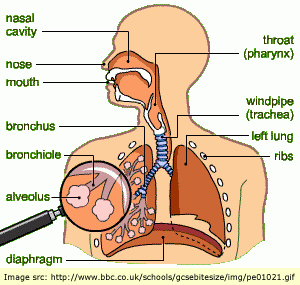
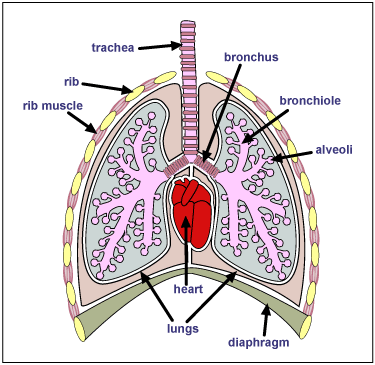
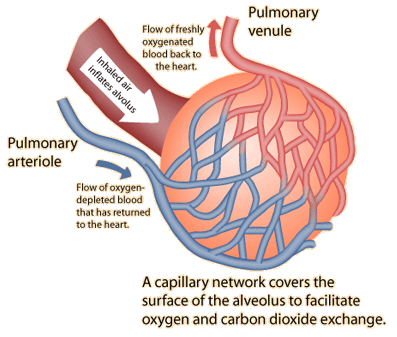
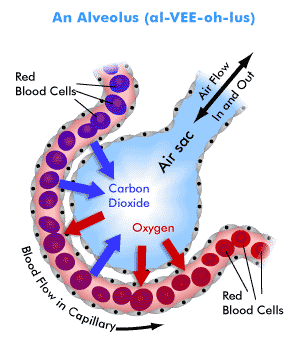
**B6 - RESPIRATION**

**6.2 Gas Exchange**

1. **Identify on diagrams and name the larynx, trachea, bronchi, bronchioles, alveoli and associated capillaries.**

[](http://www.google.com.my/url?sa=i&rct=j&q=respiratory+system&source=images&cd=&cad=rja&docid=GyI9zuNG9W4xxM&tbnid=FcyXMDEX7qhcQM:&ved=0CAUQjRw&url=http://fine4fit.blogspot.com/2012/05/respiratory-system.html&ei=3dDLUandCISIrAe864GACw&bvm=bv.48340889,d.bmk&psig=AFQjCNGMoaR5-DVa62dxJhfAkMXHleT57Q&ust=1372397878925968)[](http://www.google.com.my/url?sa=i&rct=j&q=respiratory+system&source=images&cd=&docid=if4A9pg-1XLFRM&tbnid=woLwZAPB0XThUM:&ved=0CAUQjRw&url=http://www.homebusinessandfamilylife.com/human_respiratory_system.html&ei=cNHLUfTrOY3JrAeF64GwCg&bvm=bv.48340889,d.bmk&psig=AFQjCNGMoaR5-DVa62dxJhfAkMXHleT57Q&ust=1372397878925968)

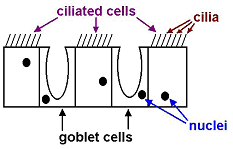
[](http://www.google.com.my/url?sa=i&rct=j&q=alveoli&source=images&cd=&cad=rja&docid=r6Kgc79_885CYM&tbnid=HQd0lh10RuAzBM:&ved=0CAUQjRw&url=http://hyperphysics.phy-astr.gsu.edu/hbase/biology/respir.html&ei=VtLLUYHYG5CnrAfbpYCgCA&psig=AFQjCNHELNFtM1nde3mBxPgLDCbRnIwUUg&ust=1372398437464842)[](http://www.google.com.my/url?sa=i&rct=j&q=alveoli&source=images&cd=&cad=rja&docid=94ksdzRk-GsW8M&tbnid=p-Kr0SGln1SzwM:&ved=0CAUQjRw&url=http://bodysystems-rlj00.blogspot.com/2012/07/gas-exchange-in-lungs-breathing-in.html&ei=ptLLUcT7M4WIrQfO2ICADQ&psig=AFQjCNHELNFtM1nde3mBxPgLDCbRnIwUUg&ust=1372398437464842)

1. **List the features of gas exchange surfaces in animals.**

* Wall of the alveolus is thin (a single layer of cells) to allow gases to diffuse across them quickly;
* They are moist to prevent the cells from drying and to allow gases to dissolve;
* They have a large surface area , so that a lot of gas can diffuse across at the same time;
* They have a high concentration gradient - maintained by the movement of air & blood.

1. **Explain the role of mucus and cilia in protecting the gas exchange system from pathogens and particles.**

**Air**

[](http://www.google.com.my/url?sa=i&rct=j&q=cilia+and+mucus+in+respiratory+tract&source=images&cd=&cad=rja&docid=Imr-K3zMJuaHaM&tbnid=qoRp9t4_f4VjyM:&ved=0CAUQjRw&url=http://www.ivy-rose.co.uk/HumanBody/Respiratory/Respiratory_Components.php&ei=utbLUZDtIIeKrgeYuoHoDA&psig=AFQjCNEZhIlFIyZZVwfVBEsfiEeAyDoeBg&ust=1372399332224315)**Diagram of lining of trachea**

* The lining contains two kinds of cells: Goblet cells and ciliated cells;
* Goblet cells make sticky, slimy mucus;
* Many of the bacteria in the air and dust particles get trapped in the mucus;
* Ciliated cells have tiny, microscopic hair on them called cilia;
* The cilia beat in unison, and sweep the mucus upwards, towards the back of the throat.

1. **Describe the effects of tobacco smoke and its major toxic components (tar, nicotine, carbon monoxide, smoke particles) on the gas exchange system.**

|  |  |
| --- | --- |
| Chemical | Effects on gas exchange system |
| Carbon monoxide | A poisonous gas; combines with hemoglobin in RBC, preventing them from transporting oxygen |
| Nicotine | Addictive; increases heart rate & blood pressure |
| Smoke particles | Irritate the air passages, causing inflammation & increased mucus production, resulting in chronic bronchitis; coughing and the presence of particles in the alveoli can lead to emphysema (breaking the walls of the alveoli) |
| Tar | A carcinogen - increases the risk of lung cancer; lines the air passages, increasing mucus production and paralyzing and damaging cilia, causing bronchitis. |

1. **State the differences in composition between inspired and expired air.**

|  |  |  |  |
| --- | --- | --- | --- |
| *Gas* | *Inspired air %* | *Expired air %* | *Explanation* |
| Nitrogen | 79 | 79 | Not used or produced by body processes |
| Oxygen | 21 | 16 | Used up in the process of respiration |
| Carbon dioxide | 0.04 | 4 | Produced in the process of respiration |
| Water vapour | Variable | Saturated | Produced in the process of respiration, moisture evaporates from the surface of the alveoli |

1. **Use lime water as a test for carbon dioxide to investigate the differences in composition between inspired and expired air.**

*IGCSE Biology* (Jones & Jones), p. 122, activity 9.5 ‘comparing the CO2 content of inspired & expired air’.

1. **Investigate and describe the effects of physical activity on rate and depth of breathing.**
2. **Explain the effects of physical activity on the rate and depth of breathing.**

* The volume of air breathed in and out during normal, relaxed breathing is about 0.5 litres (the tidal volume);
* The breathing rate is about 12 breaths per minute;
* During exercise, the volume inhaled (depth) increases to about 5 litres ( depending on the age, sex, size and fitness of the person);
* The maximum amount of air breathed in and out in one breath is the vital capacity;
* The breathing rate can increase to over 20 breaths per minute;
* The total lung volume is greater than the vital capacity because some air always remains in the lungs (otherwise the lungs would collapse and the alveoli walls would stick together)
* Breathing rate and depth increase to absorb more oxygen for the muscles as exercising muscles need to respire more to get more energy.