Blood vessels and double circulation

Student activity • observation and reasoning

YEAR 10 / LESSON 65 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How does vessel structure fit its role in circulation?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, pencil and ruler
- Artery, vein and capillary cross-section diagrams plus a circulation outline

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 2.68–2.69. Vessels and circulation.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Compare artery, vein and capillary cross-sections, linking wall thickness, lumen and valves with pressure and function.

2. Explain capillary exchange using thin walls and extensive branching; distinguish a single capillary's narrow lumen from the network's large total cross-sectional area.

3. Draw the pulmonary and systemic circuits with arrows and oxygenation labels.

4. Add renal arteries and veins, hepatic artery and vein, and the hepatic portal vein from intestine to liver.

5. Explain why a portal vein connects two capillary beds and why absorbed nutrients pass to the liver.

6. Correct the claim that arteries are defined by oxygen content and explain the pulmonary exceptions.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Arteries carry blood away from the heart, veins towards it. Capillaries have very thin walls for exchange. Vein valves help prevent backflow in many regions; not every vein has valves. The hepatic portal vein carries nutrient-rich blood from the intestine to the liver before blood returns towards the heart.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. How is an artery defined?

2. Why are artery walls strong and elastic?

3. Why are capillary walls thin?

4. What can vein valves do?

5. Which vessel connects intestine to liver?

6. Which artery carries relatively deoxygenated blood?