

## Assignment 8: The heart, part 1: Chapter 18

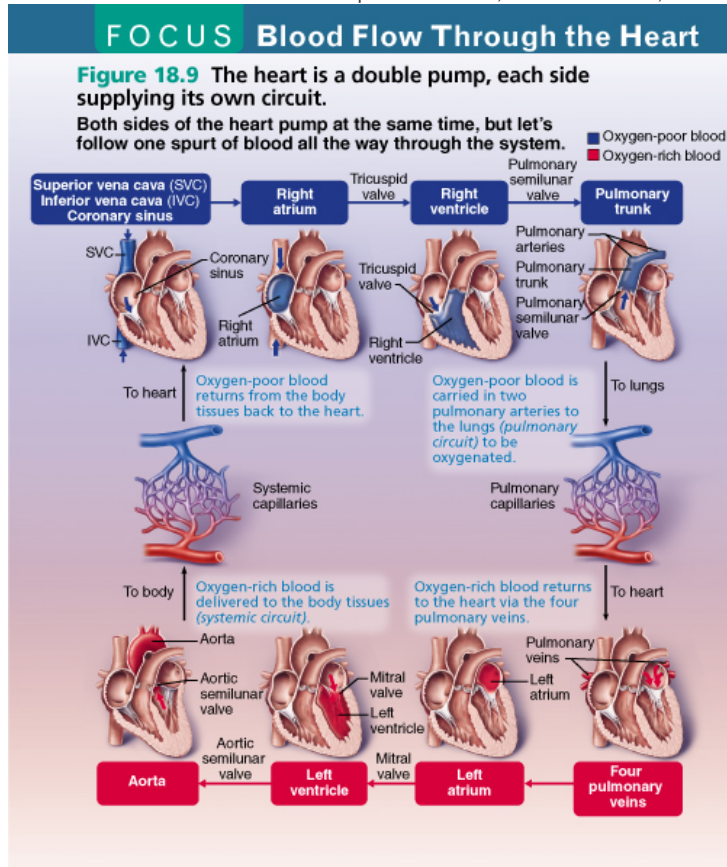
Due: 11:59pm on Tuesday, March 12, 2013

**Note:** To understand how points are awarded, read your instructor's [Grading Policy](#).

## Art Question Chapter 18 Question 7

## Part A

Into which chamber of the heart do the superior vena cava, inferior vena cava, and coronary sinus return deoxygenated blood?



ANSWER:

- left ventricle
- right atrium
- right ventricle
- left atrium

Correct

## Art Question Chapter 18 Question 8

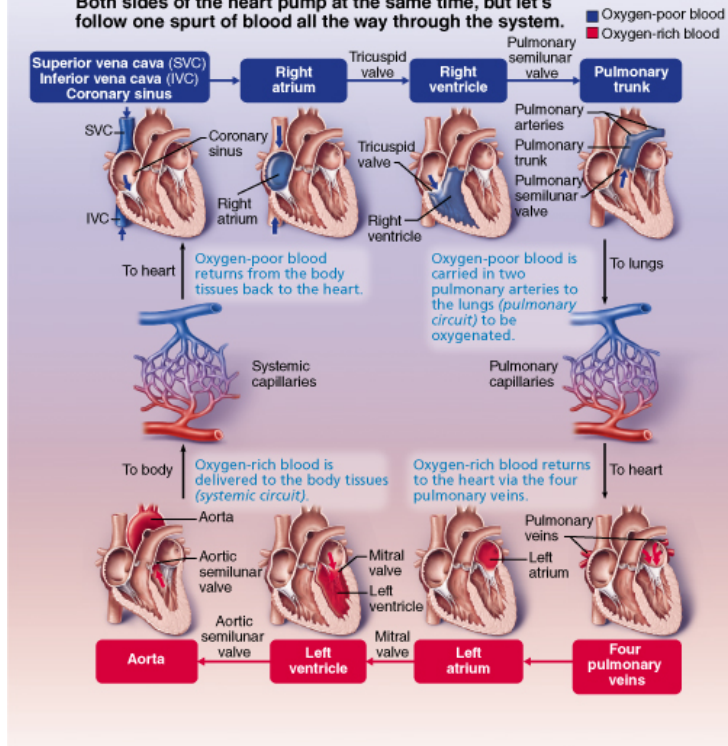
## Part A

Which chamber of the heart sends oxygenated blood to the aorta to the systemic circuit?

## FOCUS Blood Flow Through the Heart

**Figure 18.9** The heart is a double pump, each side supplying its own circuit.

Both sides of the heart pump at the same time, but let's follow one spurt of blood all the way through the system.



ANSWER:

- right atrium
- right ventricle
- left ventricle
- left atrium

**Correct**

### Chapter 18 Multiple Choice Question 4

#### Part A

The left ventricular wall of the heart is thicker than the right wall in order to \_\_\_\_\_.

ANSWER:

- expand the thoracic cage during diastole
- pump blood through a smaller valve
- accommodate a greater volume of blood
- pump blood with greater pressure

**Correct**

### Chapter 18 Multiple Choice Question 7

#### Part A

Blood within the pulmonary veins returns to the \_\_\_\_\_.

ANSWER:

- left atrium
- left ventricle
- right ventricle
- right atrium

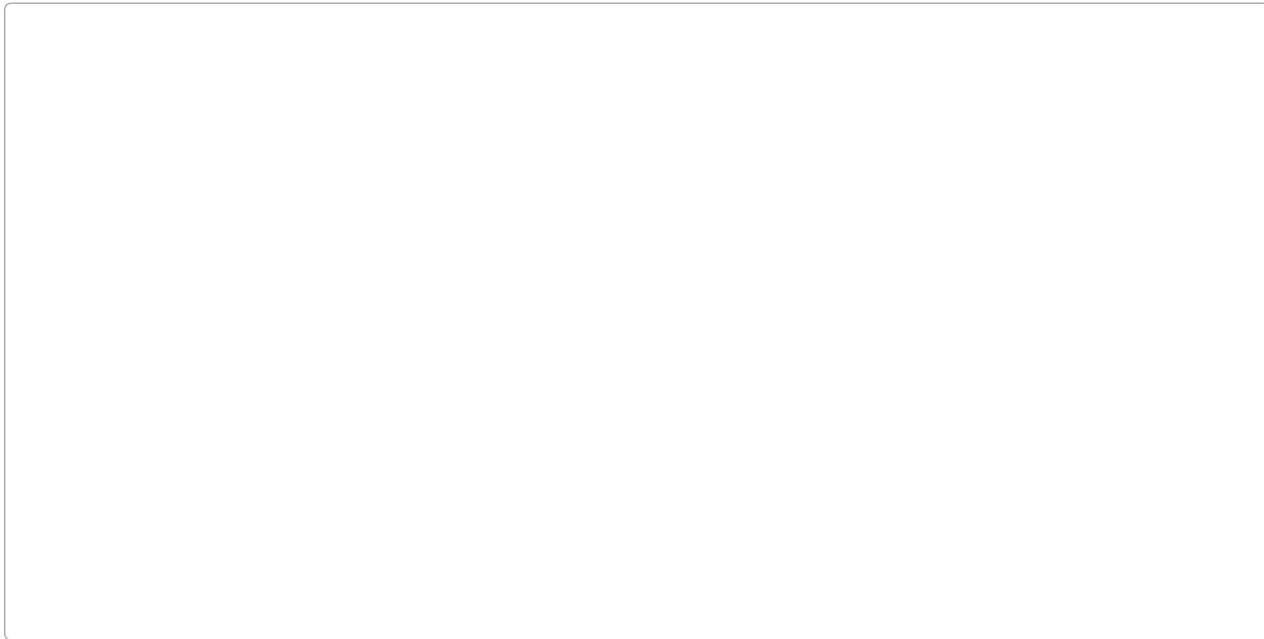
**Correct**

## Art-labeling Activity: Figure 18.3

**Part A**

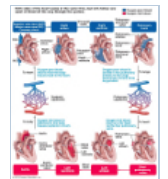
Drag the appropriate labels to their respective targets.

ANSWER:

**Correct**

## Focus Figure 18.9: Blood Flow Through the Heart

The heart is a double pump, each side supplying its own circuit. Read through [Focus Figure 18.9](#), and then complete the activities and questions below.

**Part A - Blood Entering the Right Atrium**

Drag and drop the correct item name on the left to complete the sentence. Terms may be used more than once or not at all.

**Hint 1.** Diaphragm landmark for naming great veins

Oxygen-poor blood enters the right atrium from all body tissues through one of three vessels: the superior vena cava that drains tissues above the diaphragm and the inferior vena cava that drains tissue from below the diaphragm are two of these. Each is a **vein**, a vessel **carrying oxygen-poor blood toward the heart**.

**Hint 2.** Coronary circulation

Oxygen-poor blood enters the right atrium from the **coronary sinus**, a sac-like vein, which **drains blood from the myocardial circulation**.

ANSWER:

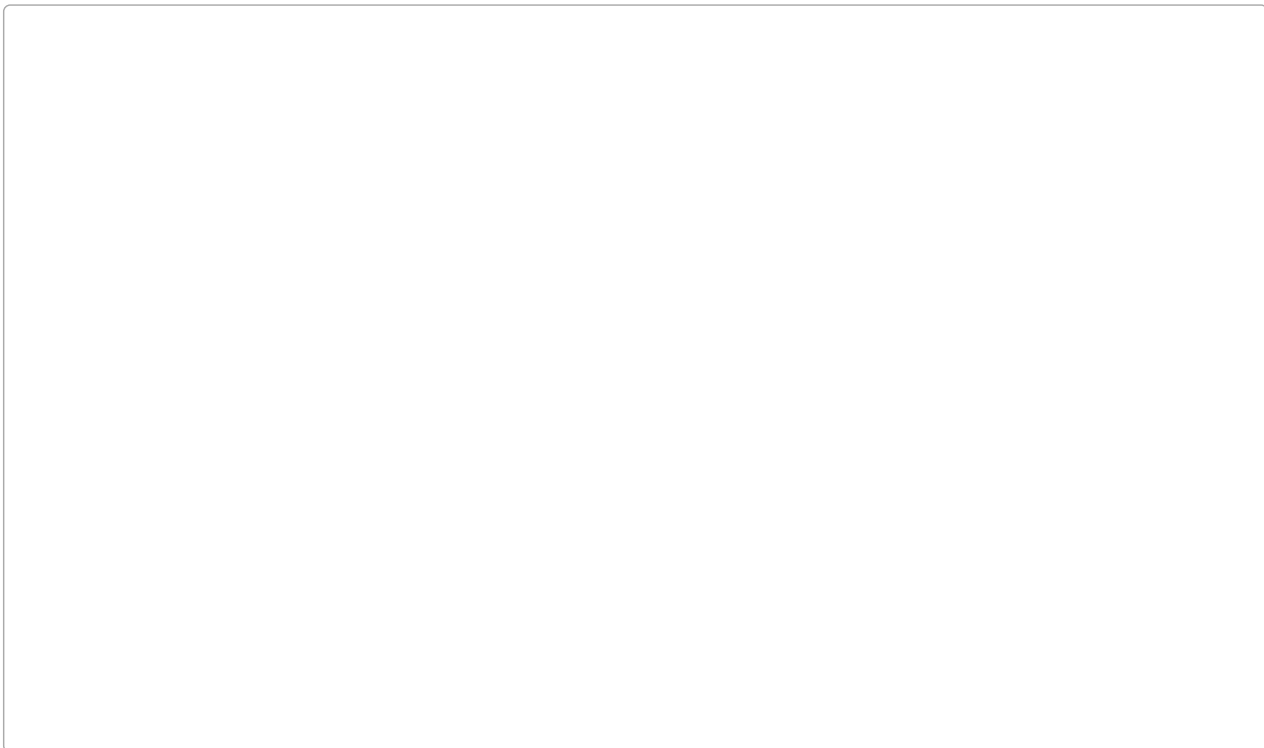
**Correct****Part B - Right-Sided Anatomical Features****Drag and drop the correct identification label to the box with a leader line. Answers may be used once, or not at all.****Hint 1. Blood exiting the heart**

The chambers called ventricles push blood up and out of the heart through an artery. Oxygen-poor blood from the right ventricle exits through the semilunar valve to the pulmonary trunk. The trunk divides to pulmonary arteries that carry blood to the capillary beds of the lungs.

**Hint 2. One-way valves**

The closed tricuspid valve prevents backward blood flow into the right atrium when the right ventricle is contracting. The closed pulmonary semilunar valve prevents backward flow from the trunk into the right ventricle.

ANSWER:

**Correct****Part C - Flow Through the Right Side of the Heart**

Assume blood is flowing from the coronary sinus to the lung capillaries. Place the anatomical items in order of flow in the target boxes.

**Hint 1. General blood flow through the heart**

On either side of the heart, an atrium receives blood from veins. Blood passes through a leaflet valve to a ventricle, forward through a semilunar valve, and out into an artery.

**Hint 2. Right-sided structures**

The tricuspid valve is located between the right atrium and right ventricle. The pulmonary semilunar valve is located between the right ventricle and the pulmonary trunk.

ANSWER:

**Correct**

**Part D - Oxygen-Rich Blood Returning to the Heart**

Drag and drop the terms to arrange them, from left to right, in order of blood flow of oxygen-rich blood into the heart.

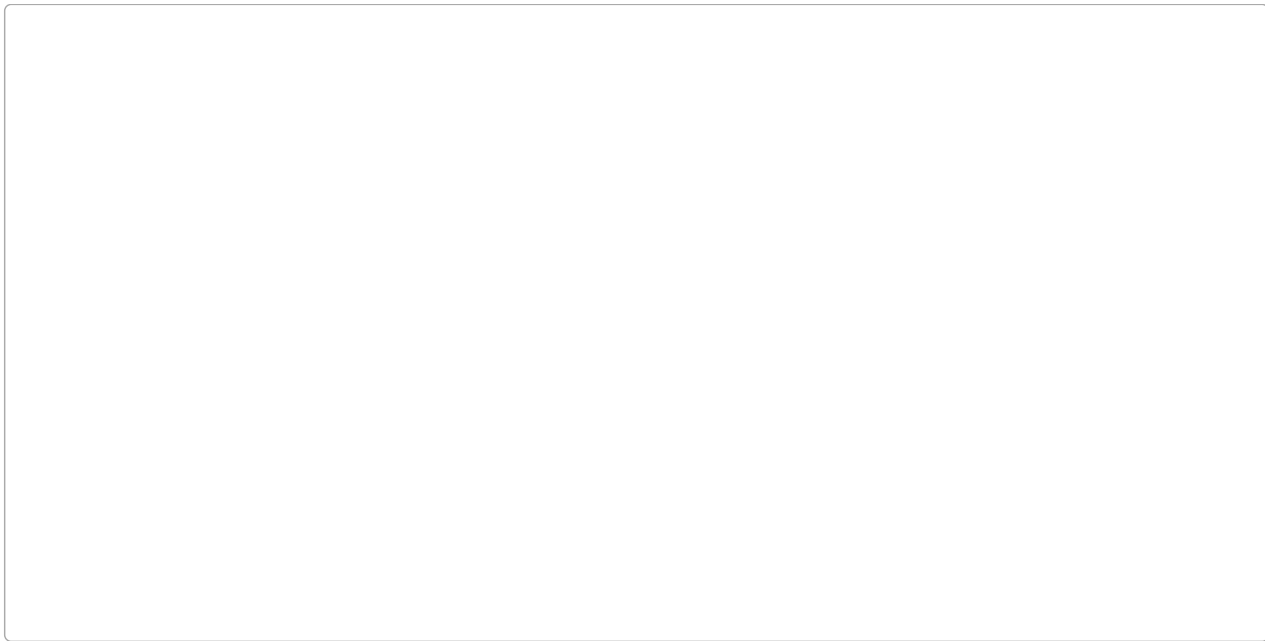
**Hint 1. Blood path from the lungs**

Blood from oxygenated lung capillaries returns to the left atrium through four pulmonary veins.

**Hint 2. Valve function**

Valves behave to prevent backward blood flow. The tricuspid and bicuspid in closed positions prevent blood from returning to the respective atrium from a contracting ventricle. Closed semilunar valves prevent blood from returning from large exit arteries, the aorta on the left and the pulmonary trunk on the right, back into the ventricles.

ANSWER:



Correct

---

**Part E - Oxygen-Rich Blood and the Left Side of the Heart**

Drag and drop the terms to the appropriate blanks in the sentences on the right. Not all labels are used.

**Hint 1. Systemic flow versus pulmonary flow**

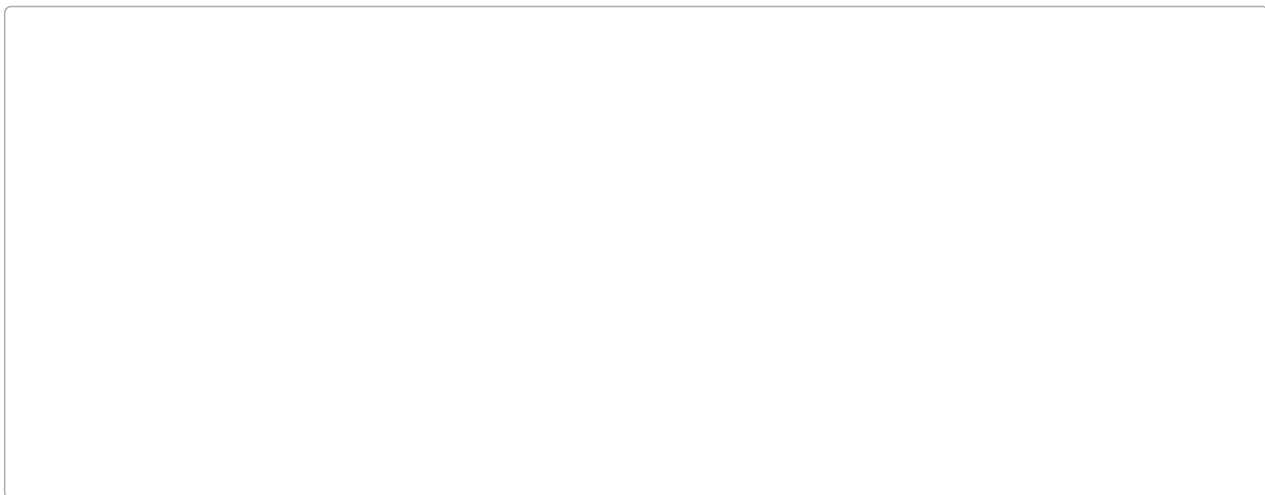
**Systemic** blood is pumped by the left ventricle out through the aorta, and flows downstream through smaller vessels to the capillaries where oxygen is diffused to tissues. Oxygen-poor blood is returned to the left atrium through veins.

**Pulmonary** blood is pumped by the right ventricle out through the pulmonary trunk, which divides to pulmonary arteries, and flows to pulmonary capillaries where blood is aerated. Oxygen-rich blood is returned in pulmonary veins to the left atrium.

**Hint 2. Valve location**

The valves located between an atrium and a ventricle are the tricuspid on the right and the bicuspid or mitral on the left. The semilunar valves located at vessel openings exiting the ventricles are the pulmonary valve on the right and the aortic valve on the left.

ANSWER:



Correct

---

**Part F - Conclusion: Valves in Blood Flow Through the Heart**

Drag and drop valve names to their correct location in the image.

**Hint 1. Semilunar valve identity**

Aortic semilunar is a **left**-sided valve located in the entrance to the aorta, which carries **oxygen-rich** blood out of the heart to systemic tissue. The pulmonary semilunar is a **right**-sided valve located in the entrance to the pulmonary trunk, which carries **oxygen-poor** blood out of the heart to the lungs.

**Hint 2. Atrioventricular valve identity**

The tricuspid valve is located between the **right** atrium and ventricle, and prevents backflow into the **right** atrium. The mitral valve is located between the **left** atrium and ventricle, and prevents backflow into the **left** atrium.

ANSWER:

**Correct****Part G - Conclusion: Blood Flow Through the Heart**

Sort the terms into the appropriate category of either oxygen-poor or oxygen-rich.

**Hint 1. Right-sided circuit**

Oxygen-poor blood enters the right atrium from three veins, and passes through the tricuspid valve into the right ventricle. Blood exits through the pulmonary semilunar valve to the pulmonary trunk, which divides into the pulmonary arteries, and on to the lung capillaries to be aerated.

**Hint 2. Left-sided circuit**

Oxygen-rich blood exits the lungs and returns to the left atrium in pulmonary veins. Blood passes through the mitral valve to the left ventricle, and is ejected out the aortic semilunar valve to the aorta to systemic capillaries.

ANSWER:

**Correct**

#### Part H - Conclusion: Blood Flow Through the Heart

Select the correct partial path below. This path is part of the complete blood flow pathway. You should be able to trace flow starting in any location.

##### Hint 1. Left-sided flow

Oxygen-rich blood coming from the lung capillaries returns to the heart through four pulmonary veins, emptying into the left atrium. This blood passes through the mitral or bicuspid valve to the left ventricle, and is ejected out through the aortic semilunar valve into the aorta.

##### Hint 2. Right-sided flow

Oxygen-poor blood from the tissues returns to the right atrium via three veins. Blood flows through the tricuspid valve into the right ventricle, and is ejected through the pulmonary semilunar valve into the pulmonary trunk artery, which splits into two pulmonary arteries carrying blood to each lung.

ANSWER:

- Pulmonary trunk to pulmonary arteries to pulmonary capillaries to pulmonary veins returning to the right atrium.
- Aorta to smaller systemic arteries to systemic capillaries to systemic veins to right atrium through the tricuspid valve
- Systemic veins returning to the left atrium and forward through the mitral valve.
- Pulmonary artery into left atrium through mitral valve to left ventricle

**Correct**

All systemic veins return oxygen-poor venous flow to the right atrium, through the tricuspid to the right ventricle, and up and out the pulmonary semilunar valve to the pulmonary trunk and pulmonary arteries to the capillaries of the lungs.

Returning oxygen-rich blood flowing through pulmonary veins enters the left atrium, passes through the mitral valve to the left ventricle, and out through the aortic semilunar valve into the aorta and on to systemic capillaries.

Congratulations on completing blood flow through the two-sided heart, identifying oxygen-rich and -poor locations, and preparing yourself for knowledge you will use again and again!

### Chapter 18 Chapter Test Question 4

#### Part A

The role of the coronary arteries is to \_\_\_\_\_.

ANSWER:

- direct blood to the aorta
- supply blood to the heart tissue
- direct blood to the pulmonary veins
- move blood from the atria to the ventricles

**Correct**

The coronary arteries, as a part of the coronary circulatory route, supply blood to the heart tissue.

---

## Chapter 18 Homeostatic Imbalance Question 1

**Part A**

Cardiac tamponade results in ineffective pumping of blood by the heart because the excessive amount of fluid in the pericardial cavity will \_\_\_\_\_.

ANSWER:

- prevent the visceral layer of the serous pericardium from properly surrounding the heart
- prevent the heart from filling properly with blood
- prevent proper oxygenation of the blood
- interfere with the ability of this fluid to lubricate the serous membranes

**Correct**

The heart is wrapped by a double-walled sac called the pericardium. The pericardial cavity lies between the parietal and visceral layers of the serous pericardium. It is filled with a very small amount of serous fluid. If additional fluid fills the pericardial space, it adds pressure on the outside of the heart, preventing it from filling normally.

---

## Chapter 18 Homeostatic Imbalance Question 2

**Part A**

The greater the mass of tissue in an organ, the greater is its need for an adequate blood supply. Which chamber of the heart has the highest probability of being the site of a myocardial infarction?

ANSWER:

- left atrium
- right atrium
- left ventricle
- right ventricle

**Correct**

The left ventricle actively pumps blood to almost all of the body's tissues via the aorta.

---

## Chapter 18 Homeostatic Imbalance Question 3

**Part A**

The presence of an incompetent tricuspid valve would have the direct effect of causing \_\_\_\_\_.

ANSWER:

- reduced efficiency in the delivery of blood to the lungs
- reduced efficiency in the delivery of blood to the myocardium
- reduced efficiency in the delivery of blood from the lungs to the heart
- reduced efficiency in the delivery of blood from the head to the heart

**Correct**

The tricuspid valve separates the right atrium and the right ventricle. It must remain tightly closed during ventricular contraction so blood can be pumped out of the ventricle and into the pulmonary arteries.

---

**Chapter 18 Reading Quiz Question 2****Part A**

Which valve is located between the right atrium and ventricle?

ANSWER:

- mitral valve
- tricuspid valve
- pulmonary semilunar valve
- aortic semilunar valve

**Correct**

The tricuspid valve separates the right atrium and ventricle.

---

**Chapter 18 Reading Quiz Question 9****Part A**

What causes normal heart sounds?

ANSWER:

- heart valve closure
- opening of heart valves
- cardiac muscle contraction
- pressure of blood in the ventricles

**Correct**

Heart sounds are caused by heart valve closure.

---

**Chapter 18 Clinical Application Question 9****Part A**

A patient is prescribed a calcium channel blocker to prevent angina (chest pain) by decreasing the demand for oxygen. What is the explanation for this pharmacological effect?

ANSWER:

- A drug that blocks the calcium channels prevents the cardiac cells from contracting, thereby relieving the chest pain.
- A drug that enhances the entry of calcium ions into the cytoplasm of cardiac cells increases the membrane potential, thereby making the heart beat slower, relieving the chest pain.
- A drug that inhibits the entry of calcium ions into the cytoplasm of cardiac cells decreases the membrane potential, thereby making the heart beat slower, relieving the chest pain.
- A drug that enhances the entry of calcium ions into the cytoplasm of cardiac cells decreases the force of myocardial contractility, thereby decreasing the oxygen demand, relieving the chest pain.
- A drug that inhibits the entry of calcium ions into the cytoplasm of cardiac cells decreases the force of myocardial contractility, thereby decreasing the oxygen demand, relieving the chest pain.

**Correct**

---

**Chapter 18 Multiple Choice Question 9**

**Part A**

The term for pain associated with deficient blood delivery to the heart that may be caused by the transient spasm of coronary arteries is \_\_\_\_\_.

ANSWER:

- pericarditis
- ischemia
- angina pectoris
- myocardial infarct

**Correct**

---

**Chapter 18 Multiple Choice Question 12****Part A**

The fact that the left ventricle of the heart is thicker than the right ventricle reveals that it \_\_\_\_\_.

ANSWER:

- sends blood through a smaller valve
- pumps a greater volume of blood
- expands the thoracic cage
- pumps blood against a greater resistance

**Correct**

---

**Chapter 18 Reading Quiz Question 3****Part A**

What structures connect the individual heart muscle cells?

ANSWER:

- anastomoses
- chordae tendineae
- trabaculae carneae
- intercalated discs

**Correct**

Intercalated discs connect the heart muscle cells. They include desmosomes (anchoring junctions) and gap junctions (communicating junctions).

---

**Chapter 18 Reading Quiz Question 10****Part A**

What is the source of ATP for cardiac muscle contraction?

ANSWER:

- glycolysis
- cellular respiration
- stored ATP
- creatine phosphate

**Correct**

ATP for cardiac muscle use is produced almost exclusively aerobically in the mitochondria, therefore requiring readily available oxygen. Glucose, fatty acids, or lactic acid may be used as the fuel molecule.

## Chapter 18 Multiple Choice Question 28

**Part A**

Compared to skeletal muscle, cardiac muscle \_\_\_\_\_.

ANSWER:

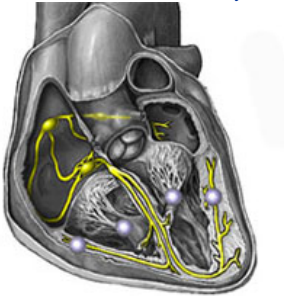
- lacks striations
- has more nuclei per cell
- cells are larger than skeletal muscle cells
- has gap junctions that allow it to act as a functional syncytium

**Correct**

## IP: Action Potentials in Autorhythmic Cells

Click on the link or the image below to explore cardiac action potentials in Interactive Physiology (IP), then answer the questions to the right.

[IP: Action Potentials in Autorhythmic Cells](#)

**Part A**

Action potentials generated by the autorhythmic cells spread to the contractile cells through what structures in the membrane?

**Hint 1.**

Which of these structures would enable ions to move easily from one cell to another?

ANSWER:

- tight junctions
- desmosomes
- gap junctions
- intercalated discs

**Correct**

Yes, action potentials generated by the autorhythmic cells spread waves of depolarization to contractile cells through gap junctions. If the depolarization causes the contractile cells to reach threshold, they will in turn generate an action potential.

**Part B**

One of the changes that occurs in the pacemaker potential (unstable resting membrane potential) in the SA node (an autorhythmic cell) is a decreased efflux of what ion?

**Hint 1.**

Decreased efflux of this ion must cause depolarization (the inside of the cell becoming less negative) so that threshold is reached.

ANSWER:

- sodium
- calcium
- potassium

**Correct**

Yes, if there is a decreased efflux of potassium while there is a normal influx of sodium, the inside of the cell would become less negative. Thus, threshold would be reached. The ability of these autorhythmic cells to spontaneously depolarize is what results in the pacemaker potential.

**Part C**

When threshold is reached at the SA node (an autorhythmic cell), what channels open causing further depolarization of the membrane?

**Hint 1.**

Depolarization is due to the inside of the cell becoming less negative (or more positive).

ANSWER:

- fast sodium
- slow calcium
- fast calcium
- potassium

**Correct**

Yes, unlike nerve cells or cardiac muscle cells, fast calcium channels are responsible for the depolarization phase of the autorhythmic cell action potential. When the fast calcium channels open, calcium rushes into the cell making it less negative (or more positive).

**Part D**

Repolarization of an autorhythmic cell is due to the opening of which channels?

**Hint 1.**

For repolarization, the inside must become more negative.

ANSWER:

- voltage-gated sodium channels
- chemically gated calcium channels
- voltage-gated potassium channels
- Chemically gated potassium channels

**Correct**

Yes, opening of voltage-gated potassium channels causes positive potassium ions to move out of the cell. This efflux of potassium causes the cell to become more negative inside thus, repolarizing the cell.

**Part E**

In order to cause cardiac muscle contraction, the contractile cells must also depolarize. What causes the depolarization of the contractile cells?

**Hint 1.**

Movement of what ions from the autorhythmic cells (or adjacent cells) would cause the contractile cells to depolarize (become less negative/more positive)?

ANSWER:

- an unstable resting membrane potential in the contractile cells
- the flow of negative ions from adjacent cells
- the flow of positive ions from adjacent cells

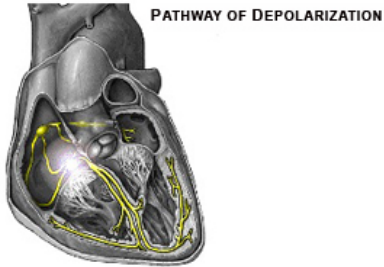
**Correct**

Yes, the flow of positive ions from the autorhythmic cells (or adjacent cells) brings the membrane to threshold initiating depolarization of the contractile cell.

## IP: Intrinsic Conduction System of the Heart

Click on the link or the image below to explore Intrinsic Conduction System of the Heart in Interactive Physiology (IP), then answer the questions to the right.

[IP: Intrinsic Conduction System of the Heart](#)

**Part A**

Which part of the conduction system initiates the depolarizing impulse, which spreads throughout the heart?

**Hint 1.**

This area is known as the pacemaker of the heart.

ANSWER:

- AV bundle (bundle of His)
- Purkinje fibers
- AV node
- SA node

**Correct**

Yes, the SA Node spontaneously depolarizes, causing the wave of depolarization that spreads through the rest of the conduction system and heart.

**Part B**

What does the ECG wave tracing represent?

**Hint 1.**

Remember that this wave is recorded from electrodes placed on the skin on various parts of the body.

ANSWER:

- contraction of the heart
- electrical activity in the heart

**Correct**

Yes, the ECG waves show the depolarization and repolarization in various areas of the heart.

**Part C**

What does the QRS complex represent in the ECG wave tracing?

**Hint 1.**

This is a large wave. Which are larger in the heart, the ventricles or atria?

ANSWER:

- ventricular repolarization
- atrial repolarization
- atrial depolarization
- ventricular depolarization

**Correct**

Yes, the QRS complex represents depolarization in the ventricles, which have greater mass than the atria.

#### Part D

Contraction of the atria results from which wave of depolarization on the ECG tracing?

**Hint 1.**

Which happens first, atrial or ventricular depolarization?

ANSWER:

- P wave
- T wave
- QRS complex

**Correct**

Yes, the P wave represents atrial depolarization, which leads to atrial contraction.

#### Part E

Which part of the intrinsic conduction system delays the impulse briefly before it moves on to the ventricles?

**Hint 1.**

If this part delays the impulse before it moves into the ventricles, where must it be located?

ANSWER:

- SA node
- Purkinje fibers
- AV bundle (bundle of His)
- bundle branches
- AV node

**Correct**

Yes, the AV node slows down the impulse giving the atria time to contract before the ventricles contract.

Score Summary:

Your score on this assignment is 100%.

You received 20.07 out of a possible total of 20 points.