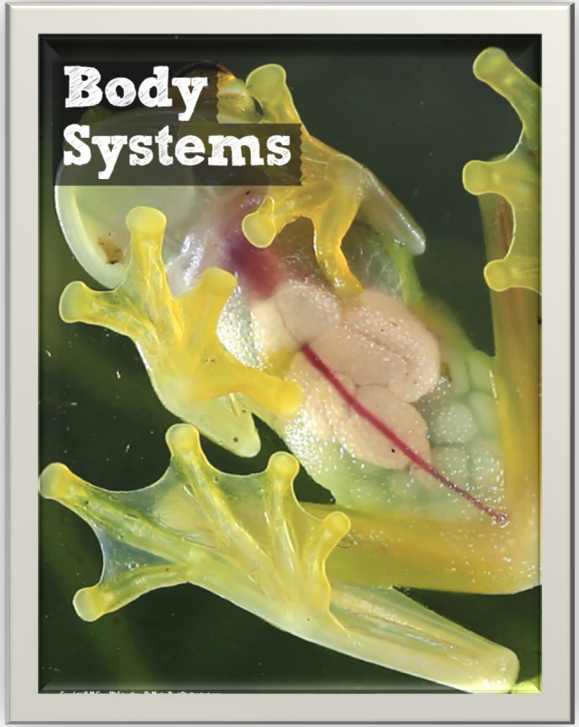
Sciences

أكاديمية أجيال المستقبل

UNIT 2
LIFE: STRUCTURE & FUNCTION

Module 2
Body Systems



Mrs. AYA 050 7175602

Lesson 2

Structure & Support

Learning Objectives

Lesson Vocabulary

Muscle

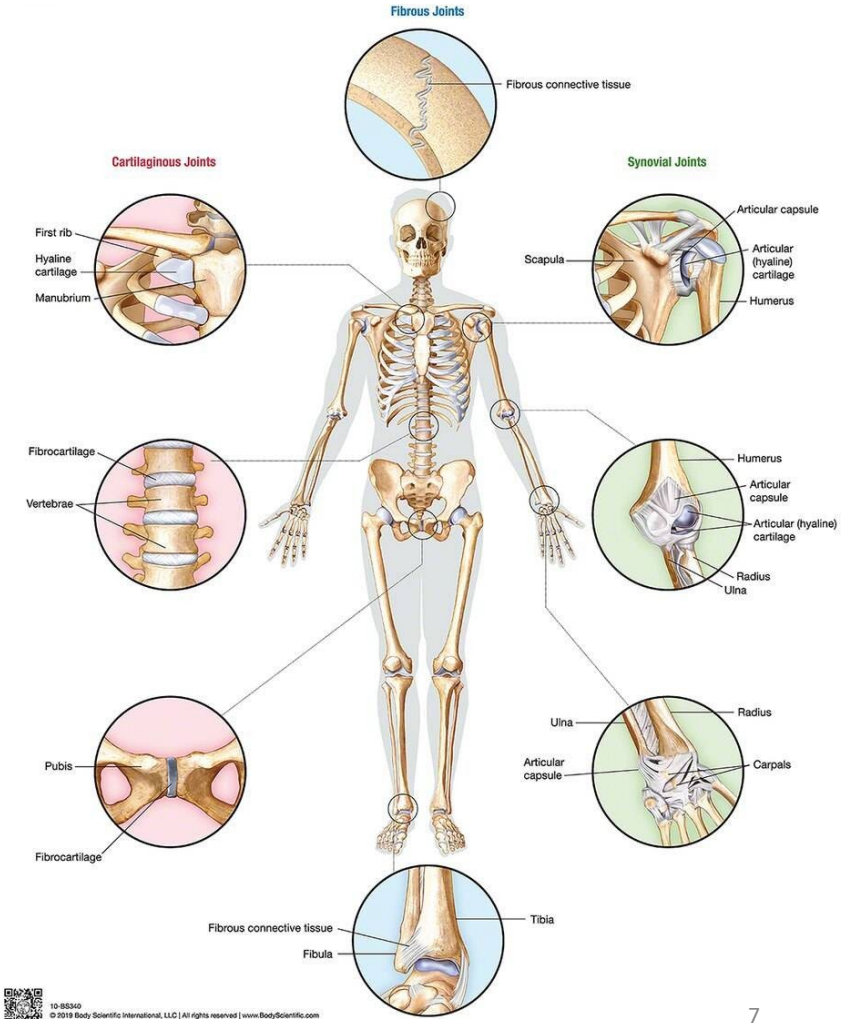
strong body tissue that can contract in an orderly way.

Muscle

strong body tissue that can contract in an orderly way.

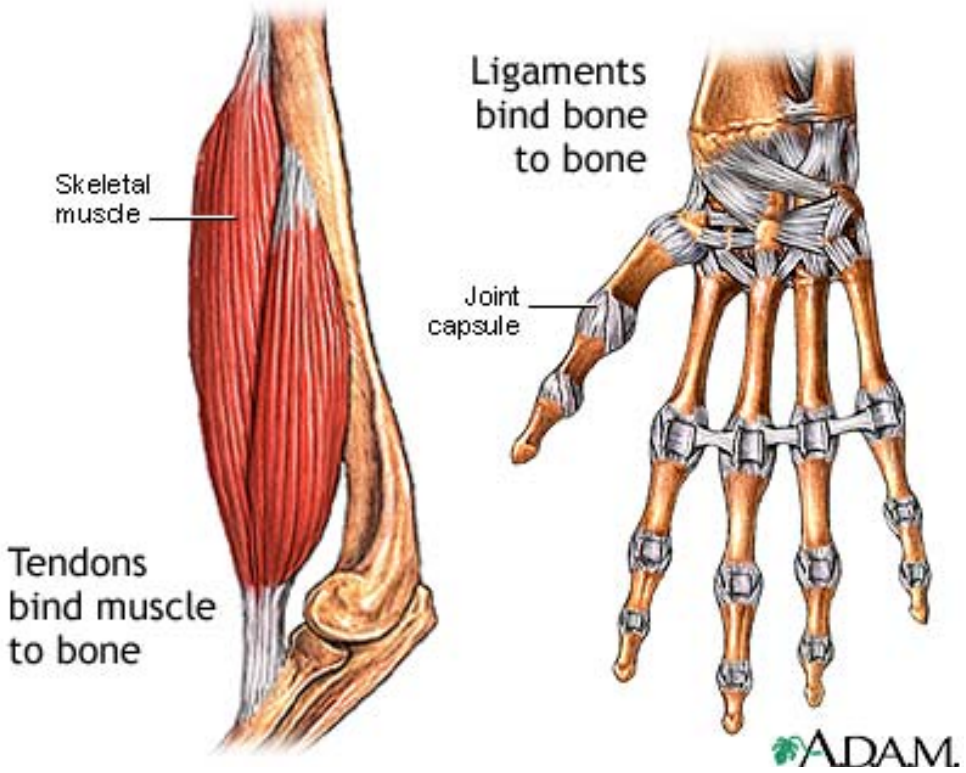
Joint

where two or more bones meet.



Ligament

the tissue that connects bones to other bones.



Hydrostatic skeleton

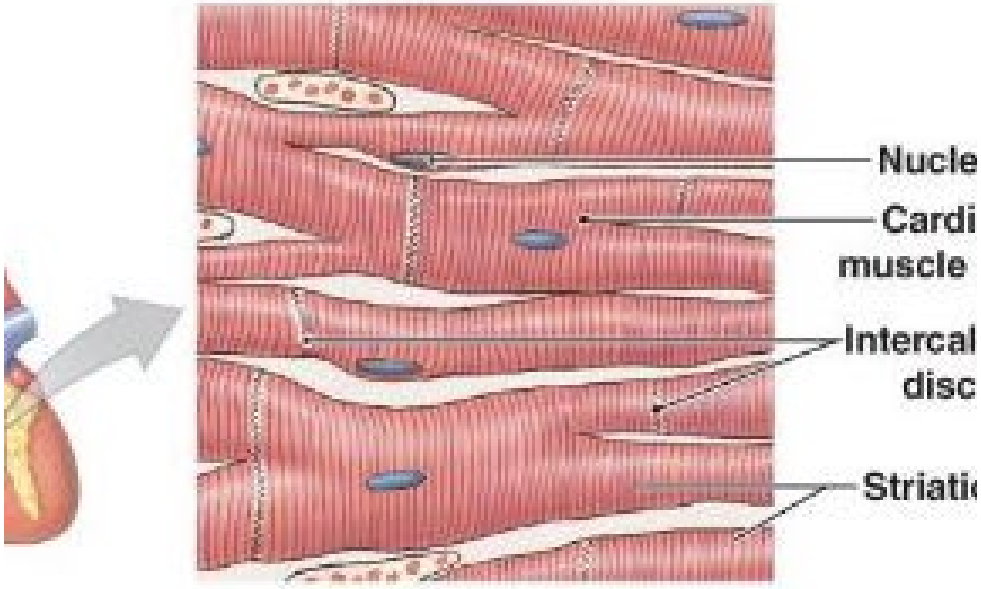
a fluid-filled internal cavity surrounded by muscle tissue.

Exoskeleton

a thick, hard outer covering; protects and supports an animal's body.

Cardiac muscle

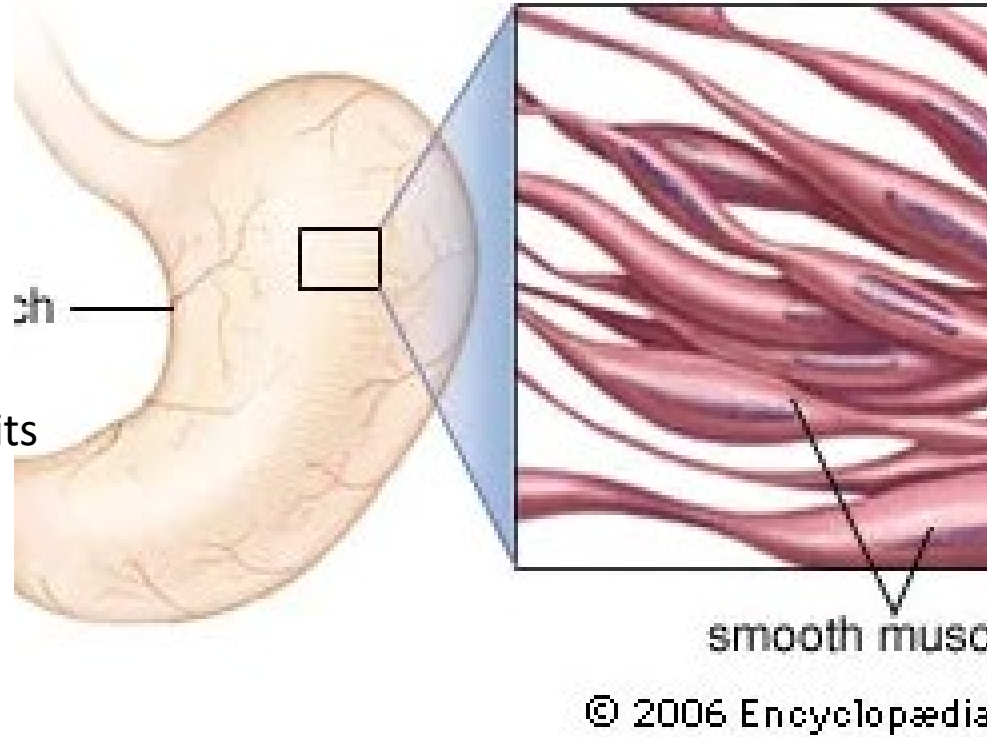
muscle found only in the heart.



Cardiac muscle moves blood and maintains l
pressure.

Smooth muscle

involuntary muscle named for its smooth appearance.



STARTER

Science Probe

Four students were discussing muscle. They each had a different idea about whether muscles are alive. This is what they said:

Millie: I think muscles are living because they are inside of our bodies.

Akhim: I think muscles are living because they are made up of cells.

Bao: I think muscles are nonliving because their cells do not reproduce.

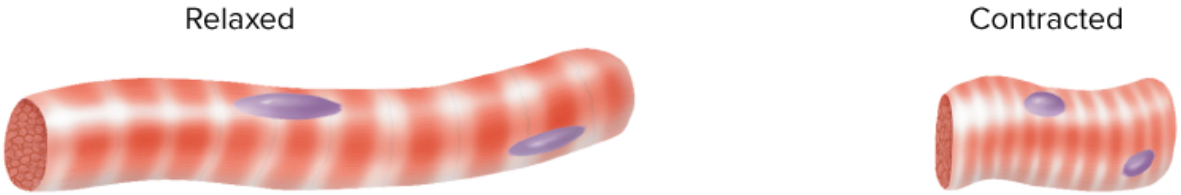
Tony: I think muscles are nonliving because they do not exist as single-celled organisms.

https://www.menti.com/ubrny15q66

What supports a body and enable its to move?

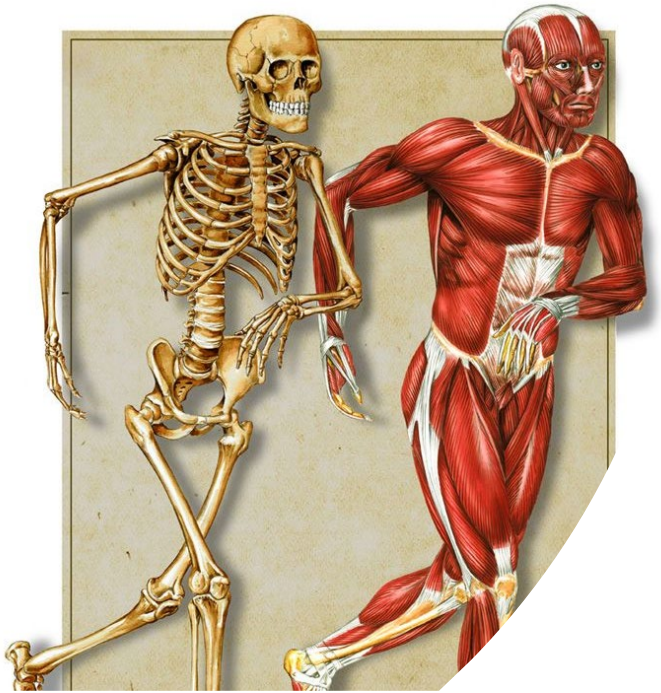
Muscle

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.



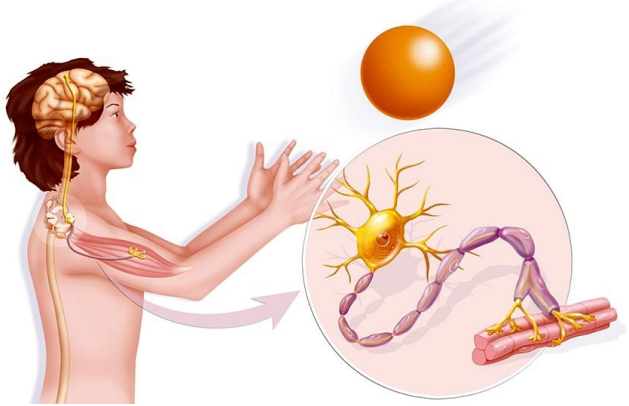
You might recall that mitochondria are the main energy producers in a cell. Because so much energy is required for muscle function, muscle cells are packed with mitochondria.

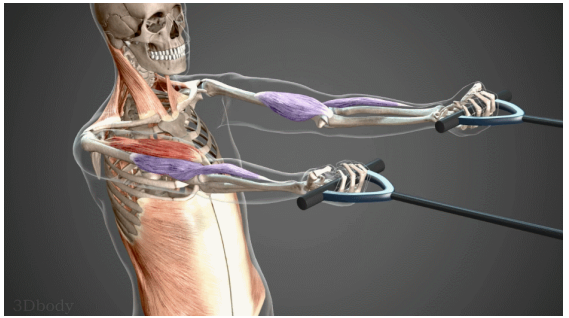
What supports a body and enable its to move?



Muscles enable the body to move, but cannot function without the support of bones. Bones can move because they are attached to muscles. The skeletal system and the muscular system work together and move your body.

Critical Thinking





- When muscles move they move the bones attached to them.
- Nervous system controls the movement .
- Circulatory provides oxygen for energy

What supports a body and enable its to move?

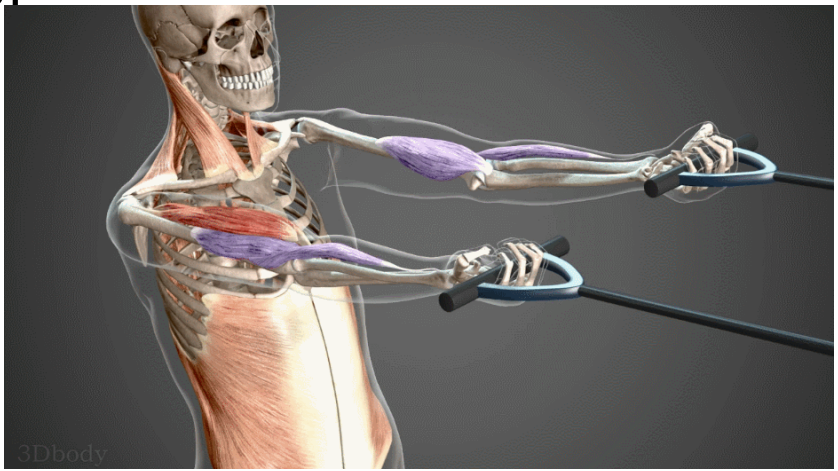
EVIDENCE (A)

A. What evidence have you discovered to explain how muscles and bones provide structure and support for organisms, such as the girl doing the handstand?

- **Muscles and bones provide structure and support by working together.**
- **Bones provide a hard, rigid structure that holds organisms up and protects internal organs**

What supports a body and enable to move?

- Muscles enable the body to move,but cannot function without the support of bones.
- Bones can move because they are attached to muscles.
- The skeletal system and the muscular system work together and move your body.

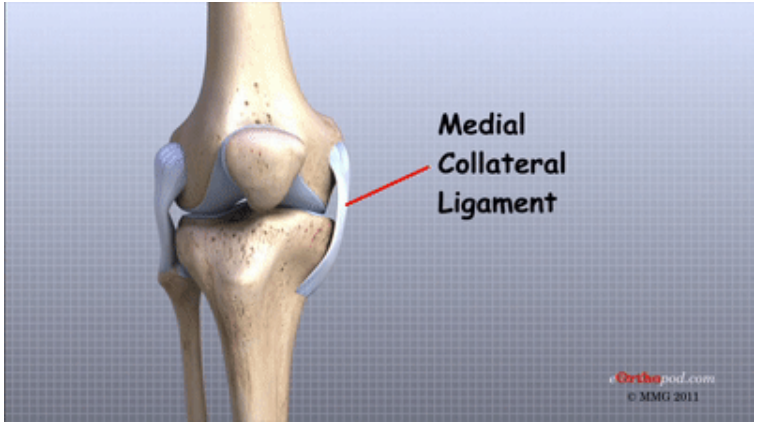


Bones & Joints

What supports a body and enable to move?

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 joint move, ligaments stretch and keep the bones from shifting away from each other.

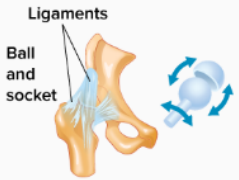
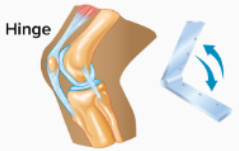
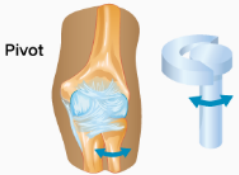
Types of joints

What supports a body and enable to move?

The body's movable joints allow for a wide range of motion.

Three different types of joints enable movement.

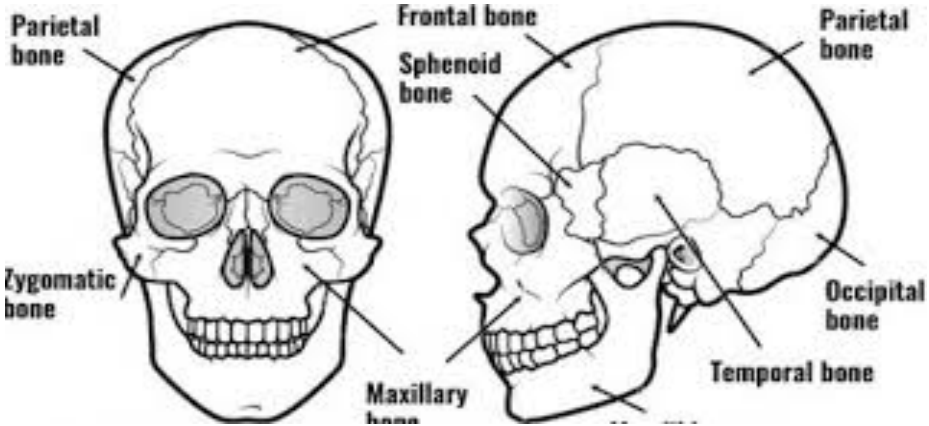
- Ball and socket
- Hinge
- Pivot

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

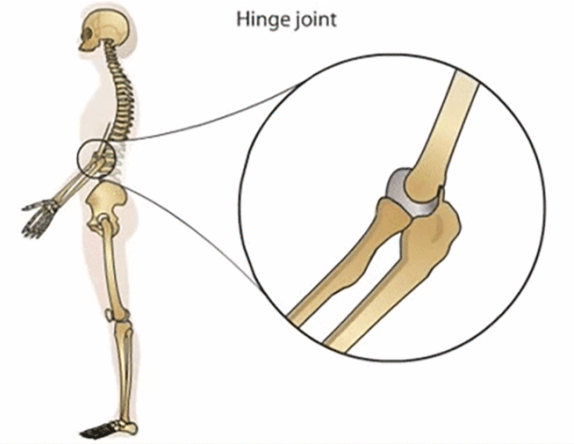
What supports a body and enable to move?

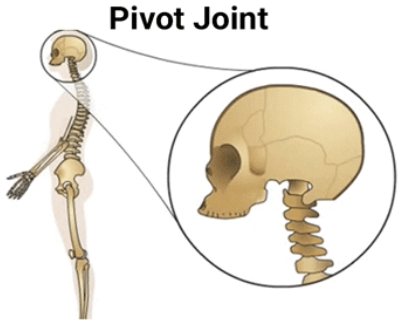
Immovable joints are parts of your skeleton made of bones that connect but do not move.

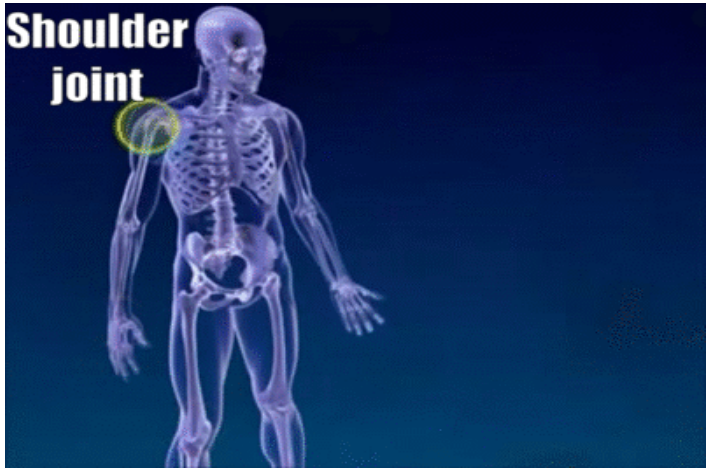
Your skull contains several immovable joints.



What supports a body and enable to move?







What supports a body and enable to move?

Functions of skeletal system

- **Support**

Bones provide support that helps you

What supports a body and enable to move?

Functions of skeletal system

- Bones in your skeleton protect soft fragile tissue and internal organs like the spinal cord, heart, and lungs from damage.

What supports a body and enable to move?

Functions of skeletal system

- **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.

In what ways are different animals supported & provided with structure?

An earthworm does not have skeleton. How is an earthworm able to move?

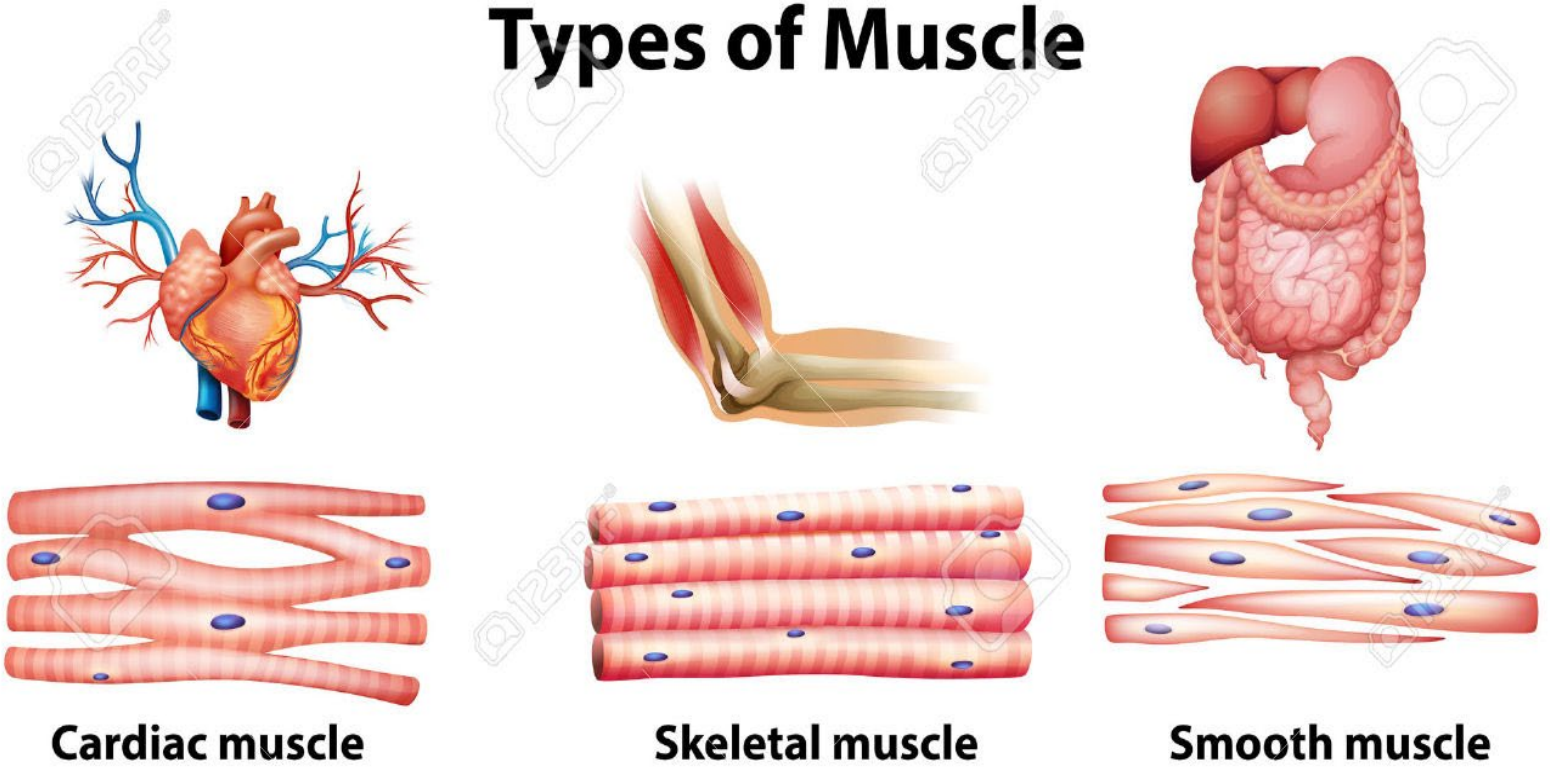
Fluid Support Some animals have a hydrostatic skeleton, which is a fluid-filled internal cavity surrounded by muscle tissue. Muscles help the organisms move by pushing the fluid in different directions. Flatworms, such as the one shown to the right, sea anemones (uh NE muh neez), and earthworms are organisms that have hydrostatic skeletons.

In what ways are different animals supported and provided with structure?

External Support Hard outer coverings provide support and protection for many animals. Sometimes called shells, these outer coverings support animals such as crabs, snails, and the scorpion shown to the left. A thick, hard outer covering that protects and supports an animal's body is called an **exoskeleton**.

Types of muscles

What do different types of muscles do?



What do different types of muscles do?

Skeletal Muscle

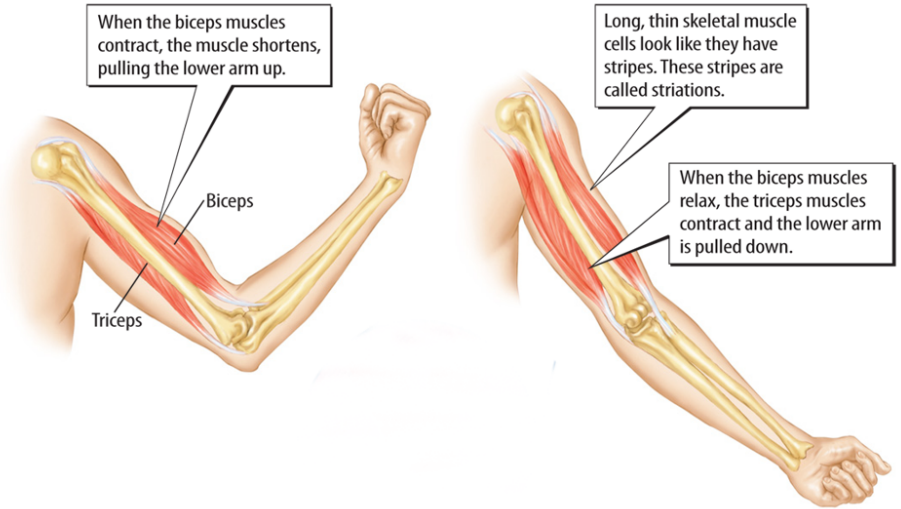
- **Skeletal muscle** is the type of muscle that attaches to bones.

- Skeletal muscles are also called **voluntary muscles**, which are muscles you can consciously control.

What do different types of muscles do?

Skeletal Muscle

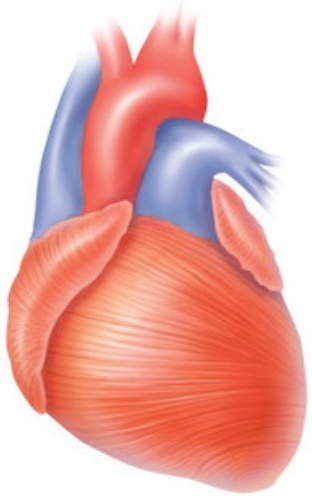
Skeletal muscles move bones by pulling them and working in pairs.



What do different types of muscles do?

Cardiac Muscle

- Your heart is made of **cardiac muscle**, which are 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



What do different types of muscles do?

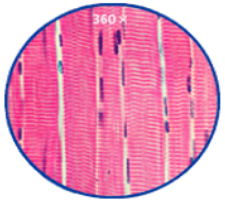
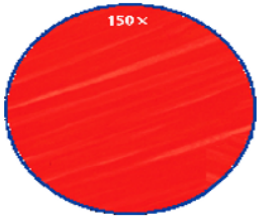
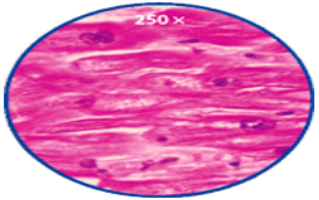
Smooth Muscle

- **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.

What do different types of muscles do?

- Skeletal muscles are also called **voluntary muscles**, which are muscles you can consciously control.
- A cardiac muscle and smooth Muscle are type of **involuntary muscle**, which is muscle you cannot consciously control.

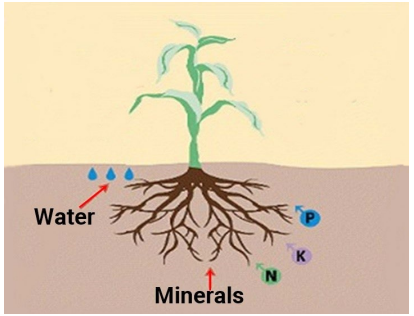
Summary on types of muscles

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	

Plant Structures & Functions

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

Roots anchor a plant, either in the soil or onto another plant or object such as a rock and enable it to grow upright and not be blown away by wind or carried away by water.



- **Roots** also absorb water and minerals from the soil for cellular process.

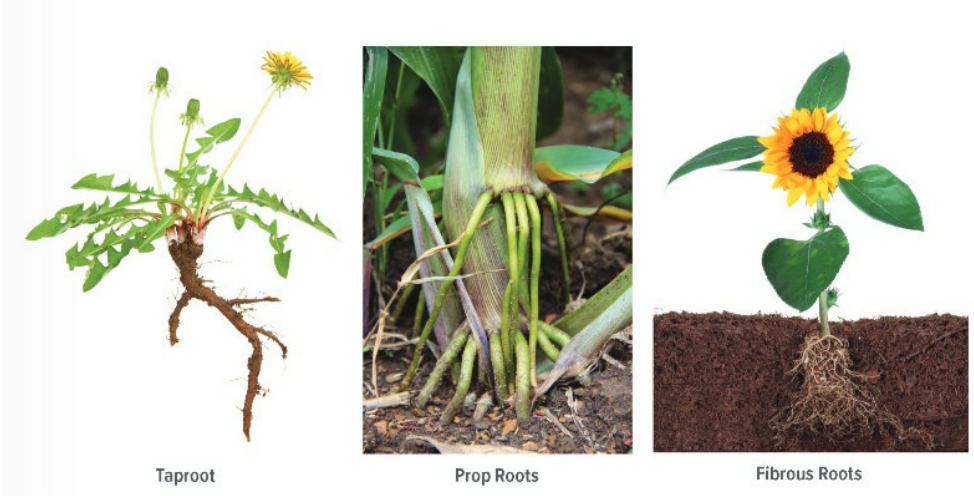
- Some plants store food in their roots.
  - This food can be used to grow new plant tissues after a dry period of cold season.
  - Sugar stored in the roots of sugar maple trees is used to make maple syrup.

Types of Roots

ROOTS ➢ There are many different types of roots :

Taproots are **large main root** with smaller roots growing from it.

Prop roots are **additional small roots above ground,** that help support the plant**.**



Fibrous roots consists of **many small branching roots.**

Fibrous roots can spread out and can absorb large amounts of water for the plant.

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

Stems

Stems support branches and leaves. Their tissues transport water, minerals, and food. The sugar produced during photosynthesis flows through the stem to all parts of a plant. Another important function of stems is the production of new cells for growth, but only certain regions of a stem produce new cells.

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.

Lesson review

THREE-DIMENSIONAL THINKING

3. Why do muscle cells have so many mitochondria?

A	Muscle cells are bigger than every other cell and can fit more mitochondria.
B	Muscle cells need to quickly respond to energy needs.
C	The mitochondria in muscle cells are smaller so more are needed.
D	There are more mitochondria only because there are more nuclei.

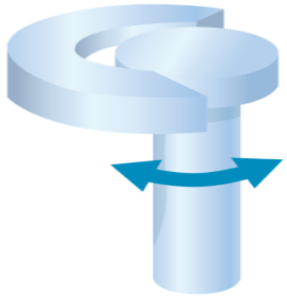
Lesson review

4. What is the effect when a muscle contracts?

A	The muscle lengthens.
B	The muscle pushes on a bone.
C	The muscle pushes on another muscle.
D	The muscle shortens.

5. The image to the right represents a joint that would be found in which structure?

A	finger
B	knee
C	neck
D	shoulder



Lesson review

Real-World Connection

6. Infer Sometimes people who have issues with their joints require joint replacement surgery. The joint is replaced with an artificial joint. Not all artificial joints are the same. Infer why there are different types of artificial joints.

saved

[redacted]

7. Argue A city sidewalk inspector is considering installing rubber sidewalks in his city after noticing how concrete sidewalks cracked near the base of trees. Construct an argument in support of this plan, explaining why rubber would be an improvement.

[redacted]

Activity

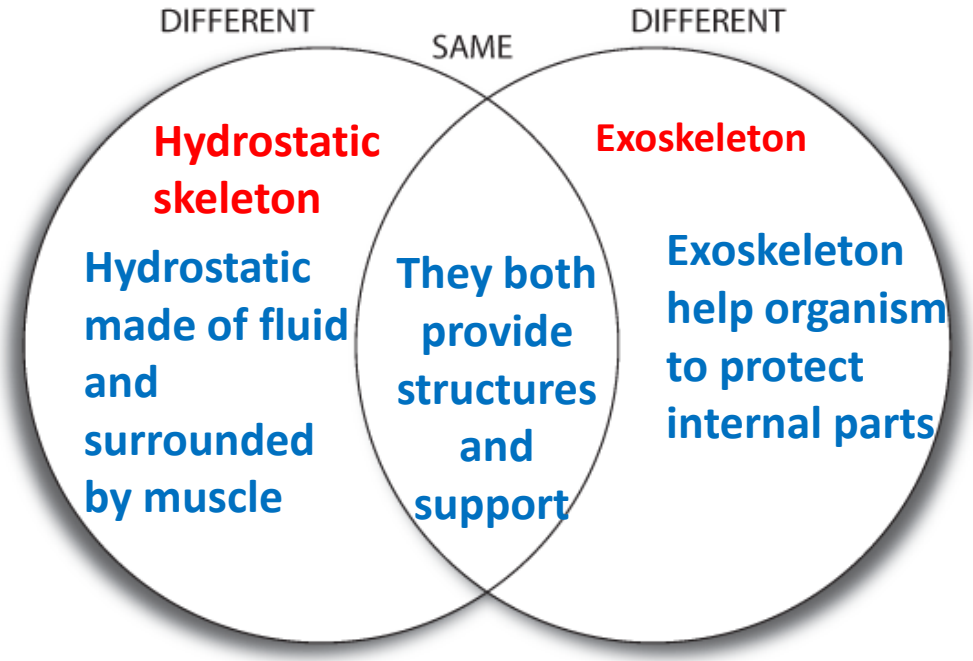
Use the space below to compare and contrast the **systems** that provide **structure** and support in plants and animals.

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

Activity

THREE-DIMENSIONAL THINKING

Compare and contrast the **structure** and **function** of hydrostatic skeletons and exoskeletons.



Activity

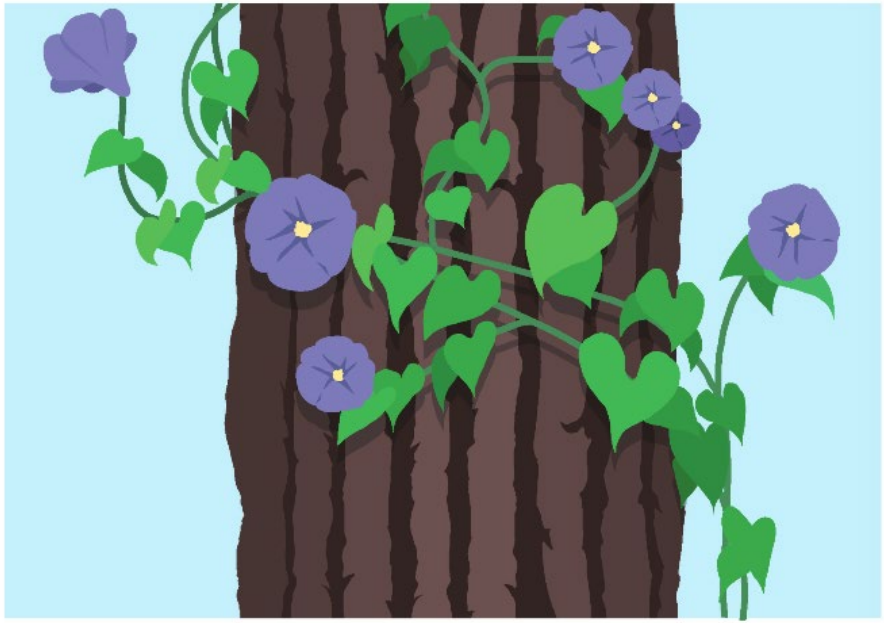
Muscular system- Involuntary and Voluntary

https://wordwall.net/play/15155/631/973

Activity

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.



Answer:

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

Activity

Choose the options depicting tap roots.

A B C D

Activity

Identify the roots.