# Revision

What is the difference between external and internal respiration?

# Respiratory System Purpose

- The external respiratory system involves the exchanges of gases between the lungs & the blood.
- The internal respiratory system involves the exchange of gases between the blood & the cells.
- The respiratory and cardiovascular systems work closely together to maintain a supply of oxygen to the working muscles and make energy via respiration.

# What are the functions of the respiratory system?

# Function of the Respiratory System

The respiratory system has two main functions:

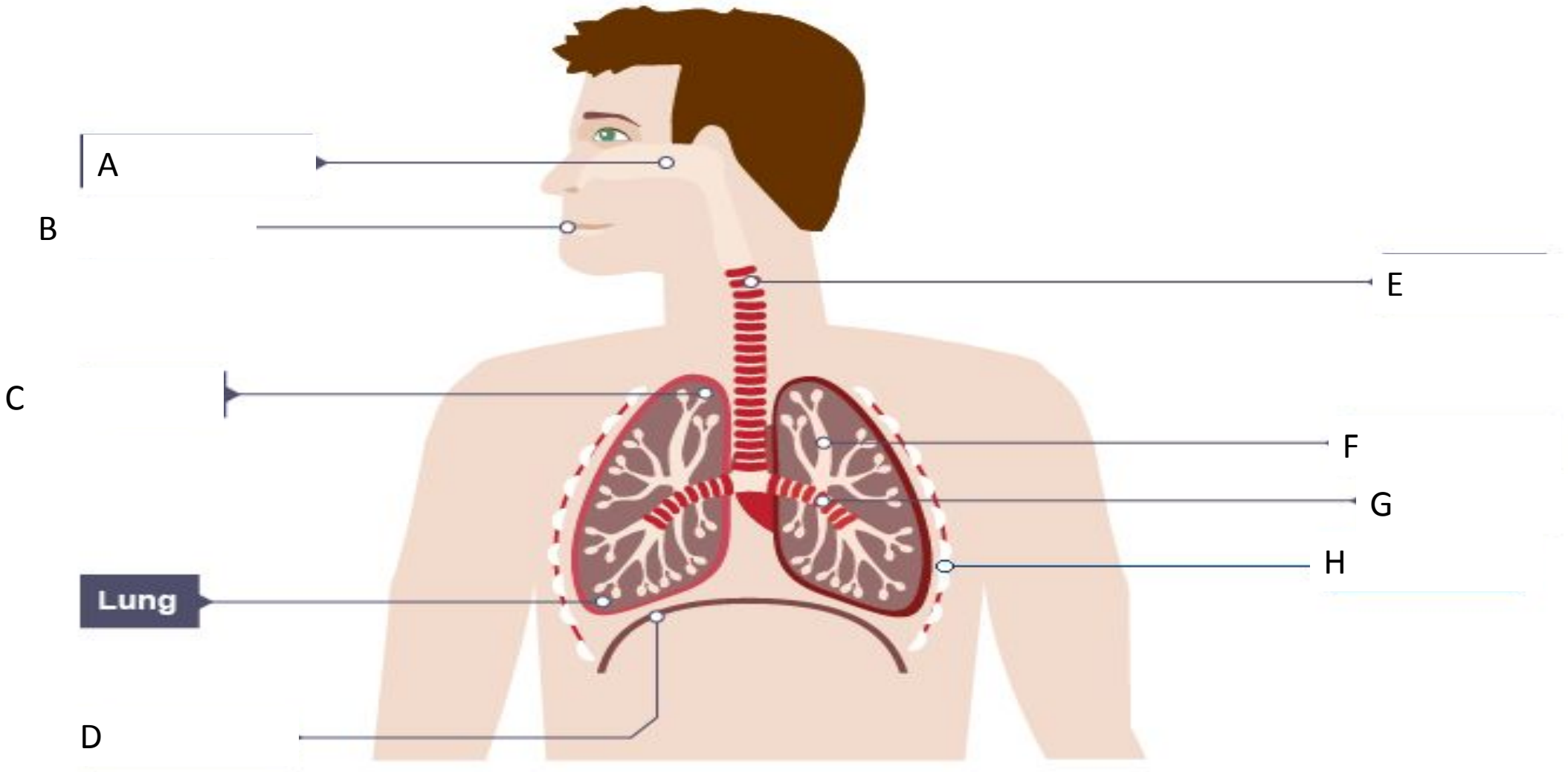
1. To transport **oxygen** into the body to make energy via respiration
2. To transport **carbon dioxide** and other **waste products** out of the body

- This happens through the act of **breathing**.

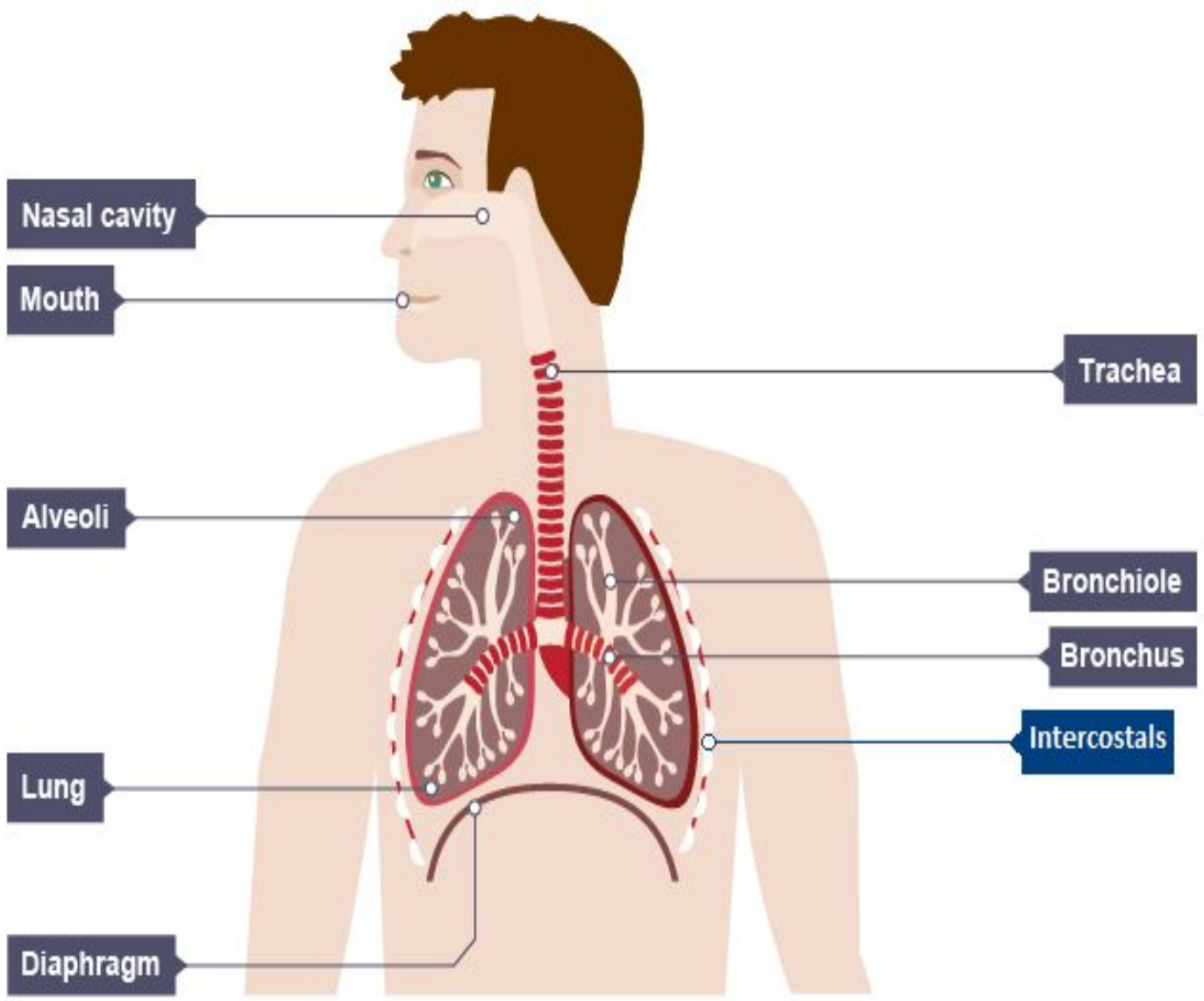
**Oxygen** passes **into** the blood during **inhalation**, so that it can be transported to muscles.

At the same time, **CO2** and other waste products pass **out** of the blood and are removed during **exhalation**.

# Retrieval



# The Pathway of Air




- Air passes through the nose/mouth & is warmed, filtered & moistened.
- Air passes through a long tube called the trachea.
- The trachea branches left & right into the bronchi which takes air to the lungs.
- The bronchi branches into smaller tubes called bronchioles.
- The bronchioles enable the air to pass into the alveoli, which are tiny sacs, where gaseous exchange takes place.

# Passage of air

- write the correct order

# (4.1) Passage of air

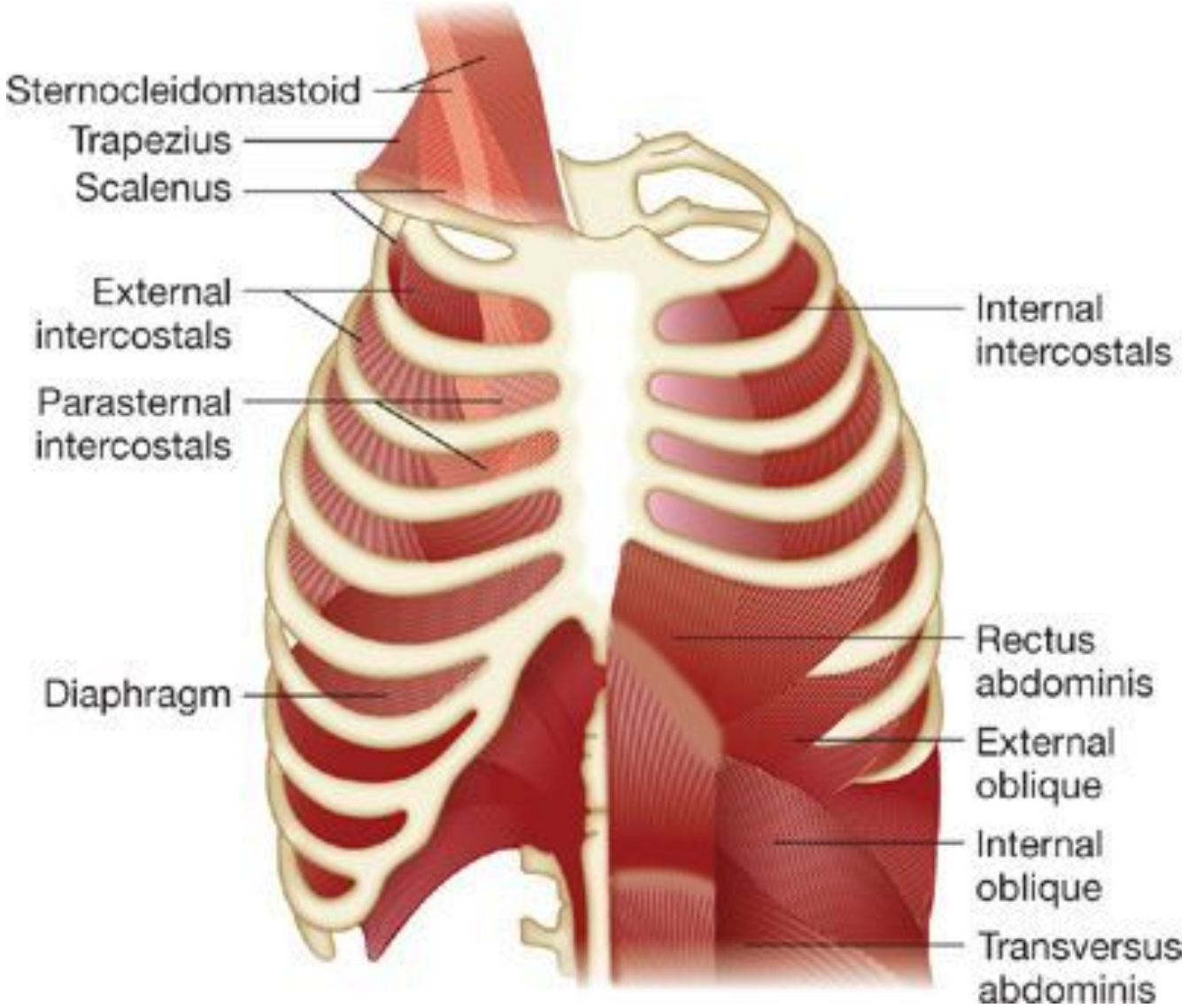
1. Air enters through mouth and nasal cavity
2. Passes through pharynx and larynx
3. Past epiglottis
4. Down Trachea
5. Trachea branches into two bronchi (left and right)
6. Each bronchus breaks down into smaller bronchioles
7. Alveoli where oxygen diffuses into the blood and CO2 back into the lungs

# Respiratory muscles

- Name 6 respiratory muscles used to in breathing in or out when exercising and what their function is.

# (4.2) Respiratory muscles used during exercise

1. Sternocleidomastoid
2. Scalene
3. Pectoralis Major
4. Internal Intercostals
5. Rectus abdominus
6. Diaphragm



## Muscles of inspiration

### Accessory

Sternocleidomastoid (elevates sternum)

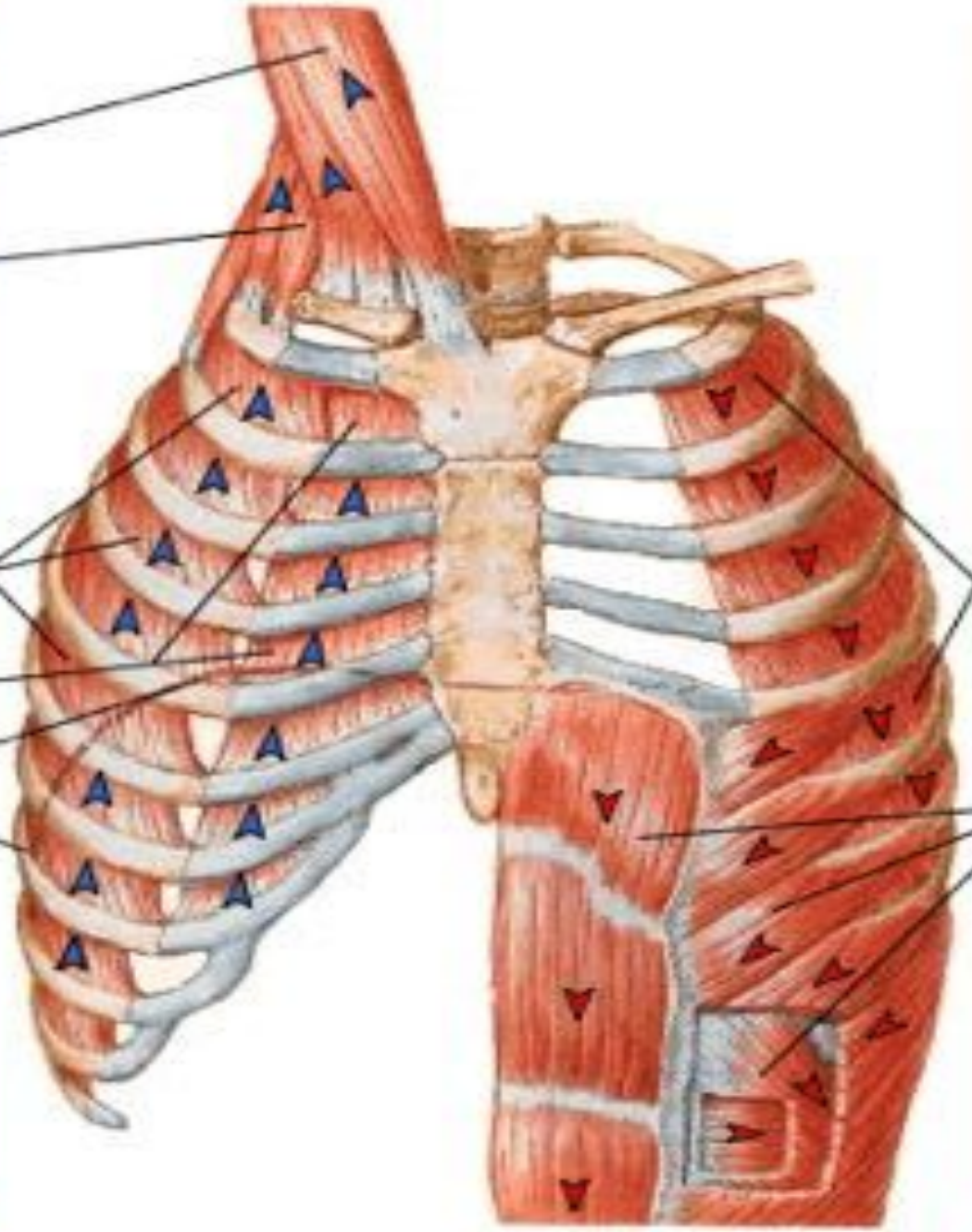
Scalenes Group (elevate upper ribs)

Not shown:
Pectoralis minor

### Principal

External intercostals
Interchondral part of internal intercostals (also elevates ribs)

Diaphragm (dome descends, thus increasing vertical dimension of thorac cavity; also elevates lower ribs)



## Muscles of expiration

### Quiet breathing

Expiration results from passive, elastic recoil of the lungs, dib cage and diaphragm

### Active breathing

Internal intercostals, except interchondral part (pull ribs down)

Abdominals (pull ribs down, compress abdominal contents thus pushing diaphragm up)

Note shown:
Quadratus lumborum (pulls ribs down)

# Inspiratory

## PULMONARY RIBCAGE

**Sternocleidomatoids**
Elevate the sternum
*Rotates head*

**Scalenes**
Elevate the upper ribs

**External Intercostals**
Elevate ribcage

## ABDOMINAL RIBCAGE

**Diaphragm**
* Primary muscle of respiration
Flow generator

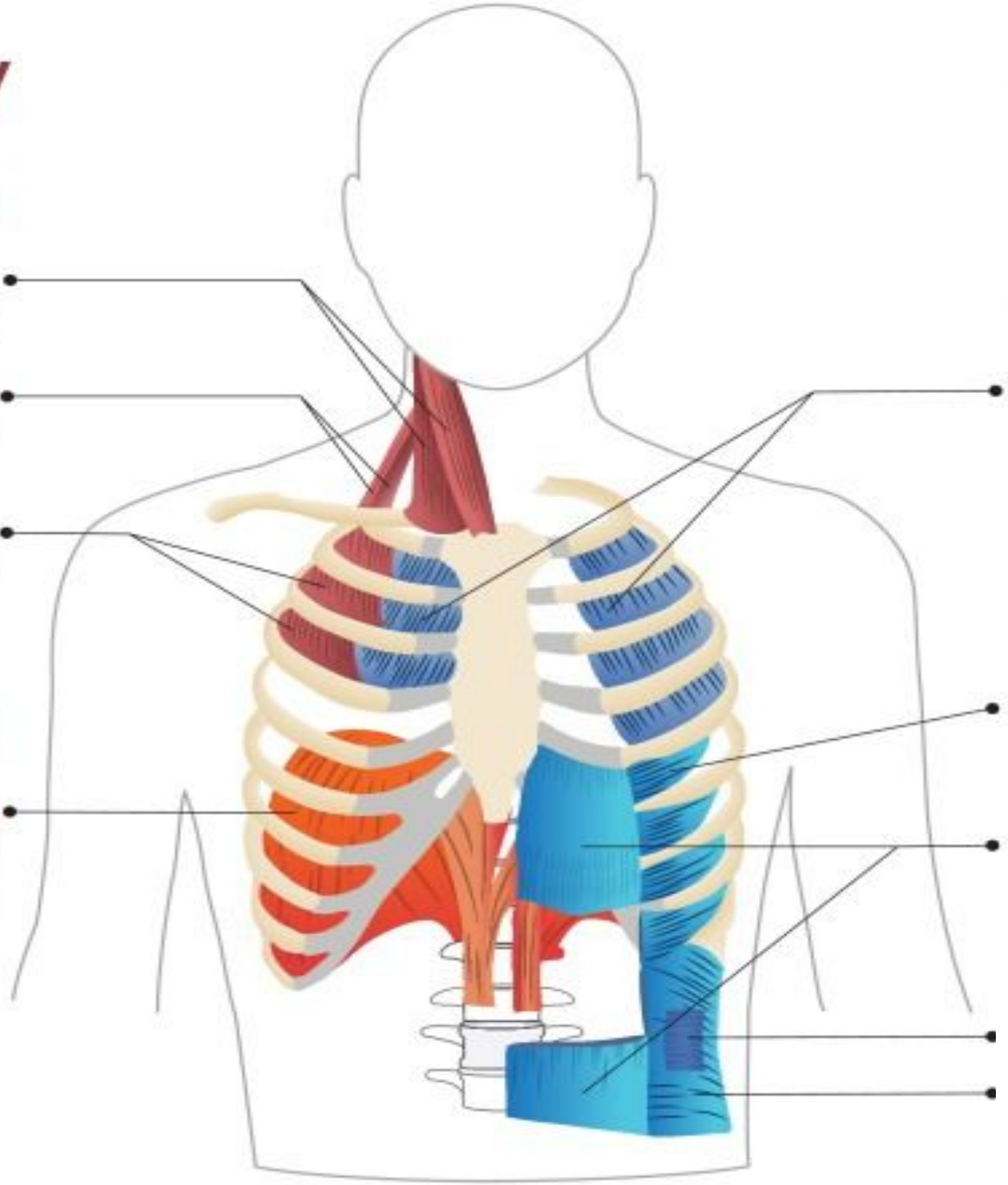
# Expiratory

## PULMONARY RIBCAGE

**Internal Intercostals**
Depress ribcage

**External Obliques**
*Contralateral rotation of torso*

**Rectus Abdominis**
*Flexes vertebral column*



Current Opinion in Physiology

# Exam Question

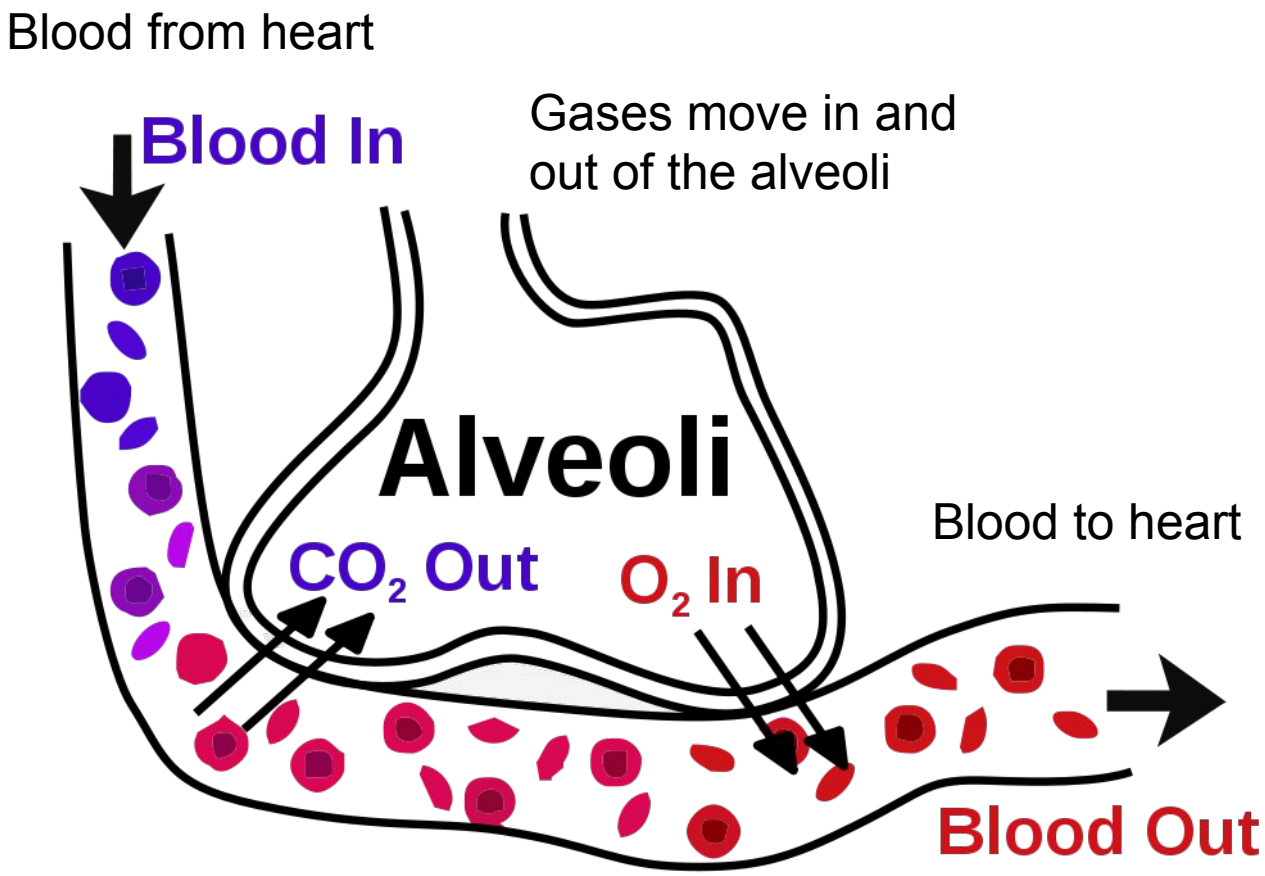
- What is the difference between inspiration at rest and when exercising with respiratory muscles?

- What is the difference between expiration at rest and when exercising with respiratory muscles?

# Explain how oxygen diffuses into the blood from the alveoli (2 marks)

# .4) Gaseous exchange at the alveoli

- Pressure of 02 inside the lungs is high
- Capillaries are low pressure
- This means 02 moves into the bloodstream from the aire
- C02 moved from capillaries into the lungs



Explain the percentage of gas in the air we breath in and out and why it changes (8 marks)

Explain the differences between air breathed in and out and why.

| Gas | Atmospheric air % | Exhaled air % | Change % |
|---|---|---|---|
| Nitrogen, $N_2$ | 79 | 79 | 0 |
| Oxygen, $O_2$ | 21 | 16 | -5 |
| Carbon dioxide, $CO_2$ | 0.04 | 4 | +3.96 |
| Water vapour | Variable | Saturated or 1% | - |