|  |  |
| --- | --- |
| logo **Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | |
|  | **Year 11 ATAR Physical Education Studies** |
| **Task 8 – Validation – Biomechanics** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Assessment type** | **Conditions** | **Task weighting** | **Marks allocated** | |
| Response | 60 minutes | 2.5% | /58 | % |

**Part A – Multichoice Questions – Clearly circle the letter corresponding to your answer 10 marks**

|  |  |  |
| --- | --- | --- |
| 1. | Internal forces are produced by; | |
| a) | | Gravity | |
| b) | | Friction | |
| c) | | Muscles | |
| d) | | Air resistance | |

|  |  |  |
| --- | --- | --- |
| 2. | The statement ‘an object as rest will remain so unless acted on by a force’ is an example of | |
| a) | | Newton’s first law | |
| b) | | Newton’s second law | |
| c) | | Newton’s third law | |
| d) | | None of the above | |

|  |  |  |
| --- | --- | --- |
| 3. | The greater an object’s mass; | |
| a) | | The greater its inertia | |
| b) | | The greater the force required to accelerate it | |
| c) | | The greater its resistance to change its state of motion | |
| d) | | All of the above | |

|  |  |  |
| --- | --- | --- |
| 4. | In order to summate forces effectively; | |
| a) | | The muscles with the least inertia should initiate the movement | |
| b) | | The muscles with the greatest inertia should initiate the movement | |
| c) | | The larger muscles should apply their forces towards the end of the movement to produce power | |
| d) | | The faster muscles should be utilised first | |

|  |  |  |
| --- | --- | --- |
| 5. | Linear motion occurs in; | |
| a) | | A straight line where all parts move in the same direction, same time at the same speed | |
| b) | | A curved or straight line where all parts move in the same direction, same time at the same speed | |
| c) | | A curved line where all parts move in the same direction, same time at the same speed | |
| d) | | A straight or curved line where all parts move in the same direction, same time, same displacement | |

|  |  |  |
| --- | --- | --- |
| 6. | Rotation only is caused by; | |
| a) | | An eccentric force | |
| b) | | A concentric force | |
| c) | | A fource couple | |
| d) | | A translation force | |

|  |  |  |
| --- | --- | --- |
| 7. | The horizontal distance a projectile travels is referred to as; | |
| a) | | Horizontal distance | |
| b) | | Optimal projection | |
| c) | | Range | |
| d) | | Optimal displacement | |

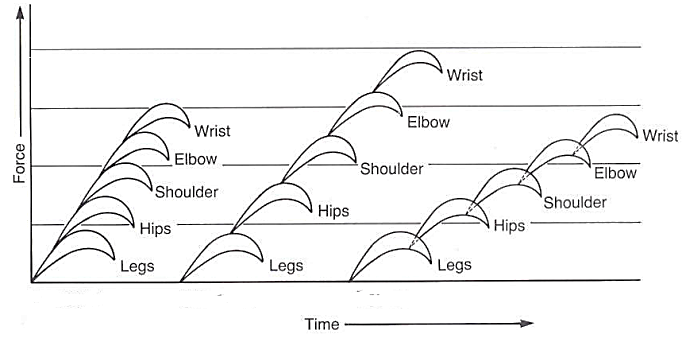
|  |  |  |
| --- | --- | --- |
| 8. | When a body is at rest, it is in a state of; | |
| a) | | Dynamic equilibrium |
| b) | | Static equilibrium |
| c) | | Mobile equilibrium |
| d) | | Gravitational equilibrium |

|  |  |  |
| --- | --- | --- |
| 9. | An increase in mass will; | |
| a) | | Increase stability | |
| b) | | Decrease stability | |
| c) | | Have no effect on stability | |
| d) | | Change the centre of gravity of the object | |

|  |  |  |
| --- | --- | --- |
| 10. | Which of the following is an example of increasing stability ? | |
| a) | | A gymnast raising both arms above their head | |
| b) | | A boxer bouncing on their toes to evade punches from their opponent | |
| c) | | A skier bending their knees as they travel down a steep slope | |
| d) | | A sprinter performing a crouch start | |

**Part B – Short Answer – Write the answer to each question in the space provided. 48 marks**

**Question 11 4 marks**

Examine the graph of a person throwing below and answer the corresponding questions

|  |  |  |
| --- | --- | --- |
| A | B | C |

a. What concept is this graph displaying? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Explain which method of throwing (A, B or C) will produce the best result and why

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 12 3 marks**

List 3 external forces that can act on a body

a.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ c.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 13 3 marks**

a. Force absorption relates to which of Newton’s laws of motion?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What two factors are important for the absorption of force when catching a ball?

•\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ •\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 14 6 marks**

The optimal angle of projection for maximum horizontal distance is usually 45°. For the following activities, explain whether the optimum angle is more, less or equal to 45° and why this is the case

1. Shot put \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Long jump \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. High jump \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 15 3 marks**

Define Newton’s first law of motion and apply it to a golfer hitting their shot off the tee

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 16 6 marks**

List and describe the four (4) factors that influence stability

•\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

•\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

•\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

•\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 17 6 marks**

A footballer tries to bump an opponent to knock him off balance in a tackle. Explain how this is achieved using a diagram to illustrate your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 18 4 marks**

Explain the concept of Newton’s second law and apply it to a sport of your choice

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 19 3 marks**

Newton’s third law states ‘that for every action, there is an equal and opposite reaction’. Use this law to explain how an athlete can pass a touch rugby ball.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 20 3 marks**

A gymnast claims to be able to place their centre of gravity outside their body. Explain what this means and, with the use of a diagram, if this is possible or not.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 21 5 marks**

Explain simultaneous summation of force and use sporting examples to explain how simultaneous summation can be used to produce power or accuracy

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 22 2 marks**

A run-up serves to maximise the distance a kicked AFL football travels. Explain how this occurs

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**End of questions**

**MARKING KEY**

|  |  |
| --- | --- |
| logo | **Year 11 ATAR Physical Education Studies** |
| **Task 8 – Validation - Biomechanics** |

**Part A – Multichoice Questions – Clearly circle the desired letter corresponding to your answer (10 marks)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| C | A | D | B | B | A | C | B | A | C |

**Part B – Short Answer – Write the answer to each question in the space provided. (48 marks)**

**Question 11 4 marks**

Analyse force summation graph and explain which option will produce the best throw

|  |  |
| --- | --- |
| **Description** | **Marks** |
| a. **1 mark** for identifying summation of force/velocity  b. **1 mark** to identify ‘C’ as the most effective throw  **1 mark** - explain body segments are sequentially added at the peak velocity of previous segment  **1 mark** - explain that larger, slower segments are used first, followed by smaller, faster segments | 1  1  1  1 |

**Question 12 3 marks**

List 3 external forces that can act on a body

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **1 mark each** for – gravity, friction, air resistance or water resistance | 1 |

**Question 13 3 marks**

Force absorption relates to which of Newton’s laws of motion?

|  |  |
| --- | --- |
| **Description** | **Marks** |
| a. **1 mark** – identify second law of motion  b. **1 mark each** – velocity and time | 1  1-2 |

**Question 14 6 marks**

Explain optimum angle (more, less or equal to 45°) for various skills

|  |  |
| --- | --- |
| **Description** | **Marks** |
| a. **1 mark** – shot put is less than 45°, **1 mark** – due to increased height of release  b. **1 mark** – long jump less than 45°, **1 mark** – it is more important to maintain horizontal velocity  c. **1 mark** – high jump greater than 45°, **1 mark** – vertical velocity more important to get over bar | 1-2  1-2  1-2 |

**Question 15 3 marks**

Define Newton’s first law of motion and apply it to a golfer hitting their shot off the tee

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **1 mark** – law defined as ‘an object at rest will stay at rest, an object in motion will stay in motion in the same direction and velocity until an unbalanced force acts on it’  **1 mark** – golf ball will sit on the tee, at rest, until acted upon by an external force (golf club)  **1 mark** – once it has been hit, the ball will continue to travel in the same direction at the same velocity until an unbalanced force acts on it (gravity, air resistance and the ground when it lands) | 1  1  1 |

**Question 16 6 marks**

List and describe the four (4) factors that influence stability

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **½ mark each** to identify the 4 factors**, 1 mark** for adequate description of each factor  a. **mass** – generally, the greater the mass, the greater stability of an object  b. **area of base of support** – the greater the area of the base of support, the greater stability  c. **height of centre of gravity** – the lower the centre of gravity, the greater stability  d. **line of centre of gravity in relation to base of support** – the closer the line of gravity to the centre of the base of support, the greater the stability | ½-1½  ½-1½  ½-1½  ½-1½ |

**Question 17 6 marks**

Explain how you would knock a footballer off balance – use diagrams

|  |  |  |
| --- | --- | --- |
| **Description** | | **Marks** |
| **1 mark** – explain how body is stable while running in football (line of gravity over base of support)  **1 mark** – explain loss of balance - falling over (line of gravity outside base of support)  **1 mark** – achieved by application of eccentric force (eg. tackle) within rules of sport  **1 mark** – applied force needs to be sufficient to move line of gravity outside the base of support | | 1  1  1  1 |
|  | **Diagram – ½ mark each for following**  Purple box – representation of football player  Black dot – centre of gravity  Red line – line of gravity  Blue arrow – direction and size of force application | ½  ½  ½  ½ |

**Question 18 4 marks**

Explain the concept of Newton’s second law and apply it to a sport of your choice

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **1 mark** – law states ‘the acceleration of an object is directly related to the net force and inversely related to its mass’ F=ma without further explanation is not sufficient  **1 mark** – a force (greater than inertia) is applied to an object to get it to move in a certain direction  **1 mark** – the more force is applied, the greater the acceleration of the object (drop shot v drive)  **1 mark** – correct application to a sporting example of choice | 1  1  1  1 |

**Question 19 3 marks**

Use Newton’s 3rd law to explain what happens when a player kicks a soccer ball.

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **1 mark** – the action force is the athlete applying a force to the ball (generated by muscles)  **1 mark** – the reaction force is equal in magnitude but opposite in direction (ball applies equal and opposite force back on the players foot)  **1 mark** – the athlete has a greater mass so is less affected by the reaction (the ball accelerates and the foot decelerates as a result of the action:reaction forces | 1  1  1 |

**Question 20 3 marks**

Explain how a gymnast can place their centre of gravity outside their body

|  |  |  |
| --- | --- | --- |
| **Description** | | **Marks** |
| **1 mark** – definition ‘imaginary point about which all of the body’s mass is equally distributed’  **1 mark** – by manipulating the position of body segments, centre of gravity can act outside the body | | 1  1 |
|  | **Diagram**  **1 mark –** accurately shows centre of gravity outside the body (other variations possible) | 1 |

**Question 21 5 marks**

Explain simultaneous summation of force, use sports examples to produce power or accuracy

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **1 mark** – simultaneous summation IS body segments reaching peak velocity at the same time  **1 mark** – accuracy requires fewer segments and lower velocity but movement all at the same time  **1 mark** – relevant example (throwing a dart, shooting in netball, shot in pool/snooker, or others)  **1 mark** – power requires all segments applying max velocity at the same time  **1 mark** – relevant example (weightlifting, high jump take off, vault take-off) | 1  1  1  1  1 |

**Question 22 2 marks**

A run-up serves to maximise the distance a kicked AFL football travels. Explain how this occurs

|  |  |
| --- | --- |
| **Description** | **Marks** |
| **1 mark** – to maximise the range of a kick (horizontal distance), the footballer applies both horizontal and vertical velocity to the ball at an optimal projection angle (near 45°)  **1 mark** – a run-up serves to increase horizontal velocity which is added to the horizontal velocity of the kicking action thereby increasing horizontal velocity at release, making it travel further | 1  1 |