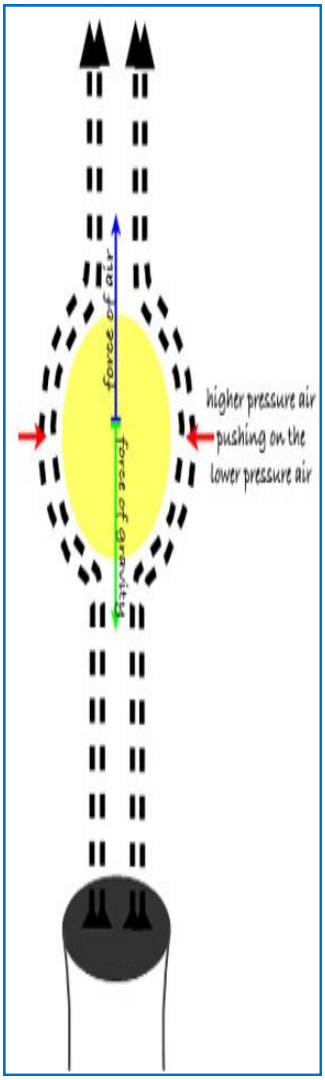
S.T.E.M.

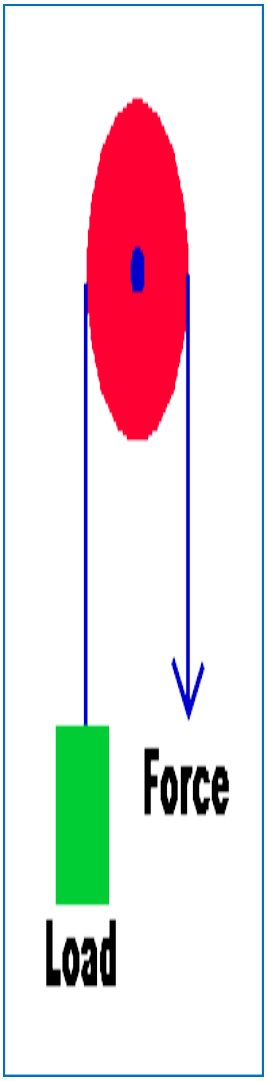
2016-7

Part 1:



Prior Knowledge:

Energy and Simple Machines

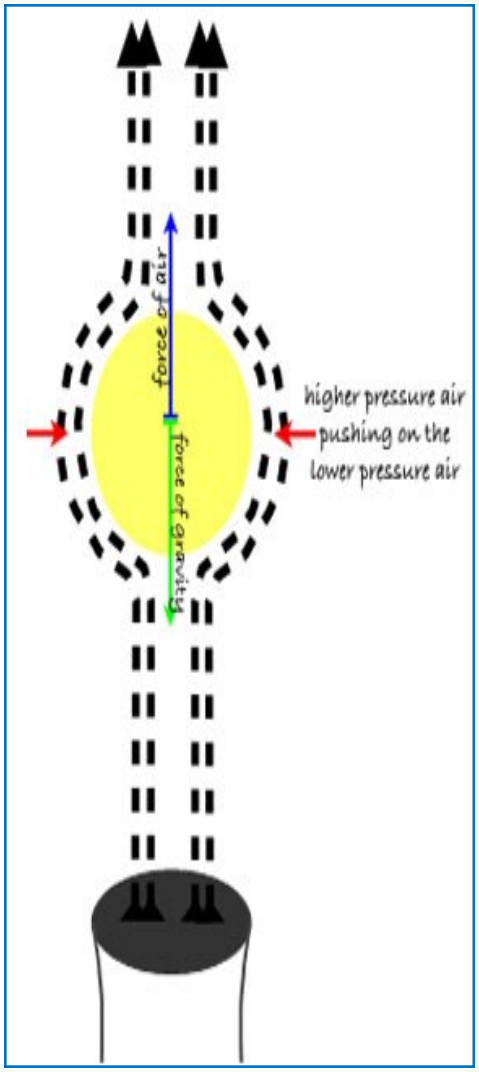


Prior Knowledge:

What is *Energy*?

Redefining:

energy, force, work and pressure

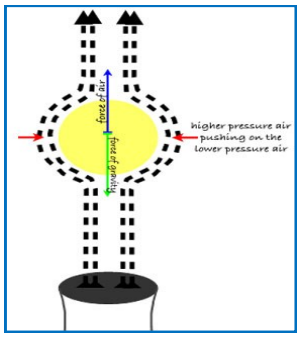


Experiment 1:

Floating Ping Pong Ball

You need:

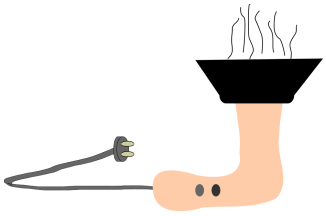
- Ping Pong Ball
- Blow Dryer
- Pencil
- 4 Index Cards



Experiment 1:

Floating Ping Pong Ball

1. Turn on your hair dryer to the highest setting and point it straight up.

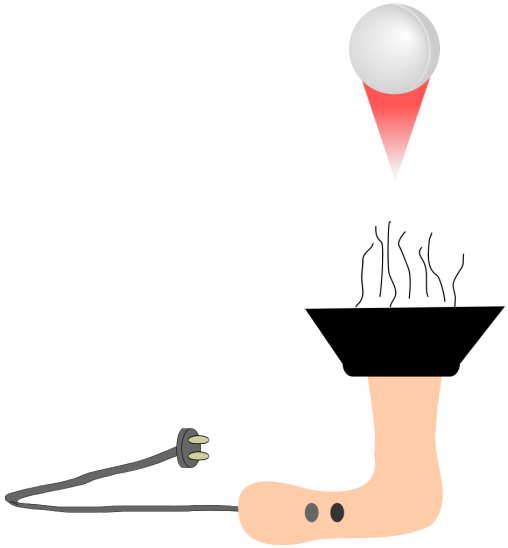


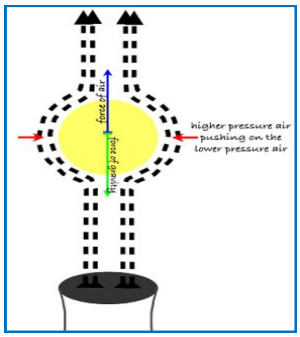
2. Gently place the ping-pong ball within the flow of air from the hair dryer and balance it in the air stream

What's Happening:

The ping-pong ball will fly up with the air from the hair dryer; the **force** of gravity (which pushes the ping-pong ball down) is equal to the **force** of the air (which is pushing the ping-pong ball up).

The ping-pong ball stays within the column of air coming from the hair dryer because of air **pressure**.





Experiment 1:

Floating Ping Pong Ball

Fill In:

(and then use the information to make your first 4 STEM cards: **pressure, force, work and energy***):*

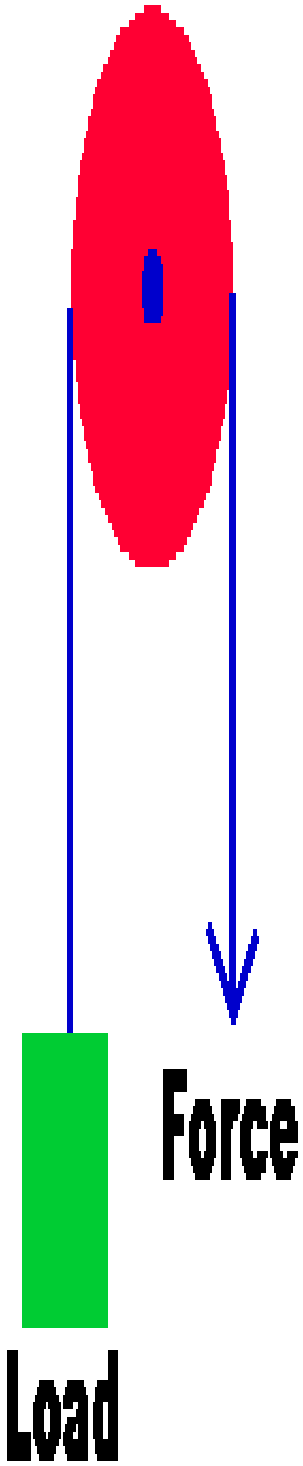
The air **pressure** from the blow dryer helps keep the ping pong ball floating in air. _____ is the **force** placed on an object, like the air under the ping pong ball. _____ is a push or a pull. In this experiment **force** was the **air pressure** from the blow dryer **pushing** the ball up. In this experiment the **air pressure** released the **potential energy** in the ping pong ball. _____ is the ability to do **work.** _____ is when force is used to move an object. We know **work** was done because the ball was in motion.

Prior Knowledge:

What is a *Pulley*?

Redefining:

pulley

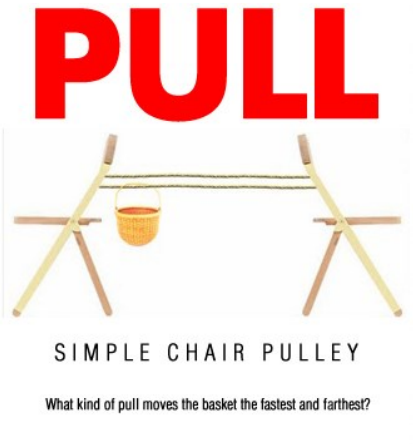


Experiment 2:

Chair Pulley

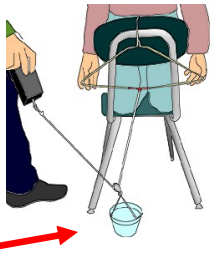
You need:

- Chair
- Rope
- Pail / Basket
- Pencil
- One Index Card



Experiment 2:

Chair Pulley



1. With an adult, lightly loop the rope around the back of 2 chairs.
2. Hang a small basket between the loop.
3. Take turns experimenting—**pull** the rope: first pull hard and then pull gently.

*Which kind of **pull** moved the basket farther? Why?*

What's Happening:

A **pulley** is a **simple machine** that makes lifting and moving objects easier. Here, **force** (which is a **push** or a **pull)**, was used in different ways to move an object, (the basket), farther and faster from one end to the other.

4. Fill out your STEM card for **pulley**.

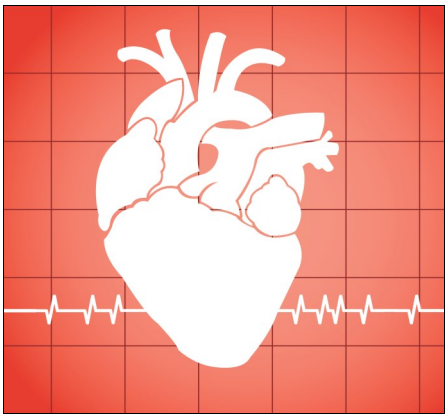
S.T.E.M.

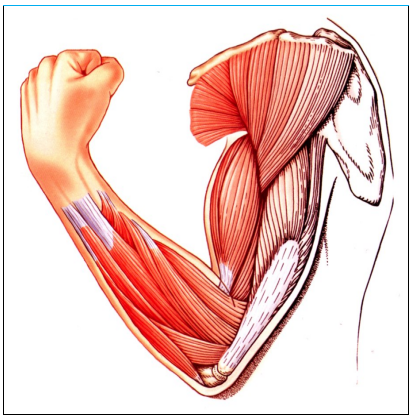
2016-7

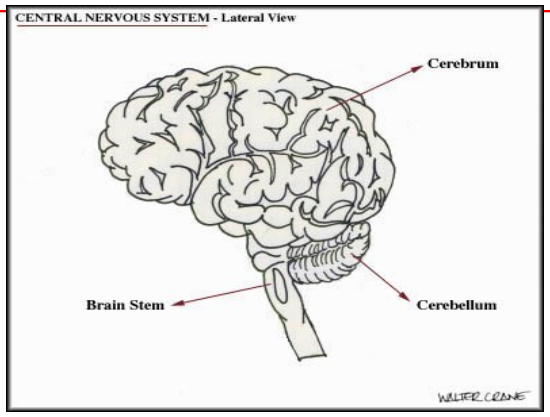
Part 2:

Biological Systems:

Central Nervous, Circulatory and Skeletal Muscular Systems.







What is:

The Central Nervous System?

What We Will Investigate:

- **Nerves**
- **Energy**
- **The Brain (2 sides, some parts)**
- **Spinal Cord**

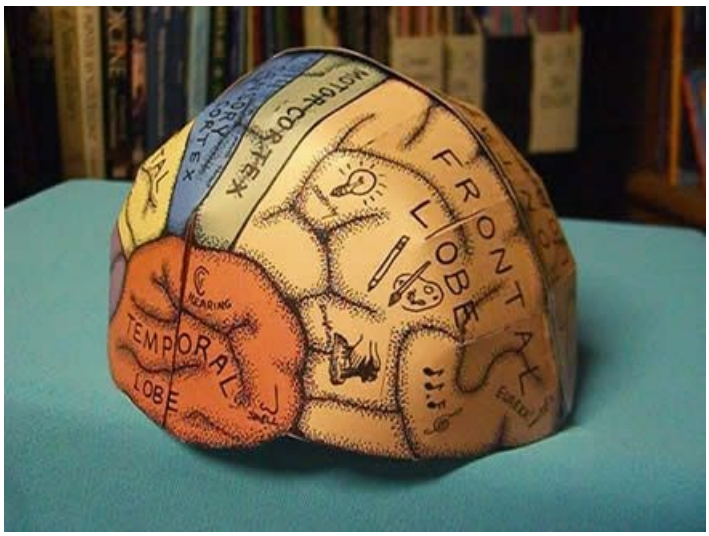
1) Watch: *The Brain:*

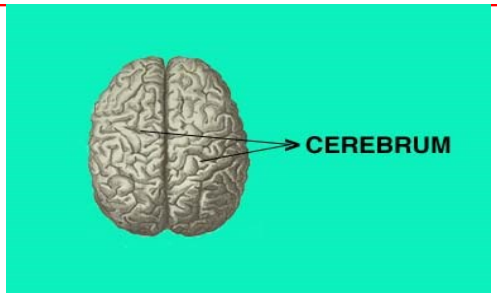
http://kidshealth.org/en/kids/nsmovie.html

2) Start your **brain** hat:

Locate and Label:

Cerebrum, Brain Stem, Corpus Callosum, Cerebellum





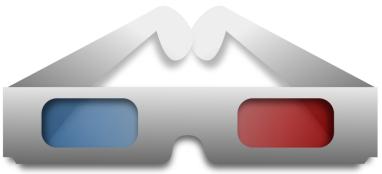
Cerebrum:

Experiment 1:

Post*erior*

1. Standing on the **X**, take 10 turns and try to throw your bean bags into the bucket; wait for your partner to mark any missed attempts.

2. Repeat; this time wearing the Prism Glasses.



What happened when you put the glasses on?

_____

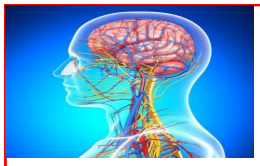
_____

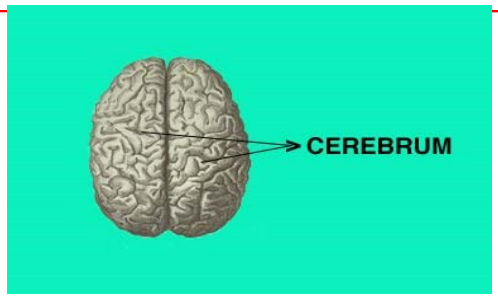
_____

_____

_____

_____



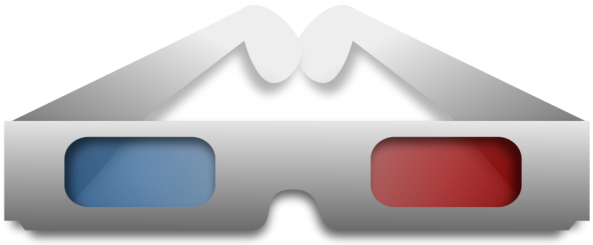


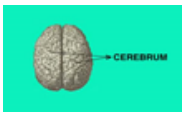
Cerebrum:

Experiment 1:

Posterior

*Look through the **information ring** and the ring of **optical illusions**. Use what you experienced, what you read about and what you **saw** to fill in the activity page.*





The **Occipital Lobe** is where the brain makes sense of what our eyes are seeing. The information our eyes collect travels to the _____ through the _____ _____ at the back of the eye. The **Optic Nerve** sends the message from the **retina** to the brain. The _____ is the eye's inner lining that converts light into nerve impulses using _____ and _____. It is important that the brain receives the correct information otherwise what we are seeing becomes distorted. Sometimes your brain can be fooled! Your _____ _____ is the part of the eye that can't see anything. An _____ _____ is when you look at something and think it's something else.

brain, optical illusion, optic nerve, blind spot, retina, rods, cones

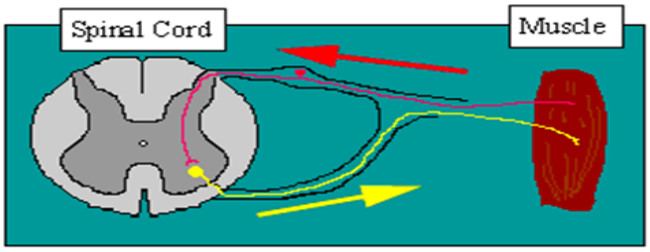
Brain Stem

Watch: https://www.britannica.com/science/brainstem

What is the difference between **Voluntary** and **Involuntary ?** What do these terms have to do with the **Brain** and **Brain Stem**?

Voluntary:

Involuntary:



Brain Stem

Read the information ring. Then **try** the following **experiment:**

Knee Jerk

1. **Taking turns**, sit with legs crossed so that they can swing freely.

2. Your partner should take the "hammer" and hit your leg **just below the knee**. Then switch

What Happened and Why?

The **Knee Jerk Reflex** is called a **monosynaptic reflex.** A

_____ _____ is when there is only **one synapse** in the

circuit needed to complete the **reflex**. It only takes about 50 milliseconds

between the tap and the start of the leg kick. The tap below the knee causes

the thigh muscle to stretch. Information is then sent to the _____ _____.

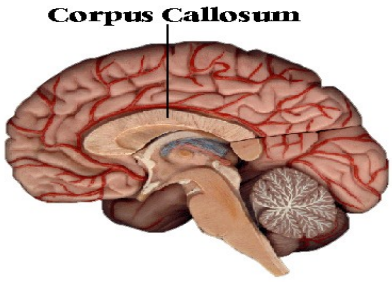
The **Spinal Cord** is connected to the _____ _____. The

brain stem passes signals between the **cerebral** cortex and the rest of

The body. Although the brain stem is the **smallest** part of the brain; it is

responsible for many of the _____ actions that are needed to live.

brain stem, involuntary,
monosynaptic reflex,
spinal cord,



Corpus Callosum:

Read the information ring. *Then* ***try***

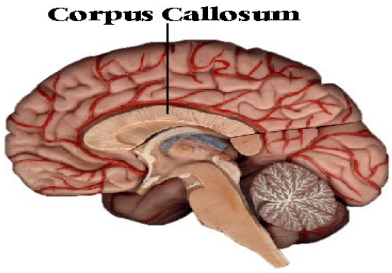
Crossing the Midline:

Place colored tape down the center of your trunk.

Elbow Tap: *Stand with arms at sides. Bend and touch right elbow to left knee as you raise your leg. Stand and then touch left elbow to right knee.*

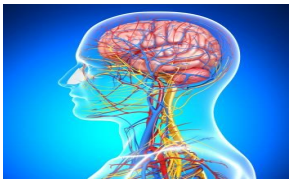
Windmills: *Feet spread apart and arms extended. Bend over at waist and tap right hand to left foot. Back up and then bend and tap left hand to right foot.*

Backwards: *Bend left knee and put foot behind right leg. Reach back around with right hand and touch left foot. Reverse and put right foot behind your left leg as you touch it with your left hand*

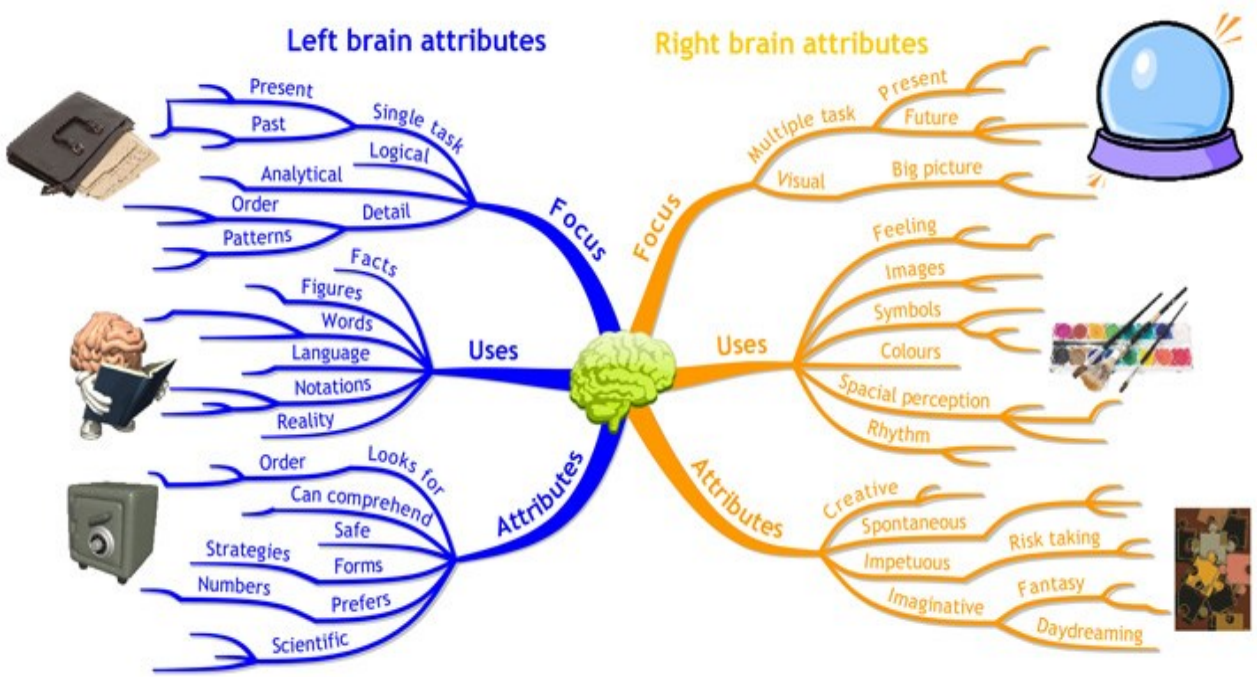


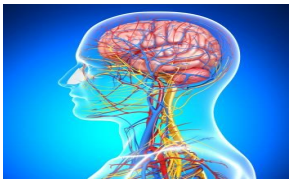
The brain is divided into the _____ and_____ **Hemisphere**; and the two halves are connected by the **corpus callosum**. The _____ _____ is a bundle of **nerve** tissue that contains over 200 million **axons** (**nerve fibers that carry electrical impulses from neurons' cell bodies**). The **Corpus Callosum** facilitates communication between **the two sides of the brain,** the left and right brain_____. Each side carries out different tasks, it is important for each hemisphere to **communicate** with the other across the **corpus callosum** in order to coordinate learning and movement.

corpus callosum, right, left, hemispheres, spinal cord,




LOGICAL
VERBAL
PART AND DETAIL
DIGITAL
SYMBOLIC
ORDER
MATH
RATIONAL
OBJECTIVE
LINEAR
TARGET AND DIRECTION
SYSTEM
ANALYTIC
art
RANDOM
AND
FREE
BIG
PICTURE
Music
emotion
Colors
Creative
analog


Left brain attributes
Right brain attributes
Focus
Present
Past
Single task
Logical
Analytical
Order
Detail
Patterns
Uses
Facts
Figures
Words
Language
Notations
Reality
Attributes
Order
Looks for
Can comprehend
Safe
Strategies
Forms
Numbers
Prefers
Scientific
Focus
Multiple task
Present
Future
Visual
Big picture
Uses
Feeling
Images
Symbols
Colours
Spacial perception
Rhythm
Attributes
Creative
Spontaneous
Risk taking
Impetuous
Imaginative
Fantasy
Daydreaming



Look at the chart: say the Color not the word

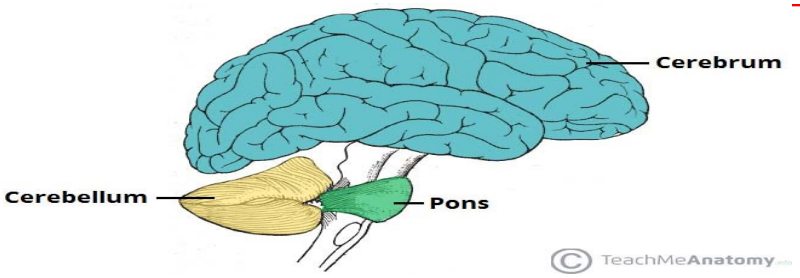
Black	Blue	Green
White	Green	Red
Green	Aqua	Yellow
Yellow	Pink	Tan
Red	Yellow	White

Example produces a Left\Right brain conflict

The right brain tries to say the color

The left brain tries to read the color

http://OfficeSpam.ChattaBlogs.com



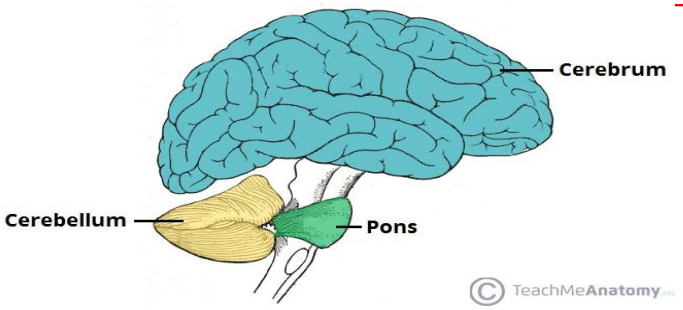
Cerebellum

Read the information ring; *then* ***try:***

1. **March in Place** *for 30 seconds. Now, try touch your right hand to the left knee and vice versa during the march. Perform this in an alternating fashion (right arm/ left leg then left arm/ right leg and so on). Now try and do it to a beat.*

2. Stand tall with good posture and **practice balancing on one leg** *at a time after 2 minutes have passed close your eyes and recite: the abc's, math facts, etc.*

What Happened and Why?



The word *Cerebellum* means little _____.

The **cerebellum** is at the _____ of the brain,

below the _____. It's a lot smaller than the

cerebrum at only 1/8 of its size. But it's a very

important part of the brain. The _____

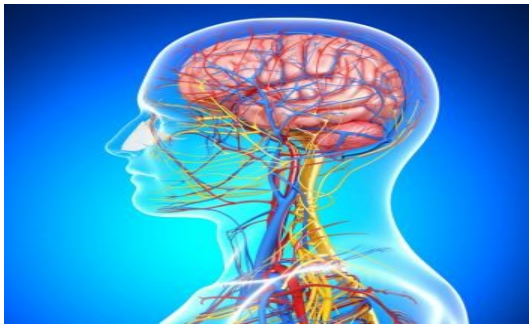
controls balance, movement, and coordination

(how your muscles work together). Because of your

cerebellum, you can stand upright, keep

your_____ , and move around.

cerebrum, back, cerebellum, balance, brain



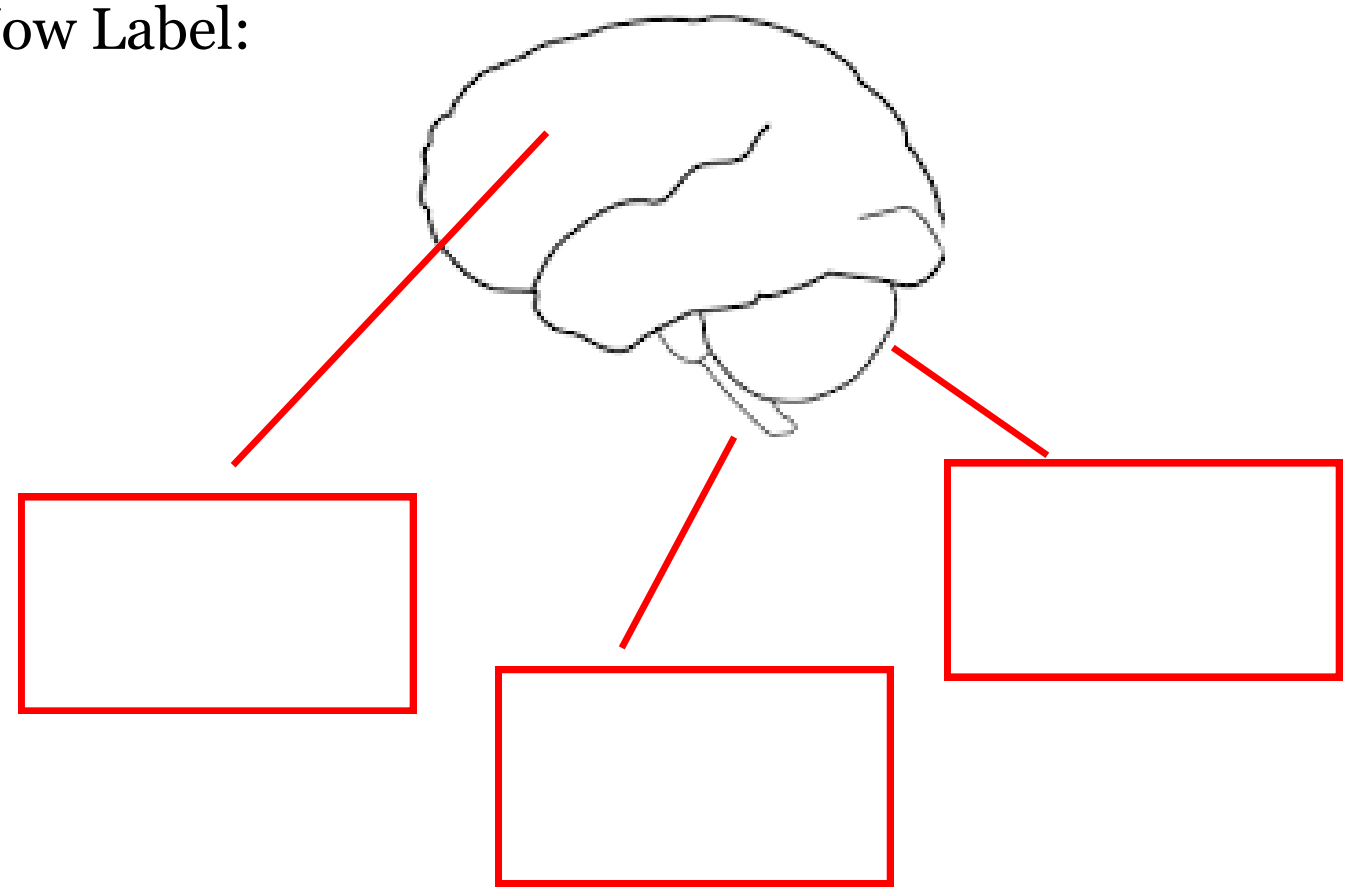
Name the 3 parts of the central nervous system:

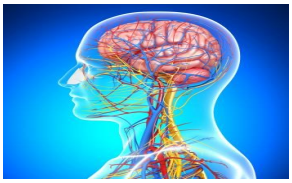
_____

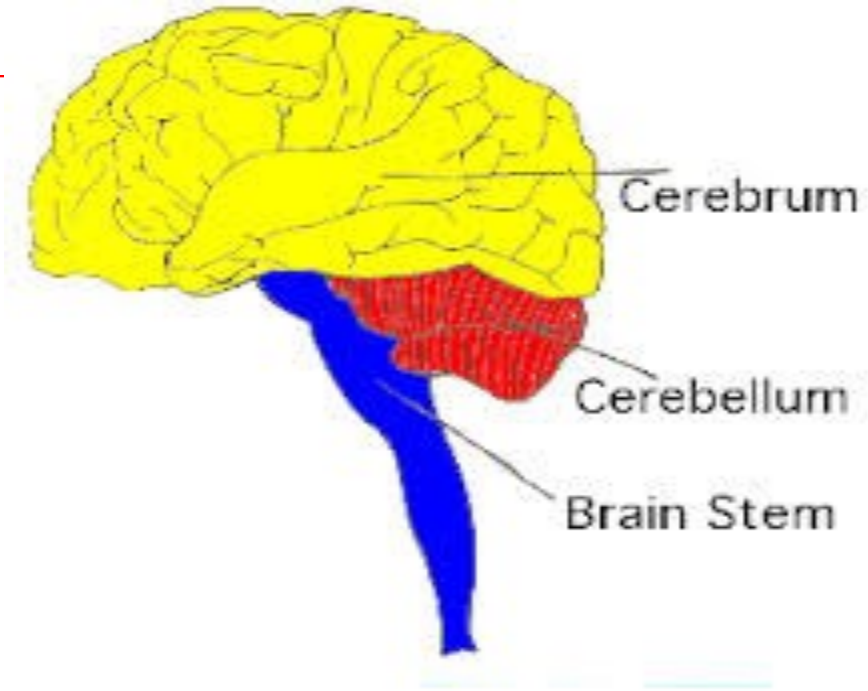
_____

_____

Now Label:



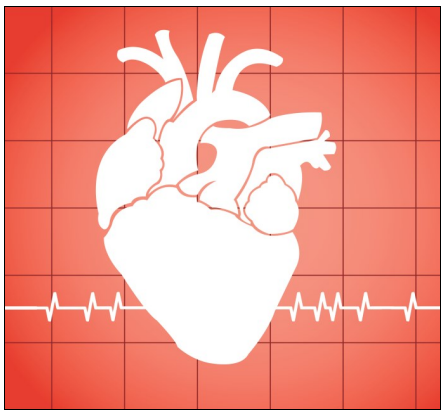




What is the main job of the Cerebrum?

What is the main job of the Cerebellum?

What is the main job of the Brain Stem?



What is:
The Circulatory System?

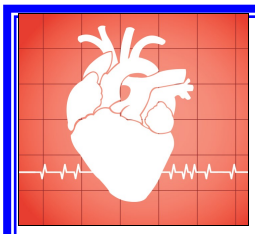
What We Will Investigate:

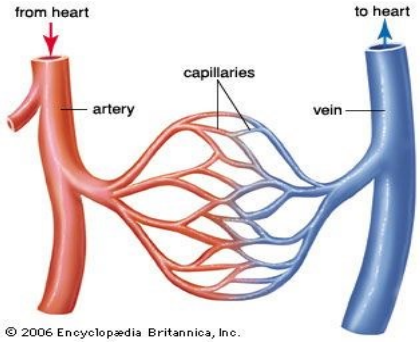
. Parts of the **Circul**atory System

. The Heart as a **Pump**

. Blood, Blood Cells & Plasma

. Energy



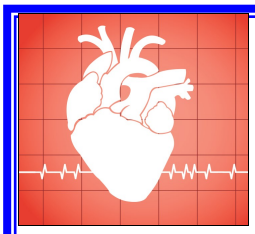


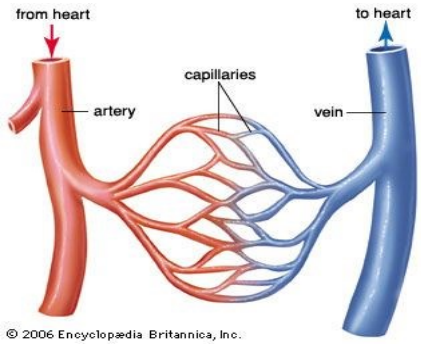
Arteries, Capillaries and Veins:

Read the information ring, then fill in:

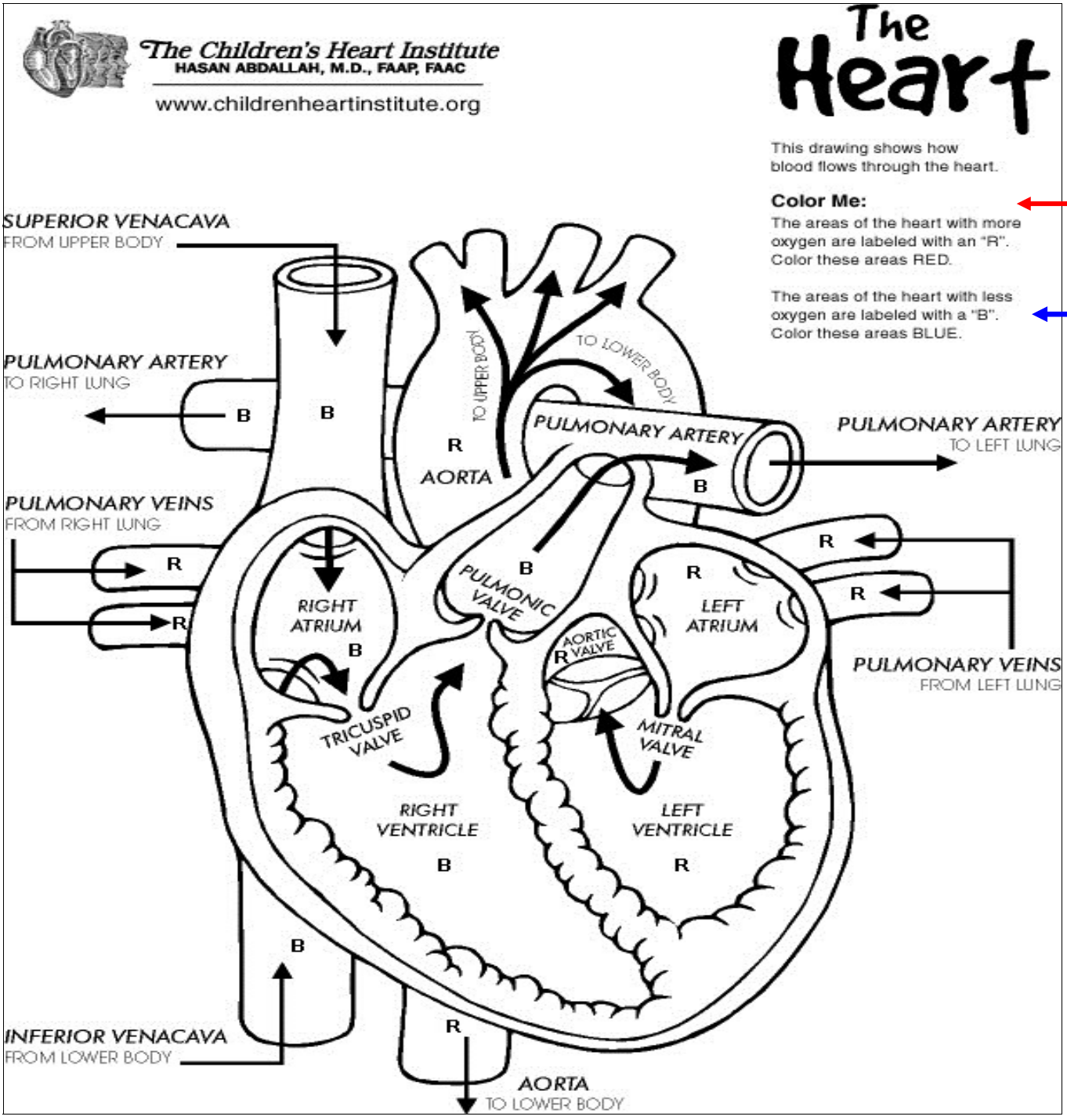
Blood **leaves** the heart in large blood vessels called _____. Blood **returns** in vessels called _____. Between the arteries and veins are tiny vessels called _____. Arteries bring _____ blood from the _____ to the cells in the _____. Veins carry _____ blood back to the heart after it has traveled the _____.

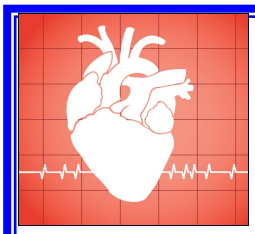
body, arteries, deoxygenated, veins, blood, oxygenated, capillaries, heart,

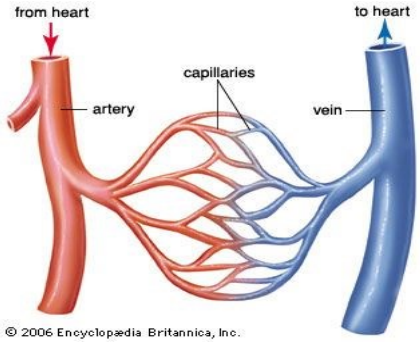




Arteries, Capillaries and Veins:







Arteries, Capillaries and Veins:

Read the information ring and then ***try***:

How the Blood Flows—Veins and Arteries

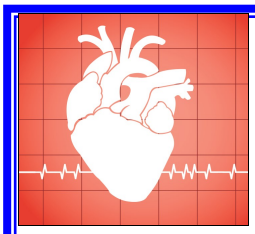
Materials:

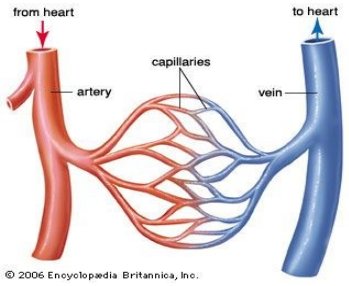
2 Cups

2 straws: one wide, one narrow.

Putty / Play—Dough

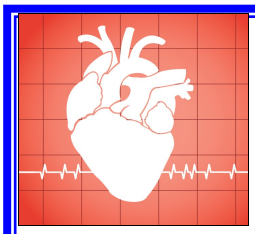
Red Water (Blood)

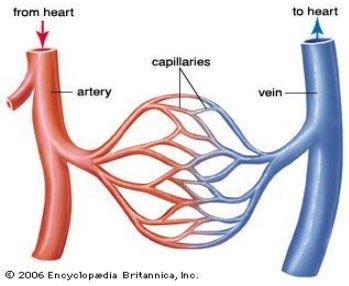




Make a Hypothesis:

How will these materials be used to create blood flow? Why are the straws different widths?

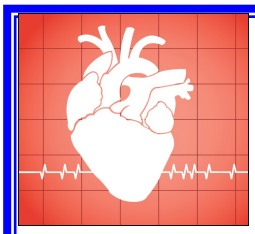


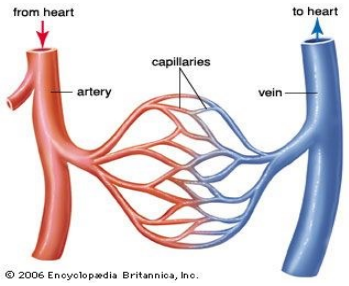


1. For each cup, put one straw in to the small hole making sure the straw is facing downwards. (Put the larger diameter straw in the cup with the larger hole. Put the smaller diameter straw in the cup with the smaller hole).

2. Use play dough, clay, or silly putty to seal the hole inside the cup and around the straw so that water cannot leak out of the hole.

Do you think the straws will have the same or different flow rates?

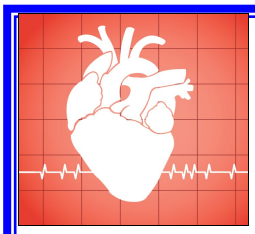




Quickly fill both cups with water. Fill them to the same level.

Observe carefully.

Explain how poor nutrition, like foods high in fat and cholesterol effect your arteries and how does this experiment show that ?



Watch:

http://kidshealth.org/en/kids/csmovie.html

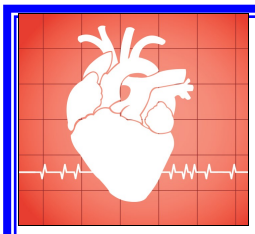
1. Take a stethoscope and listen to your heart beat record how many beats you hear

_____ beats in _____ seconds.

2. Now find your pulse (wrist or neck) and do the same:

_____ beats in _____ seconds.

Pick a situation card, perform the act and then chart the changes you find in your heart beat and pulse.

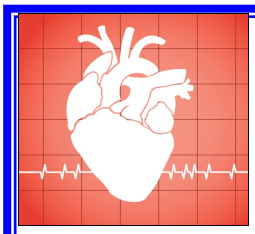


Watch:

http://kidshealth.org/en/kids/csmovie.html

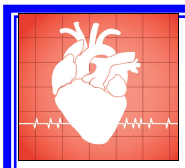
Now:

Use the materials to recreate the DOUBLE PUMP
system that is our heart



Your heart is a _____ that pushes _____ around your whole body. Your heart is in the middle of your _____ squeezed between your two _____. Your heart is really _____ pumps in one! One half pumps blood through your _____ and the other half pumps blood around your _____. The blood that pumps through your lungs is _____ and then it is pumped through your body from the _____ atrium.

left, muscle, oxygenated, chest, two, body, lungs, blood, lungs



Blood Cells, Plasma and Platelets

Read the information ring and then make **blood***:*

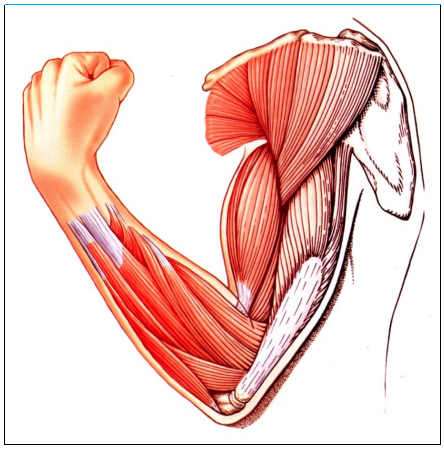
_____ is 90% water and contains _____, proteins and hormones; it is a thick, clear/yellowish liquid.

Plasma, is **55%** of our blood volume—add this amount to the jar. 

Next, add your _____ blood cells, these cells make up **44%** of our blood volume **Red Blood Cells,** carry 

_____ and _____ _____throughout the body.

Now, add your  _____ blood cells, these only make up about **0.05%** our blood volume. The last **0.05%** our blood volume is made up of _____. **Platelets** are responsible for making our blood _____ if we are cut and or injured.



What is: The Skeletal Muscle System?

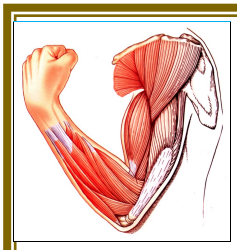
What We Will Investigate:

. Voluntary, Involuntary and Cardiac Muscles

. Bones

. Connect the Two

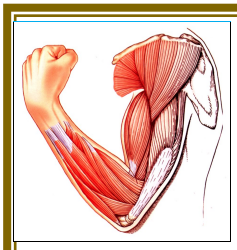
. Forces and Pulleys in our Hands



Read *the* ***information*** *ring and think about the* ***different types*** *of* ***muscles****.*

Match (draw a line to the matching **muscle** type)**:**

Skeletal	**involuntary**
Smooth	**heart / involuntary**
Cardiac	**voluntary**



Label each picture by muscle type **(use both names)**

Chewing

1._____

2._____

Blinking

1._____

2._____

Running

1._____

2._____

Heart Beat

1._____

2._____

Jumping

_____

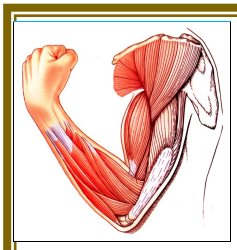
1._____

2._____

Breathing

1._____

2._____



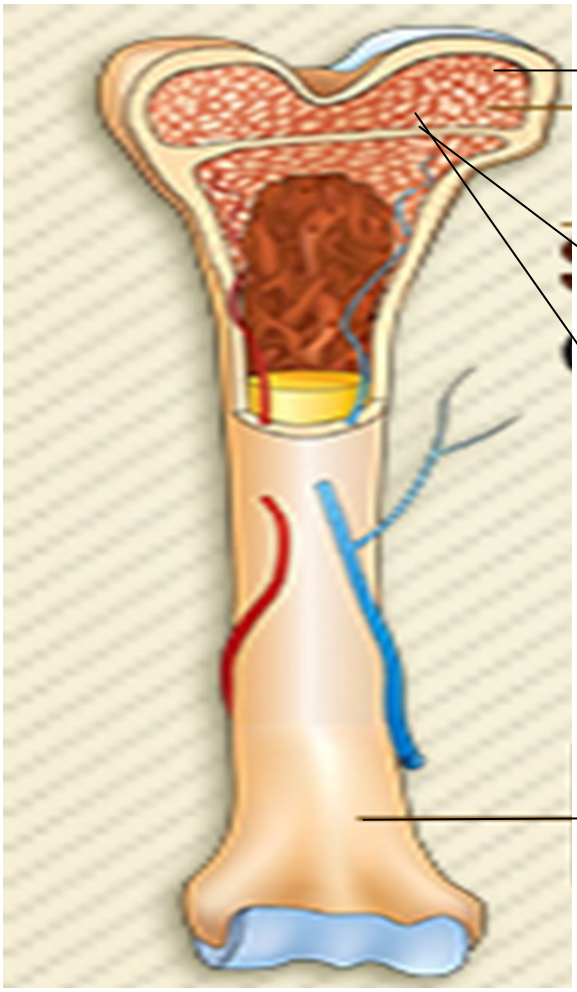
Bones:

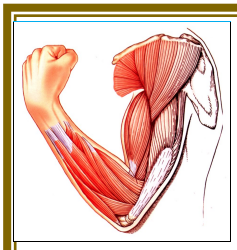
(How many bones are in our body?_____)

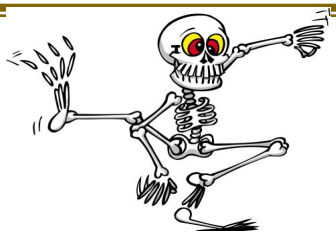
Look closely at the **Beef Femur**!

Label the picture choose with the following words:

compact, spongy, marrow



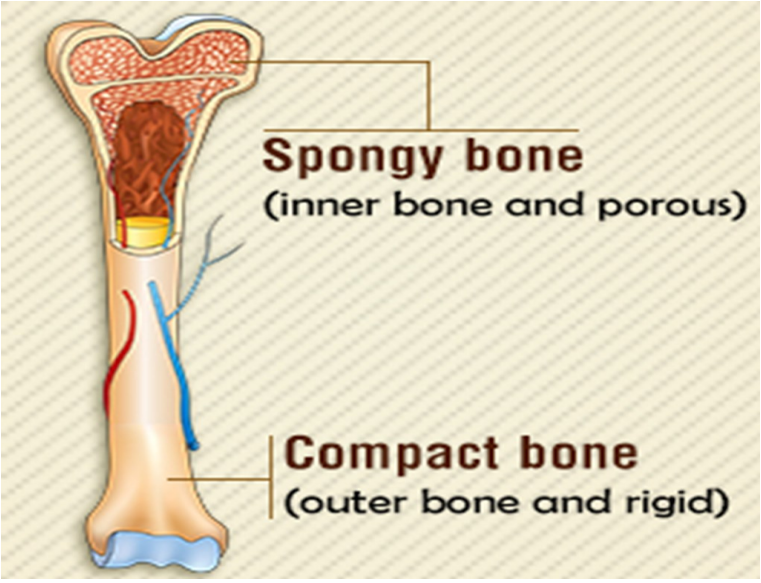


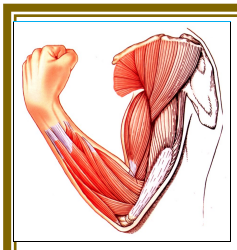


Bones:

compact, spongy, marrow

_____ bone is the hardest part of the bone. The _____ bone is filled with marrow. The bone _____ is where red blood cells are made.



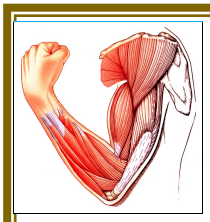


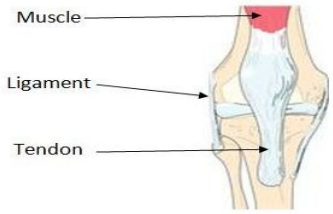
Making Connections:

Muscles and Bones in our Bodies:

Pick a partner and one of the **Body Boards**. Find the set of matching cards and play until you have **4** in a row—then call "**body**"

check with the "caller" to make sure you are right!





Musculoskeletal Movements:

Flex and Bend:

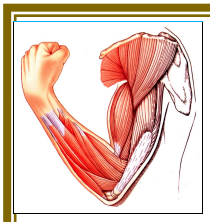
Joints, Ligaments and Tendons

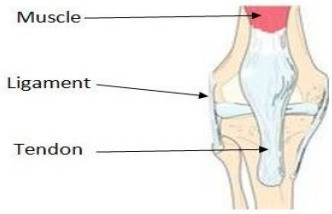
1. Trace your hands and wrists. 

(With the help of an adult cut the crease of the thumb to make it slightly opposable)

2. For each finger, in the center, from the tip to the wrist, tape down straw (do not tape on the **joint** lines!) 

3. Tie 1 piece of string in a loop that threads through the tip of the finger and the second knuckle. Thread the remaining length of string through the straw so that the excess string is free at the wrist. Repeat for each finger and thumb. 





Flex and Bend Continued:

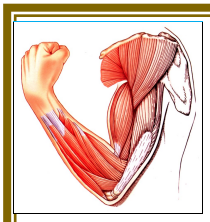
Joints, Ligaments and Tendons

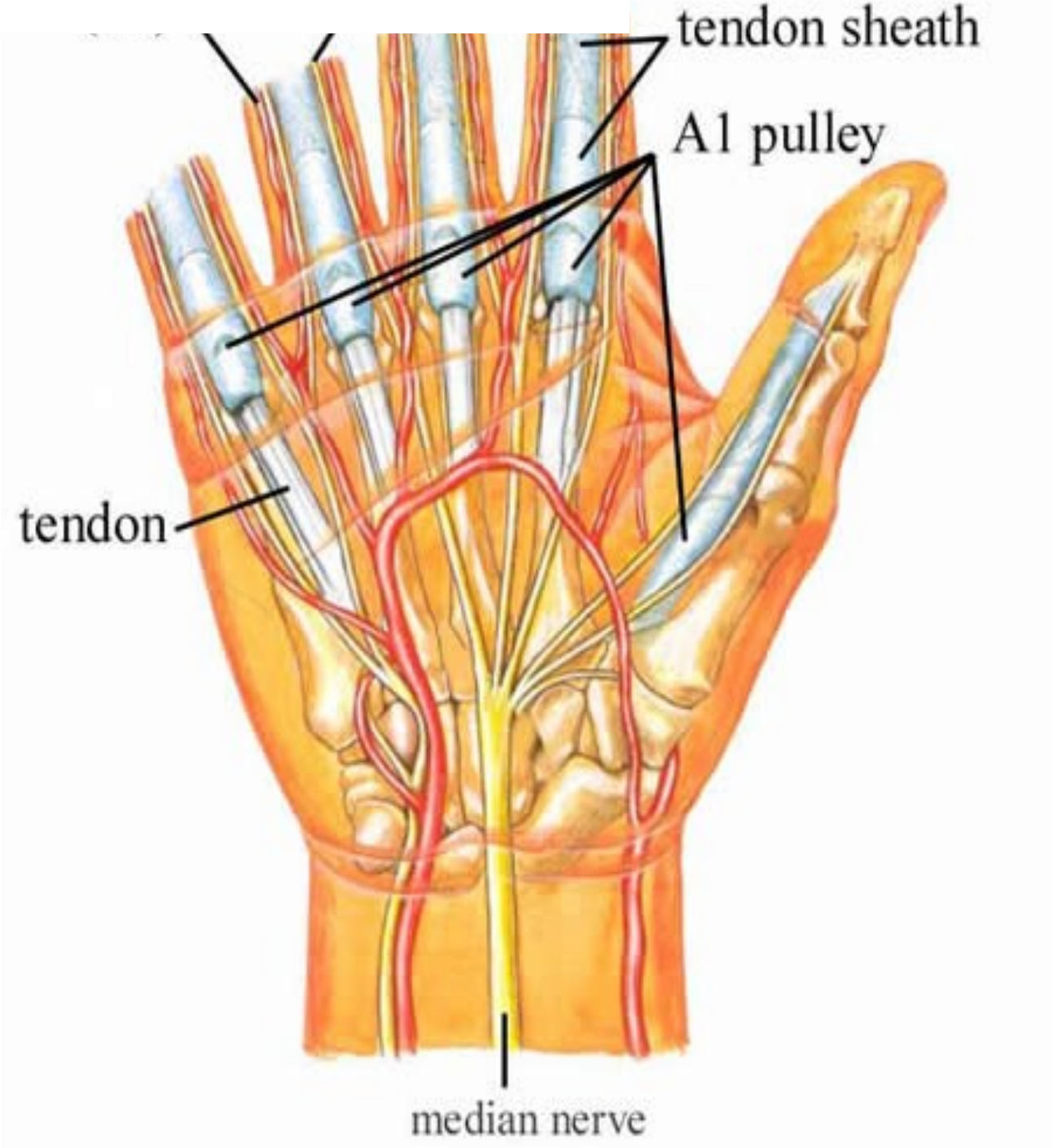
4. Tie a bead to the end of each string.

5. With the help of an adult score the knuckles on the **BACK** side of the hand. Bend the **joints** of each finger and thumb.

6. Pull beads to flex and extend the fingers and thumb.

*Play with your hand and **Read** the information ring, then: **Put** the **bone**, **joint**, **ligament** and **tendon** labels on your hand.*




tendon sheath
A1 pulley
tendon
median nerve