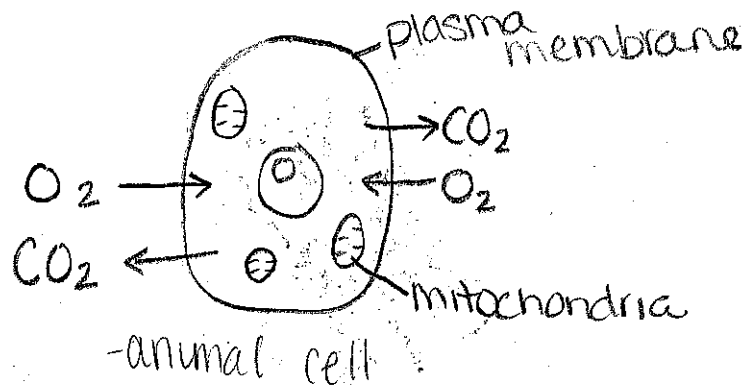


6.4 - Gas exchange

- All living things respire



• Gas exchanges between organisms and their environment.

- Gaseous exchange in animals

- Animals (such as mammals) have a specialized organ (lungs)

- provides a large, thin surface area.

- lungs are protected so oxygen must be brought in.

- lungs must be ventilated.

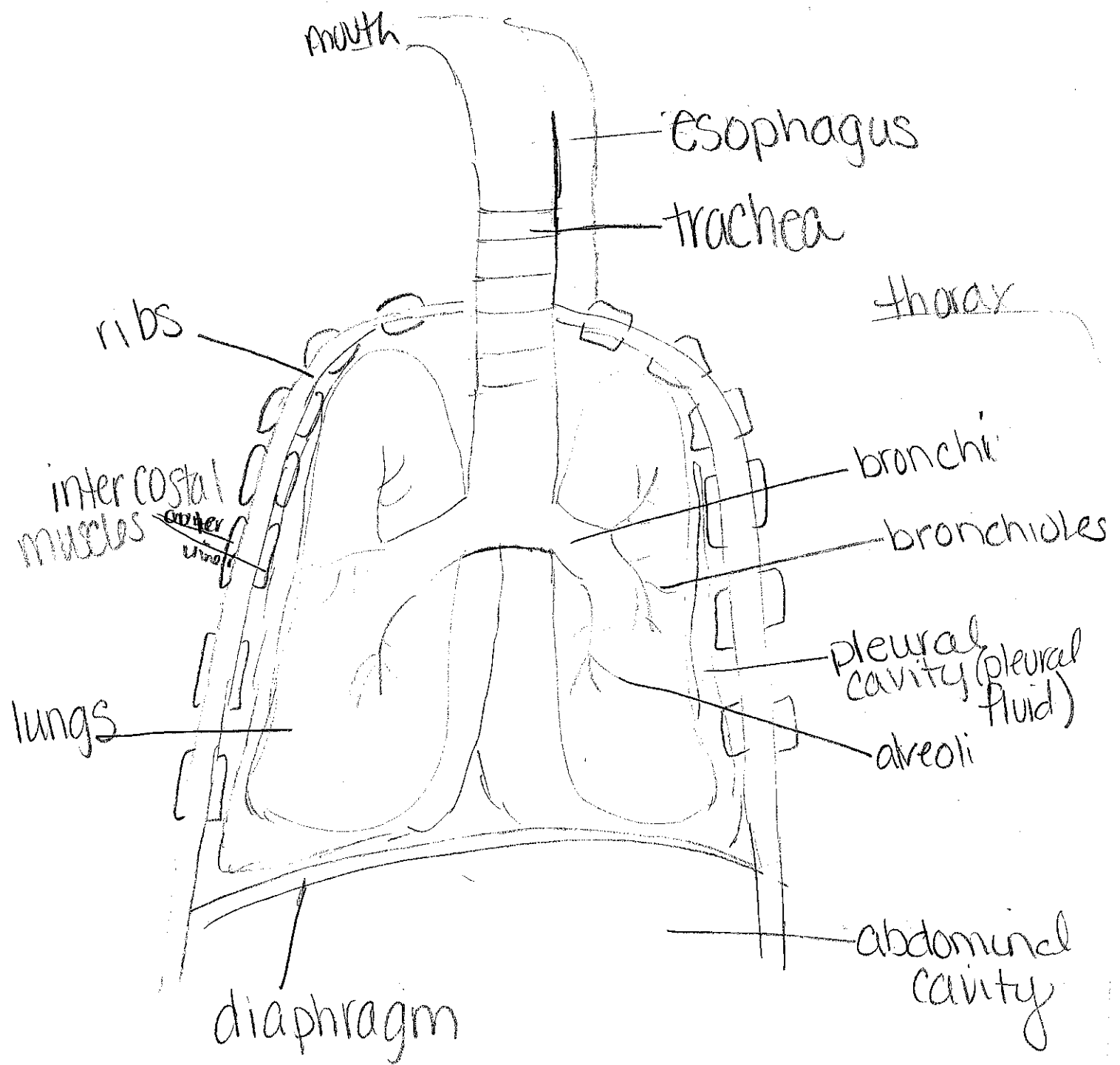
* List three characteristics of an efficient ~~of an~~ respiratory surface and explain how each influences diffusion.

- large, thin surface

- ventilation mechanism that moves air over the respiratory system

- blood circulation that speeds up the removal of dissolved oxygen

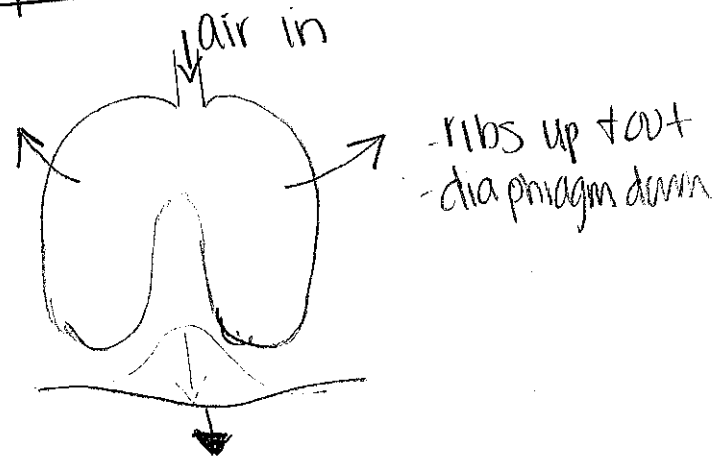
The working lungs of mammals



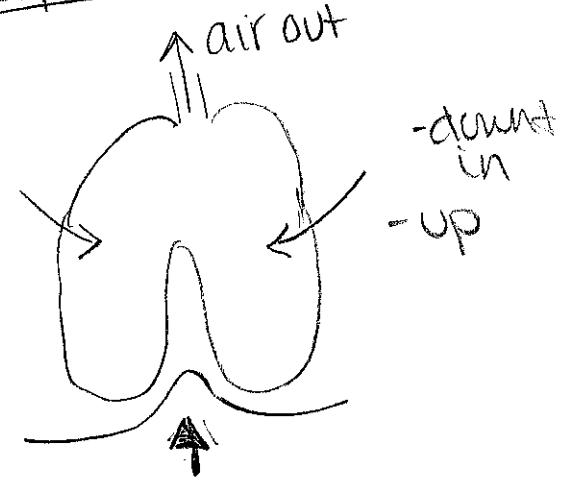
Ventilation of the lungs

- Air is drawn into the alveoli when the air pressure in the lungs is lower than atmospheric pressure, and vice versa.

Inspiration



expiration



- external intercostal muscles contract
- internal intercostal muscles relax
- diaphragm muscles contract

- external intercostal muscles relax
- internal intercostal muscles contract
- diaphragm muscles relax

Compare the roles of :

- the internal + external intercostal muscles
 - the diaphragm and abdominal muscles
- } during ventilation of the lungs.

Inspiration

Expiration

Relax

inner intercostal muscle

Contract

Contract

external intercostal muscles

Relax

Contract

diaphragm

Relax

Relax

abdominal wall
muscles

Contract

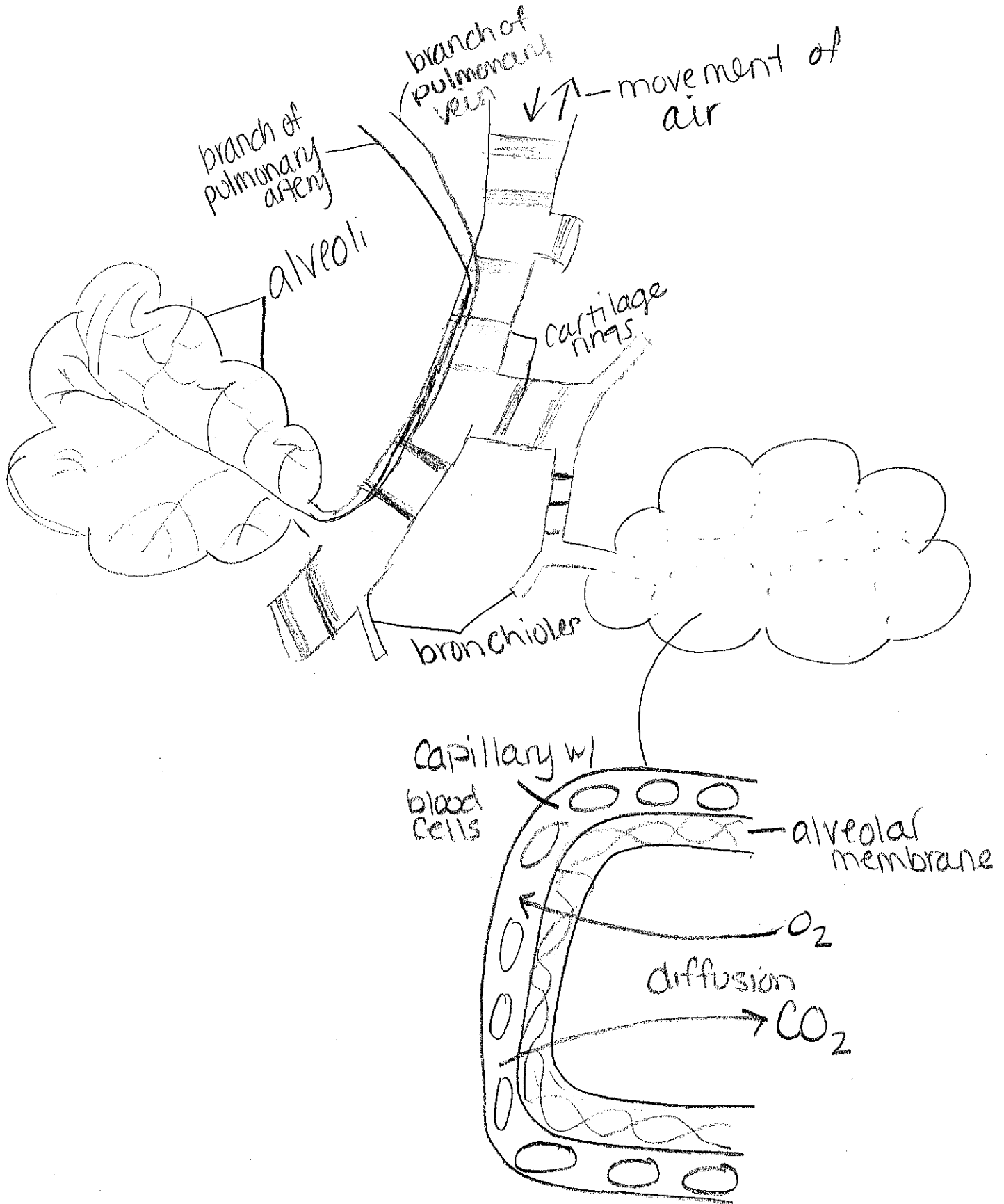
move \uparrow +
out

effects of rib
cage

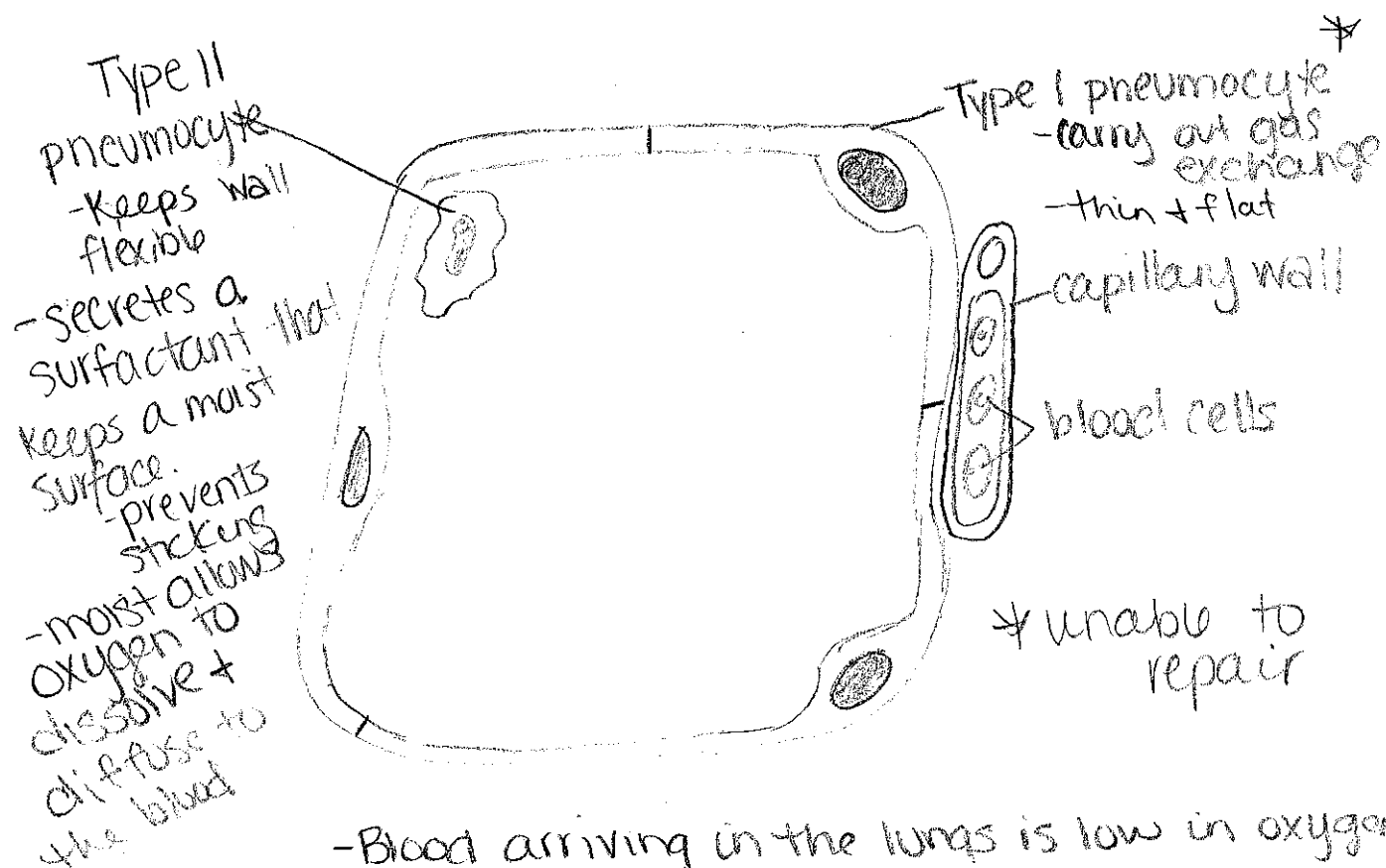
move \downarrow +
inwards

Alveolar Structure & gaseous exchange

- lung tissue consists of the alveoli, arranged in clusters, each served by a tiny bronchiole.



- Alveoli structure is protected by two types of cells.



- Blood arriving in the lungs is low in oxygen but high in CO_2 .
 - As blood flows past the alveoli, gas exchange occurs by diffusion.

Explain why, if the concentration of CO_2 built up in the blood ~~of~~ of a mammal, would be harmful.

- CO_2 is an acidic gas, if built up, the pH of the plasma solution, leading to respiratory acidosis.
- imbalance causes increase in heartbeat, high blood pressure, swellings, difficulty breathing, and even death.

Features of alveoli

Feature	Effects + Consequences
Surface area of alveoli	a huge S.A for gas exchange
Wall of alveoli (Type I)	very thin, flattened epithelium means the diffusion pathway is short
Capillary supply to alveoli	network of capillaries around each alveolus maintains concentration gradient
Type II (Surface film)	O ₂ dissolves in H ₂ O lining of alveoli, O ₂ dissolves into the blood

Explain the differences between gaseous exchange & cellular respiration:

- Gas exchange involves the action of the respiratory membrane (in the alveoli) only;
- Cellular respiration happens in the cell cytoplasm & the mitochondria, where energy is released from organic compounds

- Smoking & health
- emphysema