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|  | **Year 11 ATAR Human Biology**  **Task 4 – Respiratory, circulatory and digestive systems** |

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| --- | --- | --- | --- |
| **Name: MARKING GUIDE** | **Teacher:** | **Date:** | **Score: /60** |

**Assessment type:** Test

**Conditions**

Time for the task: 60 minutes

**Task weighting** – 5%

Total 60 marks

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**Section 1: Multiple-choice (10 marks)**

This section has 10 questions. Answer all questions by writing the letter corresponding to the correct answer in the box provided.

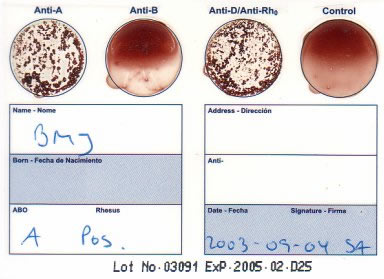
1. Use the diagram below to answer the following question.



Which of the following correctly identifies the three different formed elements of blood shown in the diagram above?

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| a) | Erythrocytes | Platelets | Leukocytes |
| b) | Leukocytes | Platelets | Erythrocytes |
| c) | Platelets | Plasma | Erythrocytes |
| d) | Leukocytes | Erythrocytes | Plasma |

1. In the case of transport of Carbon Dioxide in the blood which of the following is correct?
2. It is transported bound to haemoglobin only.
3. It is transported bound to haemoglobin and dissolved in the plasma only.
4. It is transported bound to haemoglobin, dissolved in the plasma, and as Hydrogen Carbonate ion.
5. It is transported as Hydrogen carbonate ion and dissolved in the plasma only.

The next question refers to the diagram below, showing the results of a blood test. The control shows a negative result.

1. The individual shown above has the blood type
2. A positive
3. B positive
4. A negative
5. B negative
6. The air tubes in the lungs that does not have a mucous membrane with cilia are called the
7. primary bronchi
8. tertiary bronchi
9. secondary bronchi
10. bronchioles
11. In the case of ventilation, the process of breathing in and out respectively is called
12. expiration and inspiration.
13. inspiration and expiration.
14. inspiration and expulsion.
15. expulsion and expiration.
16. During inspiration the volume of the lungs
17. decreases.
18. stays the same.
19. increases.
20. increases and decreases.
21. Which of the following statements concerning arteries and veins is correct?
22. Veins are usually rich in oxygen but most arteries carry oxygen-poor blood.
23. Arteries are highly elastic and have more muscular walls than veins.
24. Arteries have a low blood pressure but veins have a high blood pressure.
25. Veins carry blood away from the heart but arteries return blood to the heart.
26. The series of muscular contractions that moves food along the digestive tract is called
27. periosteum.
28. peristalsis.
29. pericardium.
30. perimysium.

1. Through what process do the villi absorb amino acids into the blood capillaries?
2. Endocytosis.
3. Diffusion.
4. Osmosis.
5. Active transport.
6. Which of the following relate to the structure of lipids?
7. High or low density.
8. Saturated, unsaturated and trans fats.
9. Made up of glycerol and fatty acids.
10. All of the above.

**End of Part A**

**Section 2: Short answer (36 marks)**

This section has three questions. Answer all questions. Write your answers in the spaces provided.

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**Question 11 (15 marks)**

Parts a, b, and c of the question refer to the diagram of the heart below.



1. Identify the structures labelled ‘W’ and ‘Z’.

W: **Right atrium**

Z: **Left ventricle**

(2 marks)

1. Describe the role of the structure labelled ‘V’ on the diagram.

**Prevents the backflow of blood/ maintains direction of blood flow**

(1 mark)

1. Explain why chamber Z has a thicker wall than the chamber on the opposite side of the heart.

**More muscle/ stronger to pump blood around the body**

(1 mark)

1. Describe where the blood goes and what happens to it once it exits the right ventricle up until the point it enters the left atrium.

* **Blood travels to the pulmonary artery (1)**
* **Through the lungs (1)**
* **Becomes oxygenated (1)**
* **Then to the pulmonary vein (1)**

(4 marks)

1. Compare the vessels labelled ‘X’ and ‘Y’ by completing the table below.

|  |  |  |
| --- | --- | --- |
|  | **Vessel X** | **Vessel Y** |
| **Structure** | **Thick walled/ elastic/ Muscular/ small lumen/aorta** | **Thin walled /large lumen/ contains valves/vena cava** |
| **Function** | **Carries blood away from heart/takes blood to the body** | **Returns blood to the heart** |

(4 marks)

1. Describe three events in the process of blood clotting.

**Any 3 of:**

* **Vasoconstriction of damaged vessels**
* **Clotting factors triggered**
* **Threads of insoluble protein/ fibrin creates a mesh network**
* **Mesh network traps platelets/ protein/ sticks to blood vessel walls**
* **Platelets stick together/ create plug/ clot**

(3 marks)

**Question 12 (13 marks)**

Parts a, b and c of this question refer to the diagram below, which represents the respirator system.



1. Identify the structure labelled ‘A’ and state its function.

**Any 1 of the following:**

* **Bronchi (1) Pathway for air to/from the lungs (1)**
* **Cartilage (1) Keeps airways open (1)**

(2 marks)

1. The structure labelled ‘B’ assists in the process of inspiration. Describe how Structure B assists the movement of air into the lungs.

**Any 4 of the following:**

* **Contracts**
* **Moves down**
* **Volume increased (in thoracic cavity)**
* **Pressure decreases/creates pressure gradient**
* **Air moves from high to low**

(4 marks)

The diagram below illustrates the structure that lies at the end of Structure C.



1. Complete the table below, identifying the name and function of the structures shown in the diagram.

|  |  |  |
| --- | --- | --- |
|  | **Name of structure** | **Function** |
| X | **Alveoli** | **Delivery of air to blood/gas exchange** |
| Y | **Blood capillary/vessel/plasma** | **Delivery blood to alveoli/gas exchange** |

(4 marks)

1. List three structural features that assist Structure X in achieving its function in the body.

**Any 3 of the following:**

* **Thin**
* **Moist**
* **Rich blood supply**
* **Large surface area**

(3 marks)

**Question 13 (8 marks)**

Lung capacity is measured by a simple breathing test using a spirometer. It measures the total amount of air that a person breathes in and out, giving an indication of lung capacity. Lung capacity is determined on many factors, but a person in good health will generally have a larger lung capacity than a person in poor health.

A study was conducted of the effects of exercise on lung capacity. Participants in the study were divided into two groups of nine. All participants were males aged between 18 and 30 years. Participants in group A were on an exercise program which involved regular running and swimming workouts. The participants in Group B were told not to change their daily physical activity from what they were already doing. Over a six-week period, the lung capacity of each participant was measured weekly with a spirometer and averaged for the groups. Shown below is a table of the results from the experiment.

|  |  |  |
| --- | --- | --- |
| **Time**  **(weeks)** | **Average lung capacity (litres)** | |
| **Group A** | **Group B** |
| 0 | 5.5 | 5.0 |
| 1 | 5.5 | 5.0 |
| 2 | 5.8 | 5.2 |
| 3 | 6.0 | 5.2 |
| 4 | 6.0 | 5.5 |
| 5 | 6.5 | 5.5 |
| 6 | 7.0 | 5.5 |

1. Propose a hypothesis for this experiment.

**Statement including independent and dependent variable (e.g Increased exercise will increase lung capacity)**

(1 mark)

1. Identify:

(i) The independent variable

**Amount of exercise**

(1 mark)

(ii) The dependent variable

**Lung capacity**

(1 mark)

(iii) Two variables that were controlled in the experiment:

**Any two of:**

* **Gender of participants**
* **Age range of participants**
* **Timing of recording of data/all participants measured weekly**
* **Method of recording data/all participants used a spirometer**

(2 marks)

1. If the researchers were aiming to improve the reliability of the experiment, suggest one change they could make to the experiment.

**Multiple trials/larger sample size**

(1 mark)

1. Further experiments were undertaken on different factors affecting lung capacity. What effect would you expect the lifestyle choice of smoking cigarettes would have on lung capacity? Justify your answer.

* **Reduced/lower lung capacity (1 mark)**
* **Lung function is decreased due to tar/congestion/emphysema/cancer/damage alveoli (1 mark)**

(2 marks)

**End of Part B**

**Section 3: Extended answer (14 marks)**

This section has one question. Write your answers in the spaces provided.

**Question 15**

1. Outline the mechanical digestion of the fat found on a piece of bacon.

**Any 3 of:**

* **Mechanical digestion is the physical breakdown of food (from large pieces to smaller pieces)**
* **In the mouth**
* **Saliva will lubricate food to assist breakdown**
* **Teeth/cheeks/tongue used to breakdown bacon**
* **Stomach churning**

**Any 3 of:**

* + **In the duodenum and small intestine**
  + **Bile from the liver**
  + **will emulsify the fat**
  + **Breakdown large fat globules to smaller fat globules**

(6 marks)

1. Describe the features of the small intestine that maximise the process of absorption.

**Any 4 of:**

* + **Large surface area/length**
* **Created by intestinal folds**
* **Villi/finger like projections (also increase surface area)**
* **Also microvilli/brush border**
* **Rich blood supply**
* **Lacteal in villi for fat absorption**
* **Thin membrane**

(5 marks)

1. Why are people who suffer from coeliac disease likely to become malnourished?

* **Unable to tolerate a protein called gluten (1)**
* **If they eat gluten their immune system responds by damaging or destroying the villi in the small intestine (1)**
* **Nutrients cannot then be absorbed and the person becomes malnourished (1)**

(3 marks)

**END OF TEST**