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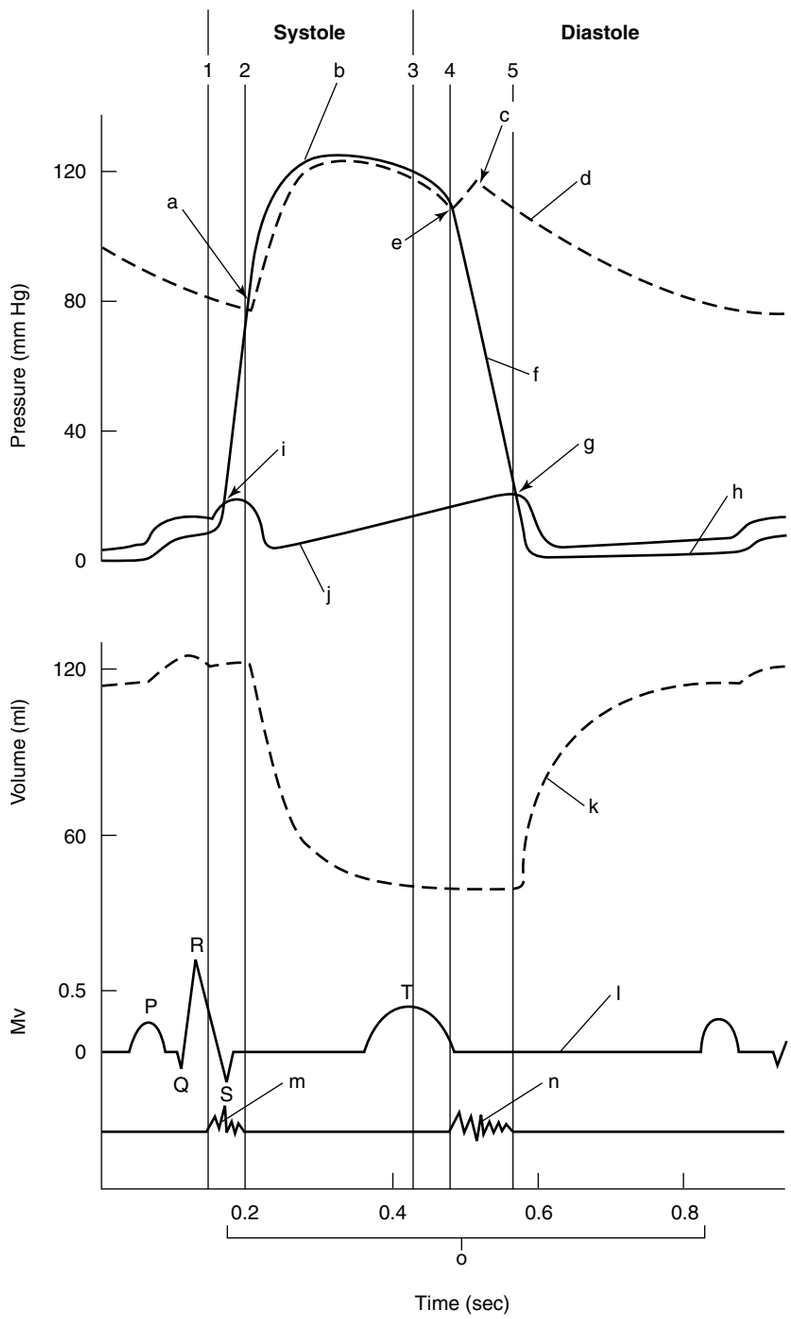
NAME _____ LAB TIME/DATE _____

REVIEW SHEET
exercise
33A

Human Cardiovascular Physiology: Blood Pressure and Pulse Determinations

Cardiac Cycle

1. Correctly identify valve closings and openings, chamber pressures, and volume lines, and the ECG and heart sound scan lines on the diagram below by matching the diagram labels with the terms to the right of the diagram.



f	1.	aortic and semilunar valves closed
d	2.	aortic pressure
e	3.	aortic valve closes
a	4.	aortic valve opens
j	5.	atrial pressure
i	6.	AV valve closes
g	7.	AV valve opens
o	8.	cardiac cycle
c	9.	dicrotic notch
l	10.	ECG
m	11.	first heart sound
n	12.	second heart sound
h	13.	ventricular diastole
b	14.	peak of ventricular systole
k	15.	ventricular volume

2. Define the following terms:

systole: *Contraction of the ventricles (general usage)*

diastole: *Ventricular relaxation (general usage)*

cardiac cycle: *One complete heartbeat including atrial and ventricular contraction*

3. Answer the following questions, which concern events of the cardiac cycle:

When are the AV valves closed? *During ventricular systole*

Open? *During atrial contraction and ventricular diastole*

What event within the heart causes the AV valves to open? *Ventricular pressure < atrial pressure*

What causes them to close? *Ventricular pressure > atrial pressure*

When are the semilunar valves closed? *During the period of relaxation of the heart as a whole and during atrial contraction.*

Open? *During ventricular systole*

What event causes the semilunar valves to open? *Ventricular pressure > pressure in great arteries*

To close? *Ventricular pressure < pressure in great arteries*

Are both sets of valves closed during any part of the cycle? *Yes*

If so, when? *Momentarily after atrial contraction and ventricular systole.*

Are both sets of valves open during any part of the cycle? *No*

At what point in the cardiac cycle is the pressure in the heart highest? *Ventricular systole*

Lowest? *Ventricular diastole*

What event results in the pressure deflection called the dicrotic notch? *The momentary increase in aortic pressure that occurs when its semilunar valves snap shut.*

4. Using the key below, indicate the time interval occupied by the following events of the cardiac cycle.

Key: a. 0.8 sec b. 0.4 sec c. 0.3 sec d. 0.1 sec

a 1. the length of the normal cardiac cycle

d 2. the time interval of atrial systole

b 3. the quiescent period, or pause

c 4. the ventricular contraction period

5. If an individual's heart rate is 80 beats/min, what is the length of the cardiac cycle? *0.75 sec* What portion of the cardiac cycle is shortened by this more rapid heart rate? *Quiescent period (ventricular relaxation period).*

6. What two factors promote the movement of blood through the heart? *Alternate contraction and relaxation of the myocardium* and *opening and closing of the heart valves (which is responsive to pressure gradients).*

Heart Sounds

7. Complete the following statements:

The monosyllables describing the heart sounds are __1__ . The first heart sound is a result of closure of the __2__ valves, whereas the second is a result of closure of the __3__ valves. The heart chambers that have just been filled when you hear the first heart sound are the__4__, and the chambers that have just emptied are the__5__. Immediately after the second heart sound, the__6__are filling with blood, and the__7__are empty.

1. *lub-dup*
2. *atrioventricular*
3. *semilunar*
4. *ventricles*
5. *atria*
6. *atria*
7. *ventricles*

8. As you listened to the heart sounds during the laboratory session, what differences in pitch, length, and amplitude (loudness) of the two sounds did you observe? *First heart sound is longer, louder, and lower in pitch than the second heart sound, which is short, sharp, and high-pitched.*

9. Indicate where you would place your stethoscope to auscultate most accurately the following:

closure of the tricuspid valve: *Left or right sternal border of the 5th intercostal space.*

closure of the aortic semilunar valve: *Right sternal border of the 2nd intercostal space.*

apical heartbeat: *5th intercostal space in line with the middle of the left clavicle.*

Which valve is heard most clearly when the apical heartbeat is auscultated? *Bicuspid*

10. No one expects you to be a full-fledged physician on such short notice; but on the basis of what you have learned about heart sounds, how might abnormal sounds be used to diagnose heart problems?

Abnormal sounds such as swishing sounds after valvular closure or high-pitched sounds arising when blood is forced through constricted (valve) openings might indicate valvular problems.

The Pulse

11. Define *pulse*. *Pressure surges in an artery occurring during each contraction and relaxation of the left ventricle.*

12. Describe the procedure used to take the pulse. *Place the first 2-3 fingertips of one hand over an arterial pressure point. Compress firmly and then release the pressure slightly to palpate the pulse.*

13. Identify the artery palpated at each of the pressure points listed.

at the wrist: *Radial*

on the dorsum of the foot: *Dorsalis pedis*

in front of the ear: *Temporal*

at the side of the neck: *Carotid*

14. When you were palpating the various pulse or pressure points, which appeared to have the greatest amplitude or tension?

Carotid artery Why do you think this was so? *The carotid artery(ies) is the major artery delivering blood to the brain (against gravity).*

15. Assume someone has been injured in an auto accident and is hemorrhaging badly. What pressure point would you compress to help stop bleeding from each of the following areas?

the thigh: *Femoral artery*

the calf: *Popliteal artery*

the forearm: *Brachial artery*

the thumb: *Radial artery*

16. How could you tell by simple observation whether bleeding is arterial or venous? *If it spurts, it is arterial. It will flow evenly if it is venous blood.*

17. You may sometimes observe a slight difference between the value obtained from an apical pulse (beats/min) and that from an arterial pulse taken elsewhere on the body. What is this difference called?

Pulse deficit

Blood Pressure Determinations

18. Define *blood pressure*. *Pressure exerted by blood against the walls of the blood vessels.*

19. Identify the phase of the cardiac cycle to which each of the following apply.

systolic pressure: *Systole (ventricular contraction)*

diastolic pressure: *Diastole (relaxation)*

20. What is the name of the instrument used to compress the artery and record pressures in the auscultatory method of determining blood pressure? *Sphygmomanometer*

21. What are the sounds of Korotkoff? *Sounds that can be auscultated over a partially occluded artery.*

What causes the systolic sound? *Sound of turbulent blood flow as it first begins to move through the constricted artery.*

The disappearance of sound? *Blood is flowing freely; the artery is no longer constricted.*

22. Interpret 145/85/82. *145=systolic pressure; 85=diastolic pressure reported as the point where the sound muffles; 82=diastolic pressure reported as the point at which sound disappears.*

23. Assume the following BP measurement was recorded for an elderly patient with severe arteriosclerosis:170/110/–. Explain the inability to obtain the third reading.

The patient's arteries are so narrowed by arteriosclerosis that blood flow is always partially occluded. Hence, the sound.

24. Define *pulse pressure*. *Systolic pressure minus diastolic pressure.*

Why is this measurement important? *It indicates the actual working pressure (actual amount of blood forced out of the heart during systole).*

25. How do venous pressures compare to arterial pressures? *Venous pressures are lower.*

Why? *Veins are far removed (in the circuit) from the pumping action of the heart.*

Observing the Effect of Various Factors on Blood Pressure and Heart Rate

26. What effect do the following have on blood pressure? (Indicate increase by I and decrease by D.)

D 1. increased diameter of the arterioles

I 2. increased blood viscosity

I 3. increased cardiac output

D 4. hemorrhage

I 5. arteriosclerosis

I 6. increased pulse rate

27. In which position (sitting, reclining, or standing) is the blood pressure normally the highest?

Standing The lowest? *Reclining*

What immediate changes in blood pressure did you observe when the subject stood up after being in the sitting or reclining position? *It decreased initially and then increased.*

What changes in the blood vessels might account for the change? *Upon standing, gravitational pull caused blood pooling in the lower part of the body, but then vasoconstriction initiated by the vasomotor center caused blood pressure to rise.*

After the subject stood for 3 minutes, what changes in blood pressure were observed? *It decreased once again.*

How do you account for this change? *Decreased activity of the sympathetic nervous system.*

28. What was the effect of exercise on blood pressure? *It increased the blood pressure.*

On pulse? *It increased the pulse.* Do you think these effects reflect changes in cardiac output *or* in peripheral resistance? *Cardiac output (+ vasoconstriction of specific vascular beds, e.g., GI tract).*

Why are there normally no significant increases in diastolic pressure after exercise? *Since diastolic pressure reflects the heart in relaxation, it would not be expected to increase in healthy individuals.*

29. What effects of the following did you observe on blood pressure in the laboratory?

nicotine *increased BP* cold temperature *increased BP*

What do you think the effect of heat would be? *Decreased BP*

Why? *Vasodilation would occur.*

30. Differentiate between a hypo- and a hyperreactor relative to the cold pressor test. *Hyperreactors exhibit a rise of 23 mm Hg or more in BP during the test. Hyporeactors exhibit a smaller increase or a decrease in BP.*

Skin Color as an Indicator of Local Circulatory Dynamics

31. Describe normal skin color and the appearance of the veins in the subject's forearm before any testing was conducted.

Skin pink; veins flat and difficult to see.

32. What changes occurred when the subject emptied his forearm of blood (by raising his arm and making a fist) and the flow was occluded with the cuff? *Skin becomes pale (cyanotic in some cases) and cool.*

What changes occurred during venous congestion? *Skin becomes pink (red) and warm, and veins are congested and very visible.*

33. What is the importance of collateral blood supplies? *Can maintain the blood supply to an organ (body part) in case the major nutrient artery is occluded.*

34. Explain the mechanism by which mechanical stimulation of the skin produced a flare. *Local inflammatory response produced by the chemical mediators released by injured tissue cells.*