

# ANSWERS TO CHAPTER 12

## CONTENT LEARNING ACTIVITY

### Size, Form, and Location of the Heart.

1. Apex; 2. Base

### Pericardium

1. Fibrous pericardium; 2. Serous pericardium;
3. Parietal pericardium; 4. Visceral pericardium;
5. Pericardial cavity; 6. Pericardial fluid

### External Anatomy

1. Coronary sulcus; 2. Venae cavae; 3. Pulmonary veins; 4. Pulmonary trunk and arteries; 5. Aorta;
6. Coronary arteries; 7. Coronary sinus

### Blood Supply to the Heart

1. Left coronary artery; 2. Right coronary artery;
3. Cardiac veins

### Heart Chambers

1. Interatrial septum; 2. Interventricular septum

### Heart Valves

1. Tricuspid valve; 2. Bicuspid (mitral) valve;
  3. Papillary muscles; 4. Chordae tendineae;
  5. Semilunar valves; 6. Skeleton of the heart
1. Superior vena cava; 2. Pulmonary semilunar valve; 3. Aortic semilunar valve;
  4. Right atrium; 5. Tricuspid valve; 6. Papillary muscle; 7. Right ventricle; 8. Interventricular septum; 9. Left ventricle; 10. Chordae tendineae;
  11. Bicuspid (mitral) valve; 12. Left atrium;
  13. Pulmonary veins; 14. Pulmonary trunk;
  15. Pulmonary artery; 16. Aorta

### Route of Blood Flow Through the Heart

1. Systemic circulation; 2. Right ventricle;
3. Tricuspid valve; 4. Pulmonary semilunar valve;
5. Pulmonary trunk; 6. Pulmonary arteries; 7. Left atrium; 8. Pulmonary veins; 9. Bicuspid (mitral) valve;
10. Aortic semilunar valve

### Heart Wall

1. Epicardium; 2. Myocardium; 3. Endocardium

### Cardiac Muscle

1. ATP; 2. Mitochondria; 3. Oxygen;
4. Intercalated disks

### Electrical Activity of the Heart

1. Plateau; 2. Sodium ion channels; 3. Close;
4. Calcium ion channels; 5. Potassium ion channels; 6. Repolarization; 7. Calcium ion channels;
8. Threshold; 9. Refractory period

### Conduction System of the Heart

1. SA node; 2. AV node; 3. AV bundle;
  4. Bundle branches; 5. Purkinje fibers
1. SA node; 2. AV node; 3. Atrioventricular bundle; 4. Bundle branches; 5. Purkinje fibers

### Electrocardiogram

1. P wave; 2. QRS complex; 3. T wave; 4. P-Q (P-R) interval; 5. Q-T interval
1. P wave; 2. QRS complex; 3. T wave; 4. P-Q (P-R) interval; 5. Q-T interval

### Cardiac Cycle

1. Atrial systole; 2. Ventricular systole;
3. Ventricular diastole

### Heart Sounds

1. First heart sound; 2. Second heart sound;
3. Murmur; 4. Stenosed valve

### Regulation of Heart Function

1. Cardiac output; 2. Stroke volume; 3. Heart rate

### Intrinsic Regulation of the Heart

1. Venous return; 2. Preload; 3. Increased;
4. Increased; 5. Increased; 6. Increased;
7. Increased; 8. Decreased; 9. Increased;
10. Starling's law of the heart; 11. Afterload;
12. Increased

### Extrinsic Regulation of the Heart

1. Baroreceptors; 2. Chemoreceptors;
  3. Cardioregulatory center
1. Decreases; 2. Increases; 3. Increase;
  4. Increase; 5. Decrease; 6. Decreases

## QUICK RECALL

1. Generating blood pressure, routing blood, ensuring one-way blood flow, and regulating blood supply
2. Tricuspid valve: between right atrium and right ventricle; bicuspid (mitral) valve: between left atrium and left ventricle; pulmonary semilunar valve: in the pulmonary trunk; aortic semilunar valve: in the aorta.
3. P wave: caused by depolarization of the atria, atrial systole; QRS complex: caused by depolarization of the ventricles, ventricular systole; T wave: caused by repolarization of the ventricles, ventricular diastole.
4. First heart sound: closing of tricuspid and bicuspid valves and vibration of ventricle walls; second heart sound: closing of semilunar valves.
5. Parasympathetic stimulation: decreased heart rate; sympathetic stimulation: increased heart rate and stroke volume.

## WORD PARTS

1. diastolic; diastole
2. systolic; systole
3. bicuspid; tricuspid
4. semilunar
5. semilunar
6. cardiac; pericardium; epicardium; myocardium; endocardium; electrocardiogram; tachycardia; bradycardia

## MASTERY LEARNING ACTIVITY

1. D. The coronary sinus, inferior vena cava, and superior vena cava all carry blood to the right atrium.
2. A. The pericardial cavity is located between the visceral and parietal pericardia. It is lined with serous pericardium which secretes pericardial fluid. Pericardial fluid reduces friction as the heart moves within the pericardial sac.
3. C. The tricuspid valve is located between the right atrium and the right ventricle. The bicuspid valve is located between the left atrium and left ventricle. The semilunar valves are in the aorta and the pulmonary trunk.
4. A. The papillary muscles are found in the ventricles and are attached to the chordae tendineae, which in turn are attached to the cusps of the tricuspid and bicuspid valves.
5. B. The red blood cell passes through these structures: inferior vena cava, right atrium, right ventricle, pulmonary trunk, pulmonary arteries, lungs, pulmonary veins, left atrium, left ventricle, aorta.
6. B. The myocardium is the middle layer of the heart wall, is composed of cardiac muscle, and comprises the bulk of the heart.
7. D. Both voltage-gated sodium ion channels and voltage-gated calcium ion channels are involved in depolarization of cardiac muscle cells. Voltage-gated potassium ion channels are involved in repolarization of the cells.
8. D. Action potentials originate in the SA node, pass to the AV node, the atrioventricular bundle, the bundle branches, and the Purkinje fibers to the myocardium of the ventricles.
9. B. T waves represent repolarization of the ventricles. The QRS complex represents depolarization of the ventricles, and P waves represent depolarization of the atria.
10. B. Both ventricles are 70% filled before atrial systole occurs. As pressure increases in the ventricles during ventricular systole, the tricuspid and bicuspid valves close. Atrial systole does not affect the aortic and pulmonary semilunar valves.
11. C. Cardiac output is heart rate times stroke volume.
12. B. The "dupp" (second heart sound) is caused by the closing of the semilunar valves.
13. D. Increased venous return results in increased stroke volume. Stretching of the SA node increases heart rate. The increased stroke volume and heart rate result in increased cardiac output.
14. D. When blood pressure decreases, the baroreceptor reflex causes an increase in heart rate and stroke volume. Consequently, blood pressure increases (returns to normal).
15. D. A decrease in blood pH and an increase in blood carbon dioxide stimulate chemoreceptors in the medulla of the brain. This results in increased sympathetic stimulation of the heart, increasing heart rate and stroke volume.



## FINAL CHALLENGES



1. In artificial heart implants it is most important to replace the ventricles because they are the major pumps of the heart. The heart can function fairly well without the pumping action of the atria.
2. A decrease in heart rate could be expected because of the baroreceptor reflex, because tilting could increase blood pressure in the carotid arteries. On the other hand, an increase in heart rate could occur because of stretch of the SA node, because tilting would increase the venous return to the right atrium.
3. After being tilted, the upright position would cause a decrease in pressure in the carotid arteries. Through the baroreceptor reflex, this would cause an increase in heart rate.
4. A decrease in CO<sub>2</sub> in the blood causes an increase in blood pH. The increase in pH is detected by chemoreceptors in the medulla oblongata; this results in an increase in parasympathetic stimulation, and a decrease in sympathetic stimulation of the heart. The result is a decreased heart rate.