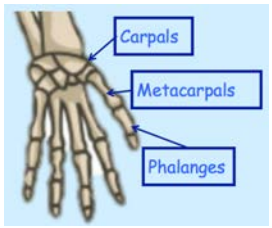
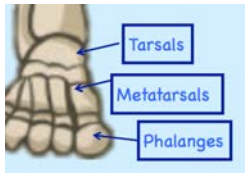
Skeletal System (1. 1a)

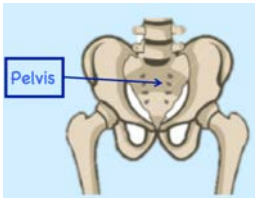
Skeletal System (1.1a): Bones and functions

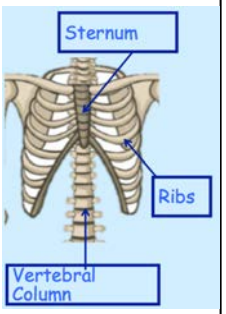
Functions of the skeleton:

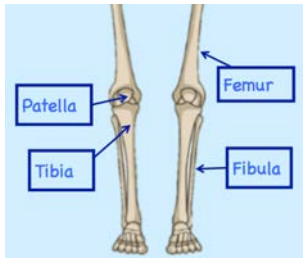
- Shape and support
- Allows movement
- Blood production
- Stores minerals
- Protection of organs

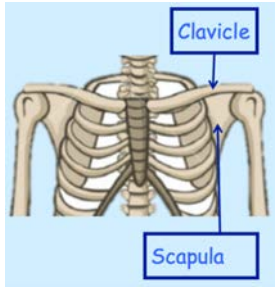


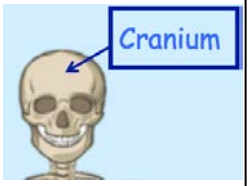










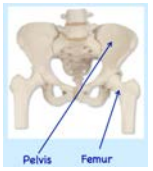


Skeletal System (1.1a): Joints

- **Synovial Joint:** This is a freely movable joint where two or more bones articulate.
- **Tendons:** Connect muscle to bone and transmit muscular force to move bone.
- **Ligaments:** Connect bone to bone and keep joints stable.
- **Articular cartilage:** Protects the bones surface at joints by reducing friction and absorbing shock. Difficult to heal as no blood supply.
- **Articulating bones:** bones that move within a joint

Hinge Joints: *(movement)* flexion an extension
Knee: tibia + femur
Elbow: radius, humerus + ulna

Ball and socket joints: *(movement)* all movements
Hip: pelvis + femur
Shoulder: clavicle + scapula



Skeletal System (1.1a): Types of movement

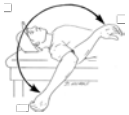
Flexion: the decrease in angle around a joint, e.g. the preparation phase when the leg is drawn back before striking a football.

Extension: the increase in angle around a joint, e.g. the execution phase as the ball is released when shooting a basketball.

Abduction: movement away from the midline of the body, e.g. A swimmer moves their arms out to the side during butterfly.

Adduction: movement towards the midline of the body, e.g. Recovery leg kick action in breaststroke.

Rotation: when a bone turns about its longitudinal axis, e.g. during the backswing of a tennis serve.

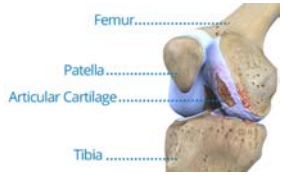


Circumduction: all movements combined to produce continuous motion.

Skeletal System (1.1a) Key Terms:

- **Ligaments:**
  - Attach bone to bone
  - Stabilise joint
  - Tough tissue

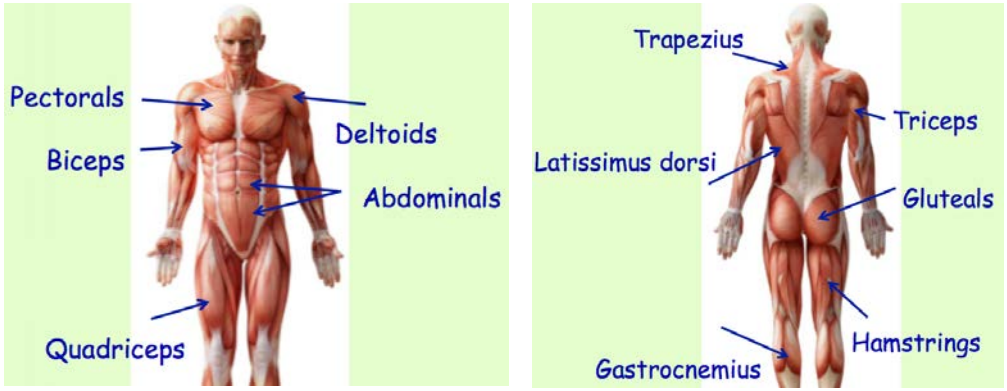
- **Tendons:**
  - Attach muscle to bone
  - Transmit movement



- **Cartilage:**
  - Reduce friction
  - Act as a shock absorber
  - Difficult to heal as no blood supply

Muscular System / Moement Analysis (1.1b+c)

Muscular System: (1.1b): Muscles of the body

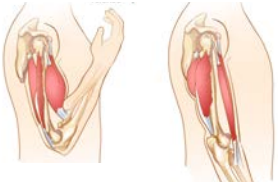


Synergist: a muscle that stabilises the joint. E.g. the trapezius contracts to stabilise the origin of the biceps.

Muscular System: (1.1b): Antagonistic muscle pairs

- **Antagonistic muscle pair:** muscles work in pairs as one muscle contracts the other relaxes.
- **Agonist:** The working muscle that causes movement. It is also known as the prime mover. E.g. the bicep is the muscle that produces flexion at the elbow.
- **Antagonist:** The muscle that relaxes in the movement. E.g. the tricep is the antagonist when the arm flexes.
- **Examples of antagonistic pairs:**

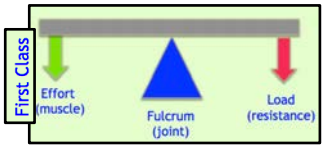
- Biceps and triceps
- Quadriceps and hamstrings



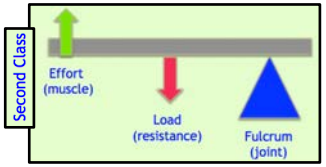
Movement Analysis: (1.1c)

- **Fulcrum:** a joint
- **Effort:** a muscle
- **Load:** the resistance

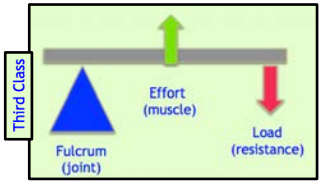
Remember: 'EFL the ELF, FEL'



Movement: elbow and neck extension.
Examples: heading a football, throwing a dart.
Description: *fulcrum is between effort and load.*



Movement: plantar and dorsi flexion.
Examples: on tiptoes when smashing in badminton.
Description: *load is between effort and fulcrum.*

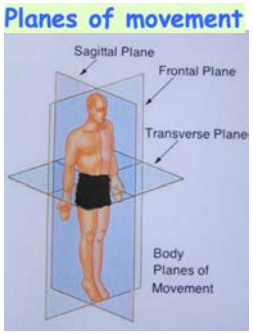


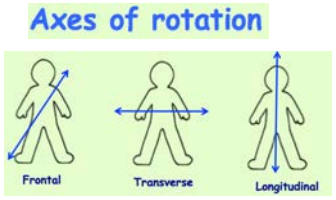
Movement: all movements except elbow extension.
Examples: a bicep curl.
Description: *effort is between fulcrum and load*

Movement Analysis: (1.1c): Planes and Axis

FAT Teachers Really Like Sausages Especially Frankfurters

Plane of movement	Tyoe of movement	Axis of rotation
Frontal	Abduction/Adduction	Transverse
Transverse	Rotation	Longistudional
Sagittal	Extension/Flexion	Frontal





Frontal plane – divides the body front and back.

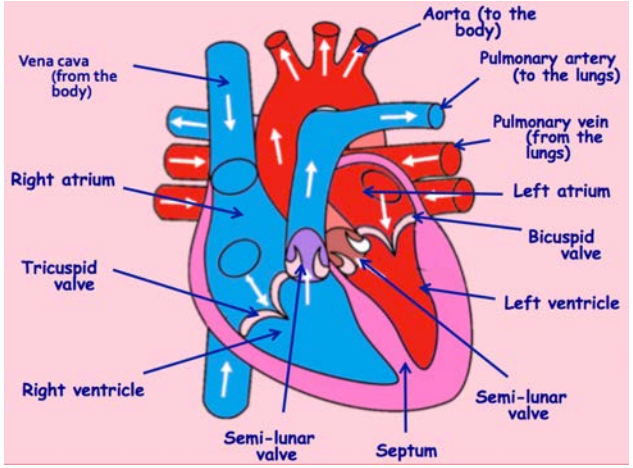
Transverse plane – divides the body top and bottom.

Sagittal plane - divides the body into left and right sides.

The Cardiovascualr and Respiratory System (1.1d)

The Cardiovascular System (1.1d):

- **Double circulatory system:** blood passes through the heart twice, it consists of two loops.
- **Pulmonary:** the circuit of the blood from the heart to the lungs.
- **Systemic:** the circuit of the blood from the heart to the body.



The Cardiovascular System (1.1d) Key Terms:

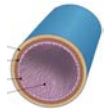
- **Stroke Volume:** the amount of blood pumped out of heart in one contraction.
- **Heart Rate:** the amount of times the heart beats per minute.
- **Cardiac Output:** the volume of blood pumped out of the heart in one minute.
- **Role of red blood cells:** to transport oxygen around the body.

Arteries

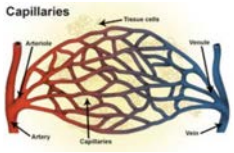
- Carry oxygenated blood
- Take blood **away** from the **heart**
- Carry blood at **high** pressure
- Arteries **do not** have valves.

Veins

- Carry **deoxygenated**
- Take blood **in** to the heart
- Carry blood at **low** pressure.
- **Do have** valves to prevent the backflow of blood.



Capillaries occur in large quantities around the muscles and this enables effective gaseous



The Respiratory System (1.1d): Breathing

Mouth/Nose → Trachea → Bronchi → Bronchiole → Alveoli

Intercostal Muscles

Inspiration

Expiration

What happens to the muscles?	Diaphragm and intercostal contract.	Diaphragm and intercostal relax.
What movement occurs?	Diaphragm moves down, rib cage moves up and out.	Diaphragm moves up, rib cage moves in and down.
What happens to the volume?	Volume inside the chest cavity increases.	Volume inside the chest cavity decreases.
Pressure?	The pressure decreases.	The pressure increases.
So air….	Rushes in.	Goes out.

The Respiratory System (1.1d): Key Terms

- **Tidal volume:** volume of air inspired or expired per breath.
- **Breathing rate:** volume of air that is inspired or expired in one minute.
- **Minute Ventilation:** the frequency of breaths measured in breaths per minute.

- **Gaseous exchange**

- Takes place between the **alveoli** and the **blood** at the **lungs**.
- Blood arriving has **carbon dioxide** blood in alveoli has **oxygen**.
- Gases **diffuse** as they move from **high concentration** to a **low concentration**.
- Blood moves away from the lungs/alveoli filled with 02.

Anaerobic exercise

- High intensity
- Short term bursts of energy
- Lactic acid is produced
- Without oxygen
- E.g. weight lifting

Aerobic exercise

- Continuous exercise
- Low intensity
- Lactic acid is NOT produced
- With oxygen
- E.g. long distance running

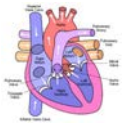
Effects of exercise on the body systems (1.1e)

Effects of exercise (1.1e): short term

Muscular System

- Muscle temperature increases.
- Lactic acid production.
- Muscle pain and fatigue.

Cardiovascular System



- Heart rate increases.
- Stroke volume increases.
- Cardiac output increases
- Redistribution of blood flow during exercise.
- Oxygen to the working muscles.

Respiratory System

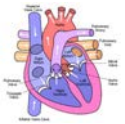
- Tidal volume increases.
- Respiratory rate increases.
- Minute ventilation increases
- Oxygen debt occurs.

Effects of exercise (1.1d): Long term

Muscular System

- Hypertrophy of muscle
- Muscular strength
- Muscular Endurance
- Resistance to fatigue

Cardiovascular System



- Hypertrophy of the heart
- Resting heart rate / stroke volume increase
- Cardiac output increases
- Capilliarisation

Respiratory System

- Rate of recovery increases.
- Aerobic capacity.
- Respiratory muscles
- Tidal volume and minute ventilation increase.