



Transport: practice questions

8 questions • 27 marks • mark scheme at the back

For IB Diploma Biology, Standard Level and Higher Level (first assessment 2025). **HL only** is additional higher level content, for HL students only.

Name

Total / 27

1 PAPER 1A STYLE [1 mark]

Fenestrated capillaries are found in the glomerulus of the kidney. What is the advantage of fenestrations?

- A. ☐ They prevent blood cells from leaving the capillary
- B. ☐ They allow particularly rapid exchange of fluid and solutes
- C. ☐ They increase blood pressure in the capillary
- D. ☐ They prevent backflow of blood

2 PAPER 2A STYLE [4 marks]

Distinguish between the structure of arteries and veins, relating each difference to function.

3 PAPER 2A STYLE [2 marks]

A student counted her radial pulse for 20 s three times and got 24, 26 and 25 beats. Calculate her mean heart rate in beats per minute and state why she should use her fingertips rather than her thumb.

Answer =

4 PAPER 1B STYLE

[5 marks]

A study recorded mean daily saturated fat intake and deaths from coronary heart disease (CHD) in six populations. The correlation coefficient was $r = +0.98$. (a) Describe the relationship shown. (b) Explain how a high saturated fat intake could lead to occlusion of a coronary artery. (c) Evaluate whether the data show that saturated fat causes CHD.

Saturated fat intake and CHD deaths (practice data)		
Population	Saturated fat / % of energy intake	CHD deaths per 100 000 per year
1	7	60
2	9	95
3	11	140
4	13	150
5	15	230
6	17	240

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5 PAPER 2B STYLE

[6 marks]

Explain how water is transported from the roots to the leaves of a plant during transpiration.

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6

PAPER 1B STYLE

[4 marks]

HL only

The table shows pressures in the left side of the heart at times during one cardiac cycle.

(a) Deduce whether the atrioventricular valve is open or closed at 0.10 s, giving a reason.

(b) Identify the time at which the semilunar valve opens. (c) State the systolic aortic

pressure. (d) Explain why aortic pressure does not fall to zero.

Pressures in the left side of the heart (practice data)			
Time / s	Left atrium / mm Hg	Left ventricle / mm Hg	Aorta / mm Hg
0.00	6	5	82
0.10	8	30	80
0.15	4	81	80
0.25	3	120	119
0.40	4	90	95
0.50	6	4	88

[illegible]

7

PAPER 2A STYLE

[4 marks]

HL only

Describe how tissue fluid is formed, used and returned to the blood.

[illegible]

8

PAPER 1A STYLE

[1 mark]

HL only

Which feature is an adaptation of companion cells in phloem?

- A. ☐ Absence of a nucleus to reduce resistance to flow
- B. ☐ Sieve plates to allow sap to pass between cells
- C. ☐ Many mitochondria to supply ATP for loading sugars
- D. ☐ Lignified walls to withstand high pressure

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B [1]

2. [4]

- arteries have thicker walls relative to the lumen / veins thinner walls [1]
- artery walls withstand high pressure [1]
- arteries have more elastic fibres which stretch and recoil to maintain pressure/even out flow [1]
- arteries have more smooth muscle to narrow the lumen/maintain pressure [1]
- veins have valves to prevent backflow at low pressure [1]
- veins have wider lumen / flexible walls compressed by skeletal muscle to push blood to heart [1]
- max 4

3. [2]

- mean = 25 beats per 20 s, so $25 \times 3 = 75$ beats per minute [1]
- the thumb has its own pulse, which could be counted by mistake [1]

4. [5]

- (a) positive correlation: as saturated fat intake increases, CHD deaths increase [1]
- (a) strong correlation, as r is close to +1 [1]
- (b) raises blood cholesterol which forms fatty deposits/plaque in coronary artery walls, narrowing lumen [1]
- (b) plaque rupture leads to a blood clot that blocks the artery [1]
- (c) correlation does not prove causation [1]
- (c) other factors could differ between populations, e.g. smoking, exercise, genetics, age / only six populations [1]
- max 5

5. [6]

- water evaporates from (spongy mesophyll) cell walls and diffuses out through stomata [1]
- water drawn from xylem/through cell walls by capillary action/adhesion to cellulose [1]
- generates tension/negative pressure potential in xylem [1]
- tension pulls water up xylem [1]
- cohesion between water molecules due to hydrogen bonding [1]
- keeps a continuous column of water [1]
- adhesion of water to xylem walls [1]
- xylem has no cell contents/end walls so flow is unimpeded [1]
- lignified walls prevent collapse under tension [1]
- pits allow water to enter/leave xylem [1]
- passive process / energy from evaporation (sun), not ATP [1]
- max 6

6. [4] HL only

- (a) closed, as ventricular pressure is higher than atrial pressure [1]
- (b) 0.15 s, when ventricular pressure first exceeds aortic pressure [1]
- (c) 120 mm Hg (accept 119) [1]
- (d) elastic recoil of the aorta wall maintains pressure / semilunar valve prevents backflow [1]

7. [4] HL only

- high (hydrostatic) pressure at arteriole end of capillary [1]
- pressure filtration of plasma through capillary wall [1]
- large plasma proteins/blood cells stay in capillary [1]
- substances such as O₂/glucose pass from tissue fluid to cells; CO₂/wastes to tissue fluid [1]
- lower pressure at venule end so fluid drains back into capillaries [1]
- excess drains into lymph ducts (thin walls with gaps) and returns to the blood in veins [1]
- max 4

8. [1] HL only

C C [1]