

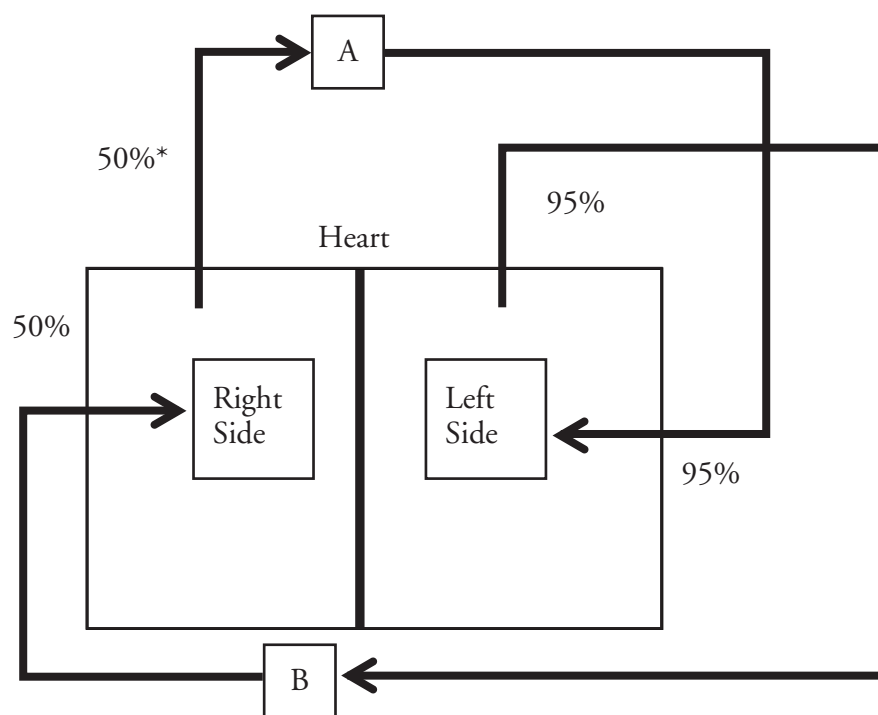
# The Circulatory System

How are materials moved by the circulatory system?

## Why?

The circulatory system delivers nutrients and oxygen to every part of an organism's body and also removes carbon dioxide and other wastes at the same time. In humans the circulatory system consists of a liquid tissue, blood, which moves through a system of arteries, veins, and capillaries. The most important part of the human circulatory system is the pump—your heart. This specialized muscle keeps the blood moving day and night, which keeps all other body systems running smoothly.

## Model 1 – Oxygen Content in Blood During Circulation



\*Percentages are used for comparative purposes only.

1. Model 1 illustrates the path of blood through the human circulatory system.
  - a. What structure does the large rectangle represent?
  - b. What do the arrows in the model represent?
  - c. Does the percent of oxygen stay constant throughout the circulation of the blood?



2. Refer to the percentages shown in Model 1.
  - a. Between leaving the right side of the heart and arriving back at the left side of the heart, what has happened to the percent of oxygen in the blood?
  - b. Between leaving the left side of the heart and arriving back at the right side of the heart, what has happened to the percent of oxygen in the blood?



3. Refer to Model 1.
  - a. What letter on the diagram did the blood flow to after leaving the right side and before entering the left side?
  - b. What structure in the body does this letter represent?
  - c. How does this explain what happened to the percent of oxygen?
  - d. To what letter on the diagram did the blood flow to after leaving the left side and before entering the right side?
  - e. What structure(s) in the body would this letter represent?
  - f. How does this explain what happened to the percent of oxygen?

## Read This

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Blood that contains higher levels of oxygen is called **oxygenated blood**. Blood with lower levels of oxygen is called **deoxygenated blood**. The **pulmonary circuit** carries deoxygenated blood from the right side of the heart and brings oxygenated blood back to the left side of the heart. The **systemic circuit** carries oxygenated blood from the left side of the heart and then returns deoxygenated blood from the body back to the right side of the heart.

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4. Color the diagram in Model 1, including the arrows according to the instructions below.
  - a. Use red to represent oxygenated blood.
  - b. Use blue to represent deoxygenated blood.



5. What is the name of the circuit that connects the heart and lungs?



6. What is the name of the circuit that connects the heart to all parts of the body except the lungs?
  
7. The blood on the right side in Model 1 only contains 50% oxygen, but it has 95% total gases.
  - a. What gas other than oxygen do you think might be dissolved in the blood on the right side of the heart?
  
  - b. What process produced this gas?
  
  - c. What happens to this gas before the blood enters the left side of the heart?
  
8. Looking at the arrows on Model 2, how would you describe the flow pattern of the blood inside the circulatory system?
  
9. What features might the entrances and exits to the heart need in order to maintain this flow pattern?



## Extension Questions

10. A “hole in the heart” is actually an opening in the wall dividing the left and right sides of the heart. This wall is called the **septum**. This defect in the septum causes the deoxygenated blood from the right side to mix with the oxygenated blood from the left side. Propose some effects that would result from a hole in the heart.
  
11. Oxygen is carried in the blood by red blood cells. At high altitudes the body cannot take in as much oxygen because of the low atmospheric pressure, so to compensate the body produces more red blood cells. Even when one returns to low altitudes, these extra red blood cells remain for about two weeks. Using this information, propose a reason why athletes often train at high altitudes before a competition.