Teaching Healthcare Science on a Budget

Good, Better, Best

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General Disclaimers

- The lessons we are teaching can be found in multiple courses and are often **Repeating** standards; therefore some of our ideas may have been done in previous courses
- Yes everything old is new again. We are experienced teachers that have taken some old ideas and modernized and improved on them
- Safety is the upmost. Make sure you monitor the students at all times when performing activities
- Before and after every activity make sure you stress to the students the importance of handwashing
- Rubrics should be used only if they apply to you and your class. Sometimes, the teachers have skills sheets/competencies which are better suited to evaluate students

Cardiac and Respiration

- Oh, you are studying the Cardiac and Respiratory System?….
    - What a Bloody Inspiration!

Standards for this Webinar

- Course 25.3300
  - 4.1 Compare and contrast veins and arteries
  - 4.2 Identify three primary sites for drawing blood
  - 4.3 Identify and explain medical terminology associated with phlebotomy
  - 4.4 Apply concepts to demonstrate the following skills related to phlebotomy
    - Apply a tourniquet, palpate an artery/vein, prepare site, label blood specimen
- Course 25.3400
  - 5.1 Demonstrate proper use of AED (Good, Better, Best)
  - 5.1 Apply knowledge of respiratory, cardiac and skeletal system and related careers (Good, Better, Best)

Standards (continued)

- Course 25.3500
  - 5.3 Punnett square diagrams
  - 5.3 Complete simulated blood typing (Good, Better, Best)
  - 3.1 Complete the AHA (American Heart Association) Heart saver CPR in schools curriculum or equivalent Red Cross curriculum (Pillow Talk) (Good, Better, Best)
  - 6.1 Access and construct ideas around the results of measuring and recording heart rate after different every day activities
  - 6.4 Research and determine appropriate respiratory rates by age group

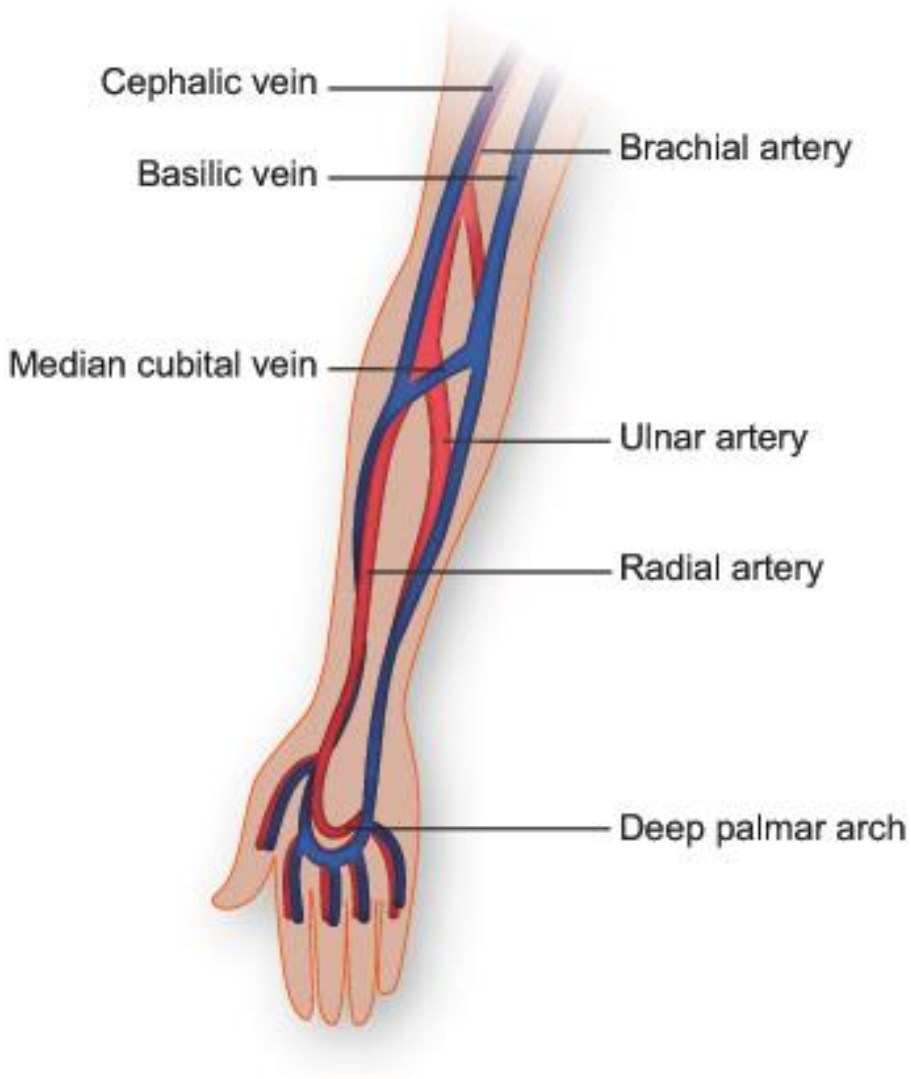
Activities

- Arm Map (Veins and Arteries)
- Apply tourniquet, palpate an artery/vein, prepare site for venipuncture, label blood specimen
- Blood Typing & Punnett Squares
- CPR (Pillow Talk)/ how to use an AED
- Heart Map (Map the flow of oxygenated and deoxygenated blood through the heart)
- Measuring Heart Rate and Respiration (Pulse & Respiration)

Arm Map

- Standard(s)
  - 4.1 Compare and contrast veins and arteries
  - 4.2 Identify three primary sites for drawing blood
  - 4.3 Identify and explain medical terminology associated with phlebotomy
  - 5.1 Apply knowledge of respiratory, cardiac and skeletal system and related careers. (Good, Better, Best)

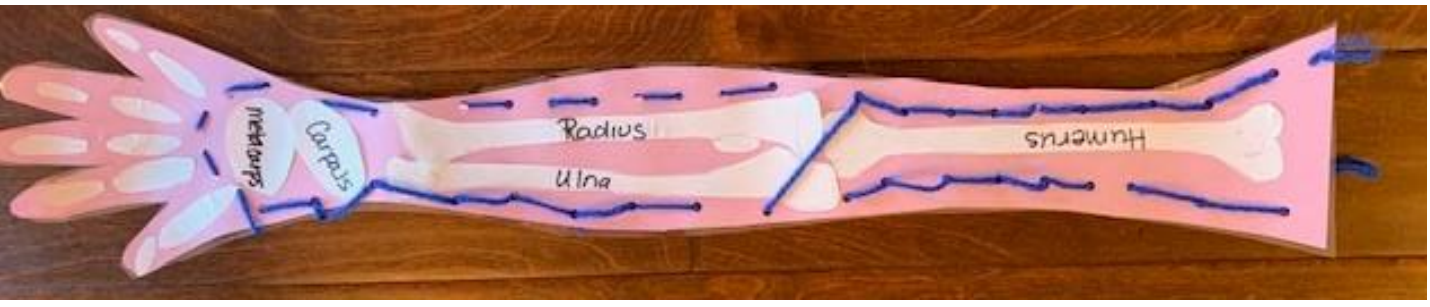
Best	Better	Good
Scientific model and chart from Pocket Nurse	Bulletin board paper and blue and red yarn, hole punch, marker	Typing paper and red and blue colored pencils

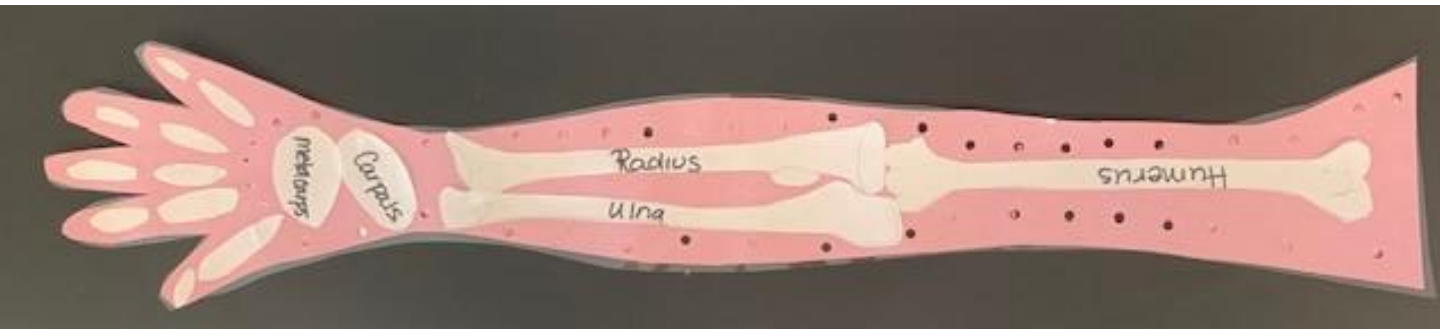


Procedure

- Supply students with either:
  - Poster board or bulletin board paper
  - Students trace their arm from shoulder to fingers
  - Optional - Use a white sheet of paper to draw and place the bones in the arm in their correct positions (this can be supplied by the teacher in advance) Name the bones
  - Use yarn (blue for vein, red for artery)


Metacarps
Carpals
Radius
Ulna
Humerus


Metacarps
Carpals
Radius
Ulna
Humerus


Metacarps
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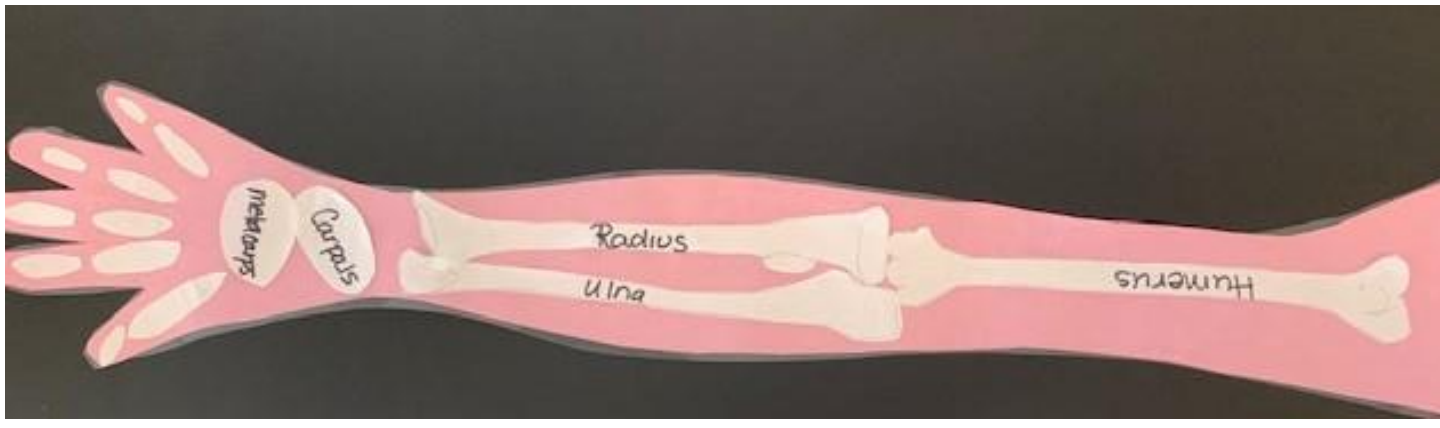

Metacarps
Carpals
Radius
Ulna
Humerus

Rubric for Arm Map

Scoring Criteria	4. Excellent	3. Good	2. Need some improvement	1. Needs much improvement	0. No Evidence Seen
Poster board or bulletin board paper is used					
Information is clearly provided					
All work is neat					
Illustrations follow a logical reasoning					
Each image and font size is legible					
No misspellings					
Total /24 x 100 = __%					
Bones are named and labeled in correct position – Extracredit – 5 pts					

Vampire Blood Drawing

- We will demonstrate drawing blood for middle school teachers since this it is a more advanced procedure. You will need a tourniquet or a substitute for this procedure. (Good and Better)

Best	Better	Good
• Venipuncture arm from Pocket Nurse or other vendor • Tourniquets from Pocket Nurse or other vendor • Syringes (without needles) from Pocket Nurse or other vendor • Tubes from Pocket Nurse or other vendor • Alcohol swabs from pharmacy	• Family member's arm • Ask family doctor for a latex tourniquet • Ask pharmacy for syringe • Ask doctor's office or pharmacy for tubes • Alcohol swabs from pharmacy	• Family member's arm • Buy rubber hollow rubber tubing from hardware store • Ask pharmacy for syringe • Buy capped tubes from Amazon • Add masking tape to tubes for labeling • Cotton balls with isopropyl alcohol • Masking tape

Unofficial CPR card

Directions: Make an official card for student. Make sure the course that was taught is used. Use your school's name and emblem. If you can use heavy stock paper that would be best. The students love cards!!

HEART SAVER

Taken from AHA 2020

_____

This card certifies that the above individual has successfully completed the guidelines and skills in accordance with the curriculum at E2 Educational Experiences

Heartsaver:

_____

_____

Issue Date Instructor

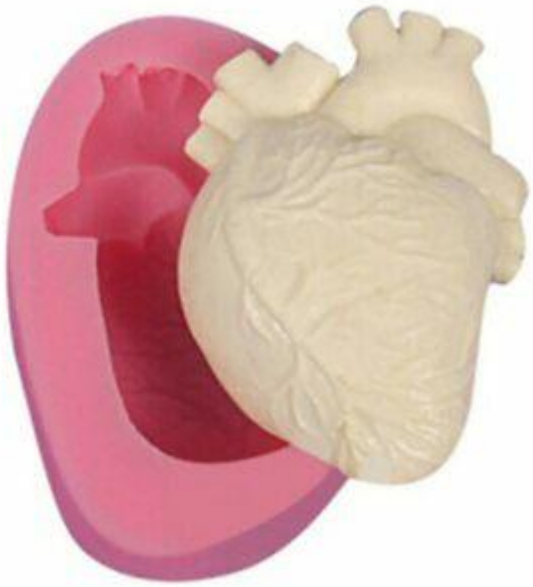
Eat Your Heart Out

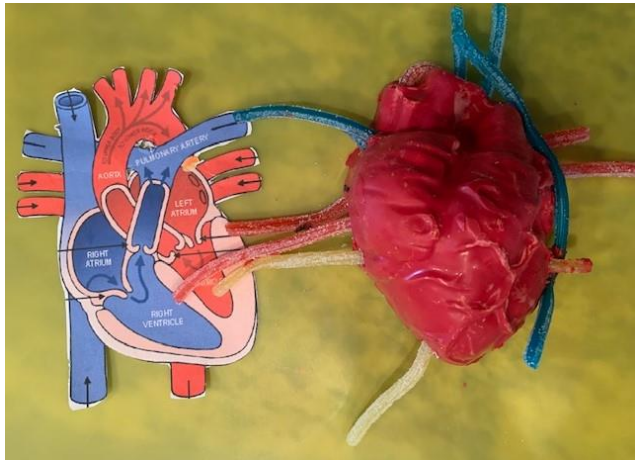
- Standard:
  - 5.1 Apply knowledge of respiratory, cardiac and skeletal system and related careers (Good, Better, Best)

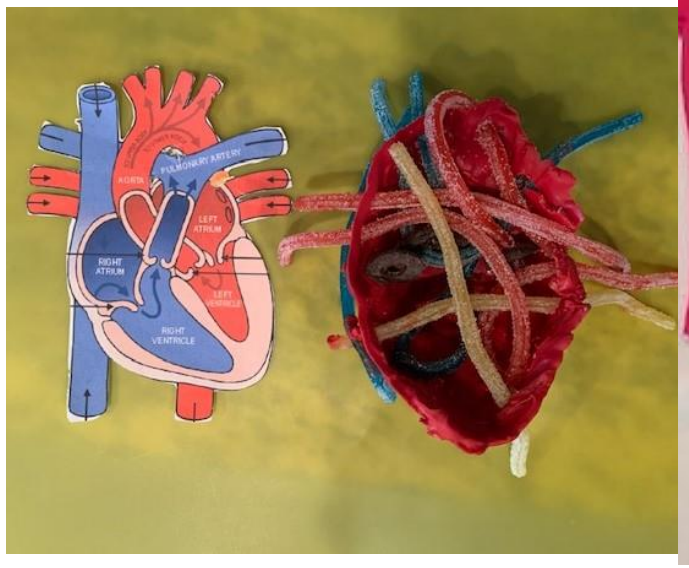
Best	Better	Good
Scientific model and chart from Pocket Nurse	Chocolate mold and Sour Punch rainbow straws	Transparency sheet paper and markers or paper or colored pencils

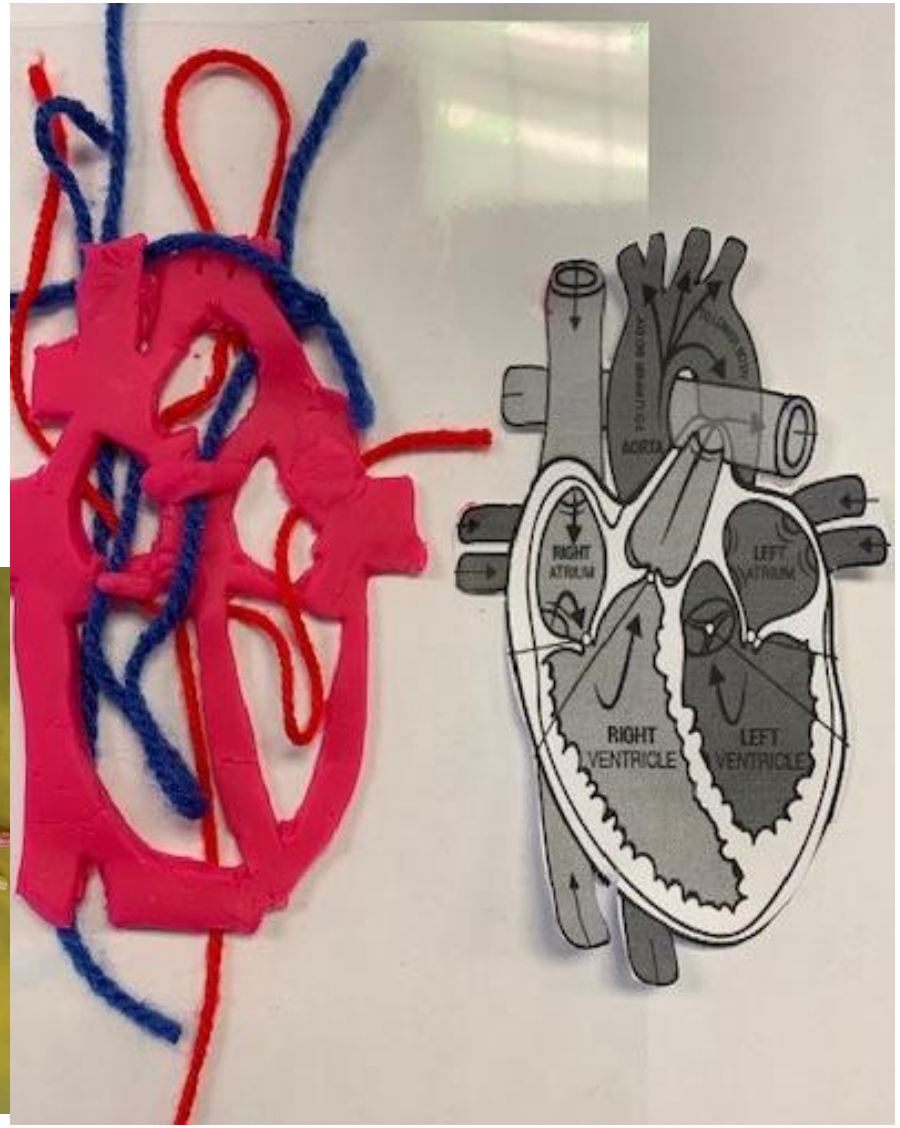
Eat Your Heart Out

- Using a chocolate mold, make a mold of the heart
- Students should watch a Youtube video demonstrating how blood flows through the heart. Student can also use other resources to trace the flow of blood
- Use the rainbow straws (red for oxygenated blood flow, blue deoxygenated and yellow for heart chambers). I used chocolate wafers to make the tricuspid valves, etc. so that the straws could pass through and be held in place.




PULMONARY ARTERY
AORTA
LEFT ATRIUM
RIGHT ATRIUM
RIGHT VENTRICLE


PULMONARY ARTERY
AORTA
LEFT ATRIUM
RIGHT ATRIUM
RIGHT VENTRICLE


AORTA
RIGHT ATRIUM
LEFT ATRIUM
RIGHT VENTRICLE
LEFT VENTRICLE

Rubric for Eat Your Heart Out

Scoring Criteria	4. Excellent	3. Good	2. Need some improvement	1. Needs much improvement	0. No Evidence Seen
The name of Youtube video and URL is provided					
A mold, Playdoh, or typing paper is used					
“Twizzlers”, pipe cleaners, or colored pencils/markers are used					
Information is clearly provided					
All work is neat					
Illustrations follow a logical reasoning					
The student will have to explain how blood flow is traced through the heart					
Total /28 x 100 =__%					

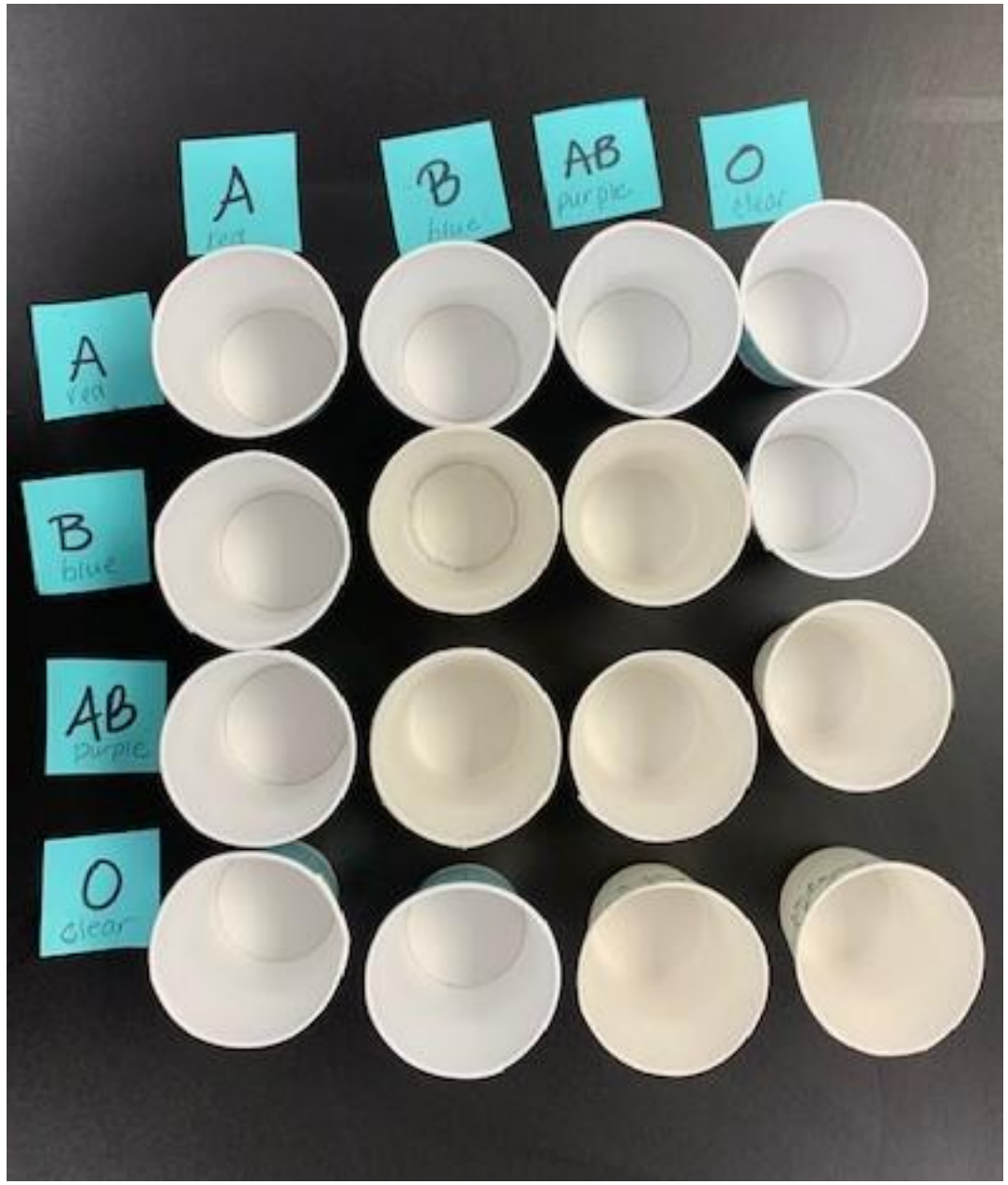
Standards for Blood Typing and Punnett Squares

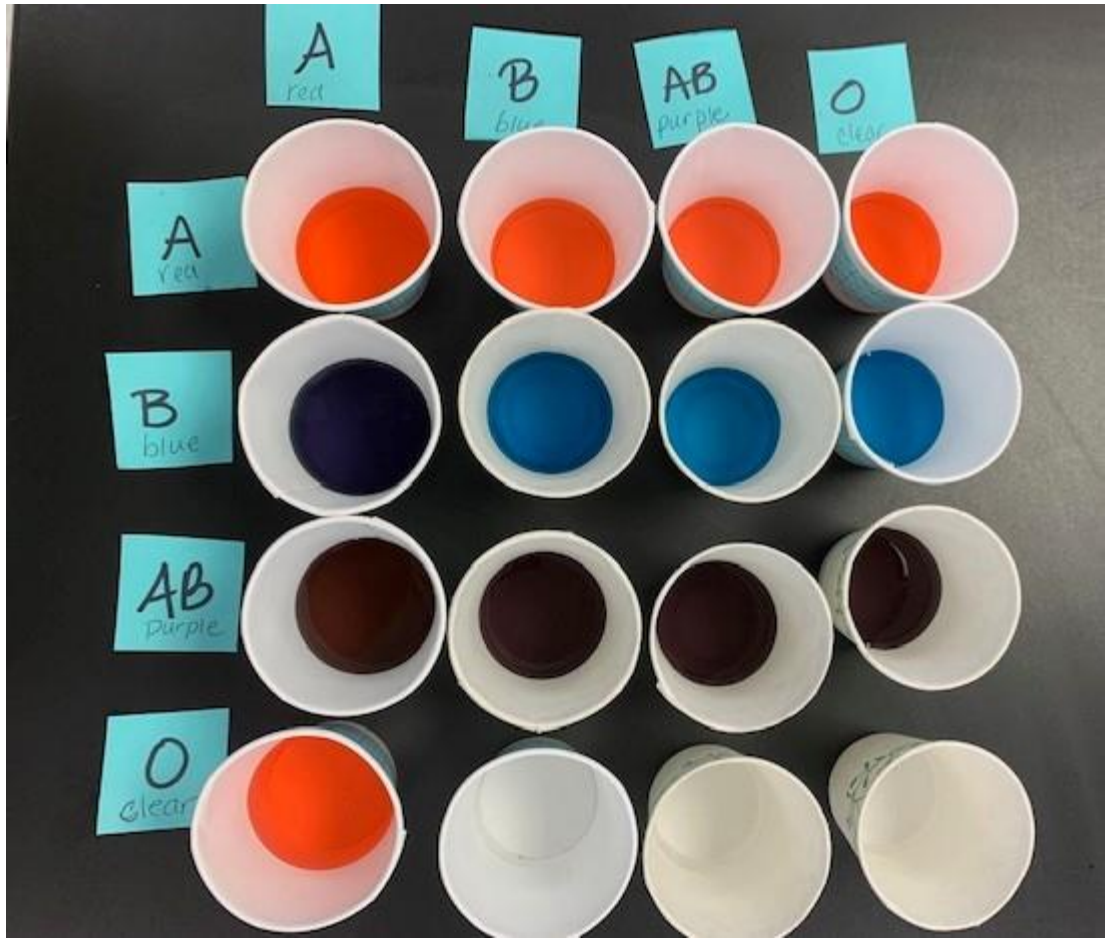
- 5.3 Punnett Square diagrams
- 5.3 Complete simulated blood typing (Good, Better, Best)

Best	Better	Good
Scientific activity from Pocket Nurse	Science well plates and food coloring (red, blue)	3 oz cups and food coloring (red, blue)

Blood Typing and Punnett Squares

- Procedure (Better)
  - Use droppers to place red food colored water in the first row of wells horizontally
  - Place blue food colored water in the second row of wells horizontally
  - Place purple (red and Blue Mix) food colored water in the third row of wells horizontally
  - Place Plain water in the fourth row of wells
  - Now Place red food color in the 1st Vertical Row of all wells
  - Place Blue Food Color in the 2nd Vert. Row
  - Place Purple in the 3rd Vert. Row
  - Place Water in the 4th row
  - Look for color change. If there is a color change to Purple, those two blood types could not transfer blood to one another. If there is no Color Change, transfusion is possible
- Red= A; B=Blue; Purple= AB, Water=O

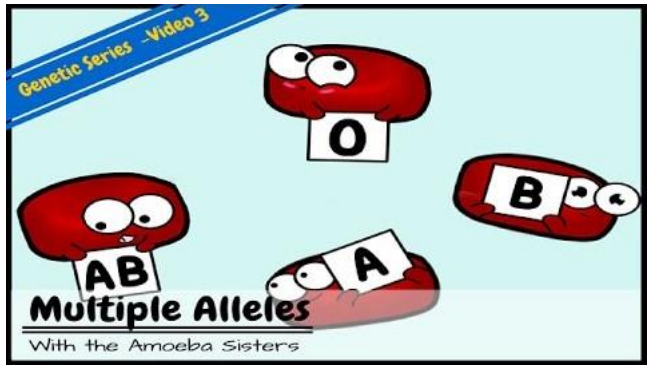

A
red
B
blue
AB
purple
O
clear
A
red
B
blue
AB
purple
O
clear


A
red
B
AB
purple
O
A
red
B
blue
AB
purple
O
clear

Blood Type for Punnett Squares

Phenotype (Blood type)	Genotype	**Antigen on Red Bld. Cell**	Safe Transfusion To	From
A	I^AI^A or I^Ai	A	A, AB	A,O
B	I^BI^B or I^Bi	B	B, AB	B,O
AB	I^AI^B	A and B	AB	A,B,AB,O
O	*ii*	none	A,B,AB,O	O

Who is the universal donor?
Who is the universal recipient?
Why is blood typing so important?



Blood Type Punnett Squares

Mom has A- (I^Ai) and Dad is B- (I^Bi). What are the possible blood types for their children? (Think FOIL)

	I^A	i
I^B	I^AI^B	I^Bi
i	I^Ai	ii

Children could be AB (I^AI^B)- 25%, A- (I^Ai)- 25%, B-(I^Bi)- 25%, or 0(ii)- 25%

Questions to Test Student's Knowledge of Blood Typing and Punnett Squares

Directions: There are 10 questions, each question is worth 10 points. Use your chart or colored wells/cups if needed.

1. What red blood cell has the A antigen and the B antigen?
2. What red blood cell does not have any antigens?
3. What red blood cell has only the A antigen?
4. Which blood type can can accept all blood types? Why?
5. Can a person with A blood type have a transfusion from a B blood type? Why or why not?
6. Can a person with 0 blood type have a transfusion from someone who has AB blood type? Why or why not?
7. Draw a Punnett Square of the following situation: Mother has A+ (I^AI^A) blood, Dad has 0 (ii) blood. Use FOIL method.

Answers to Questions to Test Student's Knowledge of Blood Typing and Punnett Squares

1. AB blood type
2. O blood type
3. A antigen
4. AB type because it has the A and B antigen on the red blood cells. It can accept O because O has no antigens
5. No because the person with the A antigen has A blood and the person with B blood has the A antigen. Antigens can not be mixed
6. No because the person with O blood does not have any antigens. The person with AB blood has an A antigen and a B antigen
7. All the children will be $I^{A}i$

CPR (Pillow Talk)/ How to Use an AED

- **Course Number 25.03300**
  - **Standard 5.1** Demonstrate proper use of AED
- **Course Number 25.03500**
  - **Standard 3.1** Complete the AHA (American Heart Association) Heartsaver CPR in Schools curriculum or equivalent American Red Cross curriculum
  - **Standard 6.1** Explore the common sites for determining a pulse

CPR (Pillow Talk)/ How to Use an AED

- Disclaimer: The release of the 2020 guidelines for CPR are going to be released at the end of October, so as of now – we do not know if any of the procedures to perform CPR will change. Typically, instructors are trained shortly afterward, and then the American Heart Association will announce a date that the new procedures will become effective (usually Spring). For right now, we will go with the old standards.
- Some of the CPR courses are taught where pulse must be taken. Therefore, we have included that standard.

The American Heart Association has information regarding the release of the New 2020 Guidelines.

CPR (Pillow Talk)/ How to Use an AED

Best	Better	Good
Have a certified CPR instructor come to the school and certify the students	Teacher (certified/ noncertified) teaches the students CPR	Parent/Coach/Teacher teaches the students CPR
AHA/ARC equipment ordered from a medical supplier is used (mannequins, AED Face shields, Resuscitator	AHA/ARC equipment ordered from a medical supplier is used (mannequins, AED Face shields, Resuscitator. This may be borrowed or "begged" from a hospital/ medical supply store, or CPR instructor who teaches CPR classes	We will have a CPR body for instructor to place on a pillow to use as a "pretend mannequin". We have a pretend AED trainer that comes with voice instructions. A doll can be used if performing infant CPR
Student is issued a CPR card	Student is issued an unofficial CPR card	No card issued or unofficial CPR card

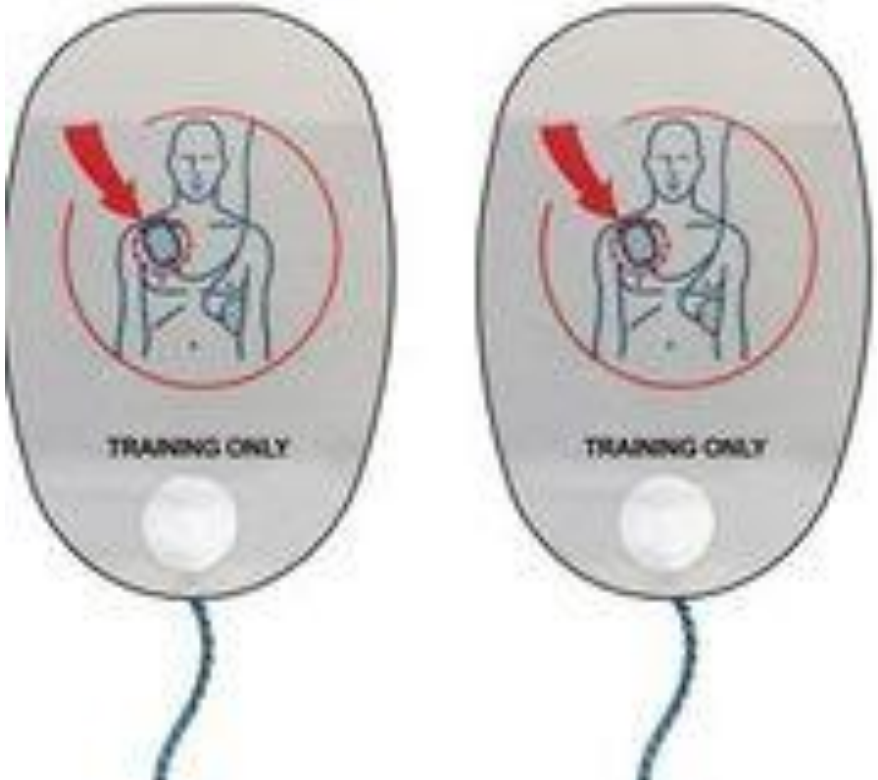
CPR (Pillow Talk)/ How to Use an AED

- The AED instructions have changed a few times since it was added to CPR in 1999
- The student must be taught how to put the AED trainer onto the mannequin
- It is very easy to use once the AED is turned on

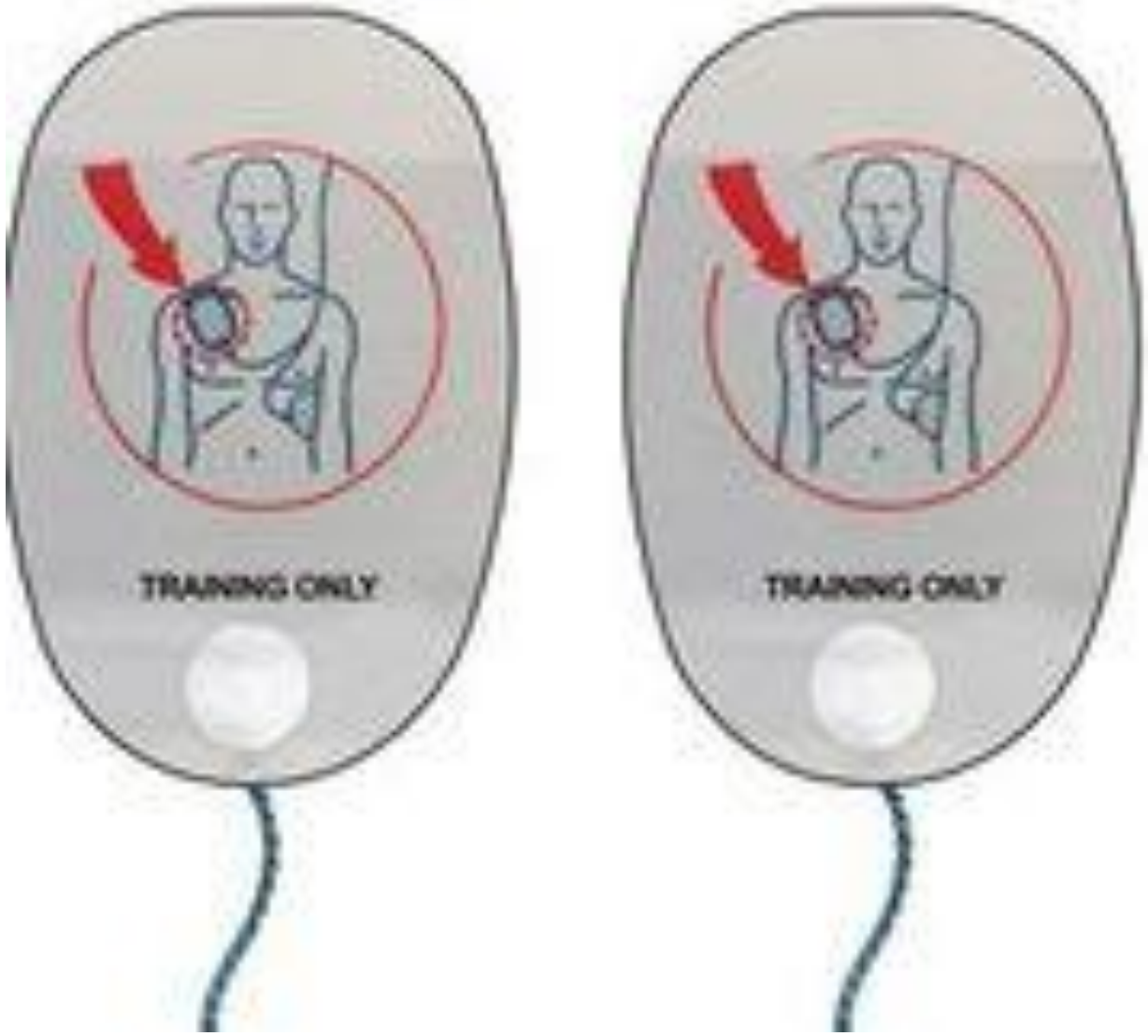
USING THE AED TRAINER

Directions: On the next few slides there a mockup of a real AED. Tear out the page for the AED on the dotted line and pretend this is a 3 dimensional machine. The instructions for AED usage are printed on the page with the AED. Those are the voice directions, which should be followed while performing the CPR/AED procedure. While the student is practicing and performing the check off, someone is reading the script.

This page contains the pads that will need to be cut out. There are 2 of them. Each of the pads shows a picture where the pads should be placed on the victim. Each of the pads will need to have about 24 inches of string or yarn attached to the pads with tape. The connector cord will be attached to the machines receptacle.



Materials
Tape
String or yarn – 24 inches long – 2 pieces required


TRAINING ONLY
TRAINING ONLY

AED Trainer Voice Instructions

- This is a training device only. No shock will be delivered
- Remove clothing from person’s chest
- Plug in connector to machine
- Analyzing rhythm
- Everyone stand clear
- Shock advised
- Charging
- Everyone stand clear
- BUZZZZZZZ
- Everyone stand clear
- Shock delivered
- Begin CPR


PUSH HERE

Heart to Heart – Pulse and Respiration

- Standard 25.3400
  - 5.1 Apply knowledge of respiratory, cardiac and skeletal system and careers.
- Standard 25.3500
  - 6.4 Assess and construct ideas around the results of measuring and recording heart rate after different everyday activities
    - Explore the common sites for determining a pulse
    - Research and determine appropriate respiratory rates by age group
    - Demonstrate the ability to assess respiratory rates

Heart to Heart - Pulse

- Most of the time pulse is taken using the radial site. However, when doing CPR, the carotid site is used and the brachial pulse when doing CPR on an infant
- We have found that when taking a pulse is taught, the students enjoy determining what effect exercise has on pulse rate and the students also like to calculate how long the average heart takes to recover from exercising

Heart to Heart – Pulse Continued

- Activity 1: The student will take a resting pulse, then take a pulse after one minute of exercise (jumping jacks, jogging in place, play music and make them dance). Students rest briefly and record data. Then repeat doing two minutes of exercise. Rest and record. Repeat for 4 minutes of exercise. Rest and record data. Students will completely rest for two full minutes, then record pulse. Students will take a pulse rate after and addition two minutes (four minutes after exercise).
- Questions:
  - What was the initial pulse rate (resting) before activity
    - Answers will vary, but usually 60-90 bpm
    - Determine class average
  - Make class data chart and/or determine class average, if time permits

Heart to Heart – Pulse Cont

- Questions can be asked:
  - Trained athletes may have a normal resting pulse rate lower than 60 BPM. Why is that the case?
  - Why do you think infants and children have a higher heart rate?

Adults	60-100 BPM
Children 6-15	70-100 BPM
Children 1-6	80-110 BPM
Infants	100-160 BPM

Heart to Heart – Pulse Continued

- Questions:
  - What was the initial pulse rate (resting) before activity?
    - Answers will vary, but usually 60-90 bpm
    - Poll students and if time allows take an average of class
  - What was the pulse rate after one minute of exercise?
    - Answers vary.
  - What was the pulse rate after two minute of exercise?
    - Answers vary
    - Poll students and if time allows take an average of class
  - What was the pulse rate four minutes after exercise?
    - Answers vary
    - Poll students and if time allows take an average of class

Heart to Heart – Pulse Cont

- What was the pulse rate two minutes later?
  - Answers vary
  - Discuss how many were at resting pulse rate, how many were higher than resting rate, and how many were lower
- What was the pulse rate four minutes after exercise?
  - Answers vary
  - Discuss how many were at resting pulse rate, how many were higher than resting pulse rate, and how many were lower than resting pulse rate

Heart to Heart – Pulse Cont

- How long did it take the heart to recover from exercising?
  - Most of the student answers will be two to three minutes. A normal heart usually recovers in two minutes to three minutes
- Was the pulse rate lower or higher than resting pulse rate at 4 minutes?
  - Answers vary
  - Determine the number of students who have lower pulse rates
- Why do you think there is a difference?

Heart to Heart – Pulse Cont

	Student Heart Rate BPM	Class Average Heart Rate BPM
Resting pulse rate		
Pulse rate after exercising for one minute		
Pulse rate after exercising for two minutes		
Pulse rate after exercising for four minutes		
Pulse rate after 2 minutes of resting		
Pulse rate after 4 minutes of resting		

Heart to Heart – Respiration

- Activity 2: The student will take a resting respiration, then take a respiration rate after one minute of exercise (jumping jacks, jogging in place, dancing), after doing two minutes of exercise, after 4 minutes of exercise. Same data collection procedure as pulse.
  - Using pulse questions, substitute respiration

Heart to Heart – Respiration Continued

	Student Respiration Rate	Class Average Respiration Rate
Resting respiration rate		
Respiration rate after exercising for one minute		
Respiration rate after exercising for two minutes		
Respiration rate after exercising for four minutes		
Respiration rate after 2 minutes of resting		
Respiration rate after 4 minutes of resting		

Heart to Heart – Respiration Cont

Adults	12-20 breaths per minute
Children 6-12 years	18-30 breaths per minute
Children 1-6 years	20-25 breaths per minute
Infants 0-12 months	30-50 breaths per minute

Check off Sheet for Pulse

Educational Experiences

Check off Sheet for Respiration

Educational Experiences

Esquarehomeschool.com or our Youtube channel
E2- Educational Experiences
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