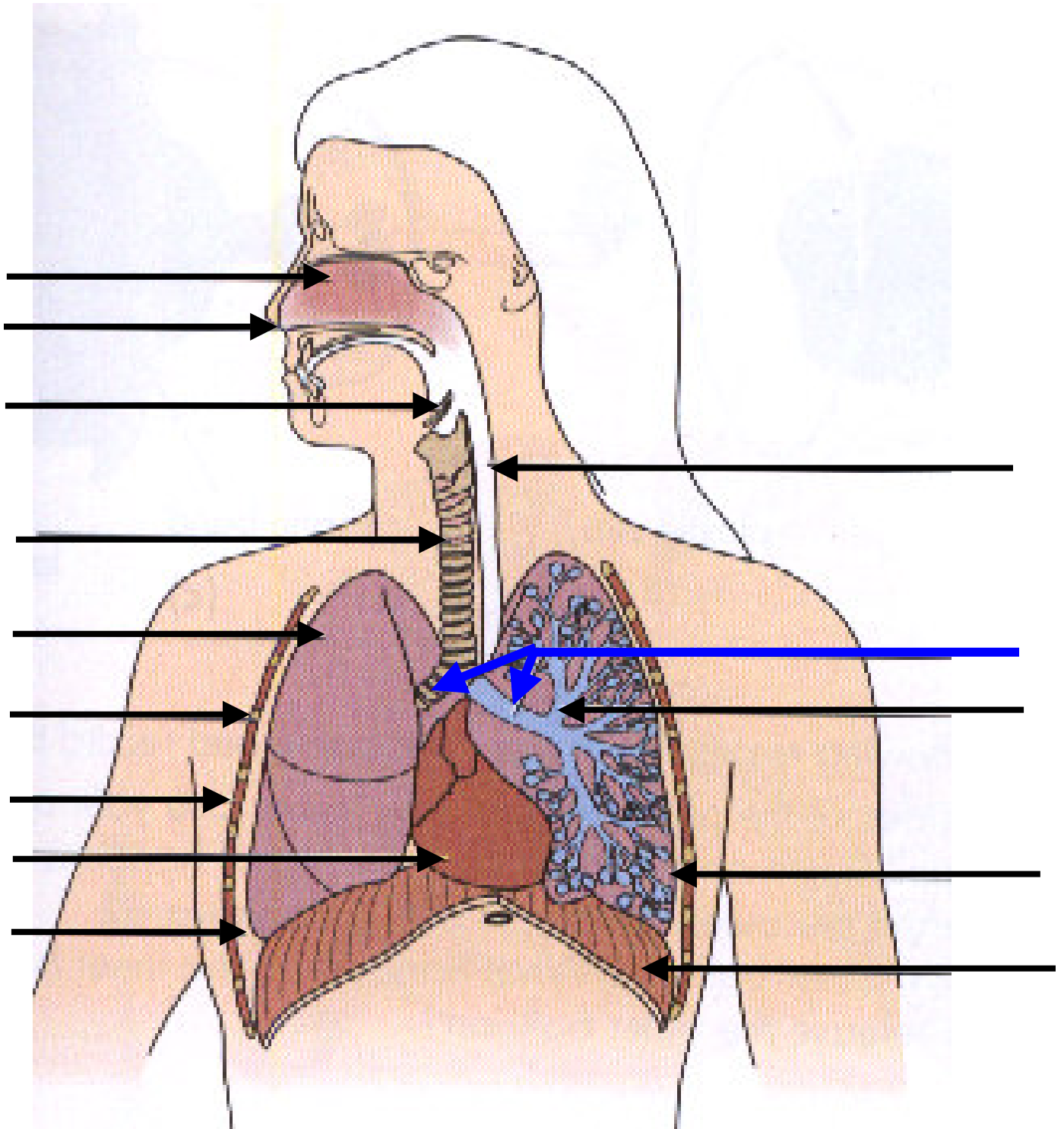
When CO<sub>2</sub> is LOW, breathing rate \_\_\_ creases

When breathing rate higher, more \_\_\_\_\_ is brought into body and more \_\_\_\_\_ is taken out. When CO<sub>2</sub> level decreases, breathing rate returns to normal.

**(Do Activity 8B-Bag Breathing)**

**(Do Review 8.1 on p. 154)**

**Label the diagram (Handout) using p. 155.**



\_\_\_\_\_ are the spongy organs that receive the air you inhale.

Tiny air sacs in lungs are called \_\_\_\_\_.  
(singular \_\_\_\_\_)

Each alveolus-surrounded by \_\_\_\_\_.  
(O<sub>2</sub> and CO<sub>2</sub> can pass into and out of blood into the alveoli)

Lungs located in the Chest Cavity (sealed chamber)

**Rib cage** - \_\_\_\_\_ bones and \_\_\_\_\_.

**Diaphragm** – large sheet of \_\_\_\_\_ at bottom of chest cavity.

(see class model of lung in the chest cavity)

### How You Breathe

-muscles of rib cage & diaphragm tighten-pull ribs up, make chest cavity volume bigger. Air rushes \_\_\_\_\_ from outside to fill empty space (vacuum) ( \_\_\_haling)

-muscles of rib cage & diaphragm relax. Rib bones move inward. –Chest cavity volume gets \_\_\_\_\_er. Air is now pushed \_\_\_\_\_ the lungs.  
( \_\_\_haling)

**Outside of lungs stick to muscular walls of chest cavity- by a thin layer of \_\_\_\_\_ . Prevents lungs from collapsing.**

**(See Review 8.2 p. 159)**

### **A Single Breath**

**-air enters through \_\_\_\_\_ goes into the \_\_\_\_\_ cavity. Tiny \_\_\_\_\_ in nose filter dust etc.**

**-air passes from nasal cavity → throat → 2 tubes  
esophagus (takes food to \_\_\_\_\_)**

**Trachea – carries \_\_\_\_\_ to the \_\_\_\_\_.**

**When swallowing or drinking, flap called the \_\_\_\_\_ closes over the \_\_\_\_\_ opening. (Food will not enter lungs)**

**Trachea has rings of \_\_\_\_\_ (hold trachea so always open)**

**All air passages covered with sticky \_\_\_\_\_  
Traps \_\_\_\_\_, \_\_\_\_\_ & other small particles**

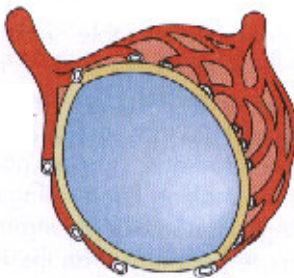
**Cilia – cells with tiny \_\_\_\_\_-like projections. Cilia wave back & forth, moving mucus (with trapped particles) AWAY from lungs → mouth & nose.(coughed, sneezed out or swallowed into dig. system)**

**Air passing through nasal cav. & trachea:**

- warmed by tiny blood vessels near surface**
- mucus adds moisture to this air.**

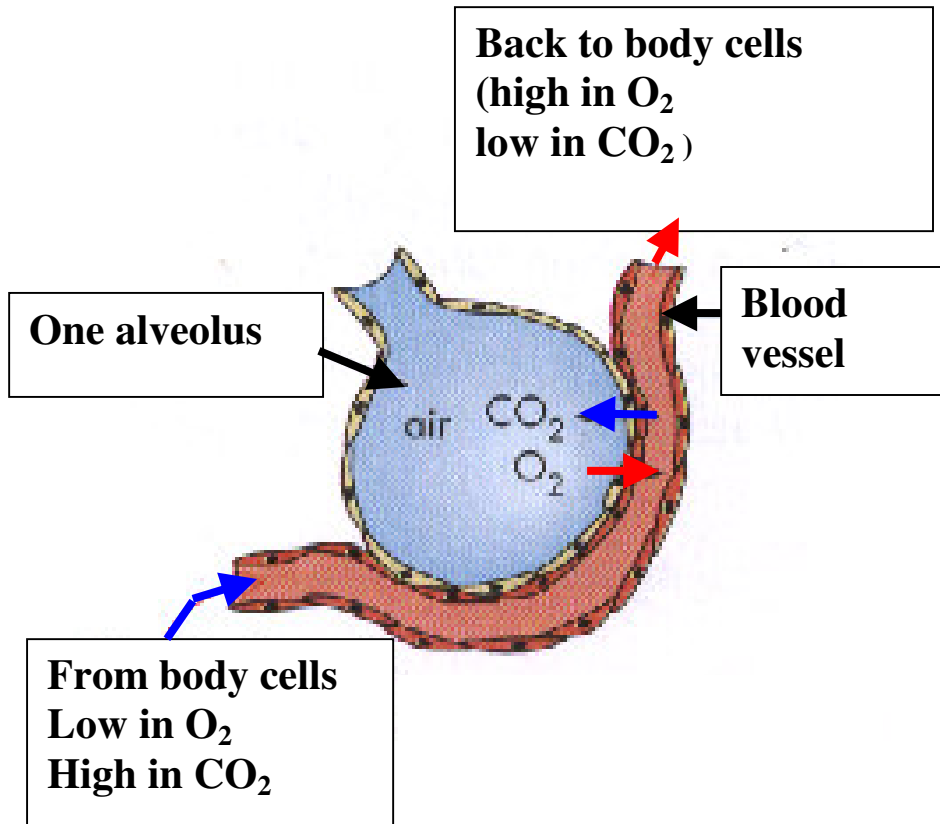
**Trachea branches into 2 tubes called \_\_\_\_\_  
Carry air into each lung. Bronchi divide into smaller tubes in lungs → air goes into alveoli.**

### **Exchange of Gases in Alveoli**



**Each alveolus – like tiny balloon with air, surrounded by very small blood vessels**

- blood from all body parts arrives low in  $O_2$   
high in  $CO_2$  (from cellular respiration)
- After inhaling-alveolus filled with  $O_2$  rich air
- Oxygen** diffuses from inside alveolus  $\rightarrow$  **blood**
- $CO_2$**  diffuses from blood  $\rightarrow$  **inside alveolus**



So blood going to lungs has fresh supply of  **$O_2$**   
The air inside the alveolus now has **more  $CO_2$** . This air is breathed out. This gas exchange always taking place.

With **pneumonia** – Alveoli become filled with fluid or blood-makes gas exchange difficult. Body doesn't get enough oxygen.

## The Amount of Air in a Breath

Typical breath ~ **0.5 L (500 mL)** of air

**Vital Capacity** – The \_\_\_\_\_ amount of air you can move in and \_\_\_\_\_ of your lungs in one breath.

Average adult vital capacity is ~ **4 L**

**Residual Air** – Air that \_\_\_\_\_ in the alveoli of the lungs after a normal breath out (exhaling)

After about \_\_\_\_\_ normal breaths, all the residual air is replaced.

(Do Activity 8E – Vital Capacity)

## Taking Care of Your Respiratory System

-Fitness and Protection

-Exercise makes muscles of resp. system stronger

-makes it easier to breathe

-able to move more air when needed

**Sometimes air contains harmful substances.**

- Lung tissue is not tough-very soft and easily damaged**
- harmful substances can enter your body through lungs**
- masks often used in jobs with harmful subst. in air**
- getting doctor care when needed (eg. infections)**
- some harmful subst. – paint fumes, dust, asbestos**
- fiberglass \_\_\_\_\_**

## **The Habit That Kills**

**Cigarette smoke** –harms smoker and people around  
(2<sup>nd</sup> hand smoke)

- hot smoke contains gases that condense into tars in mouth and air passages.**
- sticky tars stop cilia from moving (chemicals affect & can kill cells of cilia) sticky material deposits in air passages – no cilia to clean them. These materials can damage tissue. Smokers cough-tries to get rid of this.**
- tar clogs delicate surfaces of bronchi and alveoli less O<sub>2</sub> can be absorbed into body.**

- Cig. smoke also has carbon monoxide (CO)**  
CO takes place of O<sub>2</sub> in blood-so the body gets less O<sub>2</sub> than it needs.
- nicotine in cig. smoke-absorbed into blood stream, goes to brain within 7 seconds. Increases heartrate, makes heart work harder-increases heart attack risk.**
- nicotine extremely addictive drug. (brain acts like you “need” nicotine to feel “normal”)**
- Harm from smoking increases as years of smoking increase.**
- Cig. smoke contains several cancer causing compounds (including tar, benzene etc.)**
- Lung cancer** hard to detect in early stages-tissue soft & spongy so tumors do not cause pain at first.
- Later stages, cancer cells get into bloodstream and spread** to other organs – if too late becomes untreatable.
  
- smokers (& people who are near) have more frequent chest infections-eg. bronchitis** (inflammation of small air passages)
- cig. smoke damages cilia – more bacteria and viruses enter lungs.**
- Chronic bronchitis** – some passages permanently blocked—decreases surface area for gas exchange.

- emphysema – passages become blocked**
  - walls of alveoli break apart – become useless in gas exchange.**
  - Hard to breathe**
  - heart is overworked –could cause heart disease.**
  - caused by cig. smoke, asbestos fibres, mining dust.**

- Why people smoke?**
  - harm not obvious at first**
  - advertising**
  - peer pressure**
  - nicotine causes “high” at first**
  - extremely addictive – hard to quit.**

Increased risk for smokers	
Acute necrotizing ulcerative gingivitis (gum disease)	Muscle injuries
Angina (20 x risk)	Neck pain
Back pain	Nystagmus (abnormal eye movements)
Buerger’s Disease (severe circulatory disease)	Ocular Histoplasmosis (fungal eye infection)
Duodenal ulcer	Osteoporosis (in both sexes)
Cataract (2 x risk)	Osteoarthritis

Cataract, posterior subcapsular (3 x risk)	Penis (inability to have an erection)
Colon Polyps	Peripheral vascular disease
Crohn's Disease (chronic inflamed bowel)	Pneumonia
Depression	Psoriasis (2 x risk)
Diabetes (Type 2, non-insulin dependent)	Skin wrinkling (2 x risk)
Hearing loss	Stomach ulcer
Influenza	Rheumatoid arthritis (for heavy smokers) <a href="#">[5]</a>
Impotence (2 x risk)	Tendon injuries
Optic Neuropathy (loss of vision, 16 x risk)	Tobacco Amblyopia (loss of vision)
Ligament injuries	Tooth loss
Macular degeneration (eyes, 2 x risk)	Tuberculosis
<b>Function impaired in smokers</b>	
Ejaculation (volume reduced)	Sperm count reduced
Fertility (30% lower in women)	Sperm motility impaired
Immune System (impaired)	Sperm less able to penetrate the ovum
Menopause (onset 1.74 years early on average)	Sperm shape abnormalities increased

<b>Symptoms worse in smokers</b>	
Asthma	Graves' disease (over-active thyroid gland)
Chronic rhinitis (chronic inflammation of the nose)	Multiple Sclerosis
Diabetic retinopathy (eyes)	Optic Neuritis (eyes)
<b>Disease more severe or persistent in smokers</b>	
Common cold	Pneumonia
Crohn's Disease (chronic inflamed bowel)	Tuberculosis
Influenza	

**Of 1,000 young Australian males who smoke, 1 will be murdered, 15 will be killed on the road and 250 will be killed before their time by tobacco.**

**In Australia in 1986, the following body organs were removed from humans because of cancer caused by smoking:**

**521 lungs 148 gullets 71 tongues 221 voice boxes**

**82 stomachs 40 pancreases 68 wombs 85 bladders**

**115 kidneys and 161 miscellaneous body parts.**

**Cigarette smoking causes about 30% of cancers in Canada and more than 85% of lung cancers.**

### **Smoking marijuana**

**Marijuana cigarettes contain more tar than tobacco cigarettes. People who smoke marijuana generally smoke fewer marijuana cigarettes than people who smoke tobacco cigarettes. But they tend to inhale more smoke per puff and hold it in their lungs for as much as 4 times longer. Because of this, some estimate that smoking 3 to 4 marijuana cigarettes per day is roughly equal to smoking 20 tobacco cigarettes. Marijuana users may have many of the same health problems as cigarette smokers, including an increased risk of cancer.**

**A team of Canadian researchers is reporting that women who begin smoking within five years of starting to menstruate run a significantly higher risk of developing breast cancer before the age of 50 than women who don't smoke.**

**The five-year survival rate of a patient with lung cancer is 15 per cent.**

**During their lifetime, 1 in 21 women will develop lung cancer. Among men, 1 in 11 will develop lung cancer.**

**45,000 Canadians die each year from tobacco-related illnesses.**

**Nicotine is one of the most addictive substances in the world. Eight of ten people who start smoking become addicted.**

**Tobacco smoke contains more than 4000 chemicals. Many are known to be harmful substances, including nicotine, carbon monoxide, benzene, toluene, formaldehyde, acetone, ammonia, cadmium and nickel.**

**More than 40 of these chemicals cause cancer in humans, including 2-naphthylamine, 4-aminobiphenyl, polonium-210, benzene, vinyl chloride, arsenic, chromium, and nickel.**

**Smoking causes cancer of the lung, oral cavity, pharynx, larynx, esophagus, pancreas, kidney, urinary bladder, and cervix. Recent evidence links smoking with cancer of the large intestine and some forms of leukemia.**