Lesson 3 — Blood Vessels: Built for Different Jobs

Feature	Artery	Vein	Capillary
Wall	Thick, muscular, elastic	Thinner; less muscular	One cell thick
Lumen	Relatively narrow	Wider	Very narrow; about one red cell wide
Valves?	No (except at heart exits)	Yes, especially in limbs	No
Main job	Carry blood away from heart	Return blood to heart	Exchange substances with tissues

2. **Why arteries need thicker muscular walls**
   Blood leaves the heart at higher pressure. Thick muscular and elastic walls help arteries withstand and maintain this pressure.
3. **Why valves are useful in veins**
   Venous blood is under lower pressure, so valves prevent backflow and help blood return toward the heart.
4. **Two capillary features suited to exchange**
   Any two: walls only one cell thick; very narrow lumen; extensive branching network; close contact with body cells; slow blood flow/short diffusion distance.
5. **Exchange summary**
   Blood to cells: oxygen and nutrients/glucose. Cells to blood: carbon dioxide and other wastes.
6. **Why red blood cells bending through capillaries helps exchange**
   It keeps red blood cells very close to the capillary wall and slows their passage, giving oxygen a short distance and more opportunity to diffuse into tissues.

Job	Correct vessel
Carry blood away from the heart	Artery
Return blood to the heart	Vein
Exchange substances with cells	Capillary

7. **Explanation example**
   Example: Capillaries are best for exchange because their walls are only one cell thick, creating a very short diffusion distance.

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