Candidate Marks Report

Series : 6 2018

This candidate's script has been assessed using On-Screen Marking. The marks are therefore not shown on the script itself, but are summarised in the table below.

Centre No :		Assessment Code :	H555
Candidate No :		Component Code :	01
Candidate Name :			

Total Marks :

In the table below ‘Total Mark’ records the mark scored by this candidate.
‘Max Mark’ records the Maximum Mark available for the question.

Section A

Answer **all** the questions.

1 Define what is meant by 'acclimatisation to high altitude' and state **one** sporting activity in which performers would benefit from it.

~~At Altitude~~ The bodies response to a low partial pressure of oxygen. Road cycling would benefit e.g. Tour de France competitors. [2]

2 Explain why ATP plays a major role in the performance of a smash in badminton.

As a smash uses a lot of force (~~maximal~~ explosive strength) & when ATP provides the energy for by breaking down to ADP and a phosphate. [2]

3 Identify **two** types of spin and the effect of each on a table tennis ball in flight.

Topspin - Reduces the length of the flightpath
Hook - Causes the ball to swerve to the right
Slice - Causes the ball to swerve to the left [2]

4 Compare explosive strength and strength endurance.

Explosive strength is the maximal strength produced in one or a series of muscular contractions whereas strength endurance is the ability to sustain repeated muscular contractions without fatigue. [2]

5 Describe how limb kinematics can be used to enhance performance in sport.

limb kinematics allows the sport movement to be shown biomechanically. This can enhance performance as it shows the areas for improvement in ~~as~~ the technique easily. [2]
↳ It allows the adjustment of technique to be efficient.

Section B

Answer **all** the questions.

6 **Fig. 1** shows a netballer preparing to shoot.

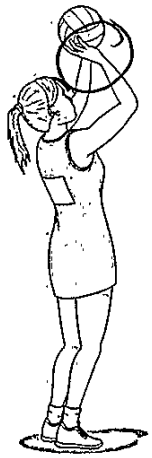

Fig. 1

(a) Complete the table below to analyse the position of the right wrist.

Joint type	Articulating bones	Plane of movement	Movement	Agonist	Antagonist
condyloid	Radius Ulna Carpals	Sagittal	Flexion	wrist flexors	wrist extensors.

[6]

(b) Explain what the energy continuum is and justify the position of **one** sporting activity on the energy continuum.

The energy continuum is a graph to show at which intensities of exercise, which energy system is dominant. For example, a 400m race will use mainly the ~~aer~~ glycolytic system, so will be higher up on the energy continuum. This is because it usually lasts between 30s and 5 minutes which is the prime time for this system. **[4]**

(c) At the start of an endurance cycling event a cyclist will experience a redistribution of cardiac output.

Explain how and why the vascular shunt mechanism redistributes blood in a cyclist as they begin cycling at the start of the event.

The vasomotor centre receives ~~it~~ information from (about chemicals in the body) (on temperature) chemoreceptors, baroreceptors and thermoreceptors (on blood pressure) indicating exercise has started. This then sends more stimulation to the ~~exercising~~ organs (via the sympathetic NS). ~~The~~ arterioles and pre-capillary sphincters causing them to vasoconstrict. Less stimulation is sent (via the sympathetic nervous system) to arterioles and pre-capillary sphincters in muscles, causing vasodilation. The vascular shunt does this to supply more oxygen to the exercising muscles to ~~prevent~~ delay anaerobic work, hence, delaying fatigue. (OBLA). [5]

(d) **(i)** Describe the mechanics of breathing which cause inspiration at rest.

External intercostals and diaphragm contract pulling the ribcage up and out. This increases the volume in the thoracic cavity, which ~~decreases~~ decreases the pressure, causing air to rush in along the pressure gradient [3]

(ii) Explain why a trained athlete will have a lower minute ventilation at rest than an untrained individual, despite having identical tidal volumes.

As the trained athlete will have more aerobic adaptations (e.g. increased mitochondrial density and capillarisation (surrounding alveoli) which makes them more efficient at utilising oxygen, so they can breathe less frequently. [2]

7 (a) Blood doping is an illegal physiological aid used by some athletes to enhance performance.

Outline how blood doping is carried out, and give **one** physiological benefit and **one** risk involved.

Blood is taken from the body, stored, and then (centrifused) reinjected before competition to increase the red blood cell count. One benefit is the aerobic capacity is higher due to more haemoglobin. One risk is of infections due to the injections at transfusion sites, and a higher blood viscosity. [3]

(b) A dislocated shoulder in rugby is an example of an acute sporting injury.

(i) Compare acute and chronic injuries.

Acute injuries happen suddenly whereas chronic occur over time from overuse.

[2]

(ii) Apart from dislocation, give a sporting example of an acute injury **and** a chronic injury.

Acute = e.g. A strained gastrocnemius

Chronic = e.g. Tennis elbow (tendonitis at the elbow). [1]

(iii) Outline the correct medical treatment a sports coach should apply to a dislocation injury.

SALTAPS

Firstly, work out what happened using SALTAPS (Stop, Ask, Look, Touch, active movement, passive movement, strength). As the athlete will have no passive movement he should be referred to a medical professional to put the joint back together and assess damage. [3]

(c) **Fig. 2** shows a gymnast performing the splits.

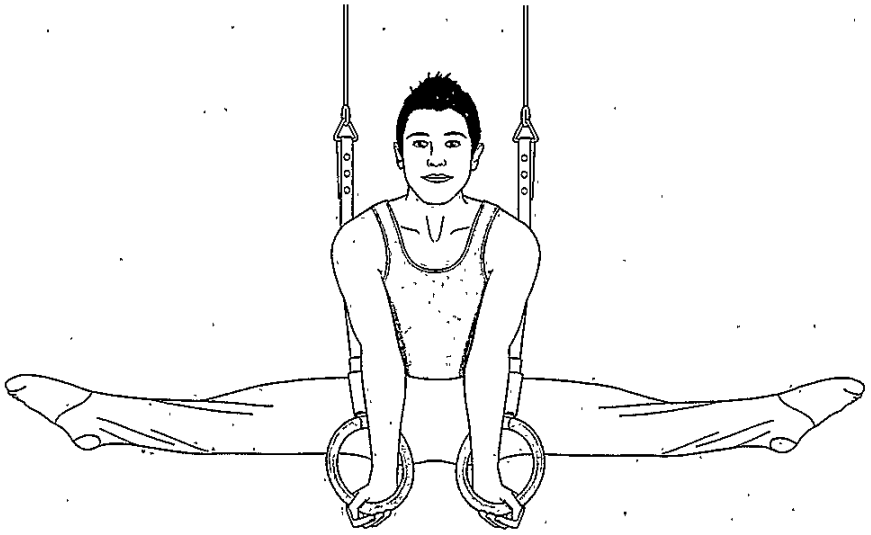

Fig. 2

(i) Describe the factors affecting flexibility that enable the gymnast to perform the splits.

Age, older people are generally less flexible. Gender, women have more oestrogen which aids flexibility. The length of surrounding connective tissue - the longer the tissue, the more flexible the joint

..... [3]

(ii) Describe **two** adaptations from training that have enhanced this gymnast's flexibility by increasing the range of motion at the hip joint.

Increased length of surrounding connective tissue, increasing the ROM (range of motion). Decreased inhibition of the stretch reflex, causing the muscle spindles to ~~relax~~ contract at a further point. [2]

(d) Describe a high intensity interval training (HIIT) session to improve aerobic capacity, and give **two** reasons why HIIT is considered more effective than continuous training.

HIIT

A HIIT session involves reps and sets of different activities. ~~For example~~ Each set can last between 30s and 8 minutes, but as it is designed for improving aerobic capacity it should be between 3 and 8 minutes. It also has a work to rest ratio of 1:1, so the rest interval should be equal. However, this 'rest' interval can contain exercises which work different muscle groups. HIIT is considered more effective as it changes between energy systems, so is on the lactate threshold. It is also easier to be motivated and can have the same effects in a shorter period of time. [6]

8 (a) Define Newton's third law of motion and apply it to a sporting example of your choice.

For every action there is an equal and opposite reaction force. For example, an athlete (set position in the starting blocks for a 100m applies a force against the blocks, the reaction force then propels them out of the blocks at the start of the race. [3]

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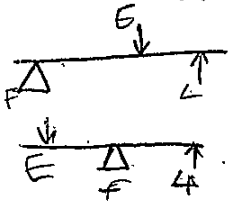
(b) (i) Using practical examples, explain how the elbow joint can act as a fulcrum for two different lever systems.



The elbow joint acts as a third class lever when doing, for example, a bicep curl. This is because the effort is in the middle with the load and fulcrum on either side. It also acts as a first class lever as the triceps brachii inserts before the fulcrum, meaning the fulcrum is in the middle, e.g. in a tricep pulldown exercise. [4]

(ii) Calculate the moment of inertia during a biceps curl, given a total mass of 10 kg at a perpendicular distance (r) of 0.5 metres from the weight to the fulcrum. Show your workings.

$\Sigma m \times r^2$ m = distribution of mass

$\Sigma 10 \times 0.5^2 = 2.5$ kgm r = 0.5

$= 2.5$ kgm^2

[2]

(c) **Fig. 3** shows a graph of the relationship between moment of inertia, angular velocity and angular momentum during the performance of a tucked somersault.

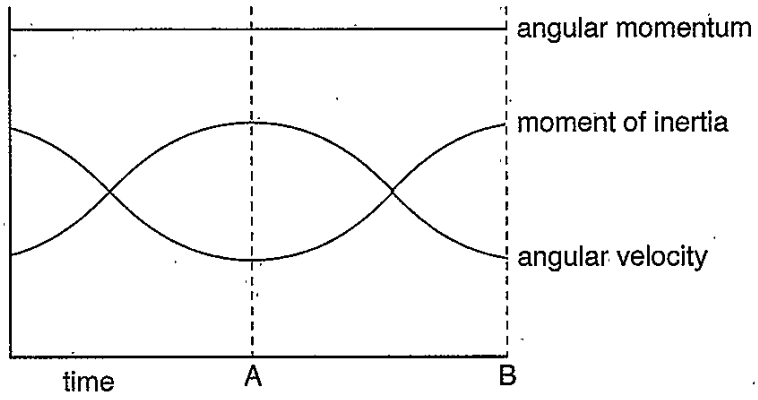


Fig. 3

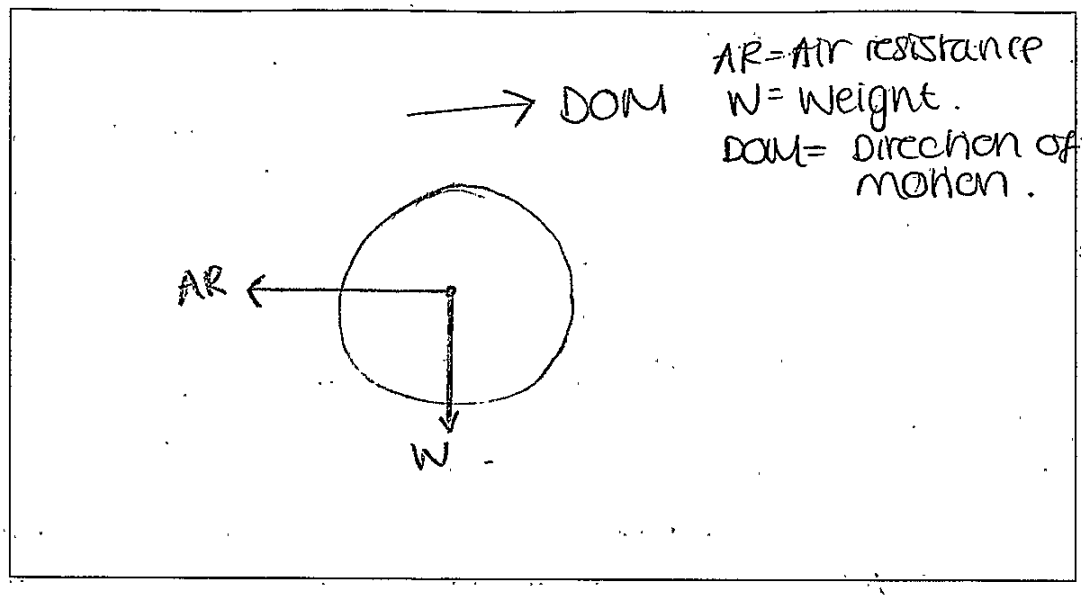
(i) Explain the shape of the graph, with reference to the tucked somersault, from A to B.

Angular momentum is a conserved amount. Therefore at point A they are in the tucked position, so the moment of inertia is low, therefore angular velocity is high. As they start to come out of the position (ready to land) they increase the moment of inertia by coming out of the tucked position, decreasing angular velocity. [3]

(ii) Explain, using the angular analogue of Newton's first law of motion, the concept of conservation of angular momentum.

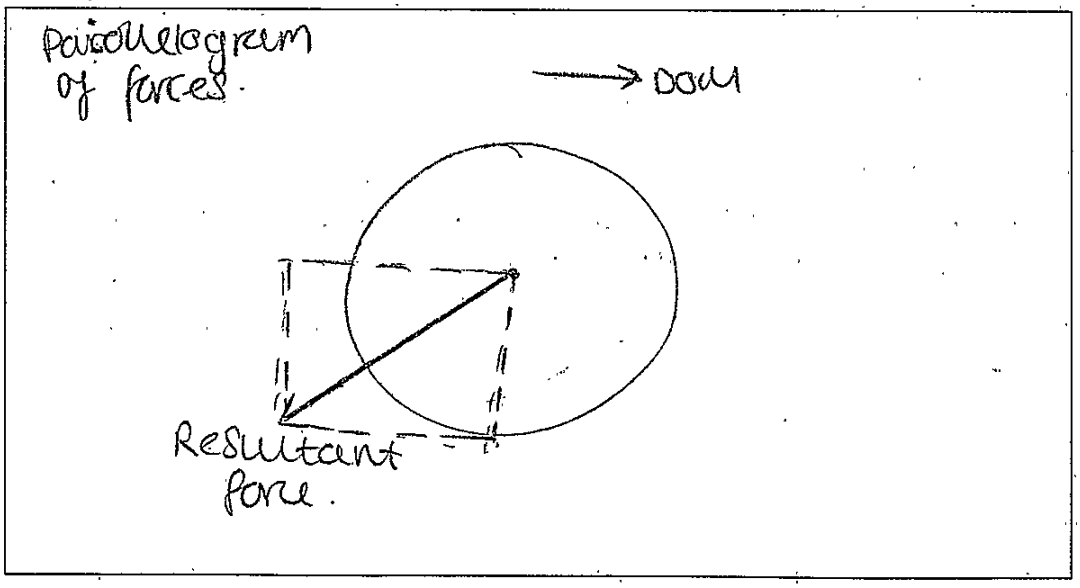
The angular analogue states a body will continue in its rate of spin or state of rest until acted upon by an external force. Therefore as very little external forces apply to the body, the angular momentum is continuous (conserved) until the performer reaches the ground. [3]

(d) (i) Sketch a free body diagram in the box below, showing the horizontal and vertical forces acting on a football in flight.



[2]

(ii) Sketch a diagram in the box below to show how you would represent the resultant force acting on the football in flight.



[3]

e.g. ↔ Netball ~~Football~~

Section C

9* A team game such as basketball provides opportunities for recovery from high intensity work both during and after the match.

↗ Resaturation of O_2 ↗ ATP resynthesis.

Outline the recovery processes that occur in the first three minutes after exercise and, using a team game of your choice, evaluate the strategies that a player or coach can use to maximise recovery.

↗ Bicarbs ↗ carbs ↗ protein ↗ Nitrates ↗ creatine. ↳ Time outs ↳ injury ↳ subs ↳ ~~out of~~ play.

Evaluate nutritional ergogenic aids that help the recovery process. **[20]**

Team games require lots of changes in exercise intensity. This can have a large effect on the body and its oxygen saturation. Teams and coaches can combat this by using time outs, subsinutes and other tactics to aid recovery.

Recovery occurs in 2 stages, ~~the~~ in the first 3 minutes, the alactacid component occurs. This uses 1-4L of oxygen to, first resaturate the haemoglobin with oxygen, then the myoglobin, to partially allow the body to return to a pre-exercised state. In this stage also, ATP is resynthesised from ADP and phosphate by the aerobic system to produce energy for reactions/to reactions to aid recovery, e.g: Removal (or conversion) of lactic acid. ~~However~~, This stage also regenerates 100% of PC (phospho-creatine) stores. This is the most useful for Team games that have breaks in (e.g: basketball in time-outs can be called) to allow coaches to use tactics to aid the overall performance. E.g: Coaches use substitutions in netball to ~~allow~~ put players on with no lactic build up before a period of intense play, as this will aid

performance and therefore allows a more effective period of play. However, changing the team constantly may disrupt the flow of the game and lead to a breakdown of the team. Another tactic some players use is injury time. For example, in rugby if players get knocked over they can take breaks in the period of that player getting back up. This would allow some resynthesis of PC stores as 50% of stores are regenerated within 30 seconds.

The stores of phospho-creatine can be enhanced by many other factors, for example taking creatine supplements. This is an example of an ergogenic aid that can be used to benefit performance. Other aids include nutritional aids.

Nutritional aids include the time, amount and composition of the meals, hydration, and some chemicals like bicarbonate and nitrates. Firstly, the timing of meals is critical for energy stores pre-event. For example, an endurance runner would use glycogen loading pre-event to increase the stores of glycogen in the muscles. This would increase the aerobic energy production by about 30%, allowing the athlete to continue respiring for longer.

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

9* However, mis can lead to ~~hyperg~~ gastro-intestinal problems. ~~This~~ For other events, e.g. a Sprint (100m) or small amounts of me athlete would use, simple sugars up to 30 minutes before to supply instant energy ~~as they are easily digested~~ and therefore allow them to work at a higher intensity for longer without as much fatigue. Bicarbonate is used largely by athletes which use the ~~glyco~~ glycolytic system. This is because lactic acid build up (OBLA) is a major problem and is reduced if delayed, performance improves. Bicarbonate is an alkaline solution that increases the buffering capacity, and therefore allows athletes (such as 400m runner, and a centre position in netball) to work more efficiently. ~~However there is a~~ due to lower ~~in~~ blood ~~hydrogen ions~~ and lactate levels, so it aids the recovery process as less lactate needs to be converted ~~back~~ back to pyruvate or oxidised during the lactacid component of recovery. Lastly, eating carbohydrates and protein high foods within 30 minutes after the event aids the recovery process as it provides

the nutrients required to restore muscles and energy (glycogen) stores in muscles to a pre-exercised state.

Overall, there are many different tactics and aids that can help the process of recovery and may aid the performance of individuals athletes and teams.