**ATAR HUMAN BIOLOGY**

**UNIT 1**

**Task 4 – Bone Practical Marking Key**

**Introduction.**

|  |  |
| --- | --- |
| **Description** | **Marks** |
| 1. **Hypothesis**  * Is testable * Includes a define relationship between the dependent and independent variable | **1-2** |
| 1. **Independent and Dependent Variables**  * Correctly identifies independent variable – the density of the bone * Correctly identifies dependent variable – the force to break | **1-2** |
| 1. **Controlled Variables**  * Correctly identifies two appropriate controlled variables * Explains that these must be controlled to ensure accurate representation of the relationship between the independent and dependent variable/to ensure a fair test/reliable | **1-3** |
| **Total** | **/7** |

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **Table**   * Force calculated accurately * Density calculated accurately | **1-2** |
| **4. Graph**   * Title includes independent and dependent variables * Axis are labelled correctly * Scales are correct * Points plotted accurately * Line graph | **1-5** |
| **5. Trend**   * As the bone density increases then so does the force required to break it * One point of interest from the graph eg skull is way denser than anything else | **1-2** |
| **6. Conclusion**   * Comment on whether the hypothesis is supported or not quoting hypothesis * Link to data/how data supports the hypothesis or not | **1-2** |
| **7. Validity**   * Experiment not valid as it is testing kangaroo bones and the hypothesis is about human bones * Results imply a connection but to support hypothesis need to test human bone/bones were from a dead animal and density changes the older the bone so may not be true indication | **1-2** |
| **Total** | **/13** |

Discussion.

1. This experiment was conducted using dead bone tissue. Explain why this would have affected the amount of force required to fracture the bones compared to living tissue. (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| The force required would be less | 1 |
| Reason – once bone is dead the material inside starts to break down  Resulting in a loss of mass/density  Bone becomes more hollow so is easier to break | 1-2 |
|  | Total 3 |

1. By referring to the structure of a long-bone, explain whether you believe that the direction of force would change how much force would be required to break your bone. (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| The shaft of the bone is made of osteons joined to form cylinders | 1 |
| The cylinders cannot be pushed down – require great force to break if applied at top | 1 |
| If force applied from the side cylinders break easily | 1 |
| The end of the bone – bone cells arranged randomly so force can be applied equally from any direction so direction would not affect force required to break | 1 |
|  | Total 4 |

1. Evaluate the following statement:

“*It is important that the femur is stronger than the radius in a human*” (3 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Femur has the biggest “load” put on it/most weight bearing/load is constant | 1 -3 |
| Radius – load comes from what lifting/loads not constant/load smaller |
| Radius also works with ulna so two bones working as one so share the force so don’t need to be as strong |
| Any valid point |
|  | Total 3 |