

WJEC Wales Biology GCSE

1.2 (c) to (i) - The Respiratory System

Flashcards

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Why do large multicellular organisms
require a respiratory system?



Why do large multicellular organisms require a respiratory system?

- Small SA/V ratio
- Diffusion insufficient to provide all cells with the required oxygen and to remove all carbon dioxide
- Large organisms are more active than smaller organisms



Why do some multicellular organisms
(e.g. trees) not require specialised
exchange surfaces?



Why do some multicellular organisms (e.g. trees) not require specialised exchange surfaces?

Trees have a large number of leaves which provide a large SA/V ratio for diffusion.



Describe the pathway of gas through the respiratory system



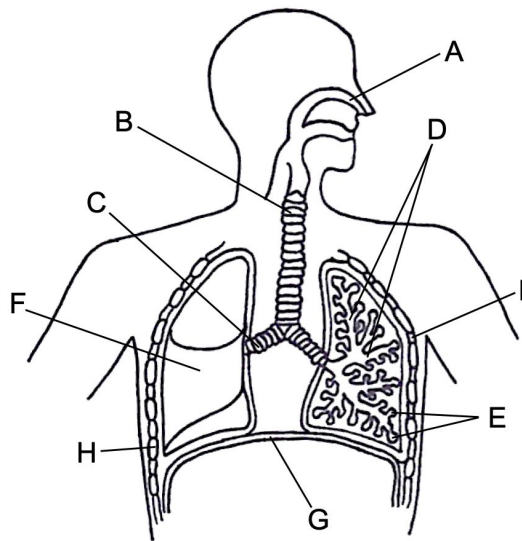
Describe the pathway of gas through the respiratory system

nose → trachea → bronchi →

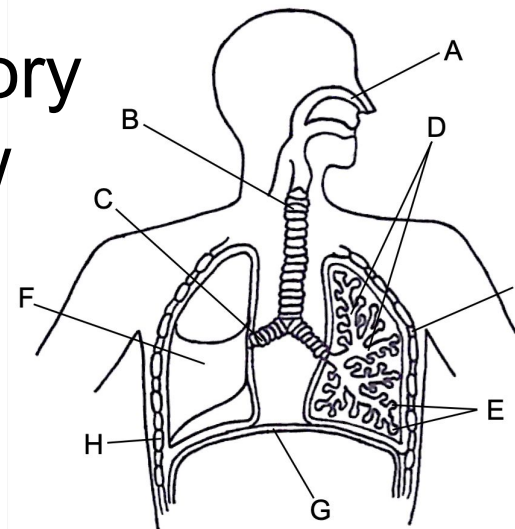
bronchioles → alveoli → capillaries



Identify the structures of the respiratory system labelled in the diagram below



Identify the structures of the respiratory system labelled in the diagram below



A	nasal cavity	F	lung
B	trachea	G	diaphragm
C	bronchus	H	rib
D	bronchioles	I	intercostal muscle
E	alveoli		



What is the function of mucus in the respiratory system?



What is the function of mucus in the respiratory system?

It traps harmful substances and organisms, preventing entry into the lungs



Where are ciliated epithelial cells found?



Where are ciliated epithelial cells found?

Found lining the surface of the
respiratory tract



Describe the function of ciliated epithelial cells lining the airways



Describe the function of ciliated epithelial cells lining the airways

Move in synchronised waves to beat mucus (containing dirt and pathogens) up to the back of the throat where it is swallowed



What are the lungs?



What are the lungs?

A pair of organs consisting of the bronchioles, alveoli and surrounding tissues



What is the thorax?



What is the thorax?

- Area between the neck and abdomen
- Includes organs found within the chest and lungs



What is ventilation?



What is ventilation?

The movement of fresh air into the lungs and stale air out of the lungs via inhalation and exhalation



What does ventilation require?



What does ventilation require?

- Rib cage
- Intercostal muscles
- Diaphragm



What is inspiration?



What is inspiration?

Breathing in



Describe the process of inspiration



Describe the process of inspiration

- Ribs move up and out
- Diaphragm contracts and flattens
- Volume of thorax increases
- Pressure in thorax decreases below air pressure
- Air moves into the trachea



What is expiration?



What is expiration?

Breathing out



Describe the process of expiration



Describe the process of expiration

- Ribs move down and in
- Diaphragm relaxes and reverts to dome shape
- Volume of thorax decreases
- Pressure in thorax increases above air pressure
- Air moves out of the trachea



How is ventilation modelled?



How is ventilation modelled?

Using the bell jar model



Describe the limitations of the bell jar model



Describe the limitations of the bell jar model

Structure	Bell jar
Thoracic cavity filled with pleural fluid	Bell jar filled with air
Cartilage in trachea flexible	Glass tube rigid
Diaphragm flattens	Rubber sheet drawn downwards
Lungs composed of many alveoli	Balloons empty
Ribs move to change thoracic cavity volume	Bell jar does not move



What are the alveoli?



What are the alveoli?

A cluster of air sacs in the lungs where gas exchange occurs



Describe the process of gas exchange at the alveoli



Describe the process of gas exchange at the alveoli

- Oxygen diffuses from air in the alveoli into blood in the capillaries
- Carbon dioxide diffuses from blood in the capillaries into air in the alveoli



How are alveoli adapted for gaseous exchange? (5)



How are alveoli adapted for gaseous exchange? (5)

- Large surface area
- Surrounded by a network of capillaries giving a good blood supply
- Rapid blood flow maintains a steep concentration gradient
- Thin wall (one cell thick) giving a short diffusion distance
- Walls covered by a thin, moist film, enabling gases to dissolve and increasing the rate of diffusion



Describe the composition of inspired and expired air



Describe the composition of inspired and expired air

Gas	% of inspired air	% of expired air
Oxygen	21	16
Carbon dioxide	0.04	4
Nitrogen	79	79
Water vapour	variable	1



What is the chemical test for carbon dioxide?



What is the chemical test for carbon dioxide?

- Bubble gas through lime water
- CO_2 turns lime water milky



What chemicals found in tobacco smoke damage the lungs?



What chemicals found in tobacco smoke damage the lungs?

- Carcinogens
- Tar
- Nicotine
- Carbon monoxide



What is a carcinogen?



What is a carcinogen?

A chemical that causes cancer



How does tar affect the airways?



How does tar affect the airways?

- Sticky substance deposited in the airways
- Stimulates mucus production
- Paralyzes the cilia, preventing mucus from being swept away. Mucus containing microorganisms and dirt builds.
- Leads to smoker's cough



Describe the effects of nicotine on the
body



Describe the effects of nicotine on the body

- Increases heart rate
- Addictive
- Damages the lungs



What effect does carbon monoxide have on the body?



What effect does carbon monoxide have on the body?

- Binds with haemoglobin in red blood cells irreversibly
- Reduces oxygen-carrying capacity of the blood



How does smoking cause emphysema?



How does smoking cause emphysema?

Damage to the alveoli walls and loss of elasticity in the alveoli lead to emphysema

