

Circulatory and Respiratory Systems Concept Questions

- What causes a pulse?
 - Why can the pulse rate be used to measure the heart rate?
- Using examples, explain the purpose served by vasoconstriction and vasodilation.
- How are the pulmonary arteries and veins different from all other arteries and veins?
 - Explain why blood has a higher O₂ concentration in the pulmonary veins than in the venae cavae, which are also veins.
- What function do capillaries serve?
- Children in famine-stricken African countries are often shown with large, bloated abdomens. Explain how chronic starvation can lead to edema.
- You bump into Joe on the Street at McDonalds and he says he doesn't understand what causes a head rush and complains that he hates getting one. You excitedly say that you have the explanation and the solution. What do you say?
 - Joe then asks if arteries have those nifty valves also.
- It is not unheard of for soldiers to faint while standing at attention for a long period of time. Explain.
- The heart of a normally developing human fetus has a hole between the left and right atria. In some cases, this hole does not close completely before birth. If the hole weren't surgically corrected, how would it affect the O₂ content of the blood entering the systemic circuit?
- Why are the atrioventricular valves and the semilunar valves so important?
- Why is it important that the AV node delay the electrical impulse moving from the SA node and the atria to the ventricles?
- The artificial pacemaker is a small battery-powered device that can send small electric impulses to the heart. What is its function and why would one be necessary?
- You visit the doctor and have your blood pressure measured.
- It is 150/110. Is this high?
 - Why might the doctor be more concerned with your diastolic pressure than with your systolic pressure?
- Imagine that you are a doctor and that you have diagnosed one of your patients as having high blood pressure. You prescribe a low salt diet. Why?
- What is the adaptive value of the fact that arteries are usually located far below the skin?
- Suppose that after you exercise regularly for several months, your resting heart rate decreases, but your cardiac output at rest is unchanged. Based on these observations, what other change in the function of your heart at rest likely occurred?
- Describe the mechanism by which atherosclerosis can cause result in a heart attack.
 - How can atherosclerosis result in high blood pressure?

18. While recent research has called into question the danger of saturated fat specifically, what is the connection between a diet high in fat and heart disease?
19. a) What is an aneurysm?
b) Why are they dangerous?
20. Imagine now that you became bored with the mundane life of a family physician and decided to become an Emergency Medical Technician. At the scene of a car accident, a victim has lost a great deal of blood and is going into shock. The victim's skin appears pale and you observe a weak and rapid pulse, and falling body temperature. Suggest a reason for each of these symptoms.
21. a) Why might a person with anemia or a low RBC count feel tired all the time?
b) In both Canada and the US, rates of anemia are higher in women and girls than in men and boys. Suggest a reason for this difference.
22. What would happen if a blood clot formed in a major artery?
23. Aspirin reduces the ability of blood to form clots. Why do you think doctors prescribe aspirin to patients who have had a heart attack or stroke?
24. a) Why would someone with hemophilia have to be careful not to cut himself or herself?
b) Clots in arteries can cause heart attacks and strokes. Why, then, does it make sense to treat people with hemophilia by introducing clotting factors into their blood?
25. Explain why a physician might order a white cell count for a patient with symptoms of an infection.
26. a) Why is a large surface area important for a respiratory surface?
b) How does the human respiratory system achieve a large surface area?
27. Joe on the street stops you and says "Hey, buddy. How do we breathe anyway?" What do you say?
28. a) When you are exercising, your respiratory rate increases. Explain how this happens.
b) A decrease in blood pH also causes an increase in heart rate. What is the function of this control mechanism?
29. The breathing control center responds to the level of carbon dioxide in the blood - not the level of oxygen. What consequence would this have for people at high altitude where there is less oxygen?
30. When CO₂ dissolves in blood, it decreases the blood pH (*i.e.*, increases the acidity). The drop in pH is detected by the medulla and the sensors in the carotid and aorta and trigger an increase in the breathing rate. A drop in blood pH also causes an increase in heart rate. Explain the functions of these two responses.
31. Metabolic acidosis is a condition that occurs when the pH of the blood is too low (*i.e.*, it is too acidic) and can occur when there is too much CO₂ in your blood. One symptom is a very rapid breathing rate. One treatment is to administer bicarbonate (which increases pH). Explain the effectiveness of this treatment.
32. A friend of yours is a smoker. Use your knowledge of the respiratory system to try to convince them to quit.