

# What is the Circulatory System?

## Worksheet

The circulatory system is the heart, blood vessels, and blood that transport oxygen and nutrients to cells and remove waste; the heart's output is measured as cardiac output,  $CO = HR \cdot SV$ .

## Questions

1. If  $HR = 80$  bpm and  $SV = 60$  mL, what is the cardiac output?
  - A) 140 mL/min
  - B) 4800 mL/min
  - C) 1.33 mL/min
  - D) 4.8 mL/min
2. Which heart chamber pumps oxygenated blood to the whole body?
  - A) Right atrium
  - B) Right ventricle
  - C) Left atrium
  - D) Left ventricle
3. Which blood vessel is the exception that carries deoxygenated blood away from the heart?
  - A) Aorta
  - B) Pulmonary artery
  - C) Pulmonary vein
  - D) Vena cava
4. Where does gas exchange between blood and body cells occur?
  - A) Arteries
  - B) Veins
  - C) Capillaries
  - D) Heart valves
5. A resting adult has a heart rate of 72 bpm and a stroke volume of 70 mL. Find cardiac output.
6. During exercise, heart rate rises to 150 bpm and stroke volume to 100 mL. Find cardiac output.
7. A trained athlete at rest has  $HR = 60$  bpm and  $SV = 50$  mL. Find cardiac output.
8. Define: What are the four chambers of the heart?
9. Define: What is cardiac output?
10. Define: What is the difference between pulmonary and systemic circulation?

## Answer Key

1. B)  $4800 \text{ mL/min} - \text{CO} = \text{HR SV} = 80 \cdot 60 = 4800 \text{ mL/min}$ .
2. D) Left ventricle - The left ventricle has the thickest walls and pumps oxygenated blood into the aorta for systemic circulation.
3. B) Pulmonary artery - The pulmonary artery carries deoxygenated blood from the right ventricle to the lungs.
4. C) Capillaries - Capillaries have thin, single-cell walls that allow  $\text{O}_2$ ,  $\text{CO}_2$ , and nutrients to diffuse in and out.
5.  $\text{CO} = \text{HR SV} \text{ CO} = 72 \cdot 70 \text{ CO} = 5040 \text{ mL/min} = 5.04 \text{ L/min}$
6.  $\text{CO} = \text{HR SV} \text{ CO} = 150 \cdot 100 \text{ CO} = 15,000 \text{ mL/min} = 15 \text{ L/min}$
7.  $\text{CO} = \text{HR SV} \text{ CO} = 60 \cdot 50 \text{ CO} = 3000 \text{ mL/min} = 3 \text{ L/min}$
8. Right atrium, right ventricle, left atrium, left ventricle.
9. The volume of blood the heart pumps per minute:  $\text{CO} = \text{HR SV}$ .
10. Pulmonary circulation carries blood between the heart and lungs; systemic circulation carries it between the heart and the rest of the body.

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