

Biology 12
Resource Exam B
Scoring Guide

1. Explain how an increase in both substrate concentration and temperature could affect an enzyme's reaction rate. (4 marks)

KEY

- **Increasing substrate concentration will increase the rate of reaction by providing more substrate to bind enzymes' available active sites. (1 mark)**
- **Until all are bound at which time the reaction rate will level off. (1 mark)**
- **Increasing temperature will increase the rate of reaction by increasing the number of enzyme and substrate collisions. (1 mark)**
- **Until the temperature changes the shape of the enzymes (or denatures the enzymes) at which point the reaction rate decreases rapidly and stops. (1 mark)**

2. List the sequence of structures that a red blood cell passes through as it moves from the left ventricle of the fetal heart to the inferior vena cava in order to increase the oxyhemoglobin concentration of the blood.

(4 marks)

KEY

The red blood cell passes from the left ventricle of the fetal heart to the:

- aorta
- umbilical artery
- placenta
- umbilical vein
- venous duct

any four for
1 mark each

Note to markers: structures must be in correct order to receive full marks.

3. Describe the role of the diaphragm, pleural membranes and rib muscles during inhalation.

(4)

KEY

- **The diaphragm contracts to increase the volume of the thoracic cavity. (1 mark)**
- **The rib muscles pull the rib cage up and out to increase the volume of the thoracic cavity. (1 mark)**
- **The pleural membranes seal the thoracic cavity. (1 mark)**
- **Due to the contractions of these muscles and the sealing of the cavity, the increased volume/decreased pressure of the thoracic cavity causes air to be pulled into the lungs. (1 mark)**

4. Explain how the hypothalamus and the adrenal glands function to increase heart rate when the brain receives sensory signals indicating danger to the body. (5)

KEY

- **Stimulation of the hypothalamus results in it sending nerve impulses to the spinal cord. (1 mark)**
- **Nerve impulses from the spinal cord travel through sympathetic nerves to the adrenal medulla. (1 mark)**
- **Stimulation of the adrenal medulla results in it releasing epinephrine and/or norepinephrine. (1 mark)**
- **These hormones travel to the heart via the circulatory system. (1 mark)**
- **Stimulation of the heart by epinephrine and/or norepinephrine causes it to increase its rate of contraction. (1 mark)**

5. Describe three processes that make use of active transport in the nephron, and give their locations.

1st process (2 marks) _____

2nd process (2 marks) _____

3rd process (2 marks) _____

KEY

- **Selective reabsorption of glucose, amino acids, nucleotides, salts etc. at the proximal convoluted tubule (1 mark). Cells of the tubule use active transport to move these materials from the filtrate into the blood (1 mark).**
- **Water reabsorption at the Loop of Henle (1 mark). Sodium ions are actively transported out of the ascending limb to make the tissues hypertonic for water reabsorption (1 mark).**
- **Tubular excretion of drugs, urea, creatine etc. at the distal convoluted tubule (1 mark). Cells of the distal convoluted tubule use active transport to move these materials into the filtrate from the blood (1 mark).**
- **pH regulation by the distal convoluted tubule (1 mark). Distal convoluted tubule actively transports hydrogen ions out of the blood and bicarbonate ions into the blood to regulate the pH of the blood (1 mark).**
- **Sodium ion regulation at the distal convoluted tubule (1 mark). Cells of the distal convoluted tubule use active transport to reabsorb Na^+ and excrete K^+ to ensure proper ion concentrations (1 mark).**

any three for
2 marks each