The EverLearner

Mark Scheme

OCR A-Level PE - Biomechanics

This mark scheme contains:

- Copy of each question for reference
- Marking guidance where appropriate
- Marking points containing alternative acceptable responses plus relevant assessment objective

How should schools use this mark scheme?

The mark scheme has been constructed specifically for the exam paper used in preparation for and during the live revision shows provided by James Simms in May 2022.

All questions/mark schemes are taken from ExamSimulator. Please note, there are hundreds of additional questions on ExamSimulator covering the AEI topics. Within the platform, the teacher is assisted with the marking and full diagnostic feedback is also provided. ExamSimulator is a premium resource available via TheEverLearner.com.

I hope this helps both students and teachers in their exam preparations.

James Simms

1. Define Newton's first law of motion **and** apply it to a sporting example of your choice.

Marking guidance

Accept other sporting examples.
Examples must relate directly to the definition of N1.

Marking points

(1) [AO 1] Body will remain in a state of inertia until compelled to change by an external force/Body will remain in a state of constant velocity until compelled to change by an external force/Motion is conserved until an external force acts

(2) [AO 2] Sprinter will remain still on the starting block/Badminton player will remain still in the ready position/Skier will slide at constant velocity

(3) [AO 2] Sprinter will accelerate forward when the block applies a reaction force to the sprinter/Badminton player will accelerate forward when the floor applies a reaction force to them/Skier will decelerate after the line when they do a parallel stop

2. Explain how **two** different factors affect the stability of a handstand in gymnastics.

2. Explain how **two** different factors affect the stability of a handstand in gymnastics.

Marking guidance

Sub max two marks for identifying factors.
Sub max two marks for explaining how the factors might change during a handstand.

Marking points

(1) [AO 1] Height of the gymnast/Height

(2) [AO 2] The higher the gymnast's legs are, the less stable they are/Lower the legs to make the move more stable/Greater height means less stability

(3) [AO 1] Mass of the gymnast/Mass/Weight

(4) [AO 2] If the gymnast has more mass, they will be more stable/More mass promotes stability/Gymnast might not be able to change mass so can only distribute it in the best way

(5) [AO 1] Base of support/Size of base

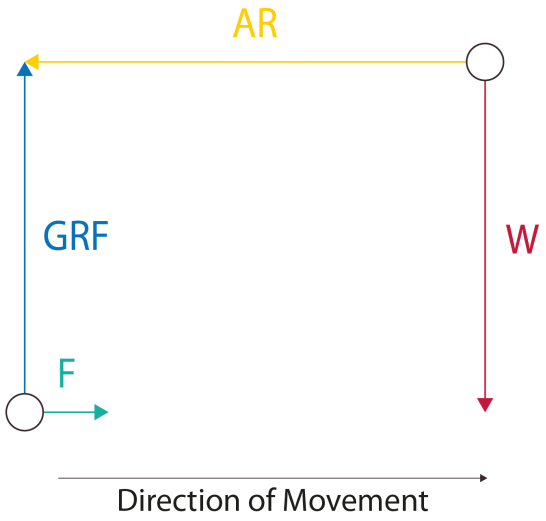
(6) [AO 2] Gymnast uses the whole flat of the hands and the fingers to increase the base/Wider the base, greater the stability/More points of contact, the greater the stability

(7) [AO 1] Line of gravity/Position of the centre of mass above the base/Centre of mass in relation to the base

(8) [AO 2] Gymnast positions the centre of mass above the hands to promote stability/If centre of mass is not above the base, they will unbalance/Hold the centre of mass above the base

2. Explain how **two** different factors affect the stability of a handstand in gymnastics.

3. This image shows all the forces acting on a runner but the image of the runner has been removed.
Using your knowledge of net force, identify the nature of the vertical and horizontal forces acting **and** name the state of motion this runner is in.



Marking guidance

Not provided

Marking points

(1) [AO 1] Balanced vertical force/Zero net vertical force/Total vertical forces are zero

(2) [AO 1] Unbalanced horizontal force/Net backwards horizontal force/Air resistance is greater than friction

(3) [AO 2] The runner is decelerating so this might be after the finish line/Decelerating body/Deceleration

4. All sporting objects will be affected by either balanced or unbalanced forces.
Explain balanced and unbalanced forces, giving a sporting example for each.

Marking guidance

Sub max of two marks for each term. One mark is available for a correct explanation and one mark is available for a suitable sporting example.

Marking points

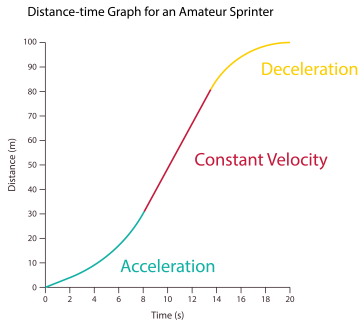
(1) [AO 1] Two or more forces acting are equal in size and opposite direction/Forces equal in size and opposite direction/Forces equal and opposite direction

(2) [AO 2] Rugby scrum/Tug of war/Running at the same velocity

(3) [AO 1] Two or more forces are not equal in size/Net force is present/Change in state of motion

(4) [AO 2] Tennis serve/Football pass/Rugby tackle

5. A 100m coach has been employed.
Use this graph to suggest **two** weaknesses in the athlete's performance.



Marking guidance

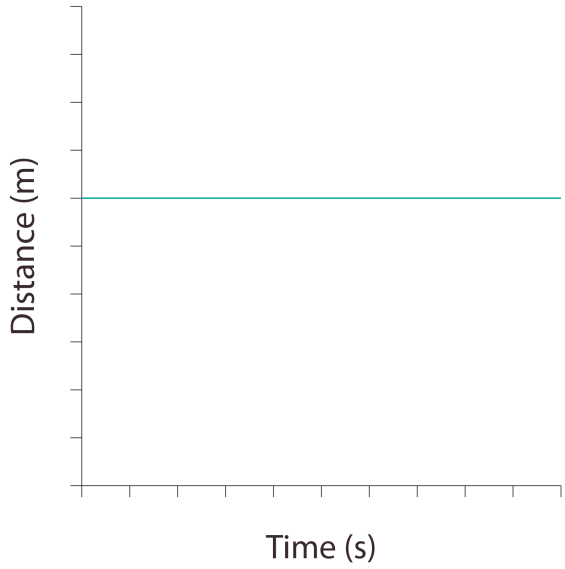
Two separate suggestions must be made to access both marks.

Marking points

(1) [AO 3] The athlete needs to improve their start/The athlete is taking too long to accelerate/Acceleration is slow

(2) [AO 3] The athlete slows down too much at the end/The athlete is fatiguing at the end/The athlete is decelerating a lot

6. Analyse what is occuring in the graph and suggest a suitable sporting example where this would occur.



Marking guidance

Sub max of one mark for analysing what is occurring and one mark for a suitable example.

Marking points

(1) [AO 3] Performer is not moving/Performer is stationary/Not moving

(2) [AO 2] Goalkeeper when play is away from them/Batsman not facing the ball/Basketball player during time out

7. The three principal axes of rotation are longtitudinal, frontal and transverse.
Suggest a suitable sporting movement for each of these three axes.

Marking guidance

Sub max of one mark for each axis of rotation.

Marking points

(1) [AO 2] Spin in ice skating/Full turn in trampolining/Turning in football

(2) [AO 2] Somersault in gymnastics/Somersault in trampolining/Somersault in diving

(3) [AO 2] Cartwheel in gymnastics/Diving to save in football/Reaching to return serve in tennis

8. Define the term **angular velocity**, state the correct equation and give the suitable unit it is measured in.

Marking guidance

Sub max of one mark for the definition, equation and units of measurement.

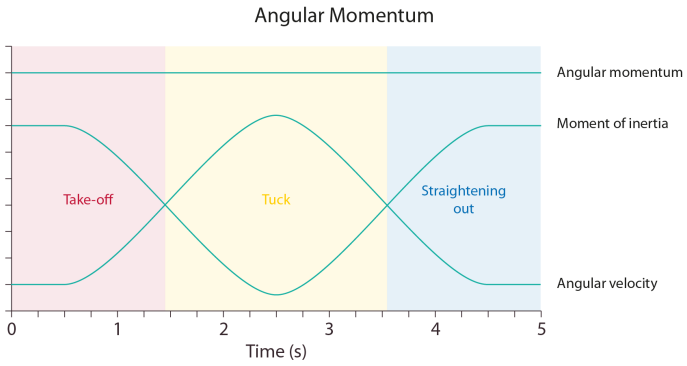
Marking points

(1) [AO 1] Rate of change in angular displacement/Rate of rotation/Speed of rotation

(2) [AO 1] Angular displacement divided by time taken/Angular displacement over time taken/Angular displacement time taken

(3) [AO 1] Radians per second/Rad per sec/Rad sec

9. The graph shows the relationship between moment of inertia, angular velocity and angular momentum for a diver performing a tuck forward somersault.
Analyse the graph, explaining the relationship between these three measurements throughout the entire movement.



Marking guidance

Whilst there is not a sub max of two marks per phase, in order to access full marks students **must** make reference to all three phases. There are, however, additional analytical marks available.
Accept MI, AV and AM for the three measurements.

Marking points

(1) [AO 3] During take-off moment of inertia is high as body is spread out/During take-off moment of inertia is high/During take-off body is spread out

(2) [AO 3] During take-off angular velocity is low due to moment of inertia being high/During take-off angular velocity is low due to high spread of mass/During take-off angular velocity is low due to mass spread away from axis of rotation

(3) [AO 3] During the tuck phase moment of inertia is low as mass of body is close/During tuck moment of inertia is low/During tuck the body is close to axis of rotation

(4) [AO 3] During the tuck angular velocity increases as moment of inertia decreases/During the tuck phase angular velocity increases as mass is less spread/During the tuck phase angular velocity increases as mass is closer to axis of rotation

(5) [AO 3] During the straightening-out phase moment of inertia increases as the mass becomes more spread out again/During straightening-out the moment of inertia increases as mass moves further away from the axis of rotation

9.	The graph shows the relationship between moment of inertia, angular velocity and angular momentum for a diver performing a tuck forward somersault. Analyse the graph, explaining the relationship between these three measurements throughout the entire movement.

(6) [AO 3] During the straightening-out angular velocity reduces as moment of inertia increases/During straightening-out angular velocity reduces as mass becomes more spread

(7) [AO 3] Angular momentum stays constant throughout/Angular momentum doesn't change due to the relationship between moment of inertia and angular velocity

(8) [AO 3] Angular momentum is moment of inertia multiply angular velocity/Symmetrical relationship between MI and AV so angular momentum doesn't change