Follow the Pressure

Model how the heart moves blood through two circuits

HAP.8.a "Create a model to show how a pressure gradient moves blood through the circulatory system."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the two pumping chambers, circle phrases that describe pressure changes, and number the vessel names in flow order from the aorta through the lung circuit. Use your marks to trace how each pump creates a path from higher to lower pressure.

A Cyclist's Circulation

1. A cyclist climbs a steep hill, and the heart contracts more often to deliver blood to working muscles. The heart acts as two pumps that create pressure differences. Blood moves from a region of higher pressure toward a region of lower pressure, much as water flows through a hose when pressure differs at its ends. A pressure gradient is that difference across a pathway. Flow needs a gradient, not just high pressure at one point. If the two ends of a blood vessel had equal pressure, there would be no net flow through it.

2. On the body's side of the circuit, the left ventricle pushes blood into the aorta. Pressure is highest near this pump and falls as blood travels through arteries, arterioles, and capillaries in the muscles. The blood then enters venules and veins and reaches the right atrium at a much lower pressure. Narrow arterioles create substantial resistance, so pressure drops sharply across them. Veins have lower pressure than nearby arteries, yet blood still moves toward the heart because pressure falls along the return path. Valves in many veins limit backward flow, especially when leg muscles squeeze those veins.

3. The right ventricle supplies a second pressure boost. It pushes blood into the pulmonary arteries, which lead to capillaries in the lungs. Pressure falls along that path, and blood returns through pulmonary veins to the left atrium. This lung circuit works at lower pressures than the body circuit, but it still needs a pressure difference to move blood. Blood passes from the left atrium into the left ventricle, where another contraction renews the body's pressure gradient. A useful model shows both pumps, arrows in the direction of flow, and pressure decreasing through each circuit rather than treating pressure as identical everywhere.

2 ANSWER WITH EVIDENCE

Use the passage

1. In a model of blood moving from the left ventricle through muscle vessels to the right atrium, where would you place “higher pressure” and “lower pressure”? Which way should the arrows point?

2. A model labels lung capillaries as having higher pressure than pulmonary arteries. How would you correct the pressure labels and arrows?

3. A model shows equal pressure at both ends of a blood vessel. What should it show for net flow through that vessel, and why?

4. A model shows leg muscles squeezing a vein and blood moving toward the heart. What feature should you add to show why the blood does not simply flow backward?

3 YOUR TURN

Your own words

Sketch one continuous path for a drop of blood starting at the left ventricle, traveling through the body and lungs, and returning to the left ventricle. Label both pumping chambers, mark a higher- and lower-pressure region in each circuit, and add arrows; write one sentence explaining what powers the flow.

ANSWER KEY

Follow the Pressure

HIGH SCHOOL · HAP.8.a

PART 1 · READ AND MARK

Underline the two pumping chambers, circle phrases that describe pressure changes, and number the vessel names in flow order from the aorta through the lung circuit. Use your marks to trace how each pump creates a path from higher to lower pressure. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In a model of blood moving from the left ventricle through muscle vessels to the right atrium, where would you place "higher pressure" and "lower pressure"? Which way should the arrows point?	**Place higher pressure near the left ventricle and aorta and lower pressure near the right atrium. Arrows point through the muscle vessels toward the right atrium.**
2	A model labels lung capillaries as having higher pressure than pulmonary arteries. How would you correct the pressure labels and arrows?	**Label the pulmonary arteries as higher pressure than the lung capillaries. Point arrows from the pulmonary arteries toward the lung capillaries.**
3	A model shows equal pressure at both ends of a blood vessel. What should it show for net flow through that vessel, and why?	**It should show no net flow because there is no pressure gradient across the vessel.**
4	A model shows leg muscles squeezing a vein and blood moving toward the heart. What feature should you add to show why the blood does not simply flow backward?	**Add a vein valve that limits backward flow.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Left ventricle [pump] → aorta [higher body pressure] → arteries → arterioles → body capillaries → venules → veins [lower body pressure] → right atrium → right ventricle [pump] → pulmonary arteries [higher lung pressure] → lung capillaries → pulmonary veins [lower lung pressure] → left atrium → left ventricle. Each ventricle raises pressure, and blood flows through its circuit toward lower pressure.

Accept models that show a continuous, correctly directed route through both circuits, with a pressure decrease from each ventricle's outflow toward the receiving atrium. Exact pressure values are not needed.