##### AEPES

##### Semester 1 Examination, 2023

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##### Question/Answer Booklet

**Students, please place your name in this box**

MARKING KEY

**SECTION ONE: MULTIPLE CHOICE** **(20 marks)**

|  |  |
| --- | --- |
| **Question** | **Answer** |
| 1 | D |
| 2 | B |
| 3 | A |
| 4 | A |
| 5 | C |
| 6 | A |
| 7 | D |
| 8 | D |
| 9 | A |
| 10 | D |
| 11 | C |
| 12 | B |
| 13 | C |
| 14 | D |
| 15 | B |
| 16 | C |
| 17 | D |
| 18 | D |
| 19 | D |
| 20 | A |

**SECTION TWO: SHORT ANSWER (65 MARKS)**

There are eight questions in this section. **Attempt all questions**.

Write your answer in the space provided. If room is insufficient, complete the question on the pages provided at the back of this booklet. Ensure that you clearly identify each answer.

Suggested working time for this section is 70 minutes.

**Question 1 (5 Marks)**

In the space provide draw and label a human heart.

|  |  |
| --- | --- |
|  | 1 mark each, MUST HAVE BOTH STRUCTURES  Aorta  Pulmonary artery & Pulmonary vein  Left & Right Atrium  Left & Right ventricle  Superior vena cava & Inferior vena cava |

Unclear diagrams – not linking chambers or aorta,

spelling

**Question 2 (3 marks)**

Identify and briefly explain the different factors that make gas exchange in the lungs possible.

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 mark | 2 marks | 3 marks |
| Capillaries | States that capillaries are one cell thick | States two of the following capillaries have walls of only one cell thickness, large surface area, moist environment, rich blood supply/surrounded by capillaries, elasticity, | States most of the following: capillaries have walls of only one cell thickness, large surface area, moist environment, rich blood supply/surrounded by capillaries, elasticity |
| Diffusion process | States that gaseous exchange is oxygen and co2 exchange | States that gaseous exchange is possible due to pressure differences or similar | Uses the word diffusion and accurately explains the process i.e. gases move from areas of higher pressure to areas of lower pressure |

Not listing key words such as diffusion, high – low pressure, concentration gradient

Simple description of diffusion process

Waffle into answer

Combination of structure or diffusion process.

Those who did well got 2/3 marks, may have missed one factor

**Question 3 (9 marks)**

1. Label the 3 types of blood vessels on the diagram below. (3 marks)

|  |  |  |
| --- | --- | --- |
| 1. Artery | 1. Capillary | 1. Veins |

Loss of easier marks, potentially due to no studying as only few marks

1. Compare and contrast the structure of these vessels (6 marks)

|  |  |  |
| --- | --- | --- |
| 1 mark per dot point addressed | | |
|  | Compare (similar) | Contrast (different) max of 4 |
| Arteries | * All vessels that carry blood throughout the body as part of circulatory system * All surrounded by smooth muscle * All tubular shaped with hollow centre | * Thick muscular walls to withstand pressure of blood being forced through * Generally carries oxygenated blood away from the heart (except pulmonary artery) |
| Capillaries | * Thin walls (singular cell layer) to allow diffusion of gases/ nutrients through walls |
| Veins | * Has valves to assist with venous return against gravity * Generally carries deoxygenated blood back to the heart (except pulmonary vein) |

Majority/all of class missed comparison part of question.

Max of 4 marks was mostly achieved

Describing arteries walls as thin and veins as thick

**Question 4 (6 marks)**

Gymnasts, in order to avoid injury, train by stretching their muscles beyond normal resting length.

This increases the muscles extendibility.

Identify and define the **three** other characteristics of skeletal muscle.

|  |  |
| --- | --- |
| **Answer Description** | **Max 6 Marks** |
| **Identifies** Contractibility  **Defines:** The ability of a muscle to shorten or reduce in length (or similar) | 1 mark  1 mark |
| **Identifies** Excitability  **Defines:** The ability of a muscle to contract in response to a stimulus or nerve impulse from the central nervous system (or similar) | 1 mark  1 mark |
| **Identifies** Elasticity  **Defines:** The ability of a muscle to return back to its original resting length after being stretched (or similar) | 1 mark  1 mark |

Spelling wasn’t great, elacticiablity or contractible – harsh on labelling in sentences not so strict

Showed who studied and who didn’t

Reasonably well done, those who guessed may have gotten a mark or two

**Question 5 (4 marks)**

CrossFit requires muscular contractions that differ between the exercise being executed.

Outline the **two** types of muscular contractions necessary for the following movements.

|  |  |
| --- | --- |
| **Answer Description** | **Max 4 Marks** |
| **Plank:** Isometric Contraction  **Defines:** Muscle length remains constant/static/the same during contraction.  **Pull Up:** Isotonic Contraction  **Defines:** Muscle length changes/shortens/lengthens during contraction. | 1 mark  1 mark  1 mark  1 mark |

Mentioned this would be in exam

Showed who studied and who didn’t

Attempted by all students

**Question 6 (10 marks)**

Below is an image of a soccer player preparing to kick a ball.

1. Label the two muscles labelled A and B in the box provided. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Accurately labels   * Muscle A – Hamstring * Muscle B – Quadricep | 1  1 |
| **Total** | **2** |

Well done by all students

1. Label the insertion point and origin point of muscle A on the diagram (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Accurately labels   * Origin at the top of the femur * Insertion across the knee joint on the head of the fibula | 1  1 |
| **Total** | **2** |

Rare to see correct placement, common mistake in first assessment task.

Origin and insertion are landmarks on bones not muscle as they are attachment site

1. Define the role of the origin and the insertion and explain how the muscles on the front and back of the thigh work together to create movement to flex the knee in preparation to strike the ball. (6 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Definition   * Origin – the points at which the muscle joins the stationary bone * Insertion – the points at which the muscles tendons attach to the moving bone | 1  1 |
| Subtotal | 2 |
| Explanation (explanation includes any **four** of the following)   * Muscles work as pairs by pulling on the bone (antagonist pairs) * As one muscle contracts, the opposite muscle must relax to create movement at the joint * When preparing to kick the ball the hamstring acts at the prime mover (agonist), contracting to decrease the distance between the joint (and flexing the leg at the knee) * The insertion attachment point of the hamstring crosses at the knee, allowing the muscle to pull on the lower leg bone to decrease the angle of the joint and flex at the knee * The quadricep works as antagonist, lengthening (or producing the opposite action to prime mover) | 1-4 |
| **Total** | **6** |

Question was misread and rushed, waffled through answer.

Flexion of the knee mostly left out of responses.

Unclear descriptions of origin & insertion points – again not just end of muscle, attachment point to bone

**Question 7 (11 marks)**

Athletes rely on the efficiency of their circulatory system to carry oxygen and nutrients around the body to all the cells, whilst removing waste products and carbon dioxide.

1. Blood is the main fluid in the circulatory system. Identify the four components found in the blood and outline their main function. (8 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 1 mark for identification, 1 mark for description  **Plasma (55%)**  Clear yellow fluid, of which 90% is water  Plasma carries the blood cells and is continually passed through capillary walls and into tissues  Provides cells with antibodies, proteins, glucose, salts, fats  **Red blood cells (45%)**  Give blood its RED colour  Responsible for carrying oxygen to the cells and the removal of carbon dioxide away from the cells of muscles and organs  **White blood cells (<1%)**  Responsible for moving to sites of infection where they destroy bacteria and other disease causing organisms  **Platelets –** (make up a very small percentage)  Produced in bone marrow and cause the blood to clot when a vessel is damaged, to prevent excess bleeding | 1-2  1-2  1-2  1-2 |
| **Total** | **8** |

Showed who studied and who didn’t

Attempted by all students

Identify means name then outline the function, two part question

1. As an athlete begins their training session, several immediate, physiological responses occur in the body and the athlete will begin to experience an increase in body temperature. Account for the increase in temperature experienced by the athlete and describe how the body prevents overheating. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 0 marks for identification and 1 for description. Responses may include:  During exercise, arteries vasodilate and vasoconstrict to allow more or less blood to reach certain areas of the body.  This increases the amount of blood available to the working muscles, increase oxygen supply to working muscles.  Activation of sweat glands. To prevent overheating the body initiates sweat as a response. Sweat is mostly comprised of water but contains electrolytes and other substances. It evaporates from the skins surface, absorbing heat in the process to promote a cooling effect.  Increased heat loss through respiration. The process of inhaling cool air and exhaling warm air promotes heat transfer from the body to the environment. | Max of 1 per response  1  1  1  1 |
| **Total** | **3** |

Overall, poorly done. Most students put sweating causes you to cool down – insufficient detail for marks and ATAR response.

**Question 8 (11 marks)**

A long-distance runner will require very different components of fitness than a 50m freestyle swimmer.

1. Identify and define the **two** components of fitness that would be the mostimportant for the long-distance runner and **two** components of fitness that would be the most important for the 50m swimmer (use different components for each athlete). (8 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| For each of **four** components:  Identifies the component  Defines the component  Long-distance runner   * Cardiorespiratory endurance – the ability of the body to be involved in continuous physical activity for an extended period. * Muscular endurance – the ability of the muscles to repeatedly exert force over an extended period. * Body composition – the percentage of fat, muscle and bone that make up the individuals body weight.   50m Freestyle Swimmer   * Muscular strength – the ability of the muscles to exert force against a resistance in a single contraction * Speed – to complete a movement or cover a distance in a short amount of time * Power- the ability to create maximum force very quickly * Body composition – the percentage of fat, muscle and bone that make up the individuals body weight. | 1  1 |
| Accept any other relevant answers |  |
| **Total** | **8** |

1. For either the long-distance runner or 50m swimmer, choose one of their main components of fitness and justify which training type would be most beneficial for them to include in their training program. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| For the training type selected: Correctly identifies  Thorough justification with supporting information  Simple justification with minimal detail  Marathon runner   * Cardiorespiratory endurance   Continuous training fartlek – exercising for a sustained period of time replicates the energy system/ fitness requirements of the marathon.   * Muscular endurance   resistance / interval / circuit training to repeatedly contract the muscles to develop aerobic capacity required to run a marathon  50m swimmer   * Muscular strength   Resistance training (isokinetic, isometric, isotonic) – performing a series of exercises with resistance using weights/machines to stress the muscles and progressively build strength/power required in sprint swimming   * Short interval training – short bouts of high intensity exercise followed by rest to train the anerobic pathway, to replicate the requirements of the 50m swim * Plyometric – rapid eccentric and concentric contraction of the muscles (of the upper body) to develop power and strength in the arms and chest – which relates to the muscles required in the 50m swim * Circuit training - performing a specific number of exercises to be complete in the quickest time possible, to train similar the anerobic pathway and specific muscles associated with the 50 m swim | 1  2  1 |
| Accept other relevant answers |  |
| **Total** | **3** |

**Question 9**

AFL is a highly demanding sport with some players running up to 15 kilometres in a game. Identify and describe three immediate responses of the circulatory system as a player is running around the field.

|  |  |
| --- | --- |
| Description | 6 Marks Max |
| Must state the response changes and description of response for 2 marks |  |
| ⇧ Stroke Volume  Volume of blood ejected by the heart per beat  ⇧ Cardiac Output  Total blood flow circulated per minute, or Heart Rate x Stroke Volume  ⇧ Systolic Blood Pressure  Pressure of blood on the artery walls whilst the heart is contracting  ⇧ AVO2 Difference  Difference in oxygen concentration in the blood between the arteries and the veins  Selective Redistribution of blood to working muscles  Blood moves to the muscles which are exercising away from other body systems/organs  Vasodilation/thermoregulation  Blood vessels to the skin dilate allowing for increased heat loss | 1 mark  1 mark  1 mark  1 mark  1 mark  1 mark  1 mark  1 mark  1 mark  1 mark  1 mark  1 mark |

**END OF SECTION TWO**

**SECTION THREE: EXTENDED ANSWER (30 MARKS)**

**Question 10** (10 marks)

In 2021, Western Australian Peter Bol became a household name after narrowly missing out on a medal at the Tokyo Olympics, placing 4th in the 800m final. During qualifying he ran an Australian national record of 1min 44.11secs. Explain the mechanics of breathing that would have occurred during Peter Bol’s 800m race.

|  |  |
| --- | --- |
| **Answer Description (Maximum of 2 marks only for identification)** | **10 Marks Max** |
| **Identifies** inspiration (or inhalation) as the process of breathing in  **Identifies** expiration (or exhalation) as the process of breathing out | **Max 2 Marks**  1-2 marks |
| **Inspiration (Inhalation)**  Diaphragm muscle contracts or flattens  Thoracic cavity (rib cage) expands, moves upwards/outwards  Increase in lung volume/size  Air pressure in lungs decreases (lower air pressure)  Air is drawn into lungs due to pressure differential (higher external air pressure moves to lower internal pressure) | **Max 4 Marks**  1-4 marks |
| **Expiration (Exhalation)**  Diaphragm muscle relaxes or rises  Pleural cavity contracts  Decrease in lung volume/size  Air pressure in lungs increases (higher air pressure)  Air is pushed out of the lungs to pressure differential | **Max 4 Marks**  1-4 marks |

**Question 9 (10 marks)**

Using your knowledge of the long term cardiovascular and respiratory effects of training, discuss **five** chronic adaptations Jai would have developed as a result of his training to be able to compete at his optimal performance state.

|  |  |
| --- | --- |
| **Answer Description**  **1 mark for correct identification, must include increase/decrease (max 5 marks)**  **1 mark for correct application to endurance optimal performance (max 5 marks)** | **Max 10 Marks** |
| **Increased cardiac hypertrophy**  Size of the heart increases, cardiac muscle strengthens, left ventricle wall thickens which allows more blood to be pumped with each beat (stroke volume) to deliver oxygenated blood to working muscles to avoid lactic acid accumulation or fatigue. | 1 mark  1 mark |
| **Decreased resting heart rate or increased maximal heart rate**  As the cardiac muscle (heart) is strengthened it becomes more efficient. At rest or lower intensities (e.g. flat stages) the heart can still pump enough oxygen to working muscles in a single beat with a lower heart rate (bpm) necessary.  At higher intensities (e.g. time trials, mountain stages), the cardiac muscle (heart) has the increased capacity to pump more blood per beat at a higher heart rate (bpm) to provide oxygen to working muscles and avoid lactic acid accumulation. | 1 mark  1 mark |
| **Increased stroke volume**  The amount of blood pumped in one beat form the left ventricle (into aorta) is increased to supply adequate oxygen to working muscles to maintain use of the aerobic system. | 1 mark  1 mark |
| **Increased blood volume or haemoglobin levels**  Red blood cell count increase results in more haemoglobin which carries/attaches to oxygen being able to be carried/transported and delivered to working muscles when required. | 1 mark  1 mark |
| **Increased capillarisation**  Increased size, density and/or number of capillaries at the lungs (alveoli) and/or muscle bed to diffuse and supply oxygen to the working muscles and remove waste (CO2 or lactic acid) as necessary. | 1 mark  1 mark |
| **Decreased blood pressure**  Due to increased efficiency of heart cardiac muscle, arteries (increased elasticity) and capillarisation the circulatory system blood flow is more efficient | 1 mark  1 mark |
| **Increased oxygen exchange or diffusion**  Increased oxygen into blood stream at capillaries in the lungs (alveoli) and/or muscle bed to diffuse and supply oxygen to the working muscles and remove waste (CO2 or lactic acid) as necessary. | 1 mark  1 mark |
| **Increased maximal oxygen uptake (VO2 max)**  The volume of oxygen that can be inhaled and delivered/utilised at the muscle bed to maintain the aerobic system before lactic acid begins to accumulate causing fatigue. | 1 mark  1 mark |
| **Increased ventilation capacity / tidal volume**  More oxygen can be inspired in a single breath (increased tidal volume) meaning a lower respiratory/ventilation rate (breaths per minute) resulting in an increased efficiency of oxygen into the lungs to be diffused to the bloodstream. Stronger respiratory muscles (diaphragm and intercostals) | 1 mark  1 mark |
| **Allow any other relevant adaptation to training identified and applied** |  |

**Question 27 10 marks**

With reference to the energy system continuum, identify which energy system will predominantly fuel the netball player during these high intensity movements on the ball, provide justification for your choice.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Maximum of 2 marks for drawing energy system continuum    Identifies correct energy system   * Anaerobic glycolysis system as the predominate system during repeated sprint efforts with justification of responses.   Simple justification with minimal detail – for full marks must reference above diagram in response.   * The ATP-PC system provides an immediate source of energy from CP stored in the muscles, which is limited to short burst of high intensity activity lasting less than 10 seconds. Due to repeated sprints lasting longer than this period of time, the ATP system would already be utilised and the anerobic glycolysis system would be the dominant system. * An example of this in netball would be a Centre court player repeatedly running from offense to defence * Jogging / walking back onside or repositioning whilst waiting for the ball to come back down court would be when the lower intensity movements and rest takes place. The aerobic system would be dominant briefly for this period of recovery. | 2 |
| Simple justification approx. 4 marks  8 marks for justification |
| **Total** | **10** |