

Structure and support -SUMMARY

What supports a body and enables it to move?

Muscle

A **muscle** is made of strong tissue that can contract in an orderly way. When a muscle contracts, the cells of the muscle become shorter. When the muscle relaxes, the cells return to their original length.



You might recall that mitochondria are the main energy producers in a cell. Because so much energy is required for muscle function, muscle cells are packed with mitochondria.

- Muscles enable the body to move but cannot function without the support of bones.
- The skeletal system and the muscular system work together and move your body.

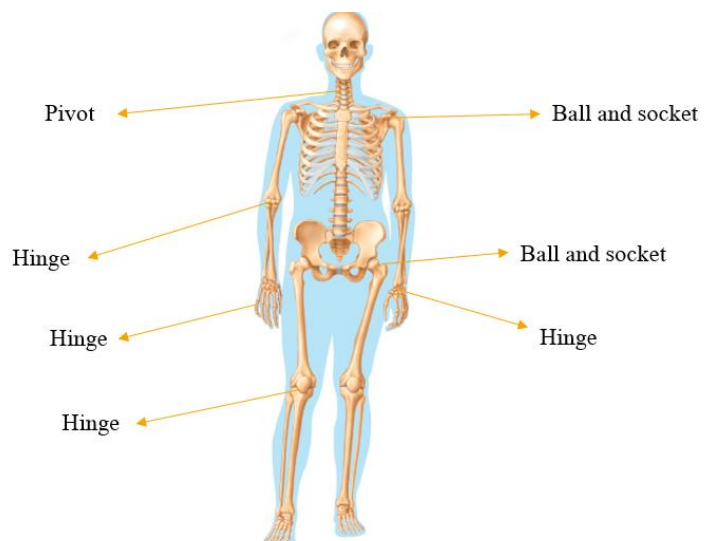
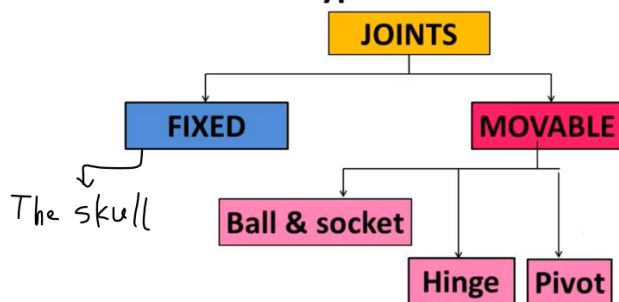


Joints

- A **joint** is where two or more bones meet and work together. Joints provide flexibility and movement.
- Bones are connected to other bones by tissues called **ligaments**.
- When the bones in the joint move, ligaments stretch and keep the bones from shifting away from each other.

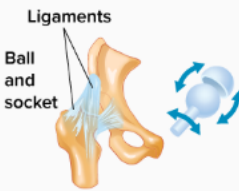
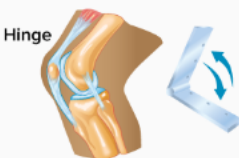



Types of Joints

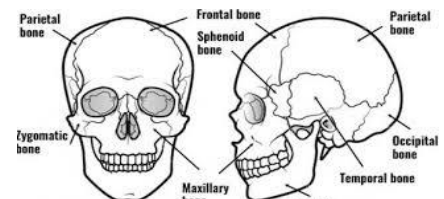
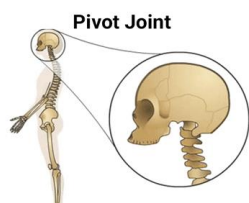
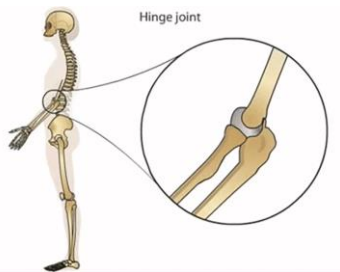


Three different types of joints enable **movement**.

1. Ball and socket
2. Hinge
3. Pivot

Types of Movable Joints		
Joint	Description	Example
	allows bones to move and rotate in nearly all directions	hips and shoulder
	allows bones to move back and forth in a single direction	fingers, elbows, knees
	allows bones to turn	neck, lower arm below the elbow

Immovable joints are parts of your skeleton made of bones that connect but do not move. Your skull contains several immovable joints.



Ball and socket

Pivot

Hinge

Pivot

allows bones to rotate

Hinge

allows bones to move back and forth in a single direction

Ball and socket

allows bones to move and rotate in nearly all directions



Functions of skeletal system

➤ Support

Bones provide support that helps you sit up, stand, and move your body.

➤ Protection

Bones protect soft fragile tissue of the brain and internal organs like the spinal cord, heart, and lungs from damage.

➤ Production and storage

- Bones produce and store materials needed by your body.
- Red blood cells are produced inside your bones.
- Bones store fat and calcium.
- When your body needs calcium, it is released from bones into the blood.

Types of support and structure.

1. Hydrostatic Skeletons (Fluid Support)

- It is a fluid filled internal cavity surrounded by muscle tissue.
- Muscles help the organisms move by pushing the fluid in different directions.
- Examples: Sea anemones, flatworms, and earthworms.



2. Exoskeletons (External Support)

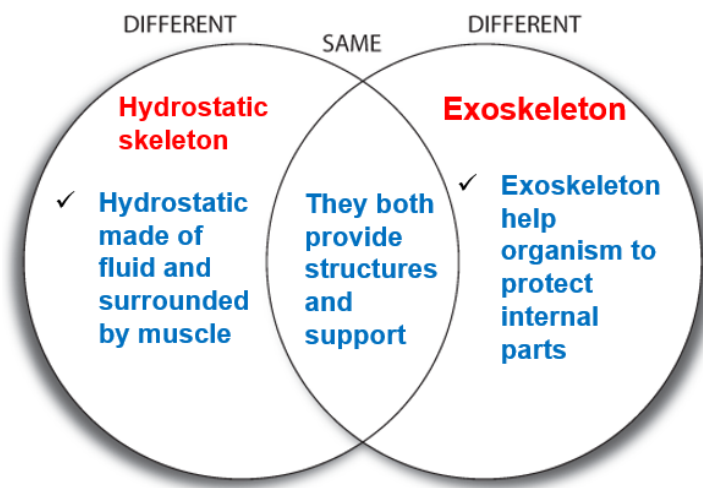
- A thick, hard outer covering that protects and supports (shells) an animal's body.
- Examples: crabs, snails, and scorpion



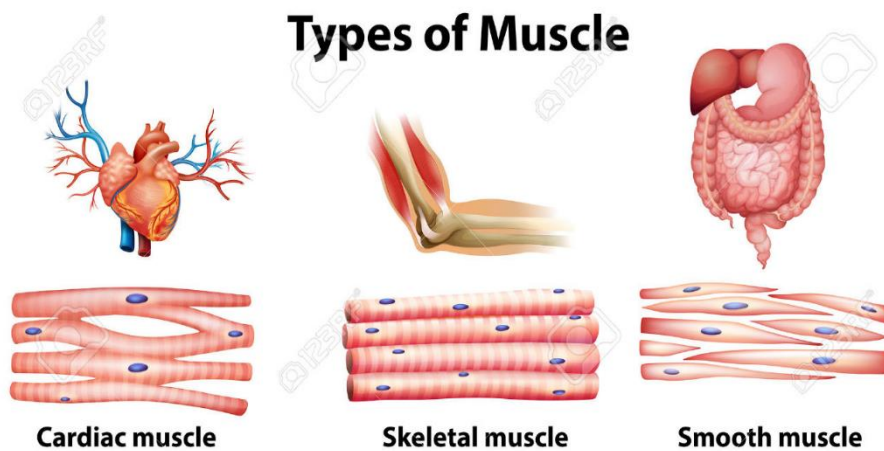
3. Skeletal skeleton (internal Support)

- provide support that helps you sit up, stand, and move your body.





What do different types of muscles do?

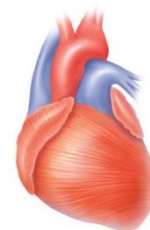


1- **Skeletal muscle** is the type of muscle that attaches to bones.

- Skeletal muscles are also called **voluntary muscles**, which are muscles you can consciously control.
- The contractions of skeletal muscles can be quick and powerful.

2- **Cardiac Muscle** cardiac muscle, which is found only in the heart.

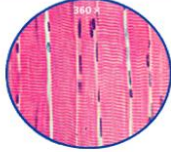
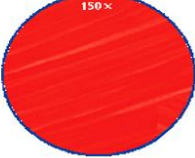
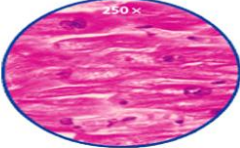
- A cardiac muscle is a type of **involuntary** muscle, which is muscle you cannot consciously control.
- When cardiac muscles contract and relax, they pump blood through your heart and through blood vessels throughout the body.



3- **Smooth Muscle** Smooth muscles are involuntary muscles, named for their smooth appearance, that line blood vessels and many organs.

- Contraction of smooth muscles helps move material through the body, such as food in the stomach and blood through the vessels.



Types of muscle	Function	
skeletal muscle, voluntary	moves bones, maintains posture, maintains body temperature	
smooth muscle, involuntary	moves internal organs, such as the intestines	
cardiac muscle, involuntary	pumps blood throughout the body	

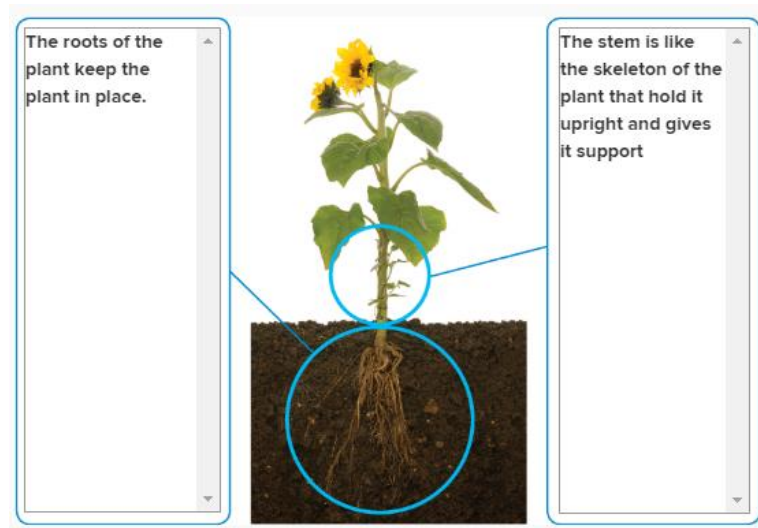
What systems do plants have that give them structure and support?

- 1- **Roots** enable the plant to grow upright and not be blown away by wind or carried away by water.
- 2- **Roots** also absorb water and minerals from the soil for cellular processing.
- 3- Some plants store food in their roots.

There are many different types of roots:

➤ There are many different types of roots :

- 1- **Prop roots** are additional small roots above ground, that help support the plant.
- 2- **Fibrous roots** consist of many small branching roots.
- 3- **Fibrous roots** can spread out and can absorb large amounts of water.



Taproot



Prop Roots



Fibrous Roots

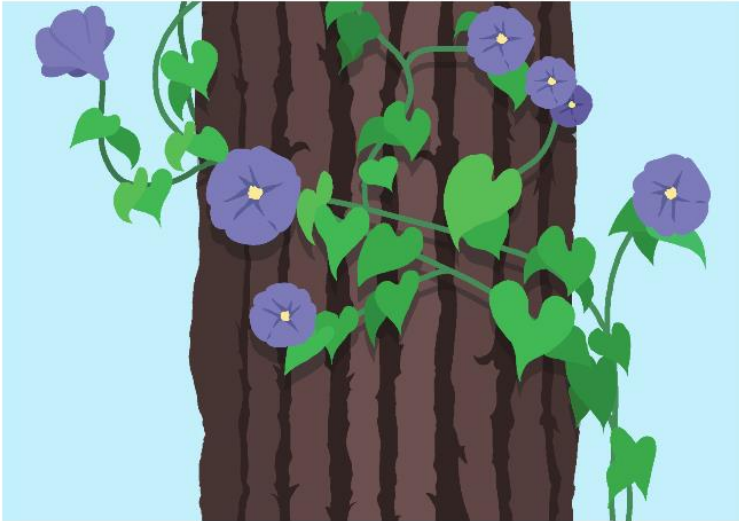
2-Stem:

Plant stems usually are classified as either herbaceous or woody. Woody stems are stiff and typically not green. Trees and shrubs have woody stems. Herbaceous stems usually are soft and green.



THREE-DIMENSIONAL THINKING

Examine the image and determine which plant has a woody stem **structure** and which has an herbaceous stem **structure**. **Explain** your reasoning in your Science Notebook.



The tree has a woody stem because it is rigid and not green, the vine has herbaceous stem because it is green and flexible.

Use the space below to compare and contrast the **systems** that provide **structure** and support in plants and animals.

Plant	Both	Animal
stems and roots	both are made up of cells and tissues both have supporting structures	muscles and bones