



# Hands-on Anatomy KSDE CTE Conf. Manhattan, KS

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# Systems of the Human Body





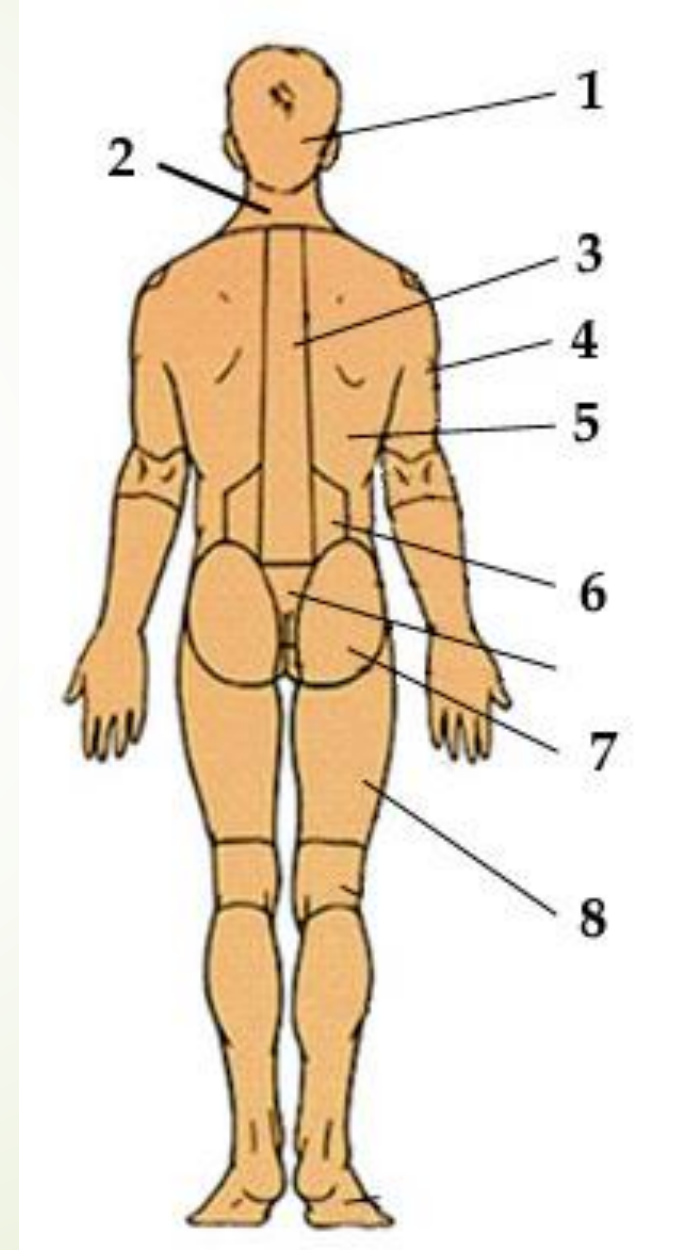
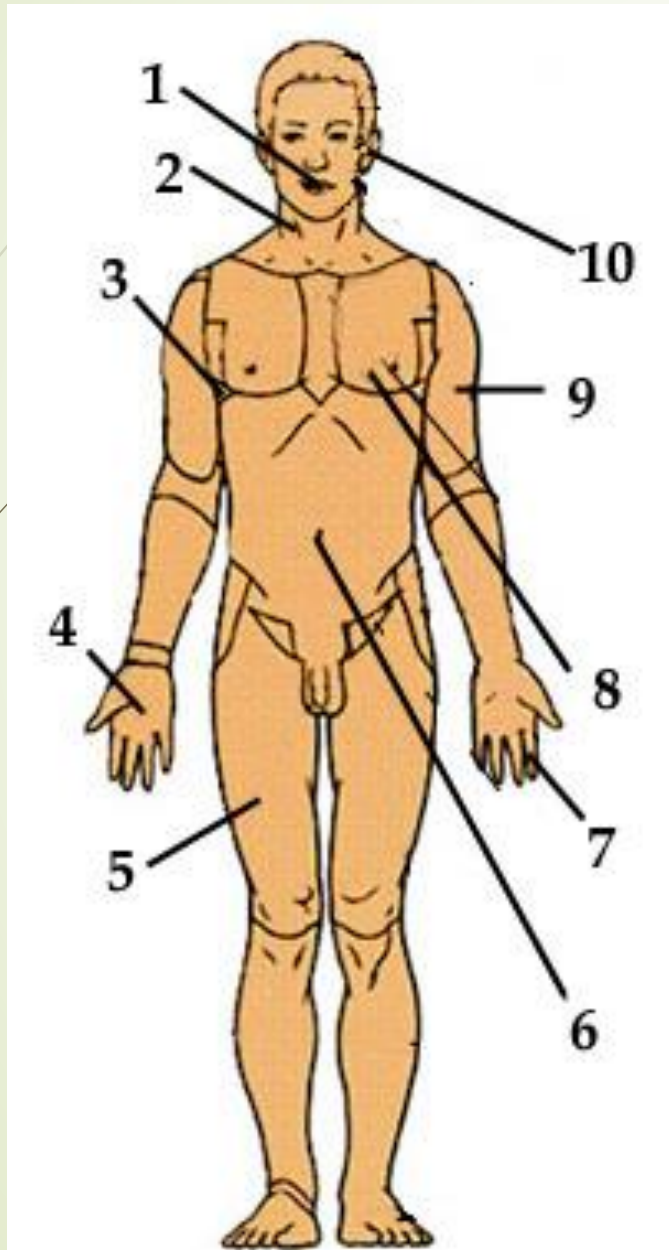
# Integration of the Human Body Systems Objectives into Anatomy & Physiology

- Many of the HBS objectives are already part of the A&P curriculum
- Helps students understand the connections between the systems
- Helps students connect information to real-world applications
- Adds more physiology to supplement the anatomy objectives

# Anatomy in Clay MANIKEN

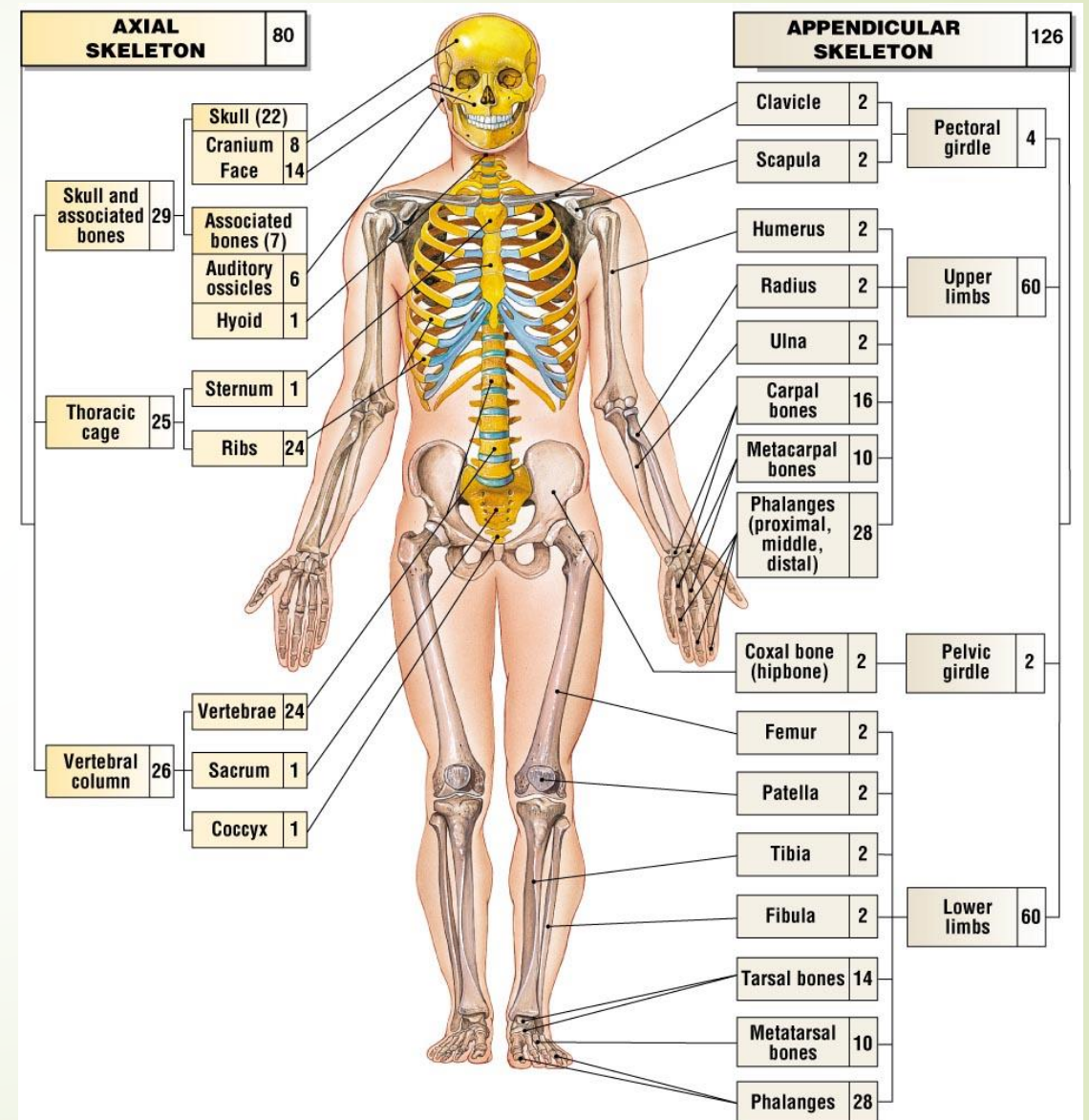


# Directional Terms & Body Regions

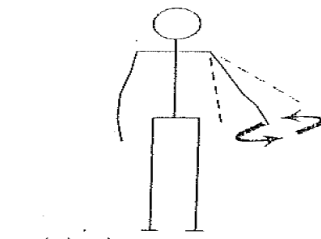


# Axial & Appendicular Skeleton:

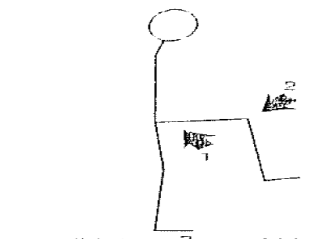
## Bones & Landmarks



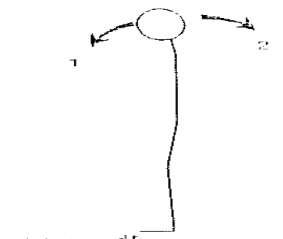
# Actions at the Various Joints – “Simon Says!”



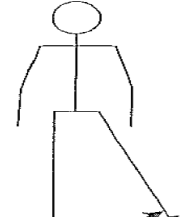
(a) 1 of arm



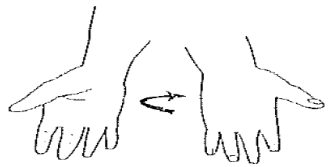
(b) 1. 2. 3. of hip of knee



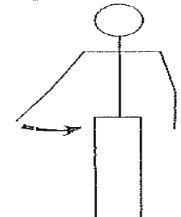
(c) 1. 2. of neck



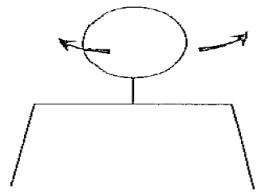
(d) 6 of the thigh



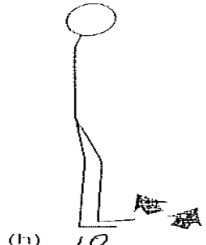
(e) 7



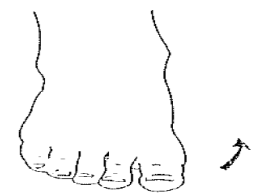
(f) 8 of arm



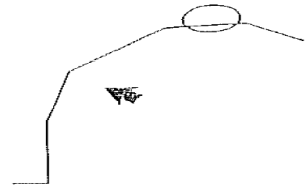
(g) 9 of head



(h) 10



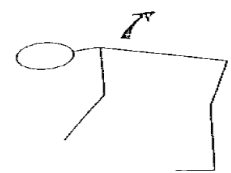
(i) 11



(j) 12 of hip



(k) 13 of elbow



(l) 14 of hip

- A. extension
- B. circumduction
- C. internal rotation
- D. external rotation
- E. dorsiflexion
- F. palmar flexion
- G. plantar flexion
- H. inversion
- I. eversion
- J. supination
- K. pronation
- L. adduction
- M. abduction
- N. flexion
- O. hyperextension
- P. circumscision
- Q. protraction
- R. retraction
- S. elevation
- T. depression
- U. rotation

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

# Muscle Principles:

1. Muscles have at least 2 points of attachment--an origin that stays stationary, and an insertion that moves.
2. Muscles attach to bones either by tendons or fleshy connections.
3. Muscles must cross at least one joint to create movement. (The face is the exception-modiolus-some lack an antagonist)
4. Muscles shorten as they contract.
5. Muscles only pull.
6. Muscles work in antagonistic pairs.
7. Muscle fibers or tendons ultimately go in the direction of the pull.
8. Flexors are on the ventral surface and extensors are on the dorsal surface.
9. Muscles shape the bones. (Wolff's Law)
10. Muscles that cross one joint are for power and stability. Muscles that cross many joints are for speed and agility.
11. Muscles for speed have parallel fibers (down hill), and muscles for power have fibers that run diagonally at an angle to the length (snow-plow).
12. Small muscles create subtle movement; big muscles create gross movements.
13. Muscles are named for a variety of reasons and the names help to remember something about each muscle.
  - Size, Shape, Direction of fibers, Function/Action, Origin/Insertion, Combination

## Building Rules:

Mark origin and insertion.

Form clay.

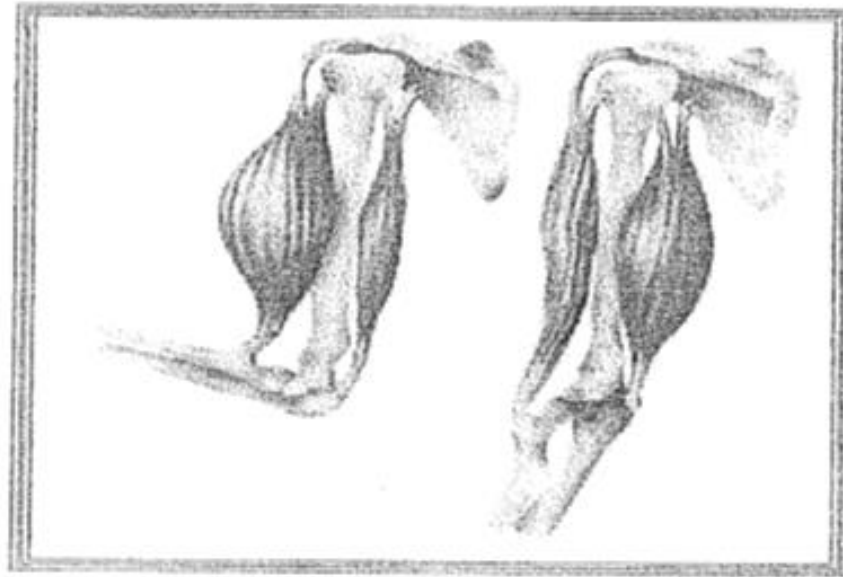
Attach to bones

Separate tendons from muscle.

Add fiber direction.

Deduce the action.

Embody it on self.







# Skeletal Muscles: Seven Characteristics By Which They Are Named

1. Location
2. Shape
3. Size
4. Pts. of attachment (origin & insertion)
5. # of heads
6. Action
7. Direction of fibers



# Two Good Web Sites for Review Games

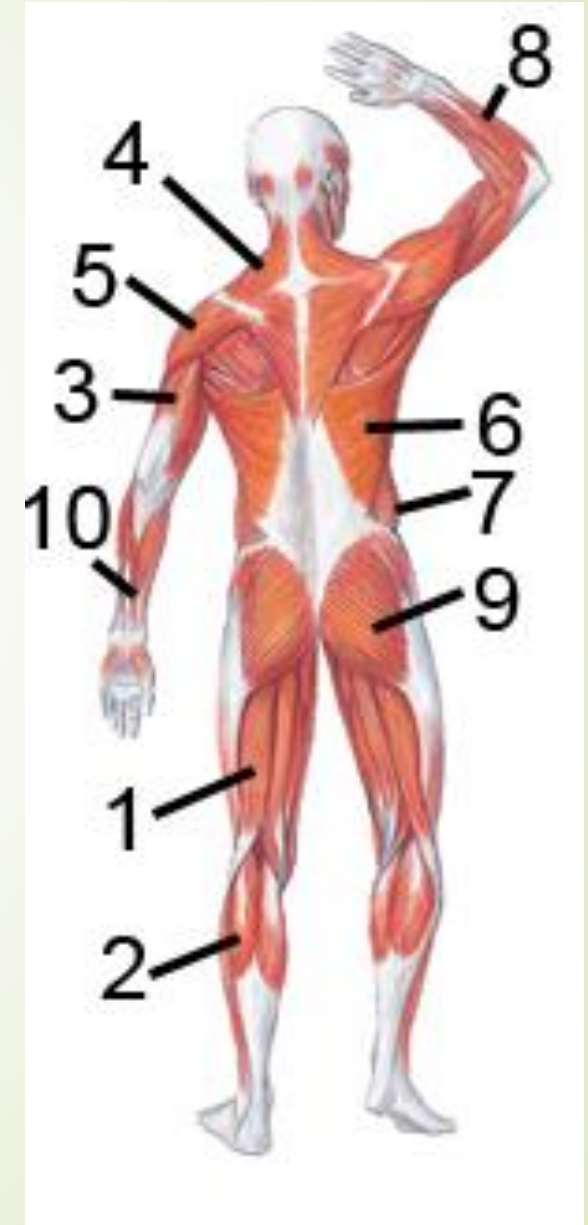
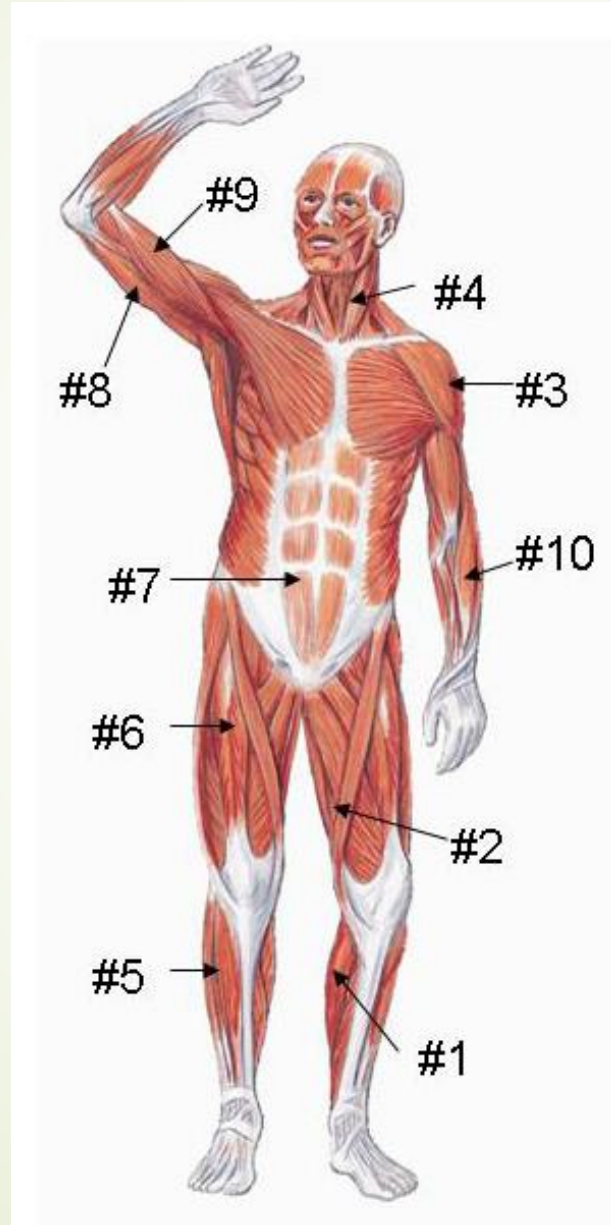
Web Anatomy:

[http://msjensen.cehd.umn.edu/  
webanatomy/](http://msjensen.cehd.umn.edu/webanatomy/)

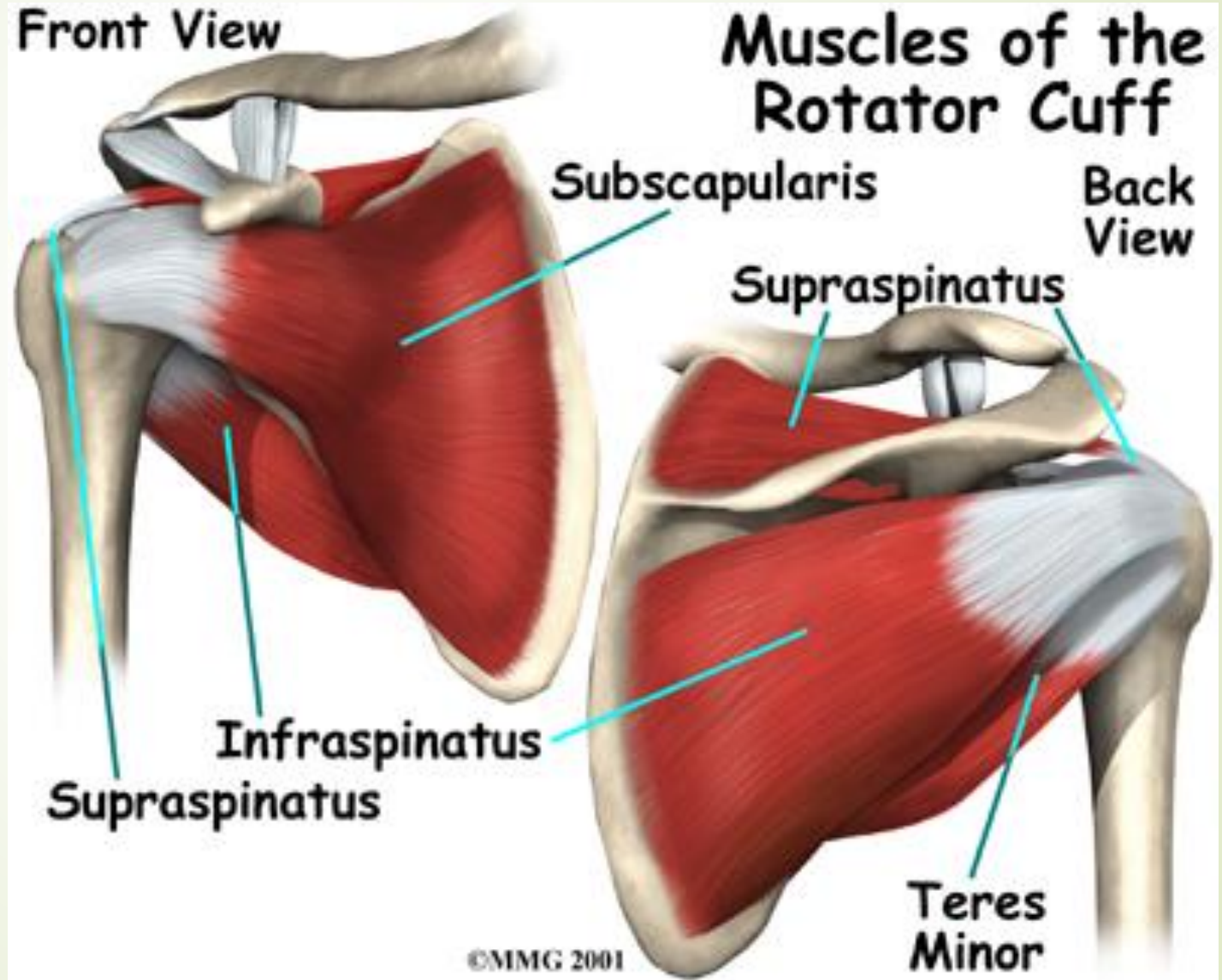
Anatomy Arcade:

[www.anatomyarcade.com](http://www.anatomyarcade.com)

# Muscles To Be Identified



# Building the Muscles of the Rotator Cuff



# Maniken Study Data

<b>Table 1</b>							
<b>Averages by Year</b>				<b>Averages by Year</b>			
<b>Year A (No Manikens)</b>		<b>2012</b>		<b>Year B (No Manikens)</b>		<b>2013</b>	
<b>56 students</b>				<b>69 Students</b>			
<b>Bones</b>	<b>Muscles</b>	<b>Heart</b>	<b>Circ.Sys.</b>	<b>Bones</b>	<b>Muscles</b>	<b>Heart</b>	<b>Circ.Sys.</b>
<b>Unit 4</b>	<b>Unit 5</b>	<b>Unit 10</b>	<b>Unit 11</b>	<b>Unit 4</b>	<b>Unit 5</b>	<b>Unit 10</b>	<b>Unit 11</b>
<b>89.5</b>	<b>79.54</b>	<b>78.98</b>	<b>79.32</b>	<b>87.93</b>	<b>79.19</b>	<b>75.58</b>	<b>76.84</b>

<b>Averages by Year</b>				<b>Averages by Year</b>			
<b>Year C (Borrow manikens)</b>		<b>2014</b>		<b>Year D (Have Manikens)</b>		<b>2015</b>	
<b>52 Students</b>				<b>63 Students</b>			
<b>Bones</b>	<b>Muscles</b>	<b>Heart</b>	<b>Circ.Sys.</b>	<b>Bones</b>	<b>Muscles</b>	<b>Heart</b>	<b>Circ.Sys.</b>
<b>Unit 4</b>	<b>Unit 5</b>	<b>Unit 10</b>	<b>Unit 11</b>	<b>Unit 4</b>	<b>Unit 5</b>	<b>Unit 10</b>	<b>Unit 11</b>
<b>94.61</b>	<b>79.87</b>	<b>82.94</b>	<b>78.75</b>	<b>92</b>	<b>82</b>	<b>82.19</b>	<b>80.59</b>

# Visible Improvements with use of the hands-on activities & Manikens

Figure 1

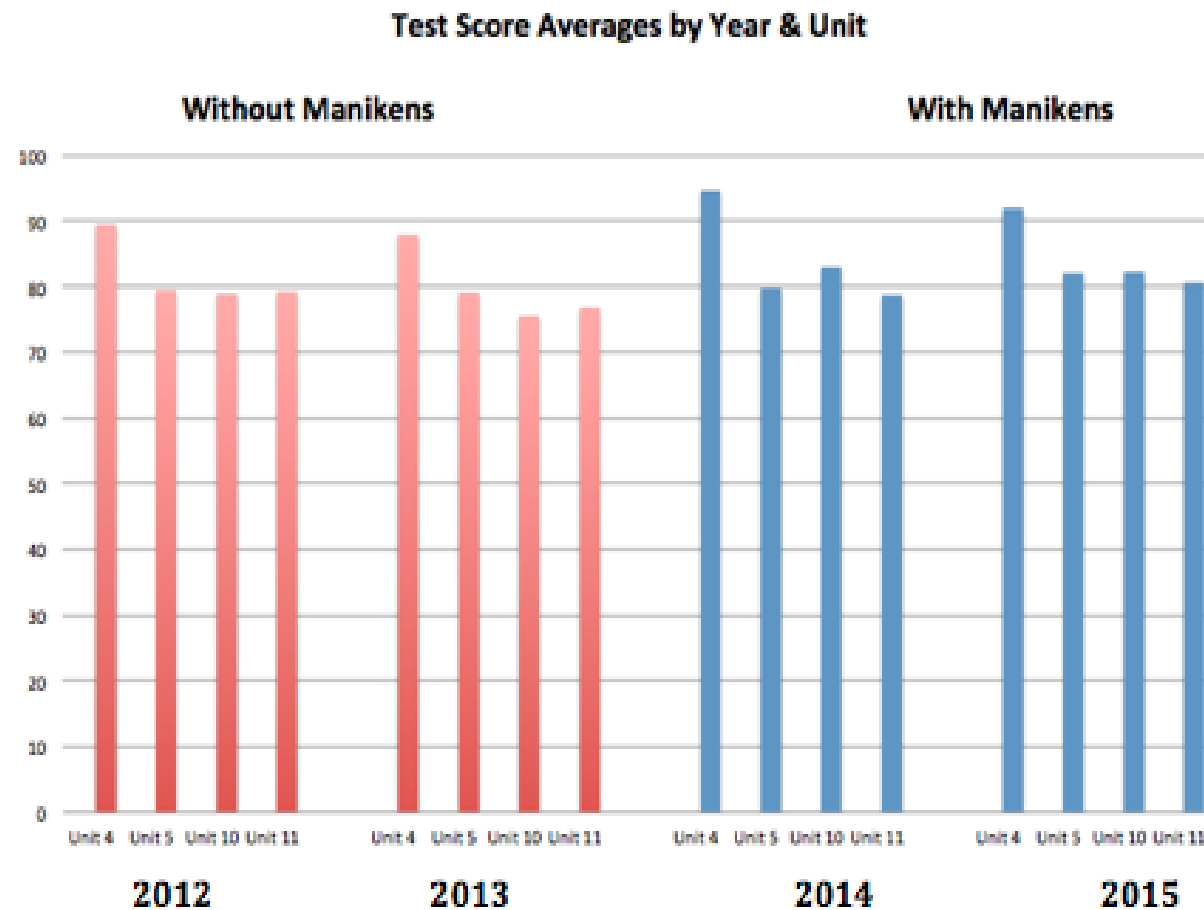
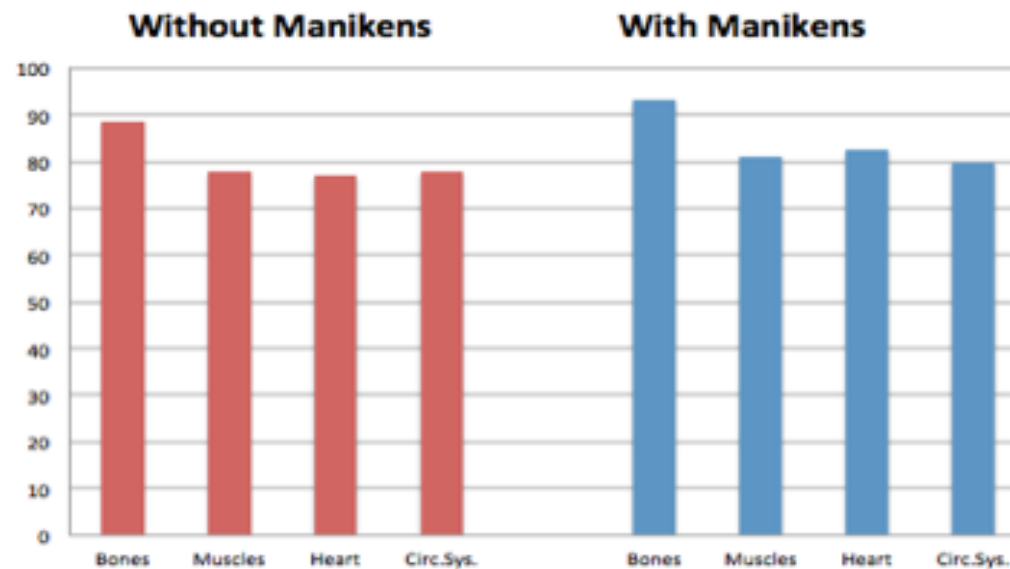


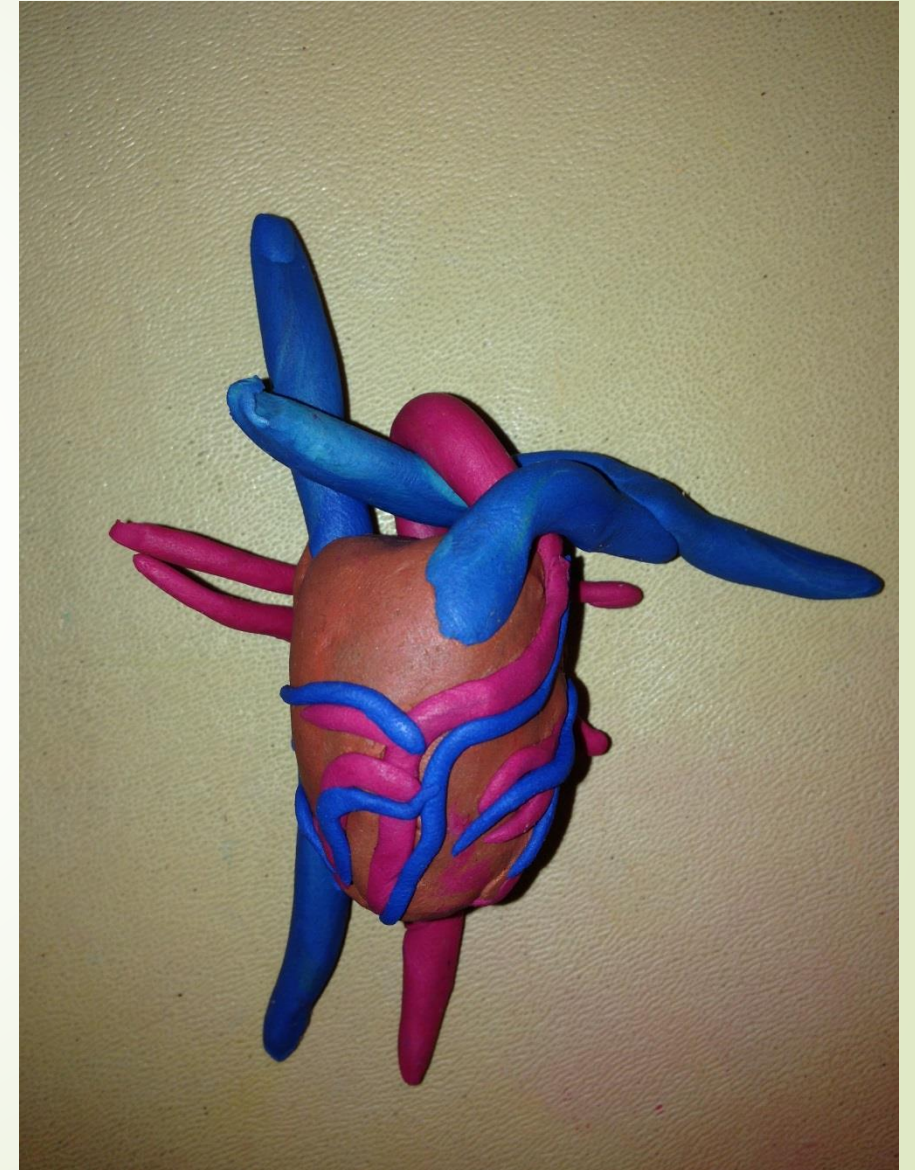
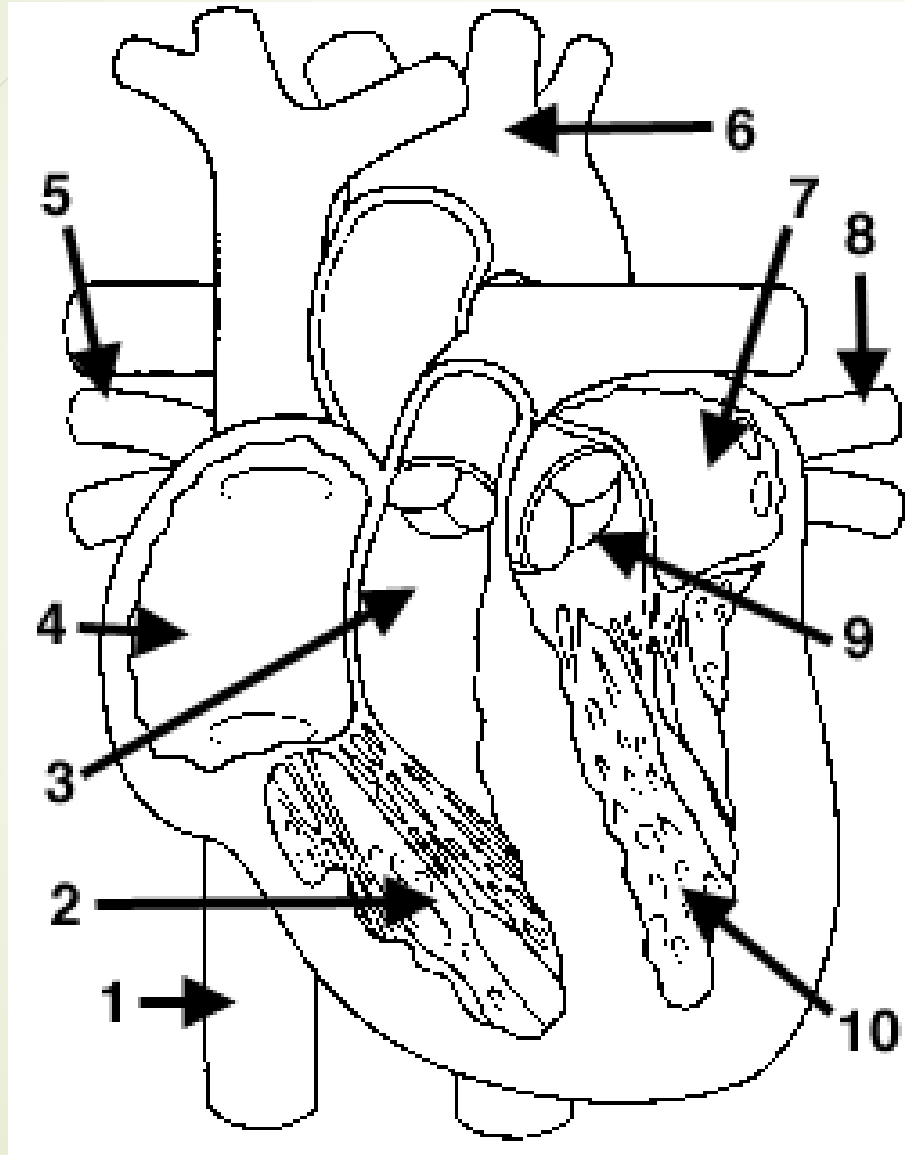
Table 2							
Total Average for Both NO Manikens Years							
Total 125 students				Total Average for Both Manikens Years			
Total 115 students							
Bones	Muscles	Heart	Circ.Sys.	Bones	Muscles	Heart	Circ.Sys.
88.63	77.69	77.1	77.95	93.16	81.03	82.53	79.76
				Percent Increase			
				Bones	Muscles	Heart	Circ.Sys.
				4.53	3.34	5.43	1.81
				Average Increase		3.78	

Figure 2

### Test Score Averages by Unit

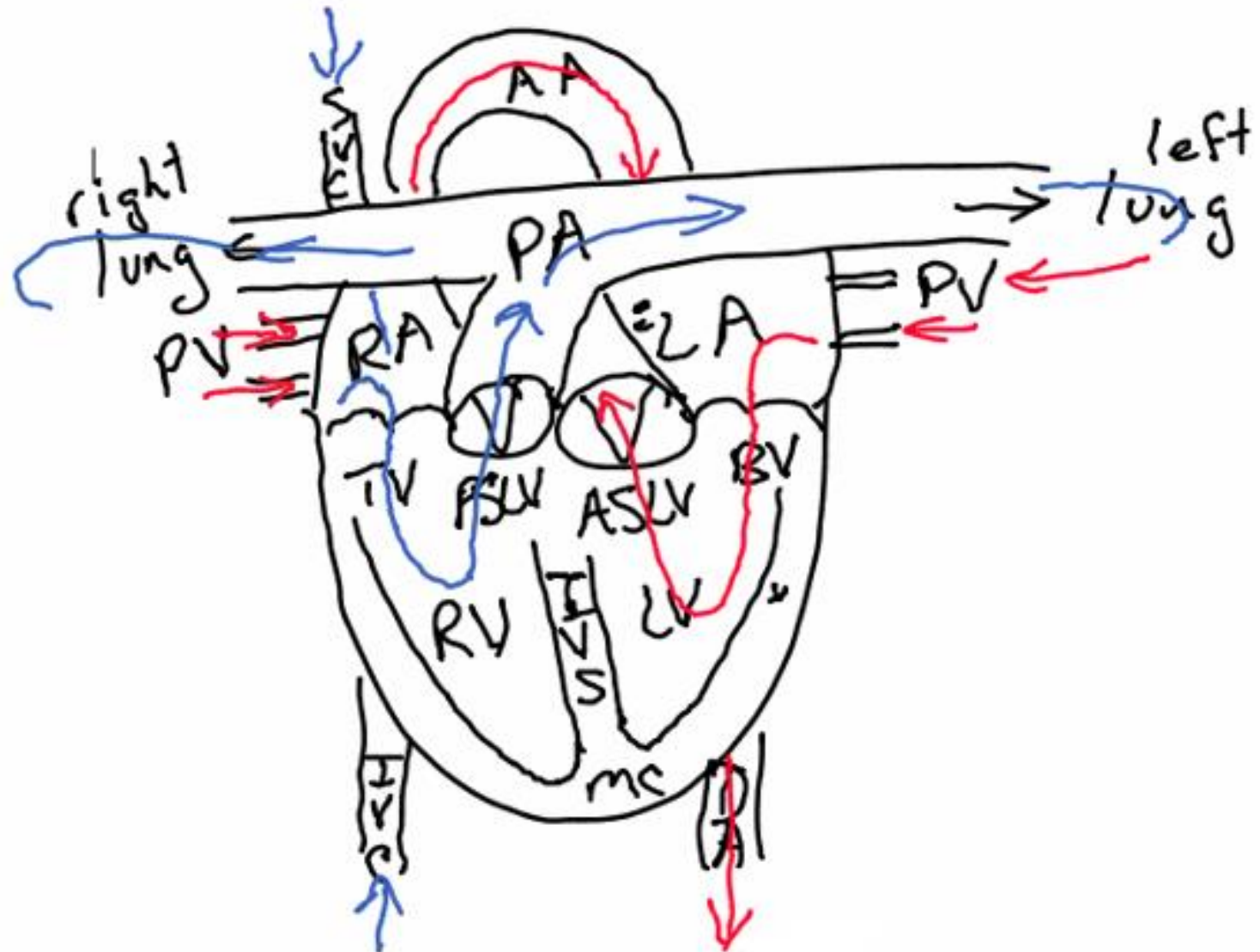


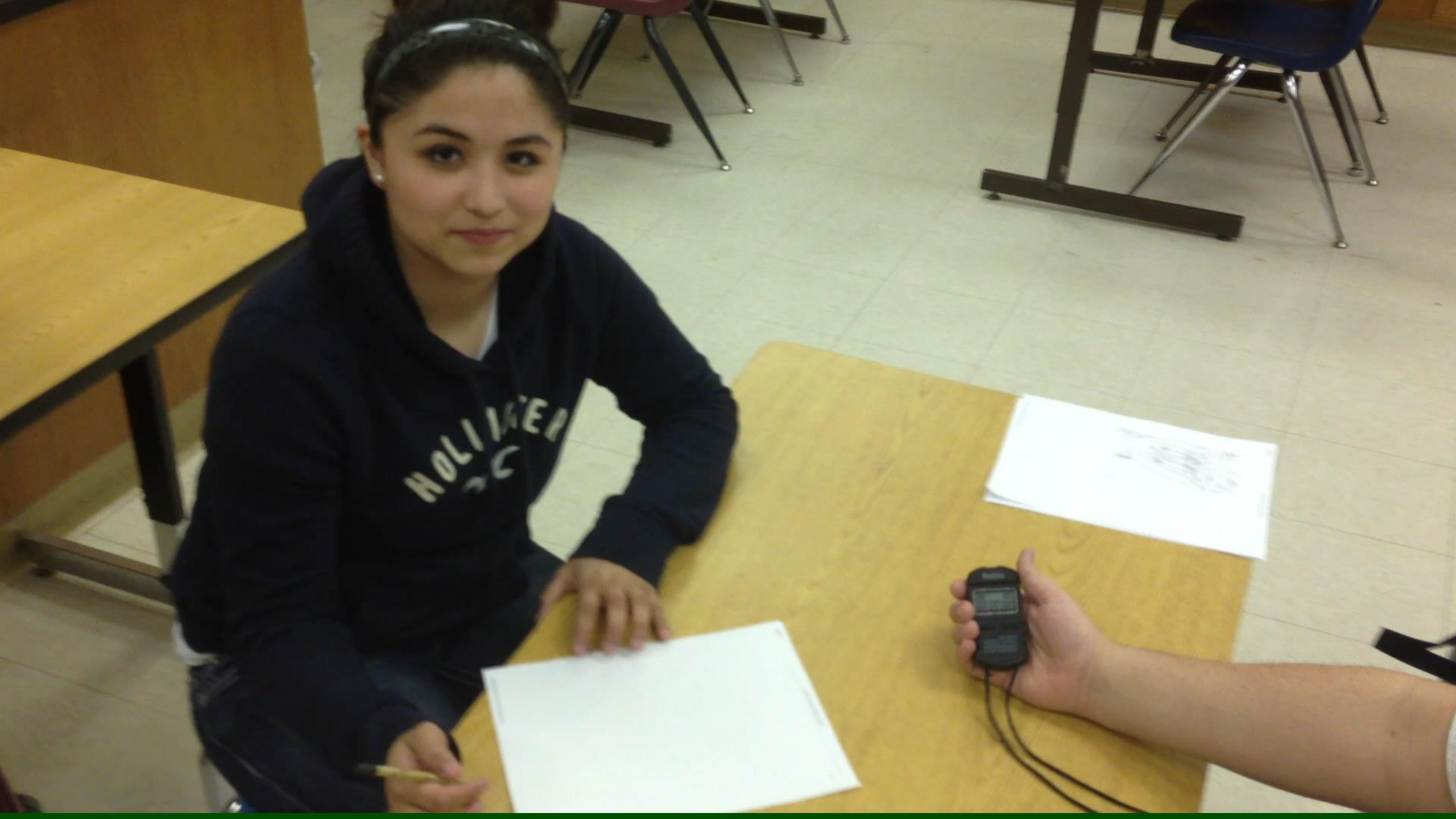
# Drawing the 1 Minute Heart!



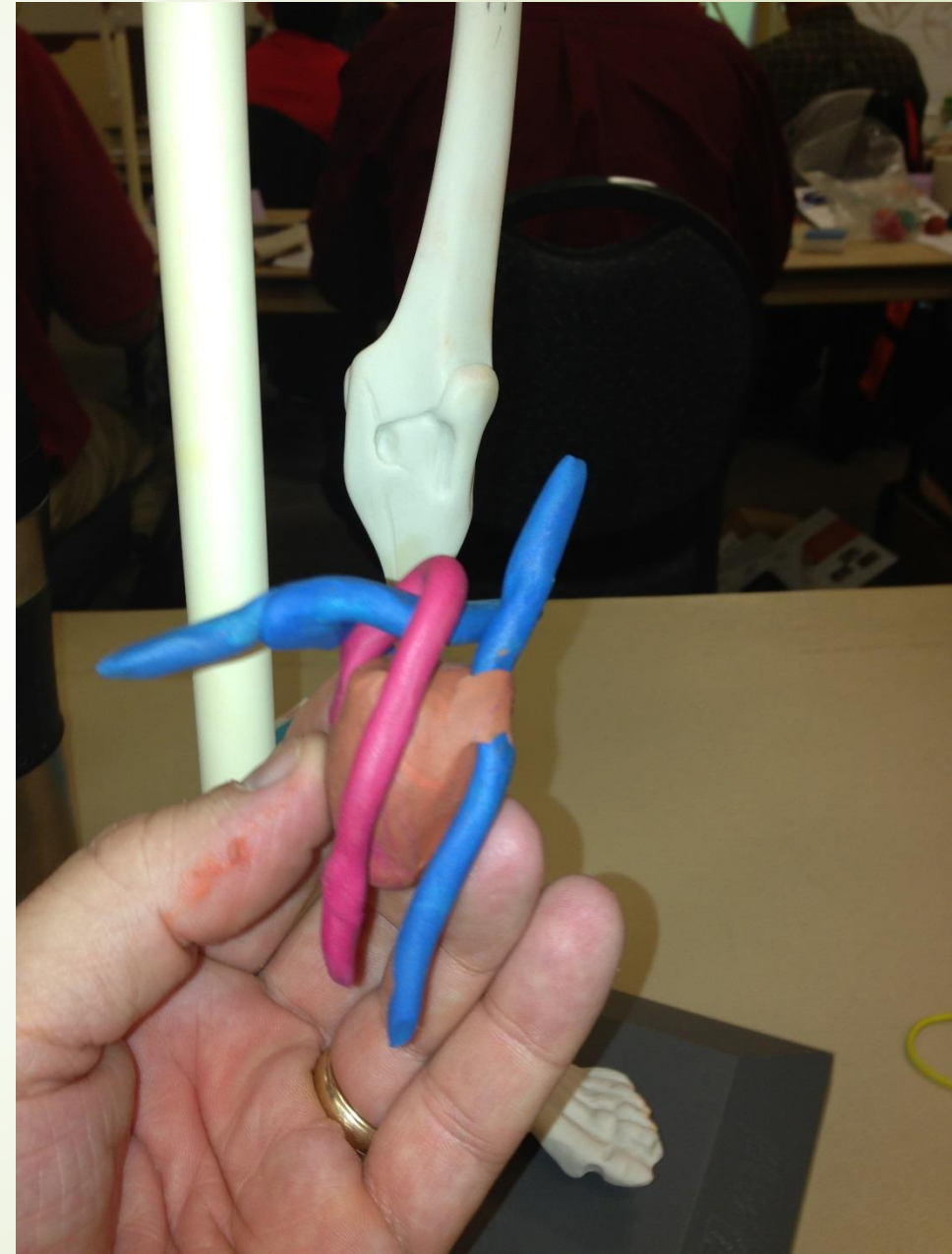
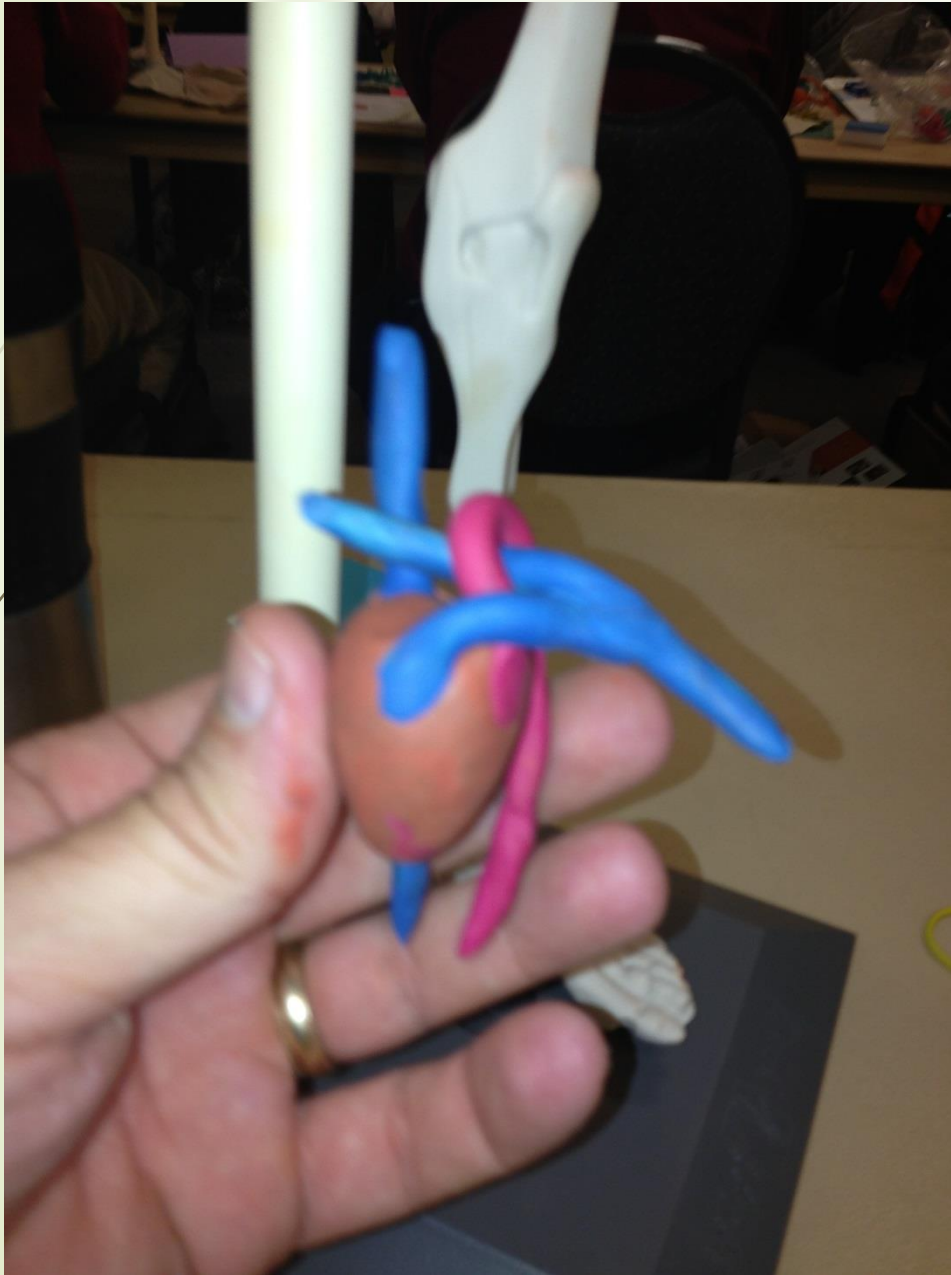


Your students can draw & label this heart in less than 1 minute. You can, too!

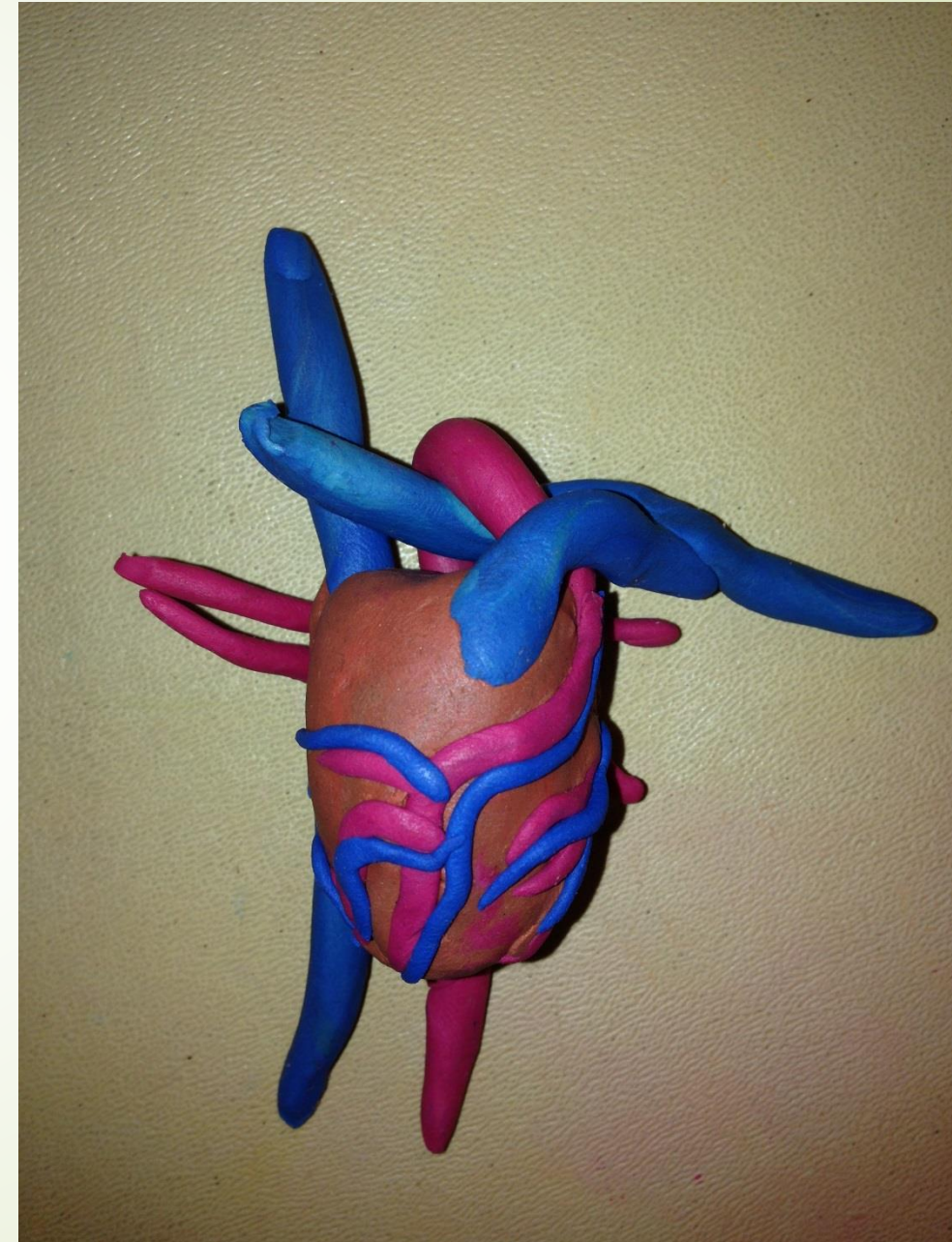
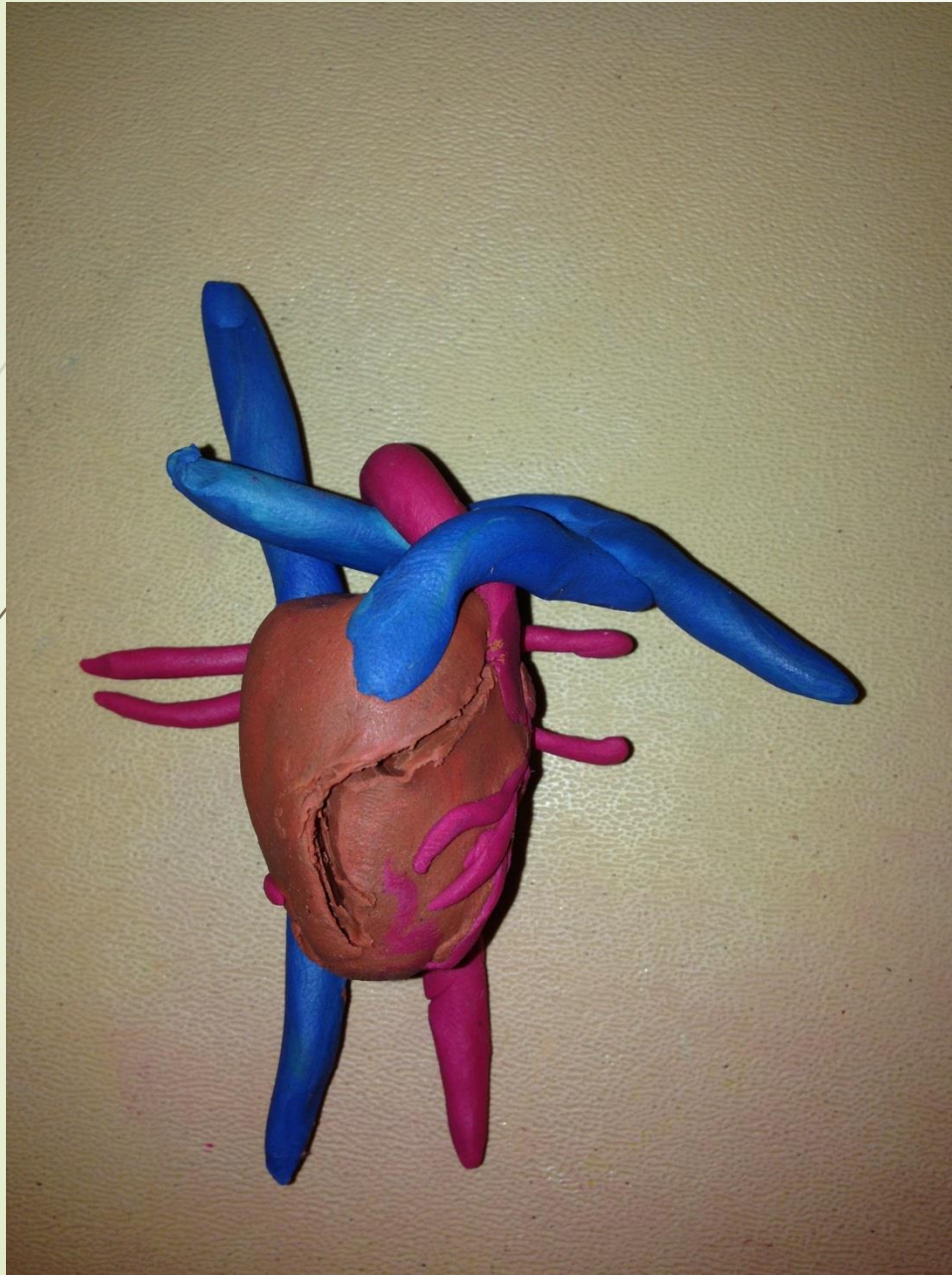




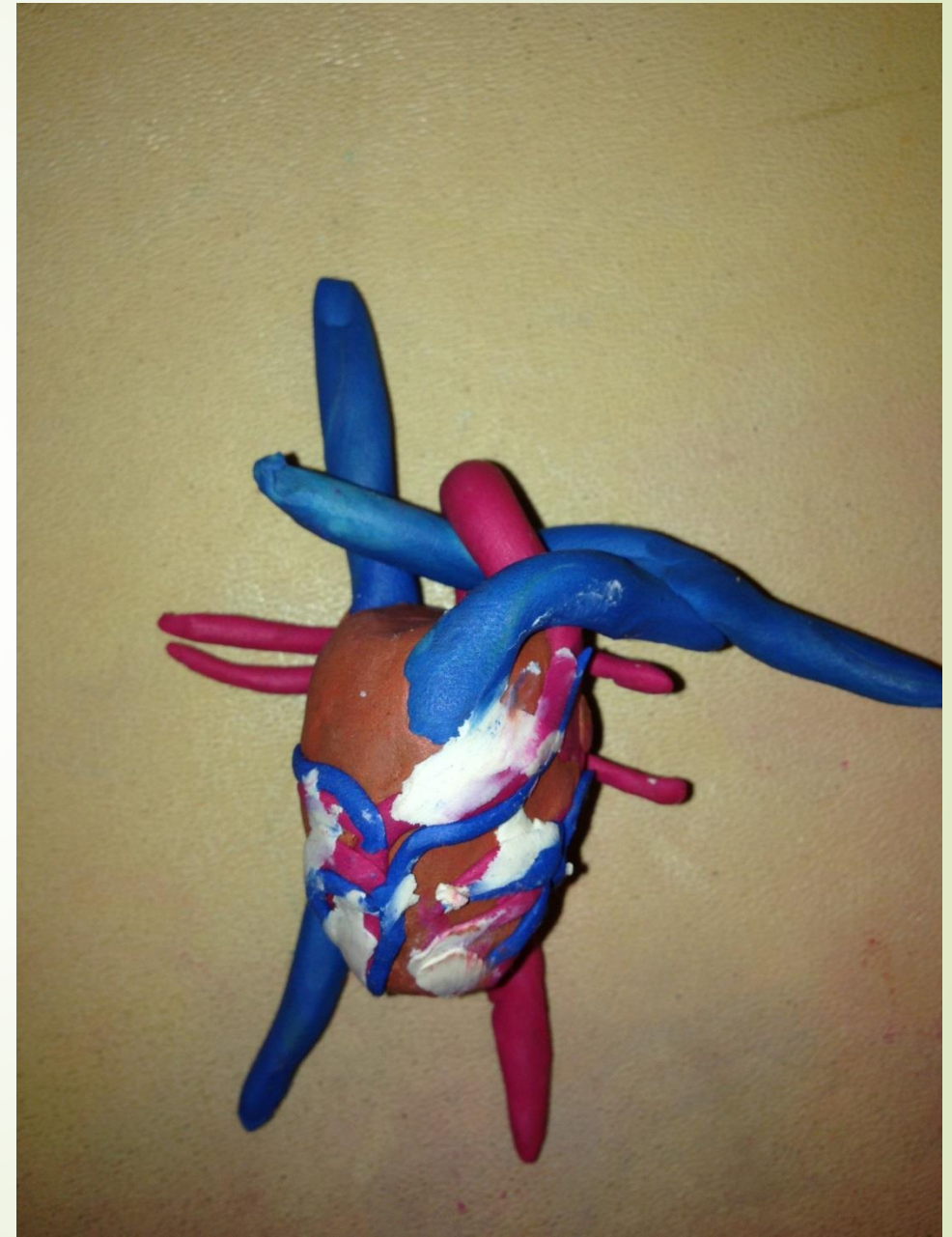
# Building the Heart – (ant. & post. views)



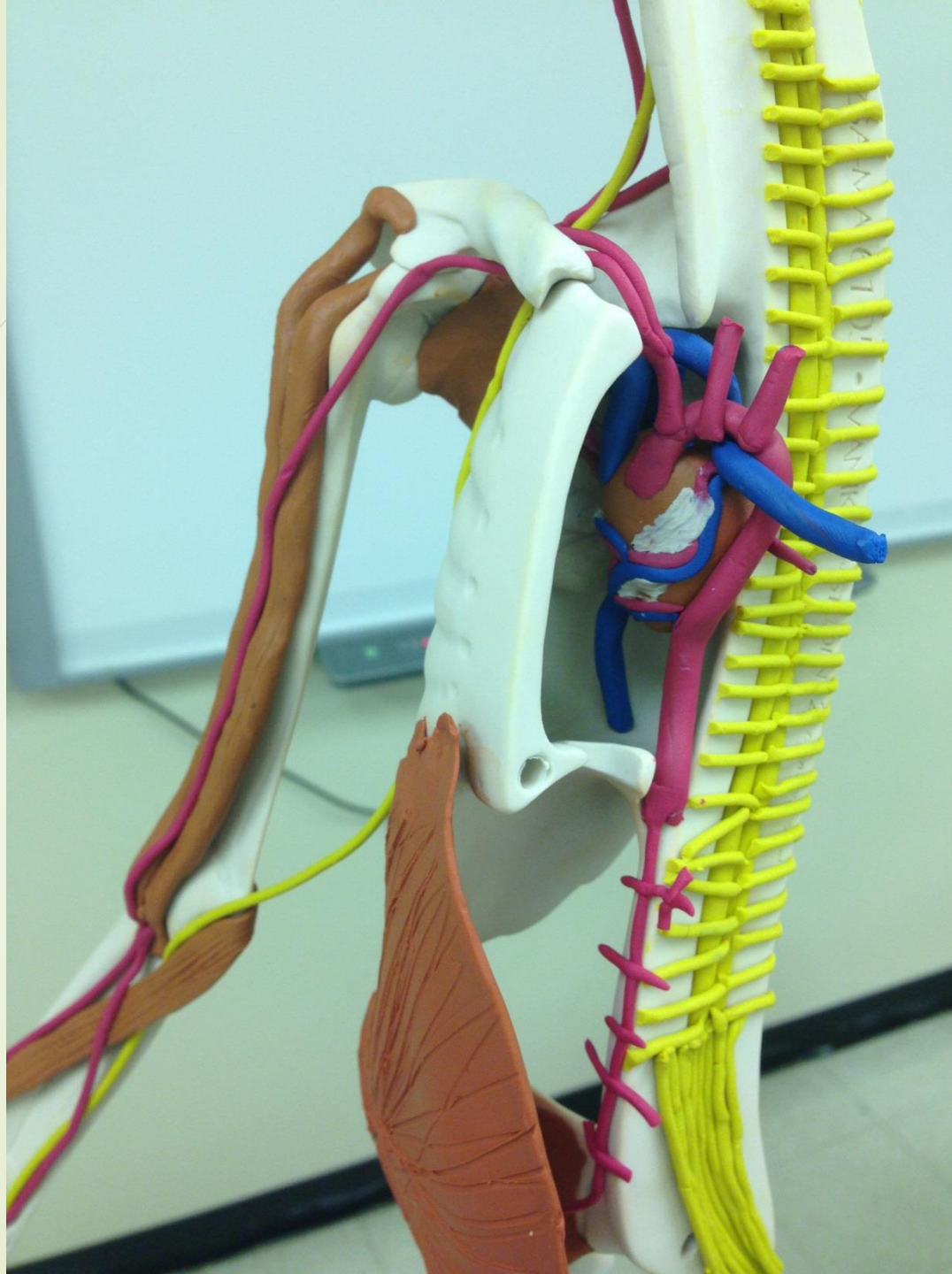
# Adding Coronary Arteries & Veins



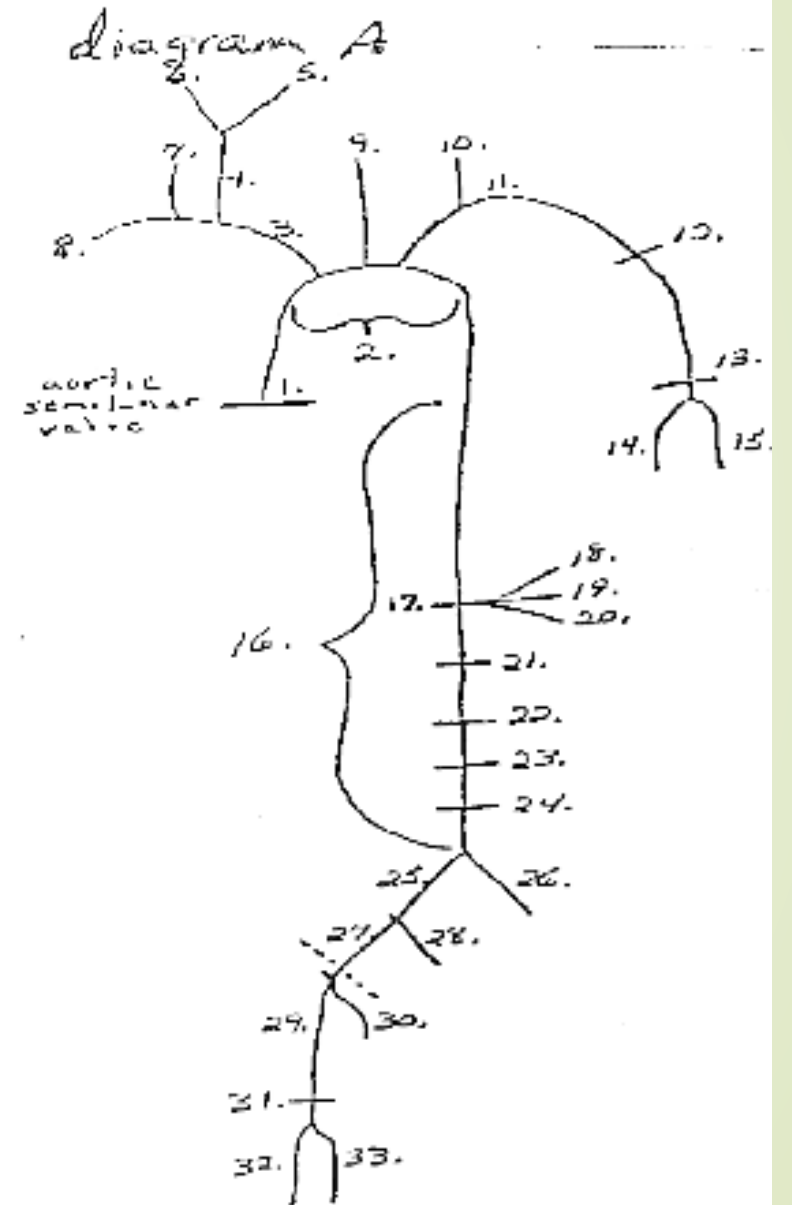
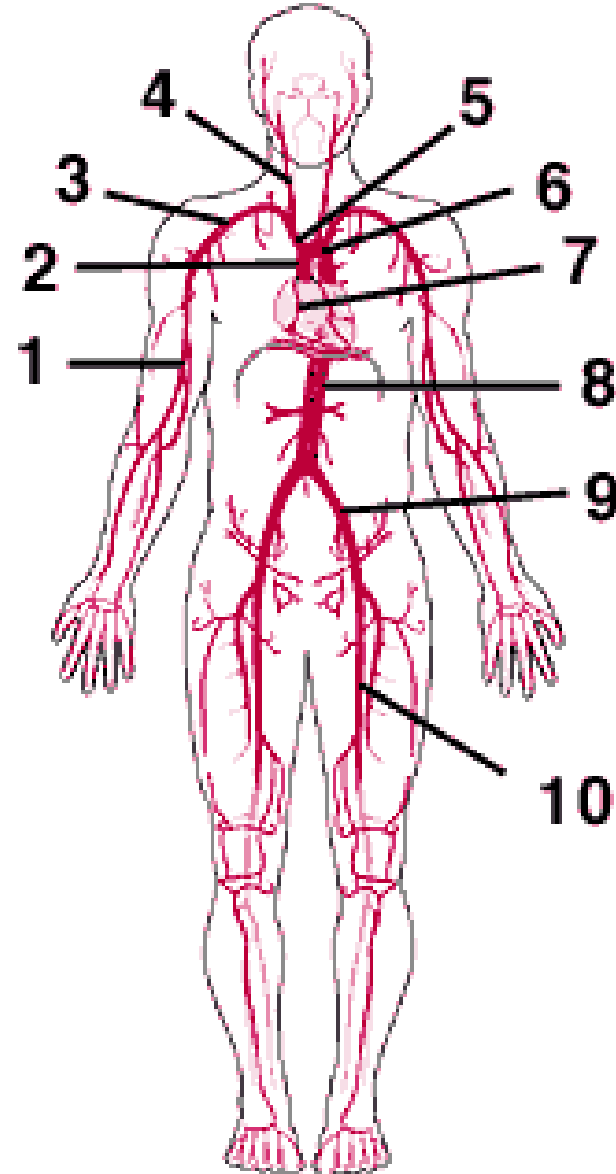
# Post. Circulation & w/ Adipose Tissue



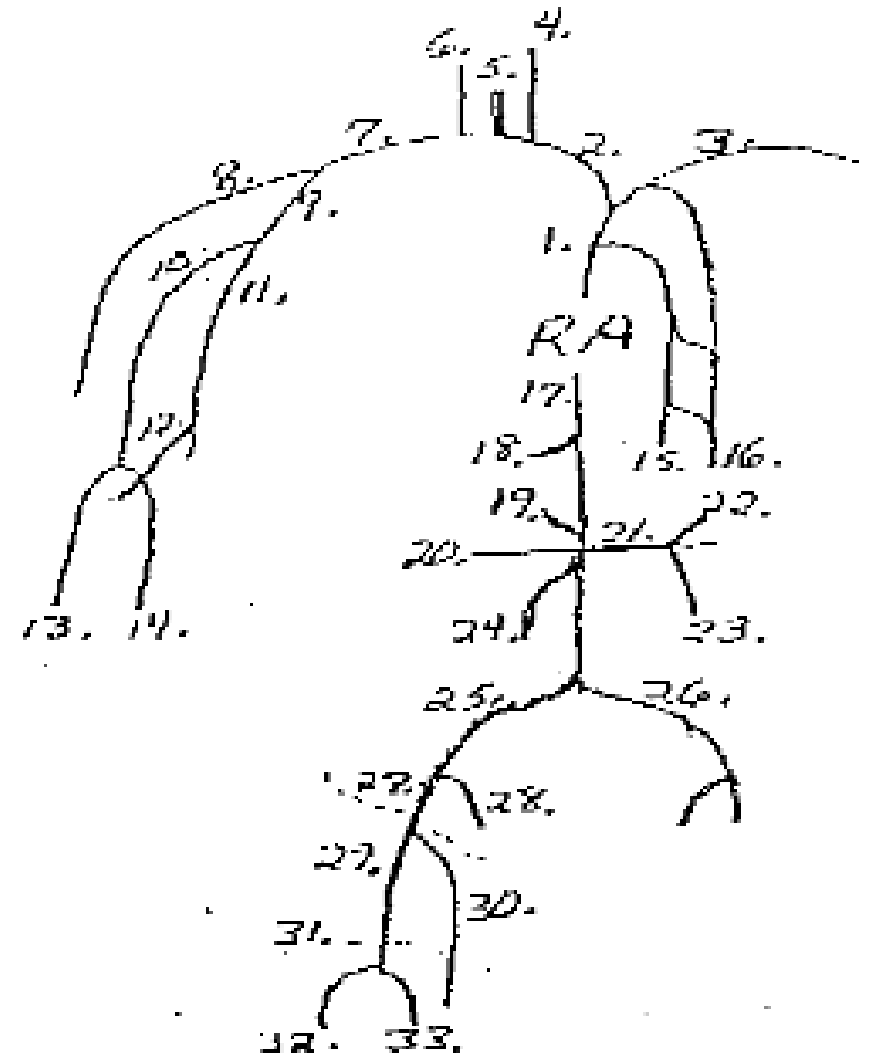
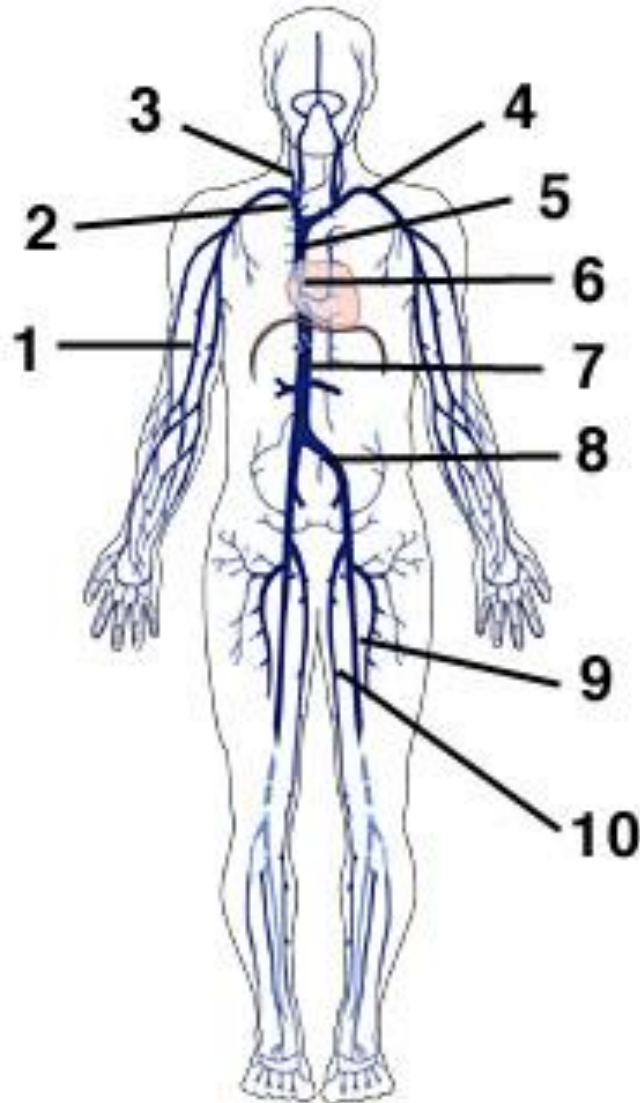
# Branching of the Major Arteries



# Branching of the Major Arteries – “Stickman Arteries”



# Branching of the Major Veins – “Stickman Veins”





Is it A&P  
or Art?!



# Let's Build A Kidney!



Renal Vein  
Renal Artery  
Ureter  
Renal Pelvis  
Renal Pyramids  
Segmental Art. & Veins  
Interlobar Art. & Veins  
Arcuate Art. & Veins  
Interlobular Art. & Veins  
Nephrons (Glomerulus)  
Medulla  
Cortex

# Parts of a Nephron

Interlobular Artery

Afferent Arteriole

Glomerulus

Efferent Arteriole

Peritubular Capillaries

Interlobular Vein

Bowman's Capsule

PCT

Henle's loop

DCT

Collecting Duct

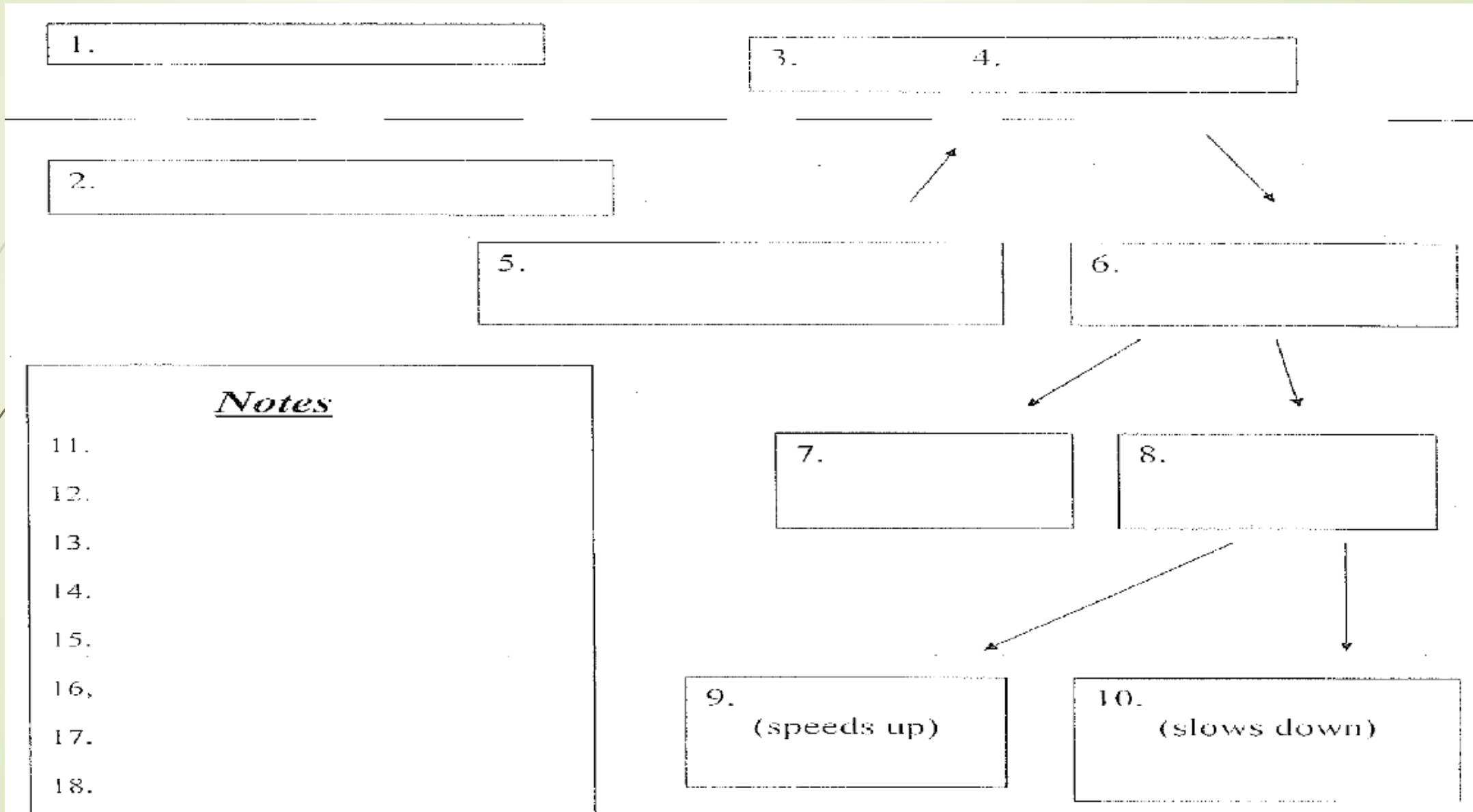


# Circulatory System – Sequencing Questions

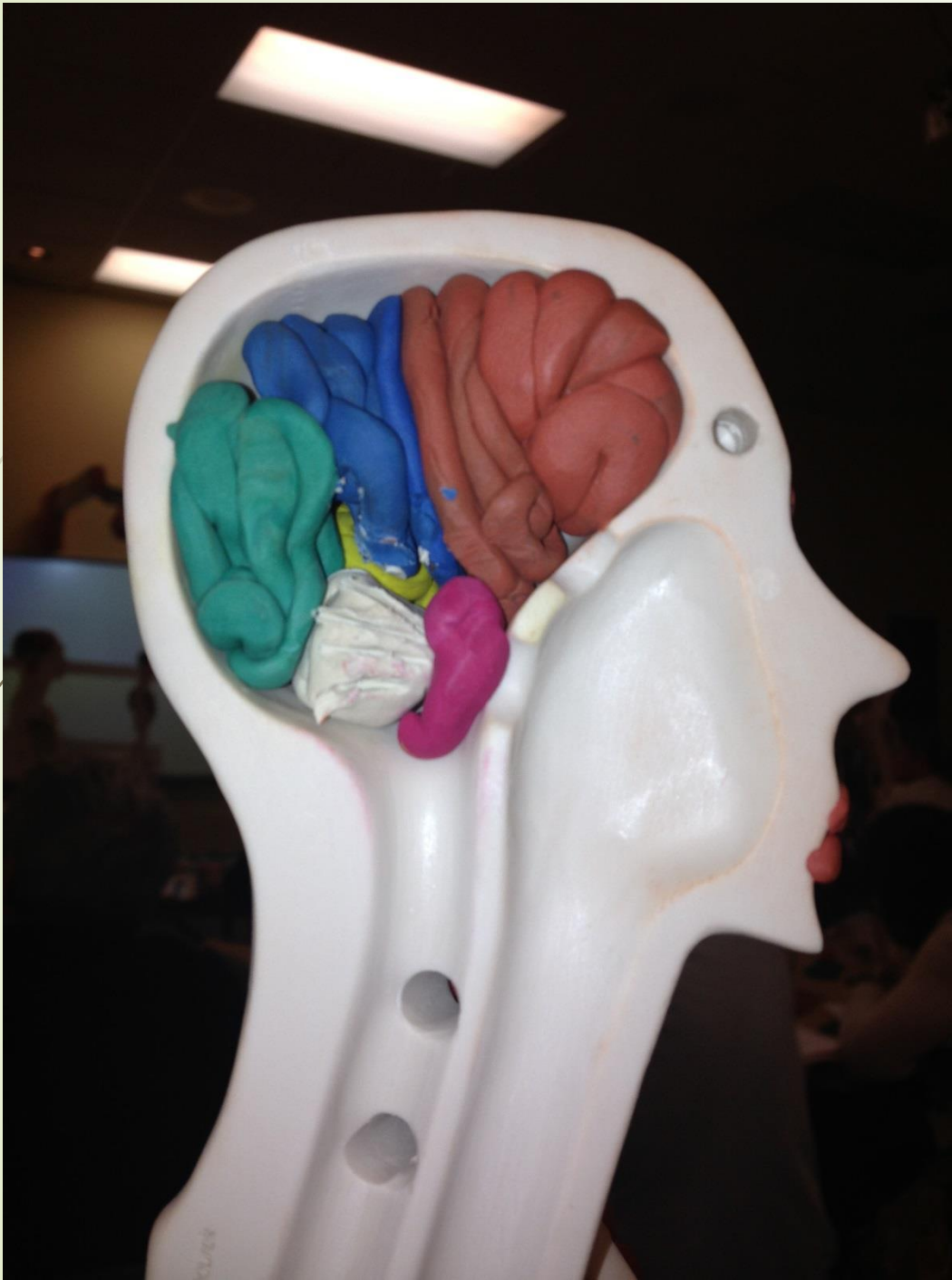
Complete the following sequences (1 pt. each)

- \_\_\_\_\_ 1. Subclavian artery → 1. → brachial artery
- \_\_\_\_\_ 2. R. common iliac artery → 2. → r. femoral artery
- \_\_\_\_\_ 3. Brachiocephalic artery → r. subclavian artery + 3.
- \_\_\_\_\_ 4. Arterioles → 4. → venules
- \_\_\_\_\_ 5. Systole → 5. → systole
- \_\_\_\_\_ 6. Pulmonary arteries → lungs → 6.
- \_\_\_\_\_ 7. R. and L. renal arteries → r. and l. gonadal arteries → 7.
- \_\_\_\_\_ 8. Gastric artery → 8.
- \_\_\_\_\_ 9. Hepatic artery → 9.
- \_\_\_\_\_ 10. Brachiocephalic artery → 10. → l. subclavian artery
- \_\_\_\_\_ 11. Left ventricle → 11. → ascending aorta
- \_\_\_\_\_ 12. Coronary arteries → 12. → right atrium
- \_\_\_\_\_ 13. Celiac trunk artery → 13. + 14. + 15.

# Divisions of the Nervous System – S. I. R.



# Building the Brain



Frontal Lobe

taupe

Precentral Gyrus – Primary Motor Area

taupe – (flattened disk)

Postcentral Gyrus – Primary Sensory Area

blue – (flattened disk)

Temporal Lobe

yellow

Parietal Lobe

blue

Occipital Lobe

green

Cerebellum

white

Brain Stem

red

# Building the Brain

Thalamus  
orange

Hypothalamus  
green

Pituitary Gland  
taupe

Pineal Body  
yellow (upper)

Fourth Ventricle  
yellow (lower)



# Building the Brain

Corpus Callosum

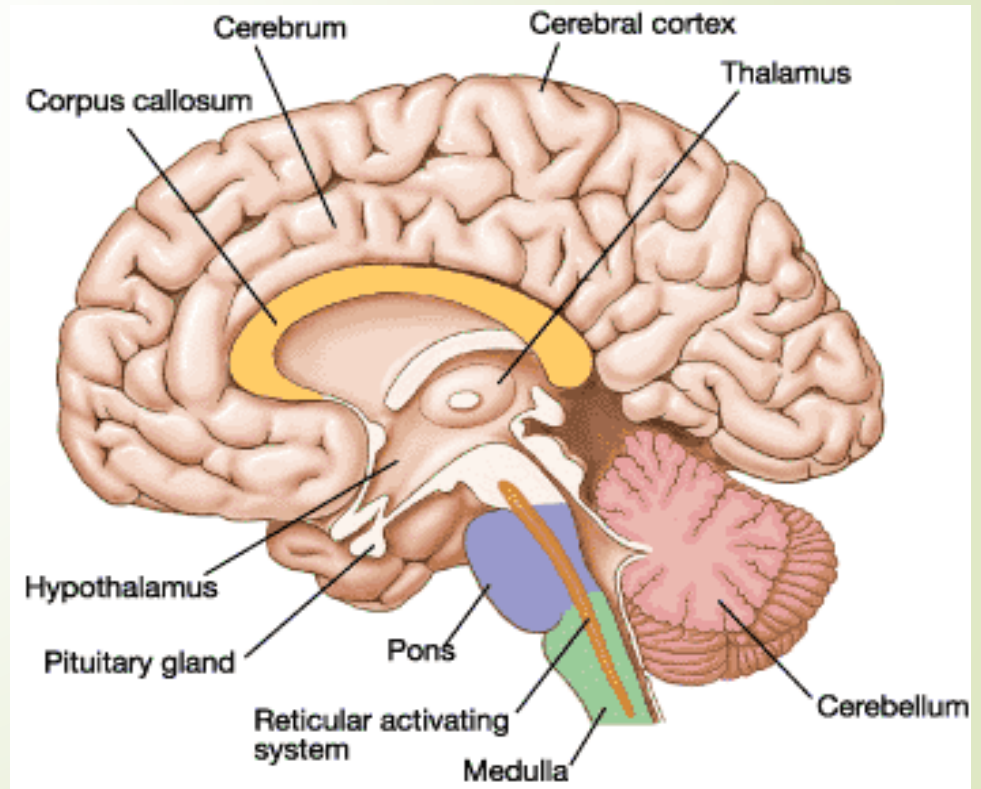
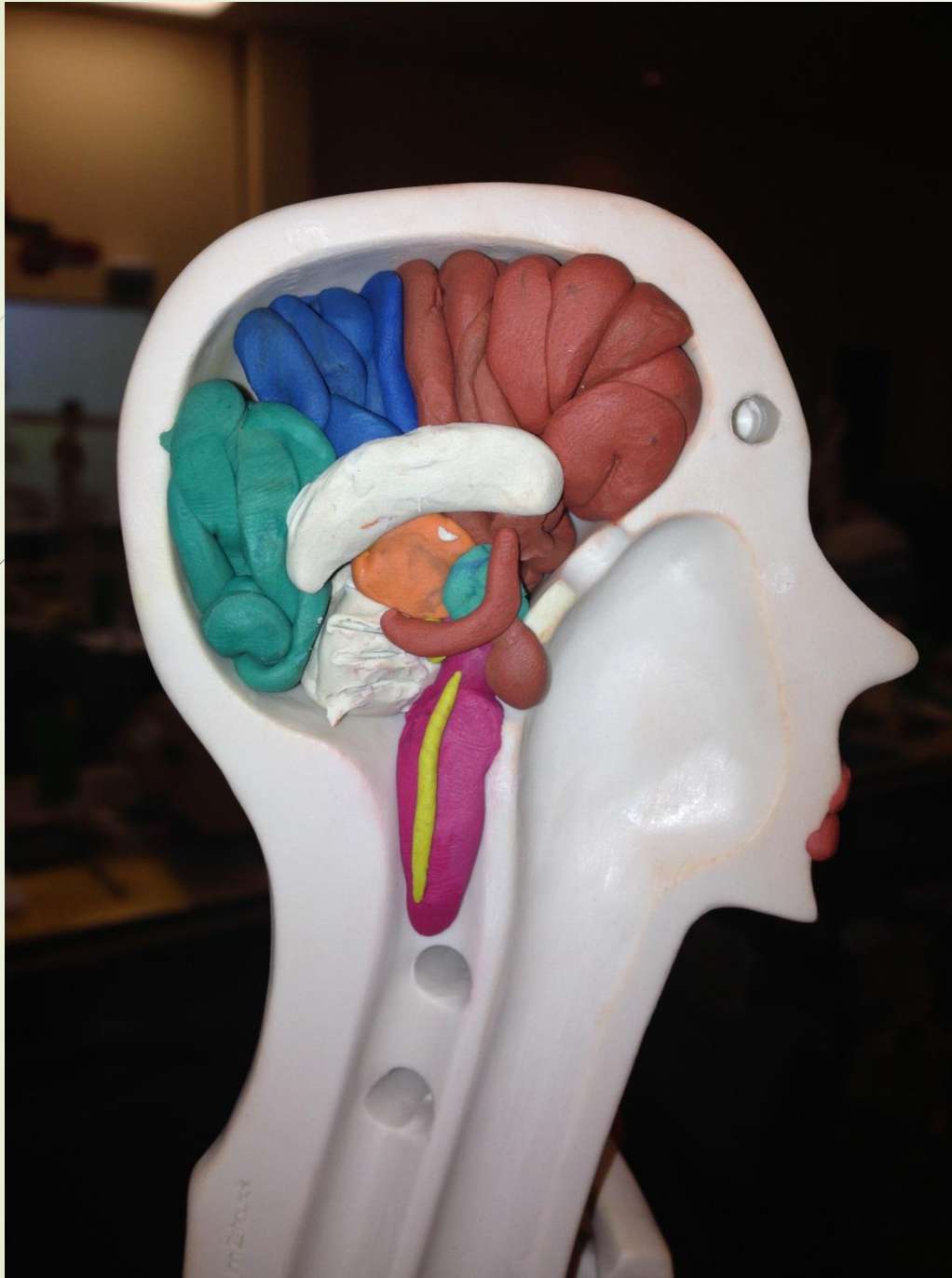
white

Central Canal

yellow

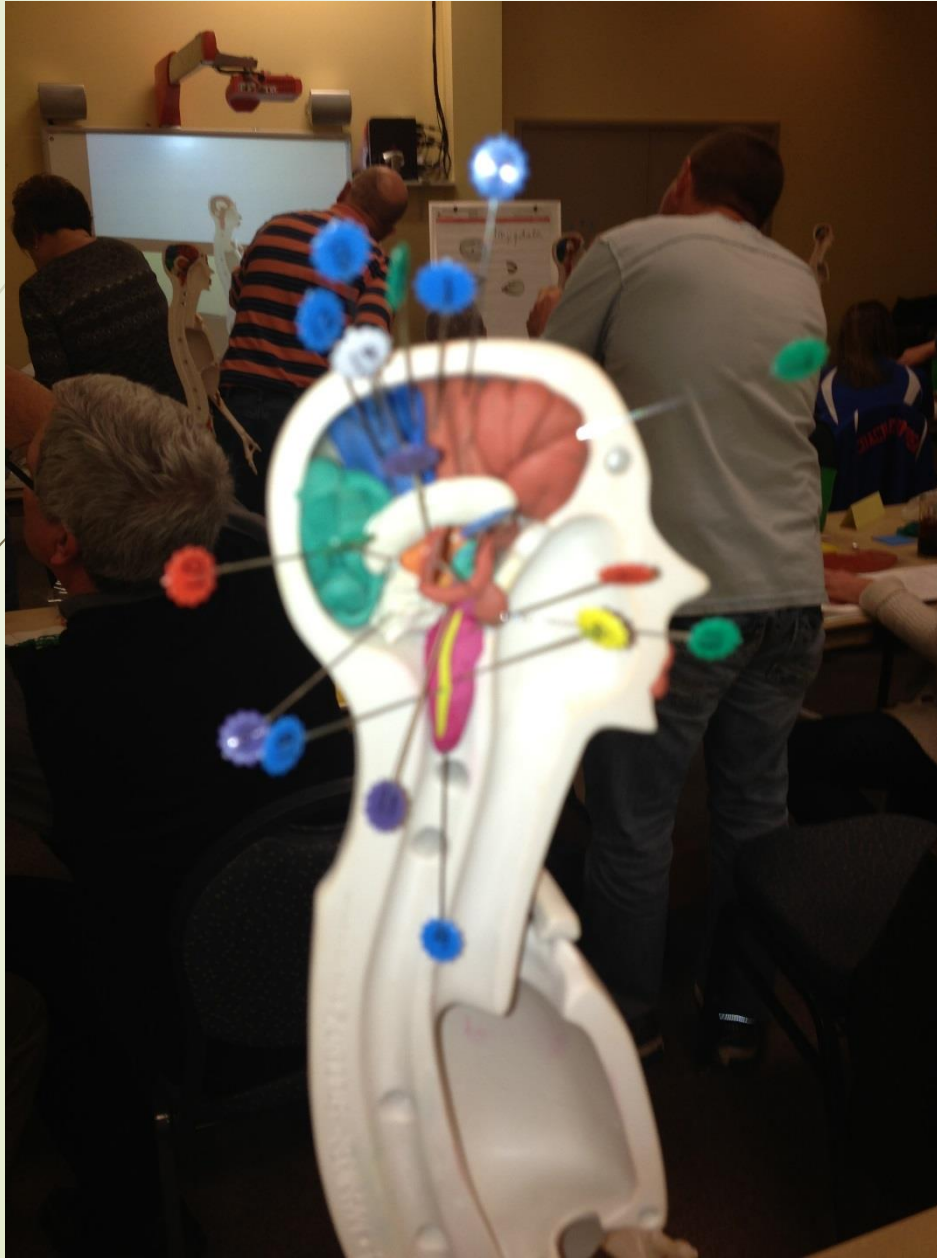
Hippocampus

taupe

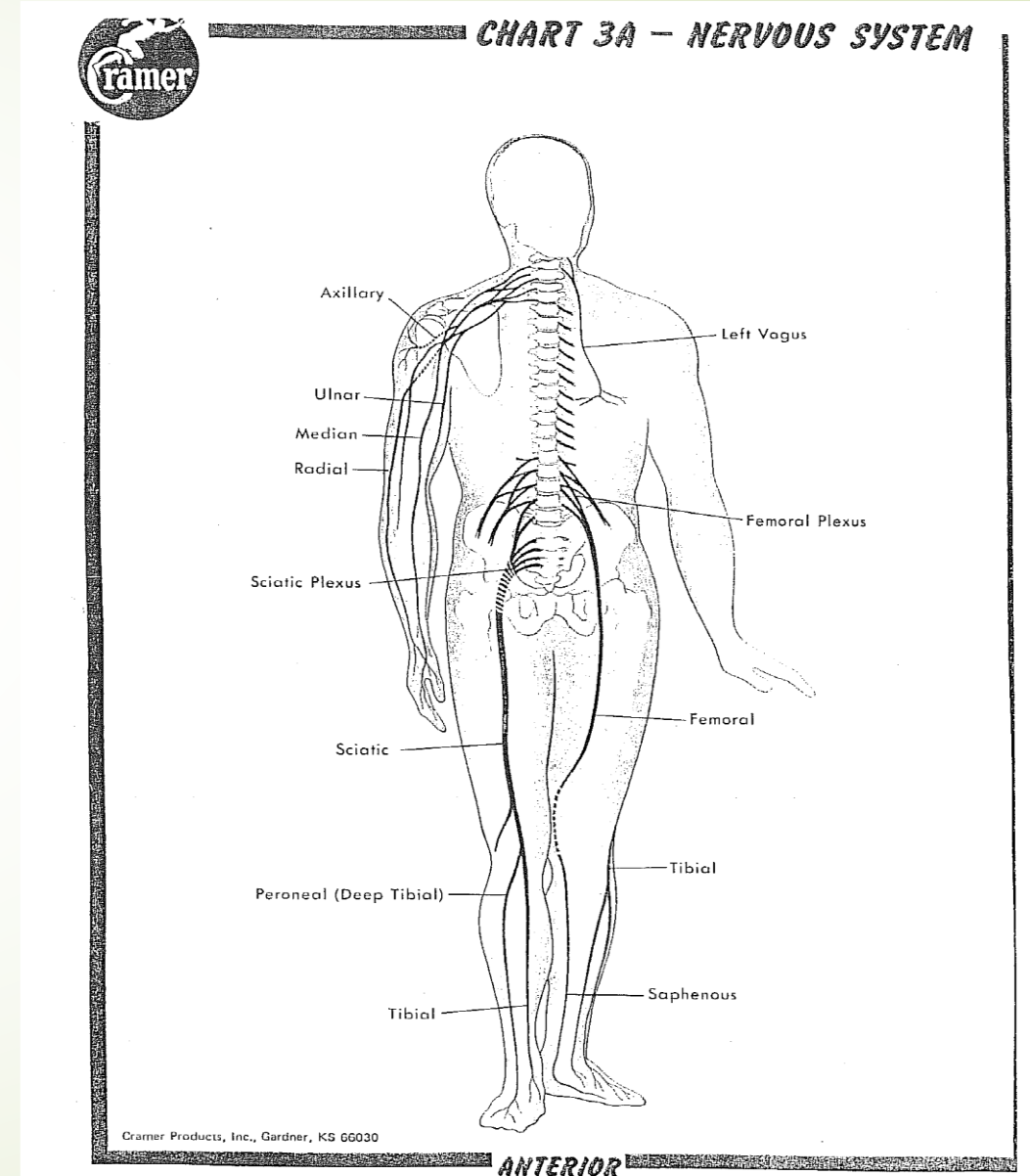




# Brain Quiz



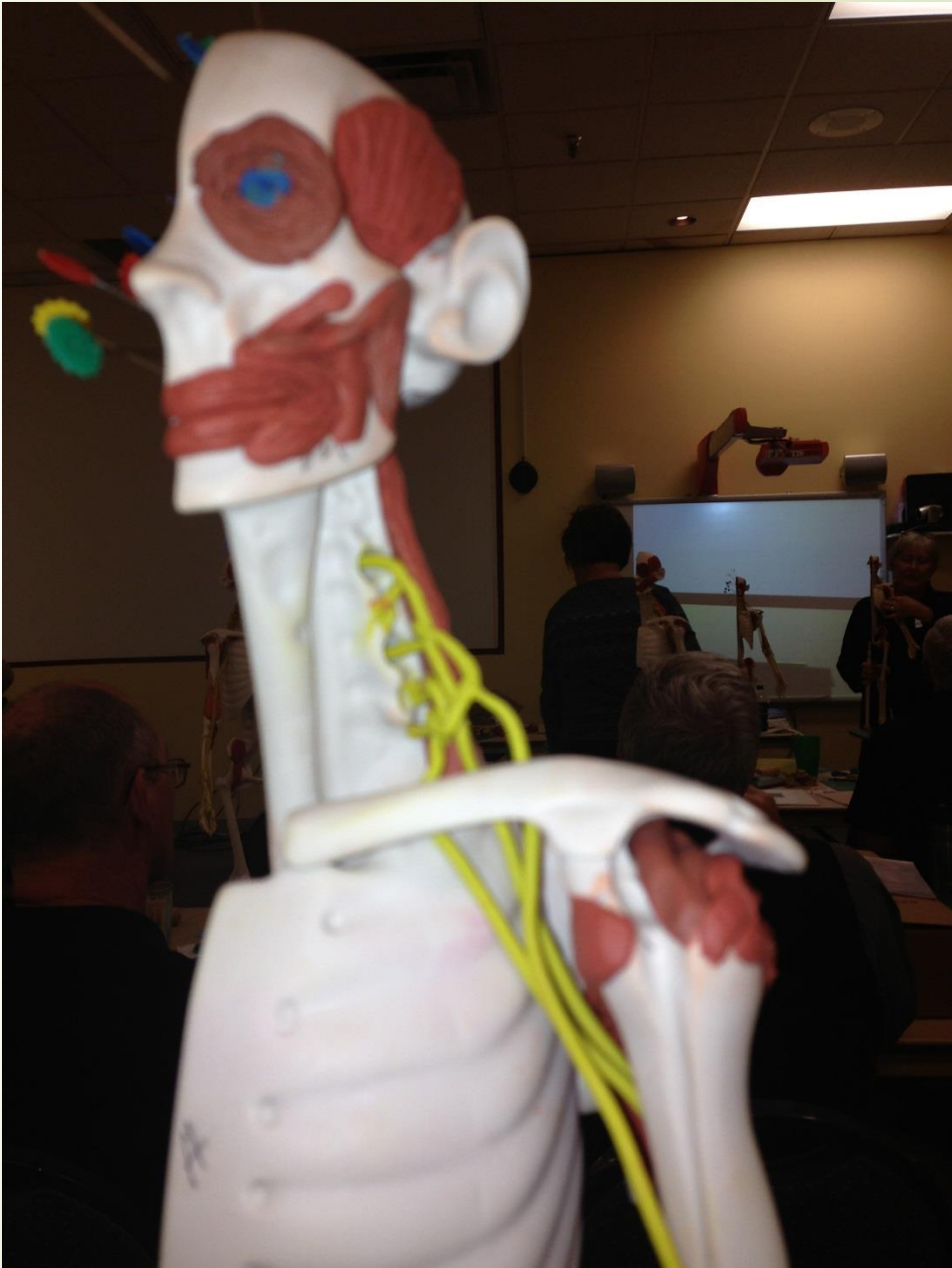
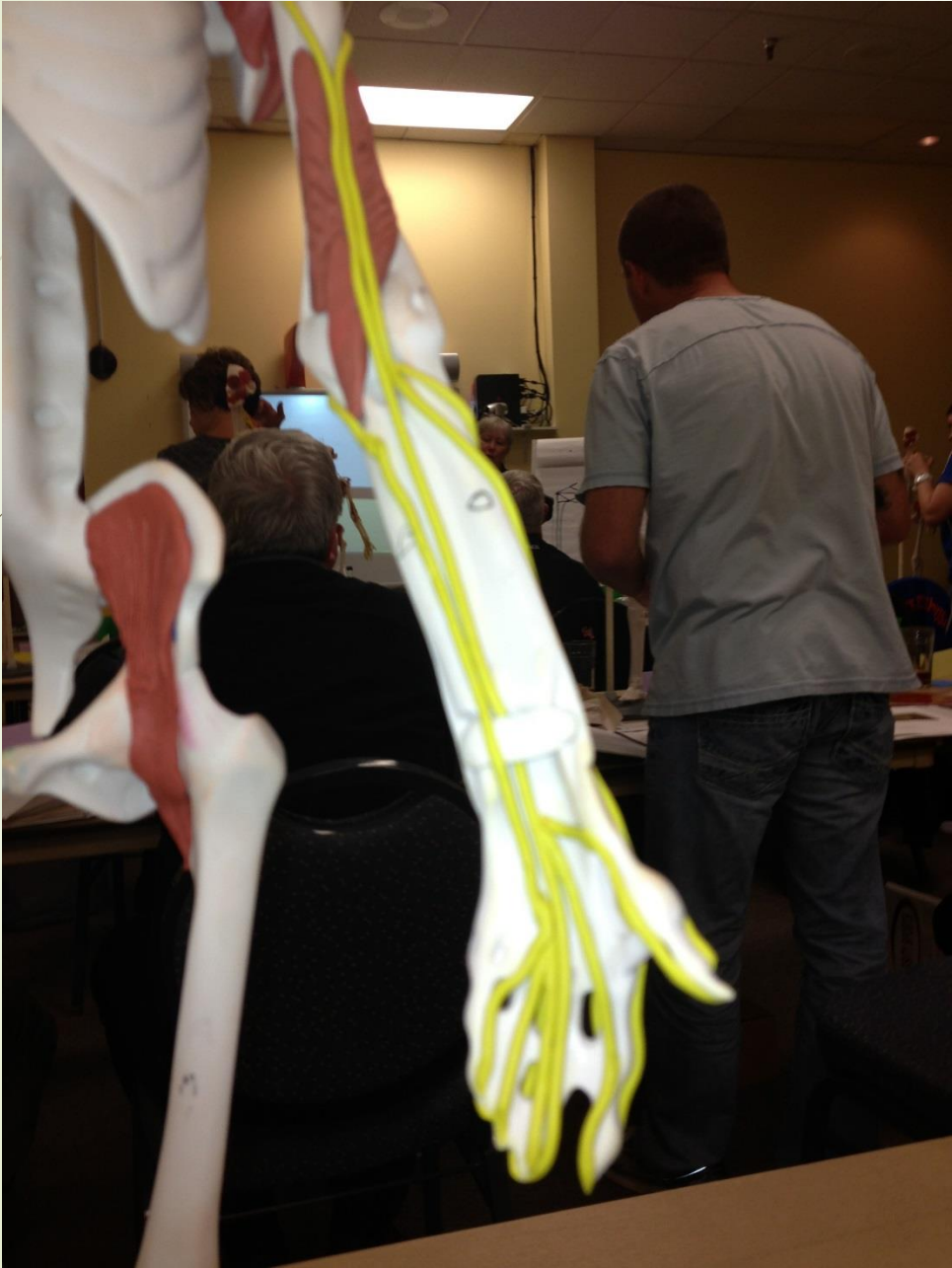
# Building CNS & PNS



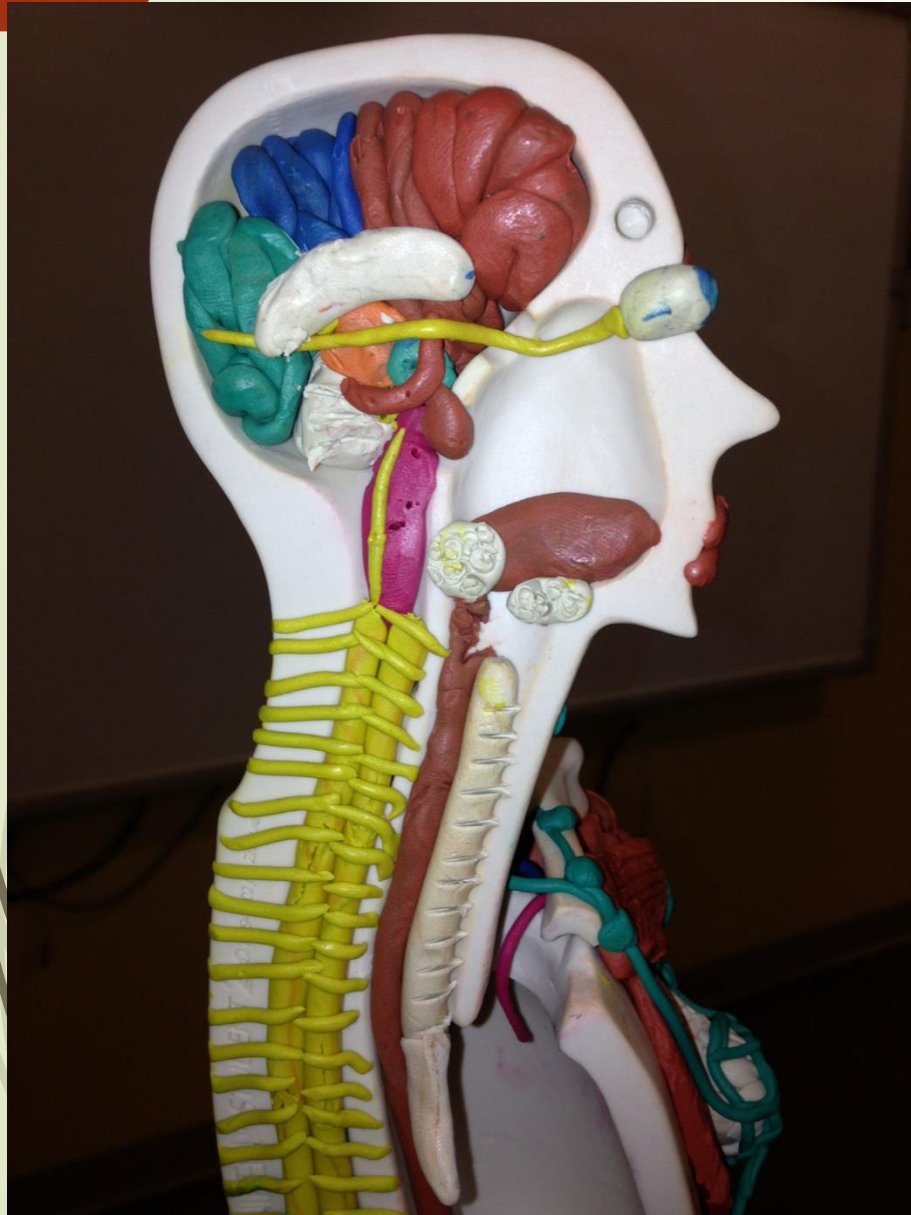
# Spinal Cord & Spinal Nerves







# Digestive & Respiratory Systems



**Tongue**

**Salivary Glands**

**Parotid**

**Submandibular**

**Sublingual**

**Esophagus**

**Epiglottis**

**Trachea**

**cartilaginous rings**

**R&L Primary Bronchi**



