



LIONHEART
EDUCATIONAL TRUST

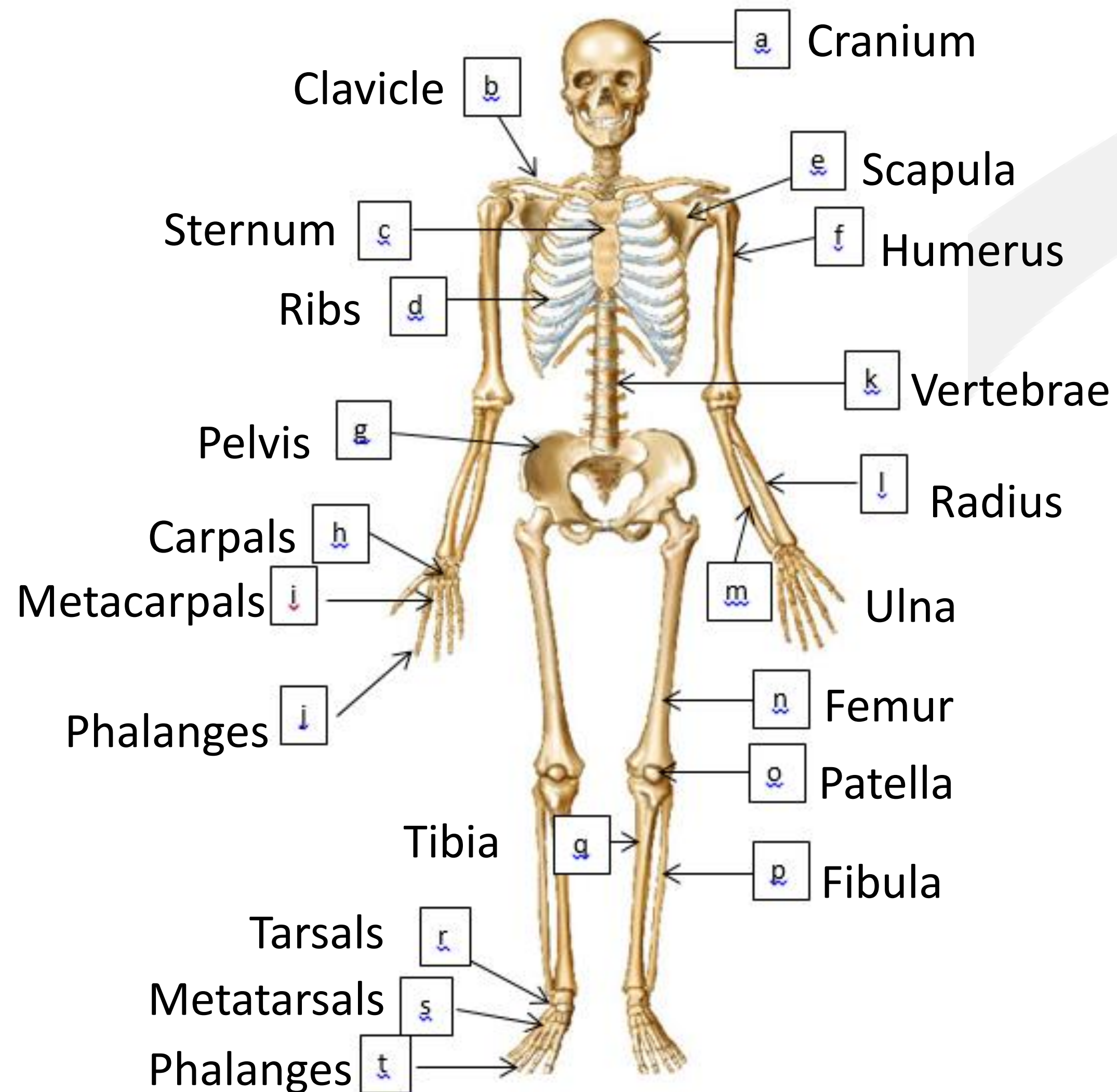
OCR GCSE PE REVISION SUMMER 2023
PAPER 1: PHYSICAL FACTORS AFFECTING PERFORMANCE



- Location of major bones
- Functions of the skeleton
- Types of synovial joint
- Types of movements at hinge & ball and socket joints
- Other components of joints
- Location of major muscle groups
- Roles of muscle in movement
- Lever systems
- Planes of movement

- Axis of rotation
- Structure and function of the cardiovascular system
- Structure and function of the respiratory system
- Aerobic and anaerobic exercise
- Short term effects of exercise
- Long term effects of exercise
- Components of fitness
- Optimising training
- Prevention of injury

LOCATION OF MAJOR BONES AND FUNCTIONS OF THE SKELETON



- Support
 - Of soft tissues such as muscles and organs
- Posture
 - Gives shape to the body and holds it upright
- Protection
 - Of vital organs e.g. ribs protect lungs
- Movement
 - Bones provide sites for muscle attachment. Muscles contract and pull on the bones to create movement.
- Blood cell protection
 - Red and white blood cells are produced in the bone marrow
- Storage of minerals
 - Minerals e.g. calcium is stored in the bones.

JOINTS AND MOVEMENTS

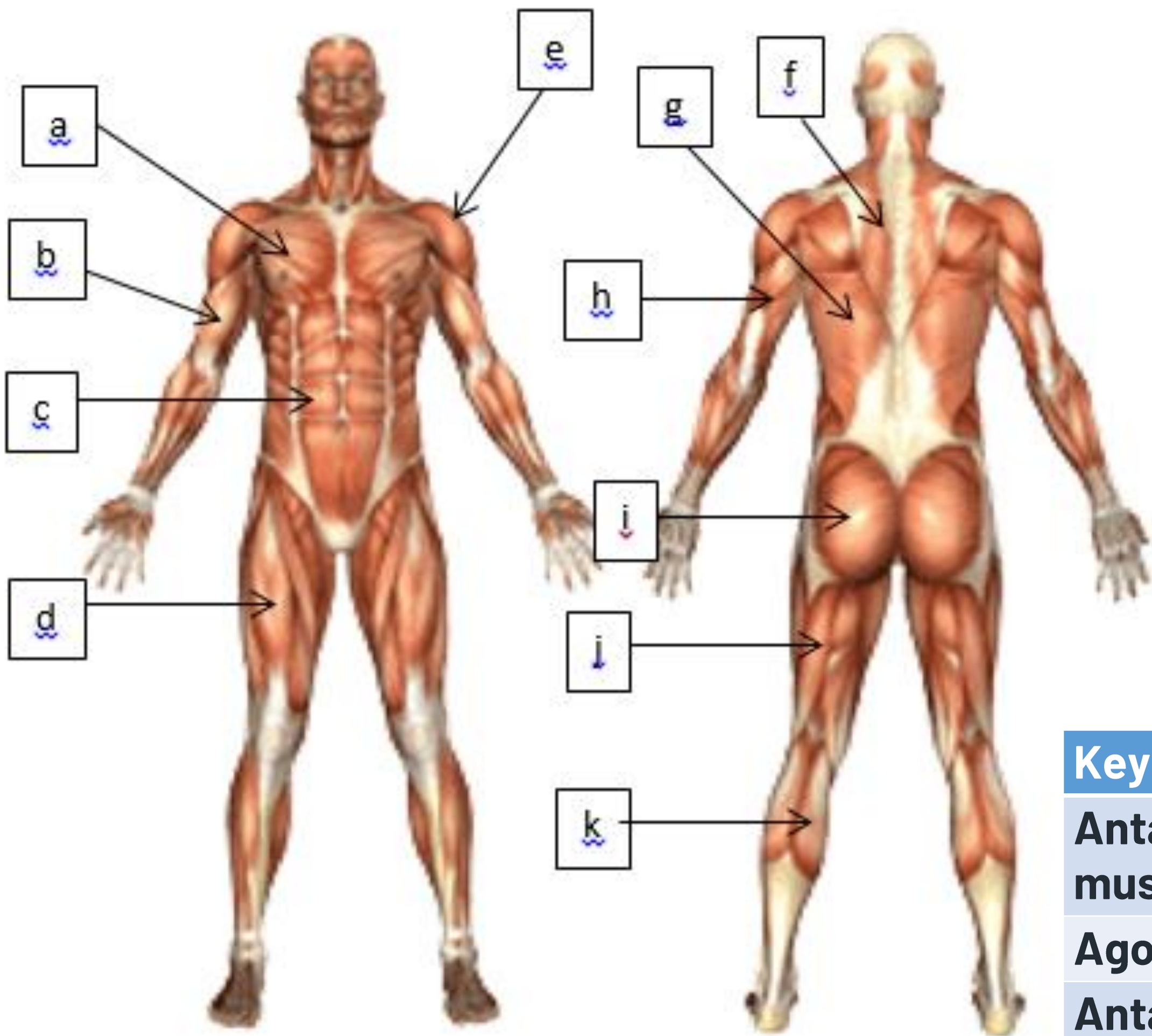


Synovial joint: freely moveable joint

Synovial joint type	Joint	Articulating bones	Movements possible
Hinge	Elbow	Humerus, radius, ulna	Flexion, extension
	Knee	Femur, tibia	Flexion, extension
Ball and socket	Shoulder	Scapula, humerus	Flexion, extension, abduction, adduction, circumduction, rotation
	Hip	Pelvis, femur	Flexion, extension, abduction, adduction, circumduction, rotation

Component of a joint	Structure	Function
Ligaments	Strong bands of connective tissue	Connect bone to bone, prevent dislocation, increase stability
Tendons	Strong bands of connective tissue	Connect muscle to bone and transmit the force from the muscle to move the bone
Cartilage	Tough and flexible connective tissue.	Shock absorber (white fibrocartilage in the knee & between vertebrae) and reduces friction (articular cartilage covering the ends of bones)

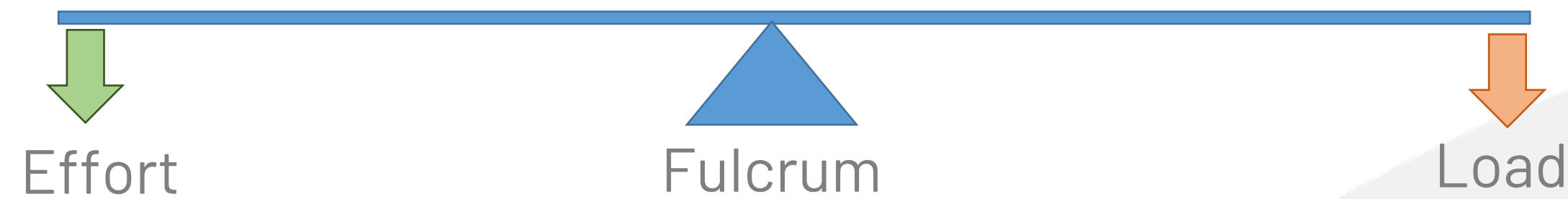
MUSCLES AND MOVEMENT



Label	Muscle	Movement caused
A	Pectorals	Adduction of the shoulder
B	Biceps	Flexion of the elbow
C	Abdominals	Flexion of the vertebrae
D	Quadriceps	Extension of the knee
E	Deltoid	Abduction of the shoulder
F	Trapezius	Extension of the neck
G	Latissimus Dorsi	Adduction of shoulder
H	Triceps	Extension of the elbow
I	Gluteals	Extension of the hip
J	Hamstrings	Flexion of the knee
K	Gastrocnemius	Plantar flexion of the ankle

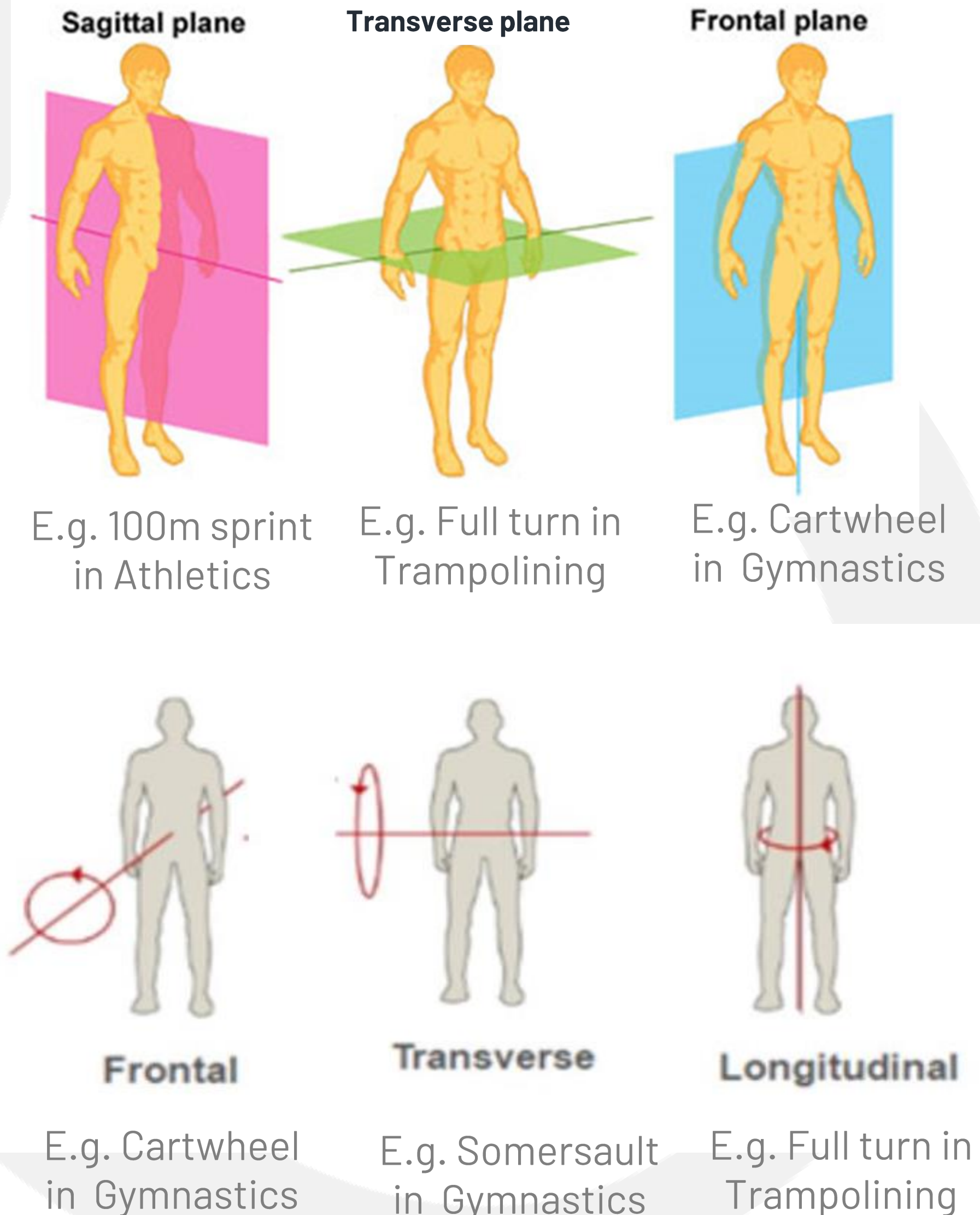
Key word	Description
Antagonistic muscle pair	A pair of muscles which work together to cause movements. When one of the muscles contract, the other relaxes.
Agonist	The muscle that contracts to cause a movement
Antagonist	The muscle that relaxes to allow the agonist to contract
Fixator	The muscle which contracts to stabilise part of the body

LEVERS (123, FLE), PLANES AND AXIS

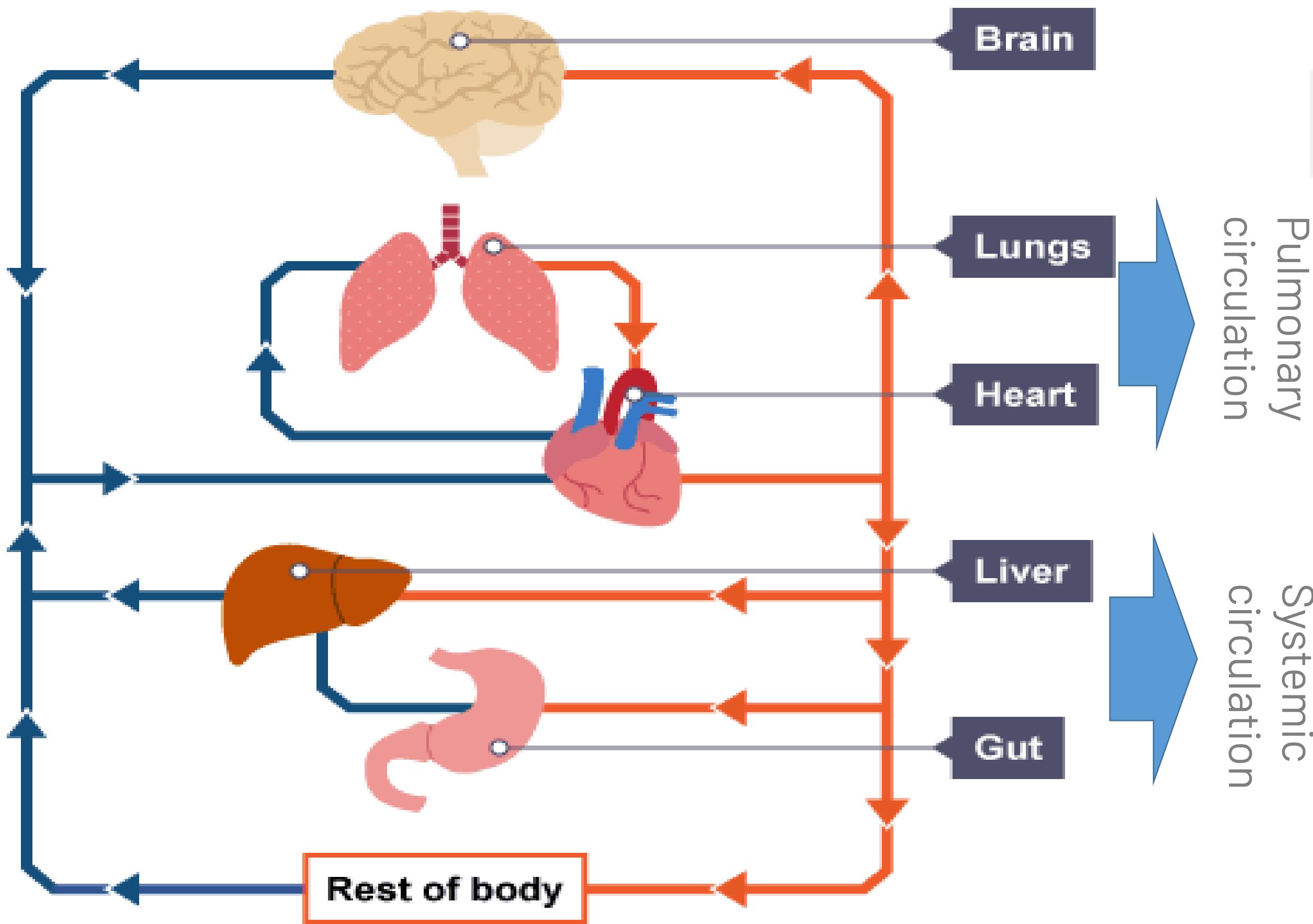


Lever system	Central element	Sporting example	Example components
1st class lever system	Fulcrum	Neck e.g. looking up to hit a smash in badminton	F: Atlanto-occipital joint in your neck L: Head E: Force created by the trapezius
2nd class lever system	Load	Ankle e.g. jumping for a rebound	F: Joint between phalanges and metatarsals L: Whole body weight E: Force created by gastrocnemius
3rd class lever system	Effort	Elbow e.g. bicep curl	F: Elbow joint L: Weight plus lower arm E: Force created by biceps

A 2nd class lever system is termed a mechanical advantage because you can lift a greater load with a relatively small effort



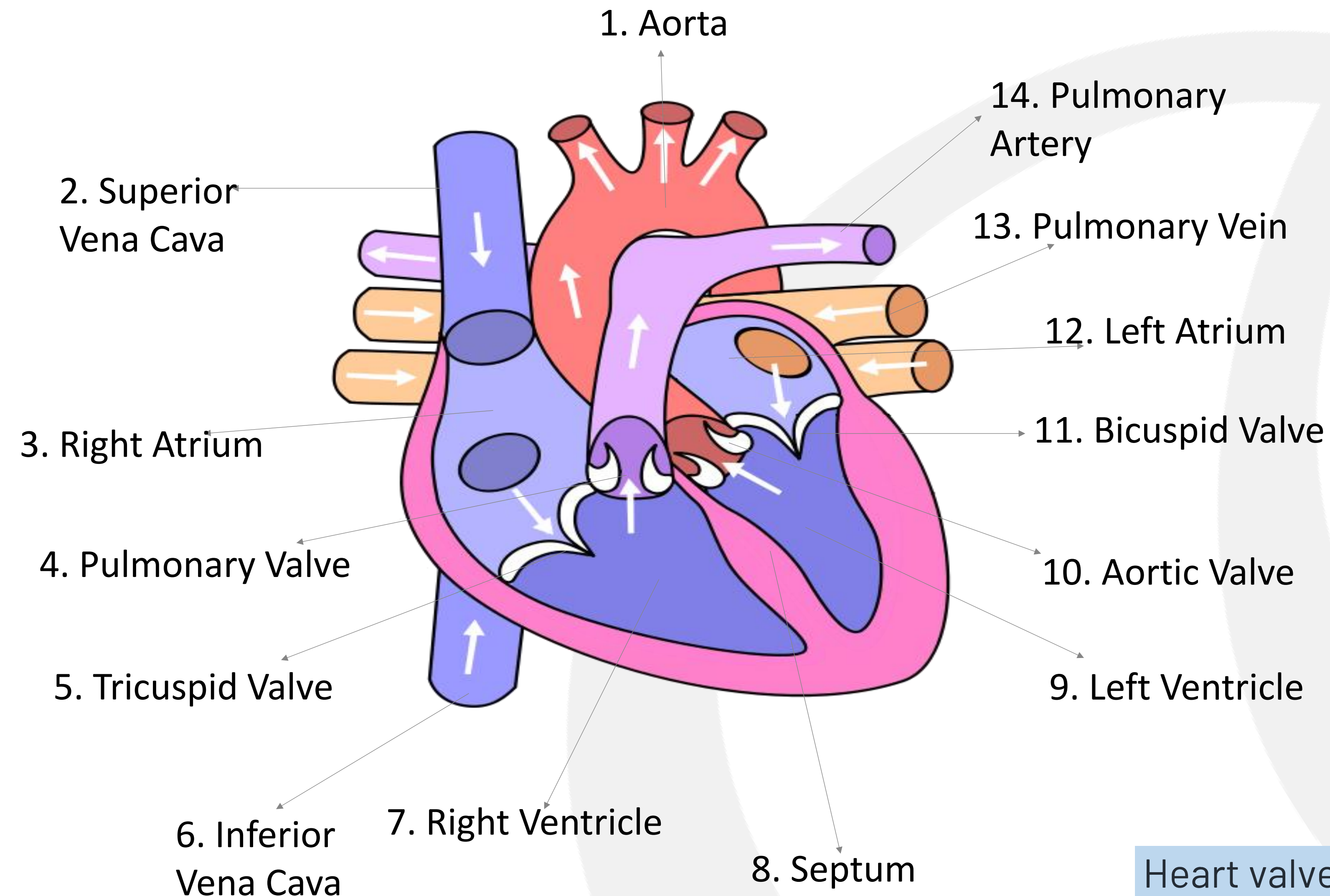
CARDIOVASCULAR SYSTEM – DOUBLE CIRCULATORY SYSTEM



Blood vessel	Structure	Function
Arteries	Thick smooth muscular wall	Take blood away from the heart
Capillaries	Very thin walls – 1 cell thick	Gaseous exchange at the lungs and the muscles
Veins	Thin smooth muscular wall Pocket valves	Take blood back to the heart

Heart measurement	Description
Heart rate	The number of times the heart beats in 1 minute
Stroke Volume	The volume of blood ejected from the left ventricle per beat
Cardiac output	The volume of blood ejected from the left ventricle per minute

STRUCTURE OF THE HEART AND THE PATH OF THE BLOOD

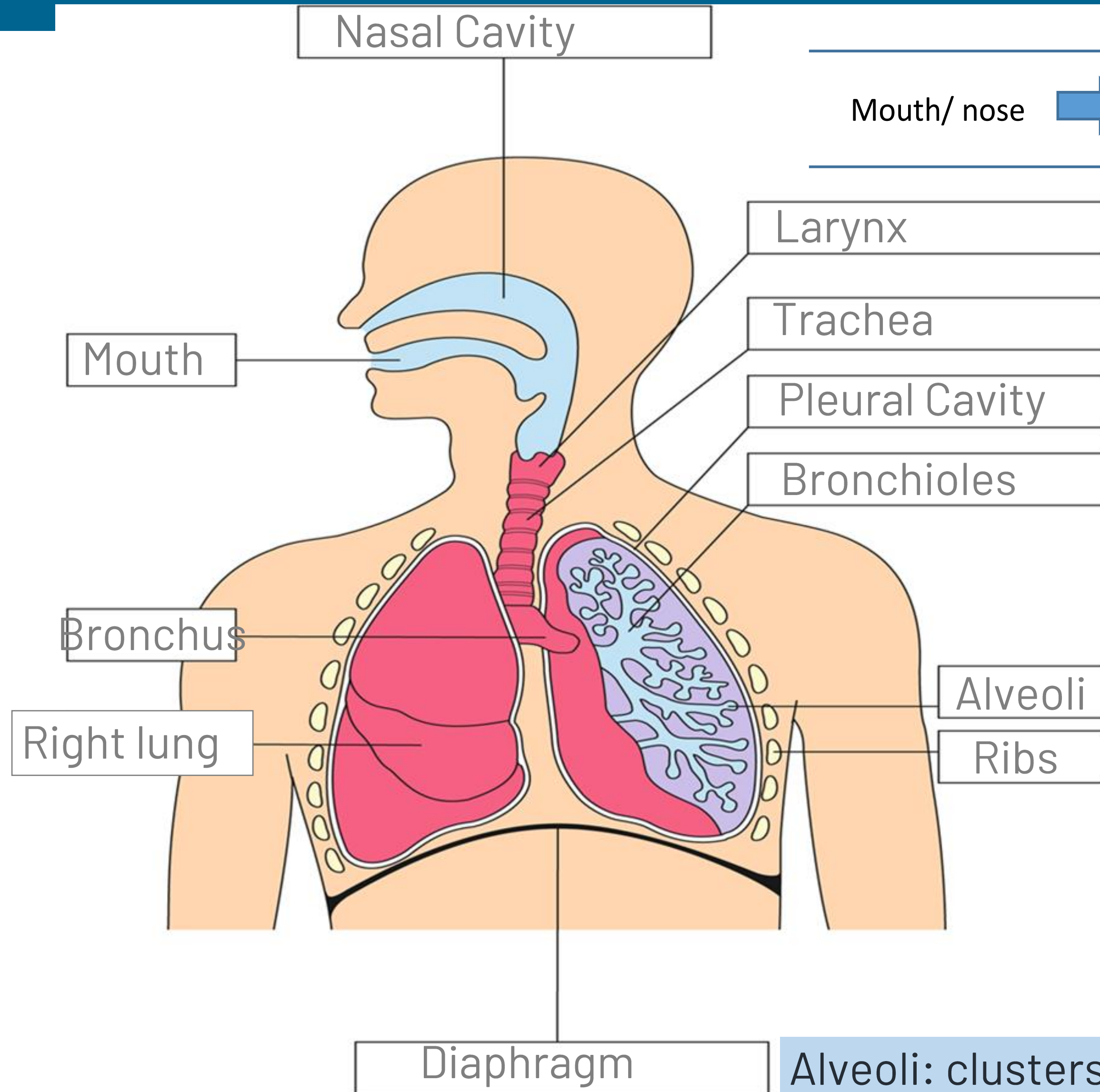


Path of the blood from the right atrium:

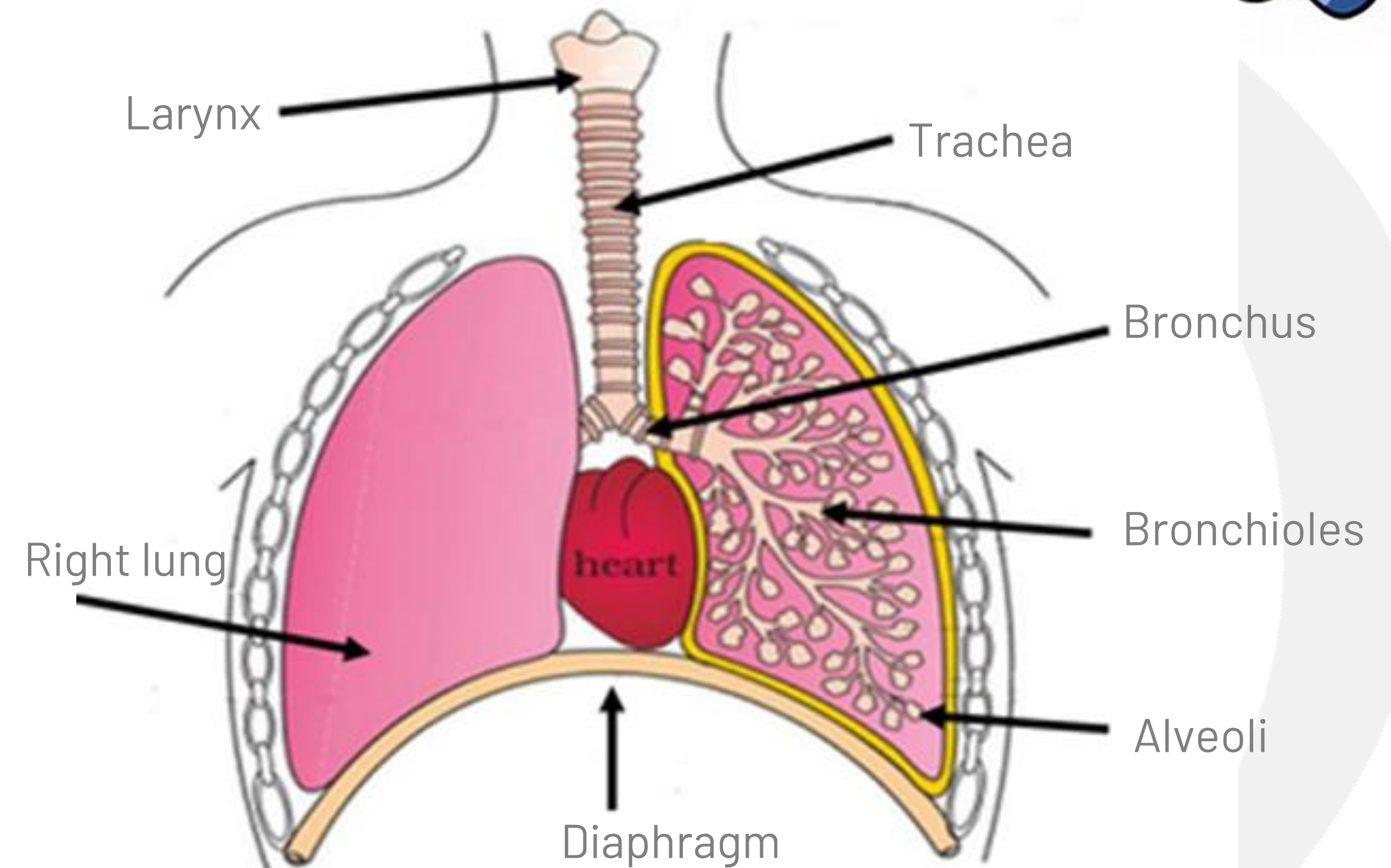
- Right Atrium
- Through tricuspid valve
- Right Ventricle
- Through the pulmonary valve
- Pulmonary Artery
- Lungs
- Pulmonary Vein
- Left Atrium
- Bicuspid Valve
- Left Ventricle
- Through the aortic valve
- Aorta
- Body tissues/ organs/ muscles
- Vena Cave
- Right Atrium

Heart valves: Prevent back flow of blood

RESPIRATORY SYSTEM

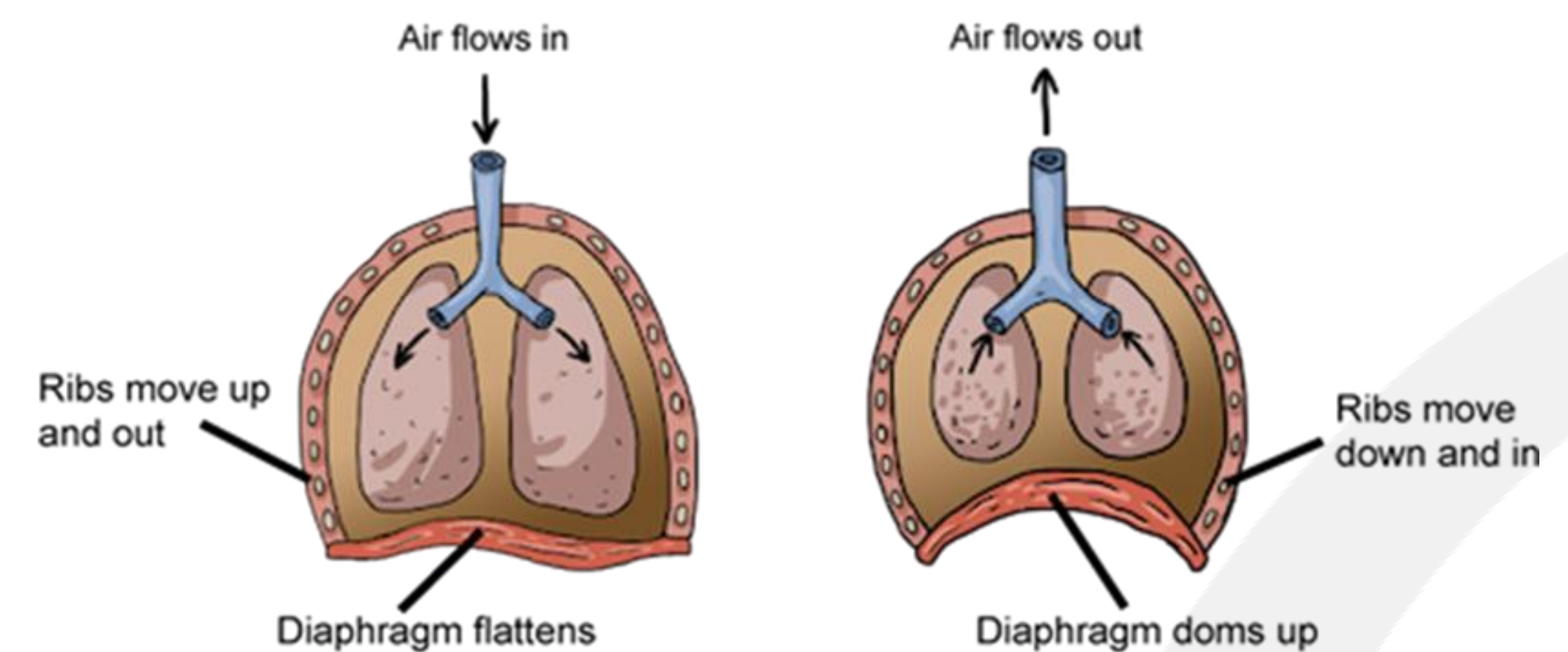


Mouth/ nose → Trachea → Bronchus → Bronchiole → Alveoli



Alveoli: clusters of tiny air sacs covered in capillaries to allow gaseous exchange

INSPIRATION (INHALING) AND EXPIRATION (EXHALING)



Lung measurements	Location
Respiratory rate	The number of breaths taken in one minute
Tidal Volume	The volume of air breathed in or out in one breath
Minute Volume	The volume of air breathed in or out in one minute

	Inspiration	Expiration
Muscles	External intercostals and diaphragm contract	External intercostals and diaphragm relax
Movement	Ribs move up and out and diaphragm moves down	Ribs move in and down and diaphragm domes up
Volume	Lung volume increases	Lung volume decreases
Pressure	Pressure of air in the lungs decreases	Pressure of air in the lungs increases
Air	Air moves into the lungs from outside	Air is forced out of the lungs
Gases	O ₂ moves into the lungs and diffuses into the blood	CO ₂ in the alveoli moves out of the lungs

Gaseous exchange: movement of O₂ and CO₂ between the blood and the alveoli/ muscle.

Haemoglobin: Iron rich protein in the RBCs which carries oxygen.

Oxyhaemoglobin: When oxygen attaches to haemoglobin it becomes oxyhaemoglobin.

Diffusion: movement of gasses from a high concentration to a low concentration.

AEROBIC AND ANAEROBIC EXERCISE



	Aerobic	Anaerobic
Description	Low intensity exercise performed for a long period of time	High intensity exercise performed for a short period of time
Energy production	Oxygen and glucose used to create low levels of energy	Glucose used to produce high levels of energy
Intensity	Low	High
Duration	Long	Short
Example	Marathon	100m sprint
By-products	Carbon dioxide and water	Carbon dioxide, water and lactic acid.

Redistribution of blood: **vascular shunt mechanism**

- **Vasodilation:** Widening of arteries to increase blood flow e.g. to muscles during exercise and to the skin when hot
- **Vasoconstriction:** Narrowing of the arteries to decrease blood flow e.g. to internal organs during exercise and to the skin when cold.

SHORT TERM AND LONG TERM EFFECTS OF EXERCISE



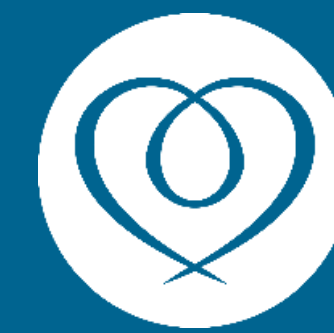
Short Term Effects of Exercise

- Increased muscle temperature
- Increased heart rate
- Increased stroke volume
- Increased cardiac output
- Redistribution of blood flow during exercise
- Increased respiratory rate
- Increased tidal volume
- Increased minute ventilation
- Increased oxygen to the working muscles
- Increased lactic acid production

Long Term Effects of Exercise

- Increased bone density
- Hypertrophy of muscle (increase in muscle size)
- Increased muscular strength
- Increased muscular endurance
- Increased resistance to fatigue
- Hypertrophy of the heart
- Decreased resting heart rate
- Increased resting stroke volume
- Increased maximal cardiac output
- Faster rate of recovery
- Increased aerobic capacity
- Stronger respiratory muscles
- Increased tidal volume during exercise
- Increased minute volume during exercise
- Increased capillarisation (alveoli and muscles)

COMPONENTS OF FITNESS



Component of fitness	Definition	Practical example	Fitness test
CV endurance	Ability of heart and blood vessels to provide O ₂ to working muscles for a long time without fatigue	Marathon	12 minute cooper run Multistage fitness test
Muscular endurance	Ability of the muscles to contract over a long period of time without fatigue	Tour de France (quadriceps)	Press up test
Speed	How fast a person can move their whole body or a body part.	100m sprint	30m sprint test
Strength	The maximum force a muscle can apply	Weight lifting	1 rep max test
Power	Speed x strength Large muscle contractions performed at speed	Long Jump	Vertical Jump Test
Flexibility	The range of movement around a joint	Splits in gymnastics	Sit and reach test
Agility	The ability to change direction at speed	Dodging in netball	Illinois agility test
Balance	The ability keep centre of mass over base of support	Handstand in gymnastics	Standing stork test
Co-ordination	The ability to use multiple body parts together	Catching a ball in cricket	Wall throw test
Reaction time	How long it takes to respond to a stimulus	Start of 100m sprint	Ruler drop test

PRINCIPLES AND TYPES OF TRAINING



Principles of training	Description	Example
Specificity	Training should be relevant to the person, activity and fibre type	A sprinter would do anaerobic track based training
Progression	Training should gradually become more difficult over time.	30 minute sessions increase to 35 minutes
Overload	Training should be more challenging than the person is used to force adaptations	Lifting heavier weights than are more challenging
Reversibility	If training stops, the adaptations will revert and fitness gains will be lost	Injury can lead to loss of strength.

FITT principle	Description	Example
Frequency	How often training sessions are	3 times per week
Intensity	How hard a person is training	60% of HR max
Time	How long a training session lasts	30 minutes
Type	The nature of the training	Continuous training (run)

Type of training	Description
Continuous	Medium – low constant intensity, long duration training.
Interval	High intensity training with rest intervals for recovery.
Fartlek	Varied intensity training, with low intensity for recovery.
Circuit	Involves body weight exercises at stations. Time limit per station and rest periods for recovery.
Weight	Training to develop strength. Reps and sets performed using free weights or weight machines.
Plyometrics	High intensity training to develop power involving hopping and jumping.
HIIT	A popular form of interval training called high intensity interval training

WARM UP AND COOL DOWN



Stages of a warm up:

- Pulse raiser
 - 5 min jog
- Mobility
 - Arm circles
- Stretching
 - Quadriceps stretch
- Dynamic Movements
 - Shuttle runs
- Skill Rehearsal
 - Passing practice

Physical benefits of a warm up:

- Preparing the body for physical activity
- Increasing body / muscle temperature
- Increasing heart rate
- Increasing flexibility of muscles and joints
- Increased pliability of ligaments and tendons
- Increased blood flow and oxygen to muscles
- Increased speed of muscle contraction

Minimising risk of injury:

- Wear personal protective equipment
- Wear correct clothing/footwear
- Appropriate level of competition
- Lifting and carrying equipment safely
- Use of warm up and cool down

Stages of a cool down:

- Low intensity exercise
 - 3 min jog
- Stretches
 - Hamstring stretch

Physical benefits of a cool down:

- Helps the body's transition back to a resting state
- Gradually lowers heart rate
- Gradually lowers temperature
- Circulates blood and oxygen
- Gradually reduces breathing rate
- Increases removal of waste products e.g. lactic acid
- Reduces the risk of muscle soreness and stiffness
- Aids recovery by stretching muscles.

Identify potential hazards:

- Sports halls
- Fitness centres
- Playing fields
- Artificial outdoor areas
- Swimming pool.

EXAM TECHNIQUE – SECTION A



- 30 marks available
- Mostly **1 mark** questions with some 2 mark questions, usually clear what is needed for each mark
 - Multiple choice
 - True or false
 - Label a diagram
 - Complete a table
 - Identify
 - Describe
 - Give an example of...
- **Read** all parts of each questions.
 - E.g. If there is a diagram there might be space to answer a 1 mark question below, however there might have been some writing above the diagram asking you to draw an arrow to identify something on the diagram.
- Highlight or underline **key words**. Be careful if it says 'which is not an example of...'
- Read all options for a multiple choice carefully, eliminate wrong answers.
- If you have to give a practical example, give the sport and the skill. E.g. extension of the elbows during a chest pass in netball.

EXAM TECHNIQUE – SECTION B



- 30 marks available
- Mixture of mostly longer questions (3-6 marks) with some 1 and 2 mark questions.
- **Read** all questions carefully and highlight key words and the command word.
- Look at **how many marks** are available and give at least one different point for each available mark. Start a new sentence for new point.
- For a **compare** (similarities/ differences) question, you need to give a piece of information about both elements for a mark. E.g. 'Veins have pocket valves and arteries don't have pocket valves' is 1 mark.
- For an **explain** questions, you need to give more detail for each point you make, using words like 'because'.
- If a questions asks for practical examples, give one for every point you make. E.g. a 4 mark explain question, make 4 separate points and give a practical example for every point you make.
- One **6 mark** 'levels mark scheme' question
 - Answer all parts of the questions – there will often be 2 sections
 - Plan your answer –write a list of key words at the side
 - For each point you make, explain it in as much detail as you can AND give a practical example
 - Use the correct terminology and write in full sentences.
- One **data** question
 - Read the question really carefully to work out what you need to do with the data.
 - Often you have to find trends in the data, don't just repeat the data. E.g. fitness levels for all participants increased over time.



- Do lots of independent revision (create mind maps/ cue cards etc.)
- Learn the content (class notes/ revision books/ print these slides).
- Use past paper questions and mark schemes to practice application of the content to answer the questions.
- Speak to your teachers about any content or questions you don't understand.
- Good luck in your exams!!