Physiology Class 2:
Cardiovascular and Respiratory Physiology

Activities

These activities are designed to be done at home. There is no grade given for these and they do not have to be turned in. The answer key has been emailed to your grown up.

Diffusion

Fill a clear glass with water. Put in 3 drops of food coloring and write down how long it takes for the color to spread evenly though the water.

There is no key for this activity.

Path of Blood

Draw a heart the shows the right and left atria and the right and left ventricles. Add the lungs on the right and left side. Add the following vessels: Pulmonary veins, pulmonary arteries, aorta, vena cava (inferior and superior). Using this diagram, add the path of blood starting with the vena cava and ending with the aorta.

Required Structures on the Diagram

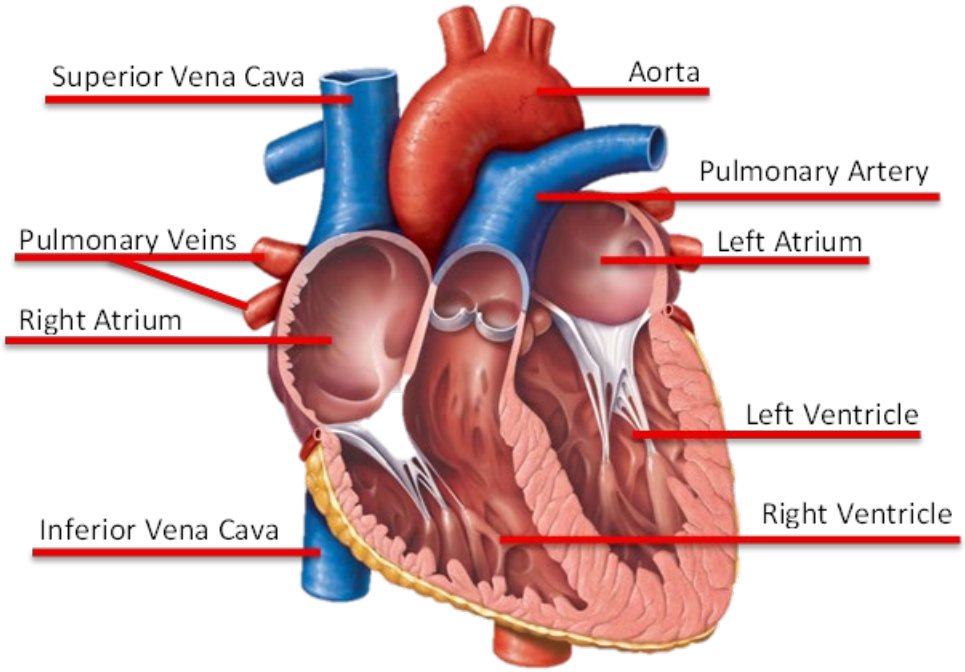
Your child's drawing should include:

Heart Chambers

- **Right Atrium**
- **Right Ventricle**
- **Left Atrium**
- **Left Ventricle**

Lungs

- One lung drawn on the **right** side of the heart
- One lung drawn on the **left** side of the heart



Major Vessels

- **Vena Cava (Superior and Inferior)** – entering the **right atrium**
- **Pulmonary Arteries** – leaving the **right ventricle** and going **to the lungs**
- **Pulmonary Veins** – coming **from the lungs** into the **left atrium**
- **Aorta** – leaving the **left ventricle** and going **to the body**

2. Correct Path of Blood Flow

Students should label or draw arrows following this sequence:

1 → Body returning blood

1. **Vena Cava**
   (Superior and Inferior vena cava bring deoxygenated blood into the heart.)

2 → Right side of the heart

2. **Right Atrium**
3. **Right Ventricle**

3 → Lungs

4. **Pulmonary Arteries**
   (Only arteries that carry deoxygenated blood.)
5. **Lungs**
   Blood drops off CO_2 and picks up oxygen here.

4 → Left side of the heart

6. **Pulmonary Veins**
   (Only veins that carry oxygenated blood.)
7. **Left Atrium**
8. **Left Ventricle**

5 → Back to the body

9. **Aorta**
   Blood leaves the left ventricle and is pumped to the entire body.

Summary Sentence for Parents

Deoxygenated blood: Body → Vena cava → Right atrium → Right ventricle → Pulmonary arteries → Lungs
Oxygenated blood: Lungs → Pulmonary veins → Left atrium → Left ventricle → Aorta → Body

Gas exchange in the lungs and peripheral body.

Explain how O2 and CO2 are exchanged in the alveoli and in the capillary beds of the peripheral body.

1. Gas Exchange in the Lungs (Alveoli)

What should your child explain:

- The alveoli are tiny air sacs in the lungs.
- Each alveolus is surrounded by **capillaries** filled with blood.
- Gas exchange happens by **diffusion** (movement from high concentration to low concentration).

Correct explanation:

1. **Oxygen enters the lungs when we inhale.**
   The air inside the alveoli has **high O_2**.
2. The blood arriving in the capillaries around the alveoli has **low O_2 and high CO_2**.
3. **O_2 diffuses from the alveoli → into the blood**, because the blood has less oxygen.
4. **CO_2 diffuses from the blood → into the alveoli**, because the alveoli have less carbon dioxide.
5. The CO_2 is then exhaled out of the body.

Summary for lungs:
O_2 goes from alveoli → blood
CO_2 goes from blood → alveoli

2. Gas Exchange in the Peripheral Body (Capillary Beds of Organs & Tissues)

What should your child explain:

- Every cell needs oxygen to make energy.
- As cells make energy, they produce CO_2 as waste.
- Gas exchange again uses **diffusion**.

Correct explanation:

1. Oxygen-rich blood arrives in the body's tissues through **arteries → arterioles → capillaries**.
2. Inside the tissues:
   - Cells have **low O_2** (because they use it)
   - Cells have **high CO_2** (because they produce it)

3. **O_2 diffuses from the blood → into the cells**, because the cells have less oxygen.
4. **CO_2 diffuses from the cells → into the blood**, because the blood entering the capillaries has less CO_2 than the cells.
5. This CO_2-rich blood returns to the heart through the veins.

Summary for body tissues:
O_2 goes from blood → cells
CO_2 goes from cells → blood

Pre-Assessment Quiz:
Cardiovascular and Respiratory Physiology

1. What is the main job of the cardiovascular system?
A. Produce hormones
B. Control body temperature
C. Transport substances like oxygen and nutrients throughout the body
D. Fight viruses

2. Which component of blood carries oxygen using hemoglobin?
A. Plasma
B. Red blood cells
C. White blood cells
D. Platelets

3. Hemoglobin carries oxygen because it contains which element?
A. Calcium
B. Sodium
C. Iron
D. Potassium

4. Why do red blood cells have a biconcave shape (pushed-in center)?
A. To help them fight infection
B. To store nutrients
C. To increase surface area and allow them to bend through tiny capillaries
D. To hold a nucleus

5. What happens during the blood clotting process?
A. White blood cells harden into a scab

B. Platelets form a plug and fibrin forms a net to seal the wound
C. RBCs break apart and glue the cut together
D. Plasma turns solid

6. Which path correctly shows blood flow?
A. Body → left atrium → right ventricle → lungs
B. Lungs → right atrium → left ventricle → body
C. Body → right atrium → lungs → left atrium → body
D. Body → left atrium → lungs → right atrium → body

7. What causes the heart to beat?
A. The brain sends a signal for every heartbeat
B. The heart has its own electrical system (SA node → AV node → Bundle → Purkinje fibers)
C. Muscles contract randomly
D. Blood pressure triggers it

8. Gas exchange in the lungs and body tissues happens by:
A. Osmosis
B. Diffusion
C. Filtration
D. Photosynthesis

9. Which statement correctly describes gas exchange in the lungs?
A. Oxygen moves from the blood into the alveoli
B. CO_2 moves from the alveoli into the blood
C. Oxygen moves into the blood and CO_2 leaves the blood
D. Gas exchange requires muscle contraction

10. During exercise, what happens when CO_2 levels rise in the blood?
A. The diaphragm stops moving
B. Chemoreceptors signal the brainstem to increase breathing and heart rate
C. Blood flow to the lungs stops
D. RBCs stop carrying oxygen