This is the **Higher Combined Science** version. Higher Tier questions (★) are included. Some Separate-only content has been omitted.

## The Circulatory System (B2a)

*Specification reference: B2a*

**Q1. Explain why the left ventricle has a much thicker muscular wall than the right ventricle.**

**[3 marks]**

**Q2. Describe the adaptations of capillaries that make them suited for exchange of substances with tissues.**

**[3 marks]**

**Q3. Describe the four components of blood and the function of each.**

**[4 marks]**

★ HIGHER TIER

**Q4. ★ A patient has a heart rate of 65 bpm and stroke volume of 80 cm³. Calculate their cardiac output.**

**[2 marks]**

## Plant Transport (B2b)

*Specification reference: B2b*

**Q5. Describe the difference between transpiration and translocation.**

**[3 marks]**

**Q6. Describe how THREE factors affect the rate of transpiration. Explain the mechanism in each case.**

**[4 marks]**

**Total: 19 marks**

## The Circulatory System (B2a)

**Q1 (3 marks)**

*Explain why the left ventricle has a much thicker muscular wall than the right v…*

- Left ventricle pumps oxygenated blood to the whole body (systemic circulation) [1]
- The body is a much greater distance than the lungs — requires much higher pressure [1]
- Thicker muscle wall contracts more forcefully, generating the required higher pressure [1]

**Q2 (3 marks)**

*Describe the adaptations of capillaries that make them suited for exchange of su…*

- Walls are one cell thick — minimises diffusion distance [1]
- Large total surface area — maximises exchange rate [1]
- Located very close to all body cells — minimises distance substances must travel [1]

**Q3 (4 marks)**

*Describe the four components of blood and the function of each.*

- Red blood cells: no nucleus, biconcave, contain haemoglobin — carry O■ [1]
- White blood cells: phagocytes engulf pathogens; lymphocytes produce antibodies [1]
- Plasma: liquid that carries dissolved substances (glucose, hormones, CO■, urea) [1]
- Platelets: cell fragments that form blood clots at wound sites [1]

**Q4 (2 marks) [★ HT]**

*★ A patient has a heart rate of 65 bpm and stroke volume of 80 cm³. Calculate th…*

- Cardiac output = 65 × 80 [1]
- = 5200 cm³/min [1]

## Plant Transport (B2b)

**Q5 (3 marks)**

*Describe the difference between transpiration and translocation.*

- Transpiration: evaporation of water from leaves through stomata; drives water movement up xylem [1]
- Translocation: transport of dissolved sugars (sucrose) in phloem from leaves to rest of plant [1]
- Transpiration is one-way upward; translocation can be in any direction [1]

**Q6 (4 marks)**

*Describe how THREE factors affect the rate of transpiration. Explain the mechani…*

- Temperature: higher temp → more evaporation from cells → steeper concentration gradient for water vapour → faster rate [1]
- Light intensity: more light → stomata open wider → more water vapour can escape [1]
- Humidity: lower humidity → steeper concentration gradient between leaf and air → faster diffusion of water vapour [1]
- Wind speed: removes water vapour from near leaf surface → maintains steep gradient [1] — any three with explanation