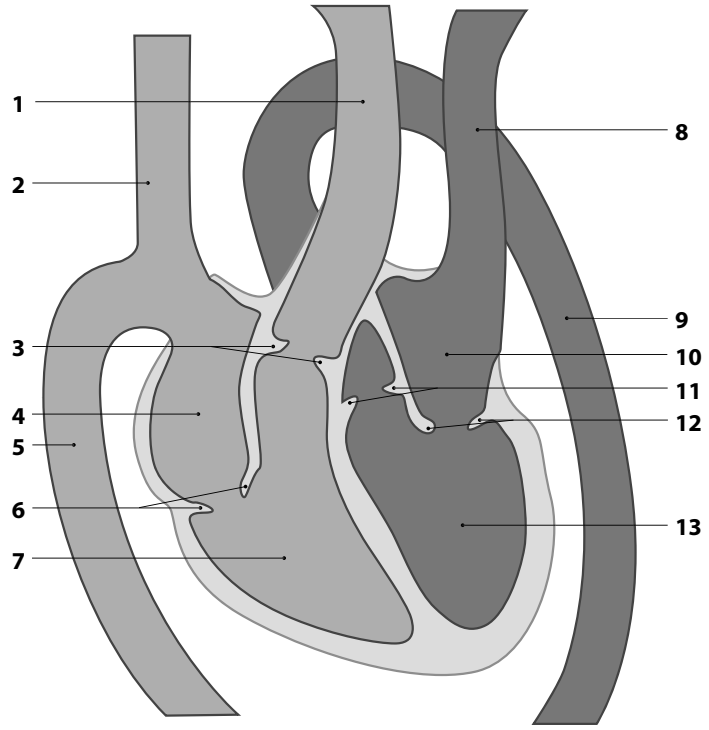
superior vena cava	
systole	
valve	
vein	
venule	
white blood cell	

❷ Circuitry of the Heart

Label the diagram of the heart on the next page. Add arrows to the diagram to indicate the direction of blood flow, using red arrows for oxygenated blood and blue arrows for deoxygenated blood. Then in the space provided below, describe the flow of blood through the entire heart starting with deoxygenated blood as it enters the first chamber of the heart. Include the names of every chamber, valve, artery, organ, and vein involved.



1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____
9 _____
10 _____
11 _____
12 _____
13 _____

❸ The "Silent Killer"

Your friend's grandfather was recently diagnosed with hypertension (high blood pressure) with a reading of 160/100 mm Hg. Your friend calls you to get some answers about blood pressure.

A. Explain what blood pressure is and why high blood pressure is dangerous. Indicate what an average normal blood pressure reading should be. Be sure to include words such as *diastole*, *systole*, *atria*, *ventricles*, and so on.

_____

_____

_____

_____

_____

B. Help your friend calculate her grandfather's cardiac output (ml/min) given the following information: stroke volume = 45 ml; heart rate = 96 beats per min. Explain how cardiac output relates to blood pressure.

_____

_____

_____

_____

_____

❹ How Hard Am I Working?

This exercise is designed to help you measure your *resting heart rate (RHR)*, *exercise heart rate (EHR)*, and *training target heart rate (TTHR)*. The two most common and reliable points to measure your pulse are the carotid artery in the neck and the radial artery in the wrist (see Figure 6.4 in the textbook).

Counting the number of beats in one minute will give you an accurate heart rate in beats per minute (bpm). However, you can also establish your heart rate in beats per minute by multiplying your 6-second pulse count by 10, multiplying your 10-second pulse count by 6, multiplying your 15-second pulse count by 4, or multiplying your 30-second pulse count by 2. Although a true resting heart rate can really only be established immediately upon waking up, this should give you a relatively accurate value. Try it and record your pulse in the table below.

Measuring heart rate is also a very simple and practical way to estimate the intensity of work or exercise. Perform the following exercises: (1) 10 push-ups at a fast pace; (2) 20 full leg squats at a fast pace; and (3) climbing stairs for 70 seconds. For each exercise, determine your heart rate (bpm) by taking your pulse immediately after each exercise for 10 seconds. Record your results in the table below. Allow yourself sufficient rest between the exercises (i.e., your RHR should return to normal levels as determined previously).

Exercise	Pulse (10 seconds)	Heart Rate (bpm)
Resting		My RHR is _____ bpm
10 push-ups		My EHR is _____ bpm
20 squats		My EHR is _____ bpm
Stair climbing		My EHR is _____ bpm

In order to obtain adequate cardiovascular development, you must train at an intensity that elevates your heart rate to at least 50% of its maximum rate. In other words, maintaining a heart rate between the 50% and 85% training intensities is necessary for improvement of the cardiovascular system.

Use the equations below to calculate your 50%, 70%, and 85% training target heart rates. This is the range you should try to maintain during aerobic exercise.

50% TTHR = _____ (RHR) + (0.50 [_____ (MHR) – _____ (RHR)]) = _____ bpm

70% TTHR = _____ (RHR) + (0.70 [_____ (MHR) – _____ (RHR)]) = _____ bpm

85% TTHR = _____ (RHR) + (0.85 [_____ (MHR) – _____ (RHR)]) = _____ bpm

Do you remember how to calculate your maximum heart rate (MHR)? The value can be estimated by using the following equation:

MHR = 220 – Age (in years)

My minimum and maximum training target heart rates:

Min (50% TTHR): _____

Max (85% TTHR): _____