

The human circulatory system has both a normal blood volume and a normal blood pressure. As the total blood volume increases, the average (mean) circulatory pressure increases. The data below are the blood volumes and corresponding mean circulatory pressures of the human circulatory system under three respective physiological conditions:

Normal Conditions		Strong Sympathetic Stimulation		Complete Sympathetic Inhibition	
Blood Volume (mL)	Mean Circulatory Pressure (mm Hg)	Blood Volume (mL)	Mean Circulatory Pressure (mm Hg)	Blood Volume (mL)	Mean Circulatory Pressure (mm Hg)
4000	0	3500	0	4250	0
4250	1.1	3750	1.2	4625	1.0
4600	2.3	3825	2.0	4850	2.1
4790	3.6	4050	3.1	5050	3.2
4880	4.7	4175	4.0	5200	4.1
4975	5.8	4325	5.1	5350	5.0
5050	6.9	4450	6.2	5500	6.3
5100	7.3	4500	7.1	5575	7.0
5190	8.2	4575	7.9	5660	8.2
5200	9.1	4600	9.0	5725	9.1
5275	10.0	4625	9.9	5760	9.9

Graph the Mean Circulatory Pressure vs. Blood Volume curves for human circulation under each of the respective physiological conditions. (Reminder: The pressure goes on the Y-axis and the volume on the X-axis.) Put all three of the curves on a single grid so you can compare them. Suggestion-- Since the lowest blood volume is 3500 mL, you might want to "break" the scale on that axis and start with a volume of 3000 mL. Use three colors for your lines (or three different point protectors) and include a legend on your graph. Don't forget to add a title. Your graph should be neat.

The feeling of absolute rage (such as that perhaps caused by having to do this lab problem) results in the discharge of many sympathetic nerves and, consequently, strong stimulation of body organs such as the heart. One specific result is that blood pressure increases. For a given blood volume (as an example, use 4500 mL on you graph), how much does the blood pressure increase (i.e., 2X, 3X, or what)? _____

What happens to blood pressure under the condition of complete sympathetic inhibition?

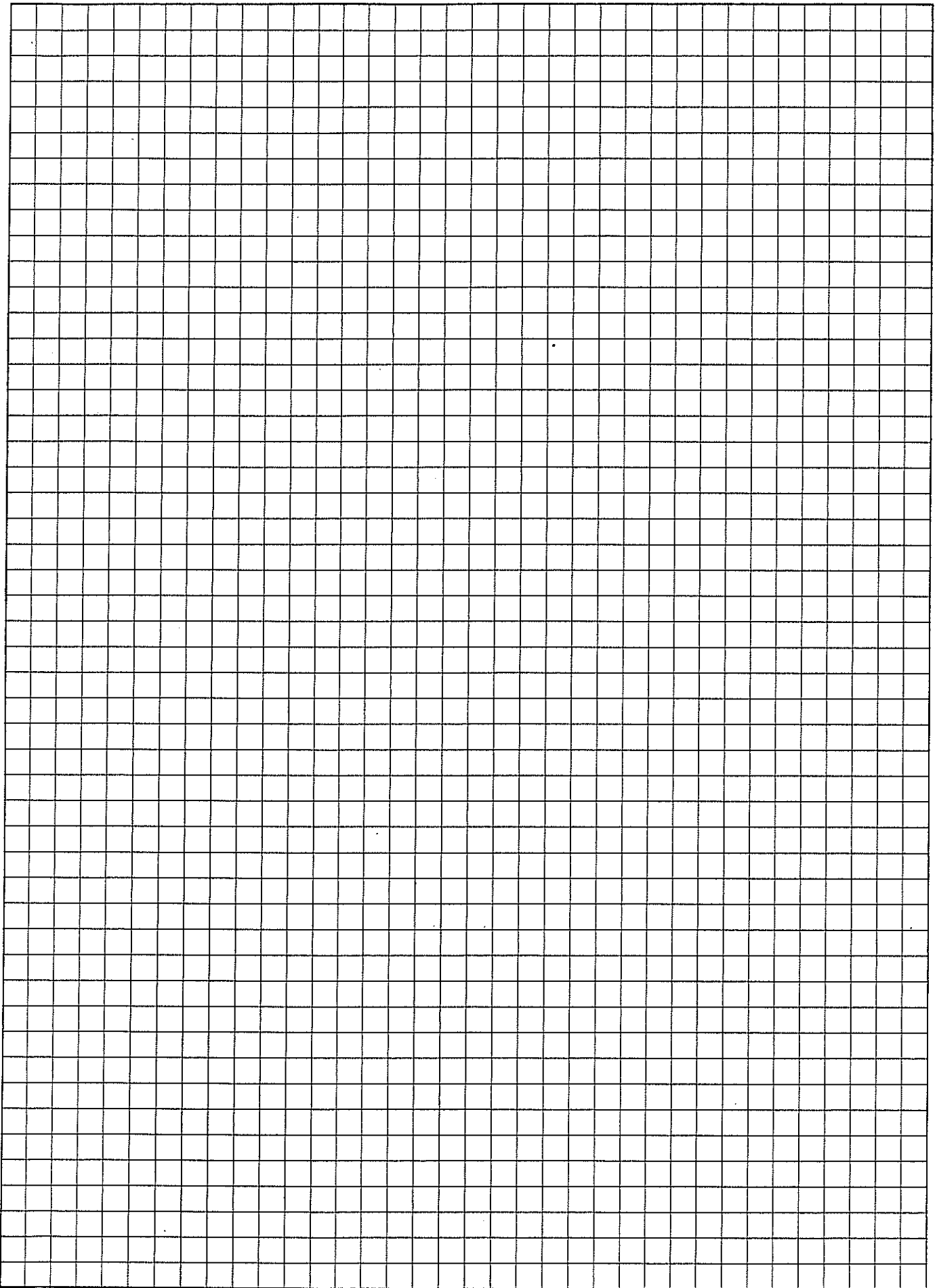
The human circulatory system is a so-called “double circulation” system. This consists of the pulmonary circulation between the heart and the lungs and the systemic circulation between the heart and the body. In normal systemic circulation, the blood pressure has a characteristic value in a particular vessel. The following are data for these normal pressures:

Location of the vessel in the Systemic circulation	Pressure (mm Hg)
Entry to aorta from heart	120
End of aorta/entry to large arteries	100
End of large arteries/entry to small arteries	95
End of small arteries/entry to arterioles	86
End of arterioles/entry to capillary networks	38
End of capillary networks/entry to venules	17
End of venules/entry to small veins	5
End of small veins/entry to large veins	3
End of large veins/entry to vena cava	1

Construct a bar-graph that shows pressure vs. location of the vessel in the systemic circulatory system. Remember to label each bar (leave extra room at the bottom of your graph since the labels will be long.) For those of you that want a challenge, see if you can come up with a way to shorten each label WITHOUT leaving out any of the table information (no abbreviation, keys, etc.—the labels must all be in place.)

At what location (which vessels) in the system would the fluctuations between systolic and diastolic pressures no longer be detected? _____ How does your graph help to support your answer? _____

5 millimeters/Division



5 millimeters/Division

