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|  | **Year 11 ATAR Human Biology**  **Task 6 – Excretory and musculoskeletal systems** |

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| --- | --- | --- | --- |
| **Name: ANSWERS** | **Teacher:** | **Date:** | **Score: /70** |

**Assessment type:** Test

**Conditions**

Time for the task: 55 minutes

**Task weighting** – 5%

Total marks - 70

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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. The three major parts of the kidney from the outermost layer to the innermost layer.
2. Medulla, cortex and renal pelvis.
3. Cortex, renal pelvis, and medulla.
4. Medulla, renal pelvis and cortex.
5. **Cortex, medulla and renal pelvis.**

1. Which of the following organs does not play a role in excretion?
2. The liver.
3. The skin.
4. The kidneys.
5. **The heart.**
6. Which of the following is the first step in urine formation?
7. Selective reabsorption.
8. **Glomerular filtration.**
9. Secretion.
10. Excretion.
11. Reabsorption of ions, such as chlorine, in the nephron does not occur in the
12. proximal convoluted tubule.
13. **renal corpuscle**
14. distal convolute tubule.
15. collecting duct.
16. Which of the following is an activity of the collecting duct of the nephron?
17. Filtration of blood.
18. Formation of filtrate.
19. **Active reabsorption of water.**
20. Reabsorption of sodium ions.
21. Whilst running, the gluteus maximus and hamstrings work together to help perform a movement. What name is given to such a pair of muscles?
22. Antagonistic
23. Agonistic
24. Origins
25. **Synergistic**

**Use the diagram of the ballerina below to answer Question 4.**

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1. The movement of the hip joint allowing the ballerina to lift her leg is best described as
2. flexion.
3. **abduction.**
4. adduction.
5. extension.

1. The cartilage in the nose that provides form and support is best described as being
2. **hyaline cartilage.**
3. fibrocartilage.
4. elastic cartilage.
5. smooth cartilage.
6. A specific type of muscle will exhibit all of the following characteristics. Choose the best response.
7. Have properties of contractibility, extensibility and elasticity.
8. Bring about movement of joints.
9. Gives the body its form and contours.
10. Allow the body to maintain posture.

The specific type of muscle that exhibits all of the characteristics from above is known as

1. smooth muscle.
2. voluntary muscle.
3. **skeletal muscle.**
4. cardiac muscle.
5. Which of the following statements is incorrect about synovial fluid? It
6. contains phagocytic cells that remove micro-organisms and any debris.
7. **may decrease in volume when a joint is traumatised or injured.**
8. lubricates the joint and provides nourishment for the cells of the articular cartilage.
9. forms a thin film over surfaces within the capsule.

**End of Section 1 – See below for Section 2**

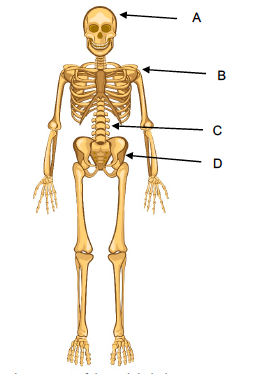
**Section 2: Short answer (45 marks)**

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

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**Question 11 (14 marks)**

The skeletal system of the human body is shown in the diagram below.



1. Identify the letter(s) that make up part of the axial skeleton.

**A and C**

(1 mark)

1. The femur is an example of a long bone. Draw a cross section diagram through a long bone and identify the compact bone, spongy bone and epiphysis.

 **Appropriately drawn cross section identifying spongy bone (1), epiphysis (1) and compact bone (1)**

(3 marks)

1. There are two types of bone marrow in a long bone: red and yellow. How do they differ in

function?

**Red – production of blood cells/erythropoiesis**

**Yellow – fat storage/production of fat/cartilage/bone**

(2 marks)

1. Outline how two named features of the hip joint help prevent injury and allow for stability when moving.

**1 mark for feature and 1 mark for how they prevent injury and allow stability:**

**Any two of the following:**

* + **Shape of the articular surface/bones which allow them to fit together without rubbing/touching**
  + **Ligaments attaching bone to bone which restrict movement**
  + **Joint capsule / fibrous capsule is lined with synovial membrane / encloses /supports joints**
  + **Meniscus fibrocartilage improves the fit between adjacent bones**

(4 marks)

A 60-year old patient is exhibiting signs of hip pain, decreased range of motion, and a popping feeling when walking.

1. State the degenerative disease most likely attributed to this pain.

**Osteoarthritis**

(1 mark)

1. Suggest a management plan the doctor may assign to help assist the patient.

**Three of the following:**

* + **Weight loss / control**
  + **Exercise**
  + **Paracetamol/non-steroidal anti-inflammatory drugs**
  + **Physiotherapy**
  + **Injections of glucosamine/corticosteroids**

(3 marks)

**Question 12 (18 marks)**

The diagram below represents the urinary system of the human body.



Y

Z

1. Identify the following labelled structures stating a function for each.

Y **Ureter Carries urine from the kidney to the bladder**

Z **Bladder Collects/stores urine from the kidney**

(4 marks)

1. Describe the processes that occur during excretion in the kidneys.

* **Filtration**
* **Fluid is forced out of the blood into the glomerular / Bowmans capsule**
* **Reabsorption**
* **Substances taken back into the blood vessels from the nephron**
* **Secretion**
* **Substances moves into the nephron/tubules from the blood/capillaries**

(6 marks)

1. Explain how the structure of the nephron relates to its function to excrete wastes.

**Must relate structure to function. Answers may include any two of the following:**

* **Glomerulus is a network which increases surface area to increase filtration**
* **Glomerular capsule surrounds the glomerulus to collect the fluid filtered out of the blood capillaries**
* **Arteriole leading out of the glomerulus has a smaller diameter than the arteriole leading in to increase pressure/filtration**
* **The tubule has two sets of convolutions and a long loop so that each tubule has a large surface area for reabsorption and secretion**
* **Each kidney has over a million nephrons so the total surface area available for reabsorption and secretion is large**
* **Cells in the PCT have cilia / large numbers of mitochondria to increase reabsorption / increase active reabsorption**

(4 marks)

Urea is a metabolic waste that is excreted primarily from the kidneys.

1. Describe the formation of urea in the body and state an organ besides the kidney that excretes this metabolic waste.

**Three marks from the following for formation of urea:**

* **Deamination**
* **Amine group / NH2 converted to ammonia**
* **that is further converted to urea**
* **energy / ATP is required**

**One mark from the following for excretory organ:**

* + **Skin / sweat gland**

(4 marks)

**Question 13 (13 marks)**

A sport science student wanted to investigate if there was a difference in percentage of fast and slow twitch fibers of highly skilled marathon runners compared to non-athletic individuals. His sample size of individuals tested at each level was 100. He used a muscle fibre composition test to obtain his data.

The results of his investigation are in the table below.

Table 1: Average muscle fibre composition for non-athletic and endurance athletes

|  |  |  |
| --- | --- | --- |
| **Athletic level** | **Average amount of fibres (%)**  **Fast twitch**  **Slow twitch** | |
| Non-athletic | 50 | 50 |
| Endurance athlete | 30 | 70 |

1. Propose a suitable hypothesis for this investigation.

**The endurance athlete will have a higher percentage of slow twitch fibres compared with the non-athlete group.**

(1 mark)

1. Identify:
   1. the independent variable – **athletic level**
   2. the dependent variable – **percentage of muscle fibres**
   3. two controlled variables– **any 2 from: same age of individuals, same amount of training/intensity of training for endurance athletes, similar diet, same method of measuring muscle fibre composition, same timing of completion of muscle fibre composition test (any suitable)**

(4 marks)

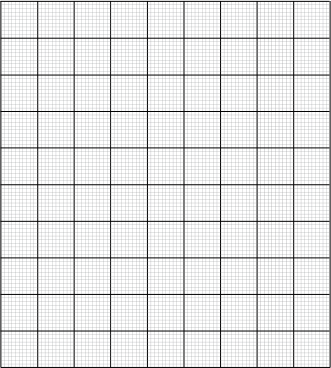
1. Draw a graph of the results in the space provided below.

**- Title – includes both variables (1)**

**- Correct graph (column graph) (1)**

**- Axis correctly labelled (1) with units(1)**

**- Plotting accuracy (1)**



(5 marks)

1. Propose a suitable conclusion for this investigation.

* **Hypothesis was/was not supported (1)**
* **General comment about data – Endurance athletes have a larger percentage of slow twitch fibres compared with non-athletic individuals (1) Supported with data (1)**

(3 marks)

**End of Section 2 – Turn over for Section 3**

**Section 3: Extended answer (15 marks)**

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

**Question 14**

The human body is composed of tissues, which are groups of cells that perform specific functions.

1. Identify and compare the types of tissues that make up the muscular system.

|  |  |  |
| --- | --- | --- |
| **Description** | **Mark** | |
| Skeletal, Cardiac and Smooth muscle tissue identified | 1 | |
| Any 7 of the following rows for 1 mark each: | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Type | Skeletal | Cardiac | Smooth |  | | Function | Movement of bone | Heart beating | Movement of internal organs | 1-7 | | Striation | Striated | Striated | Non-striated | | Nucleated | Multinucleated | Uninucleated | Uninucleated | | Shape | Long cylindrical | Spindle | Short cylindrical | | Fibres | Bundled/ unbranched | Sheets | Networks/  branched | | Location | Limbs | Heart | Iris/ureters/  bronchi | | Control | Voluntary | Involuntary | Involuntary | | Fatigue | Yes | No | No | | Contraction | Quick | Quick | Slow | | Intercalated discs | Not present | Present | Not present | | \*Other appropriate comparisons accepted. | | | | | | | |
| **Total** | | **8** |

(8 marks)

Muscle tissue consists of elongated cells called muscle fibers. This tissue is responsible for movement through muscle contraction.

1. Draw an annotated diagram of the sliding filament model and explain how muscle contraction takes place using this model.

|  |  |
| --- | --- |
| **Description** | **Mark** |
| 1 mark for each correctly labelled term (example as shown)  Sarcomere  thick and thin filaments  Z line and H zone, A & I Band | 3 |
|  |  |
| The sliding filament model states that the actin and myosin filaments slide past each other.  When the muscle contracts, the sarcomere shortens and the A bands move closer to one another.  When the muscle relaxes, the actin and myosin filaments are pulled past one another in the opposite direction  The sarcomere lengthens. | 1-4 |
| **Total** | **7** |

(7 marks)

**END OF TEST**