**Answer Sheet**

Investigating Antagonistic Muscles

*Muscle Length*

|  |  |  |  |
| --- | --- | --- | --- |
| **Origin of biceps muscle** | **Insertion of biceps muscle** | **Origin of triceps muscle** | **Insertion of triceps muscle** |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Muscle gets shorter when arm bends** | **Muscle gets longer when arm bends** | **Muscle gets shorter when arm straightens** | **Muscle gets longer when arm straightens** |
|  |  |  |  |

*Contraction and Movement*

|  |  |
| --- | --- |
| **Prediction for biceps contraction** | **Observation for biceps contraction** |
|  |  |

|  |  |
| --- | --- |
| **Prediction for equal contraction of both** | **Observation for equal contraction of both** |
|  |  |

|  |  |
| --- | --- |
| **Prediction for triceps contraction** | **Observation for triceps contraction** |
|  |  |

|  |
| --- |
| **Additional Observations** |
|  |

Testing Mechanical Advantage

*Calculating Resistance Force*

|  |  |  |
| --- | --- | --- |
| **Total Mass (kg)** | **Acceleration due to gravity (m/s2)** | **Resistance Force (Newtons or N)** |
|  |  |  |

*Measuring Effort Force, Calculating Mechanical Advantage and*

*Measuring the Effort Arm*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Biceps Insertion** | **Effort Force (Newtons)** | **Resistance Force (Newtons)** | **Mechanical Advantage** | **Effort Arm (centimeters)** |
| Peg B |  |  |  |  |
| Peg C |  |  |  |  |
| Peg D |  |  |  |  |

Application Questions

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