

# 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.

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

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**Total Marks : 57 / 90**


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

<b>Paper:</b>	<b>H555/01</b>
<b>Paper</b>	<b>57 / 90</b>
<b>Total:</b>	
Question	Total / Max Mark Mark
1	1 / 2
2	1 / 2
3	1 / 2
4	1 / 2
5	1 / 2
6a	3 / 6
6b	1 / 4
6c	4 / 5
6di	3 / 3
6dii	2 / 2
7a	3 / 3
7bi	1 / 2
7bii	0 / 1
7biii	1 / 3
7ci	1 / 3
7cii	2 / 2
7d	3 / 6
8a	2 / 3
8bi	4 / 4
8bii	2 / 2
8ci	3 / 3
8cii	1 / 3
8di	2 / 2
8dii	1 / 3
9	13 / 20


## 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.

~~Altitude~~ The bodies response to a low partial pressure of oxygen <sup>TV</sup> load 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~~ <sup>explosive</sup> strength) ~~is~~ which 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 flight   
 Hook - Causes the ball to curve to the right <sup>TV</sup>  
 Slice - Causes the ball to curve to the left [2]

- 4 Compare explosive strength and strength endurance.

Explosive strength is the maximal strength produced <sup>one or</sup> ~~in a~~ <sup>muscular contractions</sup> ~~series of movements~~ 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 ~~the~~ technique  easily. [2]  
 ↳ it allows the adjustment of technique to be efficient.

REP



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## Section B

Answer all the questions.

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

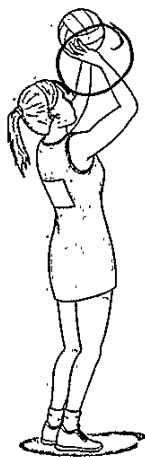


Fig. 1

- (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 ~~atp~~ 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]

TV



- (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 <sup>BOD</sup> information from <sup>(about chemicals in the body)</sup> chemoreceptors, <sup>(on temperature)</sup> baroreceptors and <sup>(on blood pressure)</sup> mechanoreceptors indicating exercise has started. This then sends more stimulation to the exercising organs <sup>(via the sympathetic NS)</sup> ~~the~~ arterioles and precapillary sphincters causing them to vasoconstrict. Less stimulation is sent <sup>(via the sympathetic nervous system)</sup> to arterioles and precapillary sphincters in muscles causing vasodilation. The vascular shunt does this to supply more oxygen to the exercising muscles <sup>delay</sup> hence, delaying fatigue. <sup>(SBLAS)</sup> **SEEN** [5]

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

External intercostals and diaphragm contract pulling the rib cage 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 <sup>(unwinding)</sup> **REP** <sup>(all over)</sup>) which makes them more efficient at utilising <sup>(2)</sup> oxygen, so they can breathe less frequently.



- 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 <sup>crystallised</sup> then re-injected before competition to increase red blood cell count. The 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 <sup>AKU</sup> whereas chronic occur over time from <sup>AKU</sup> 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 <sup>TV</sup> elbow).

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

**SALTAPS** X  
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 <sup>TV</sup> to put the joint back together and assess damage. [3]

TV



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

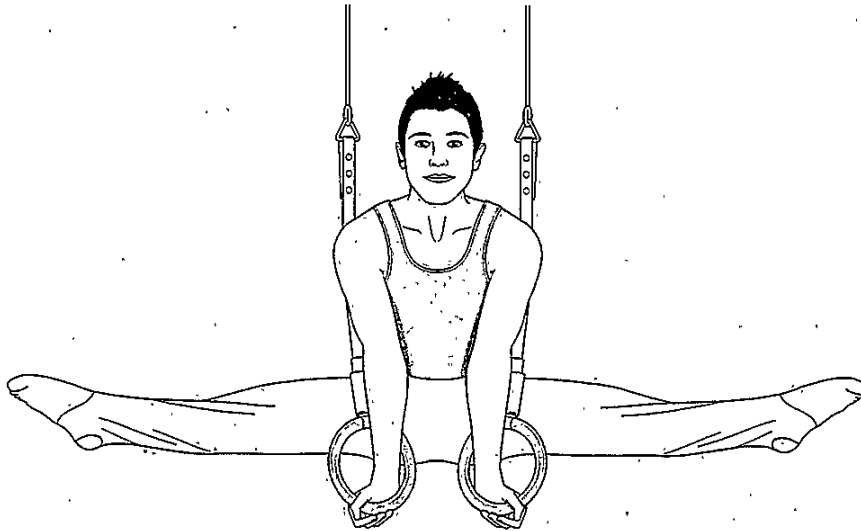


Fig. 2

(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. Decreased inhibition of the stretch reflex causing the muscles to contract at a further point.

[2]



DO NOT WRITE IN THIS MARGIN



- (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.

A HIIT session involves reps and sets of different activities. 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.

HIIT

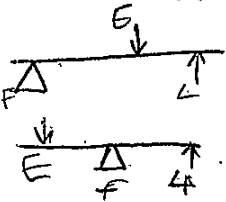


- 8 (a) Define Newton's third law of motion and apply it to a sporting example of your choice.

For every action there is an equal and opposite reaction force. For example, an athlete 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]

123  
P L E

- (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 theiceps brachii inserts before the fulcrum, meaning the fulcrum is in the middle, e.g. in a knee 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.

$$\begin{aligned} \Sigma m \times r^2 & \quad m = \text{distribution of mass} \\ \Sigma 10 \times 0.5^2 & = 2.5 \text{ kgm} \quad r = 0.5 \\ & = 2.5 \text{ kgm}^2 \end{aligned}$$

[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.

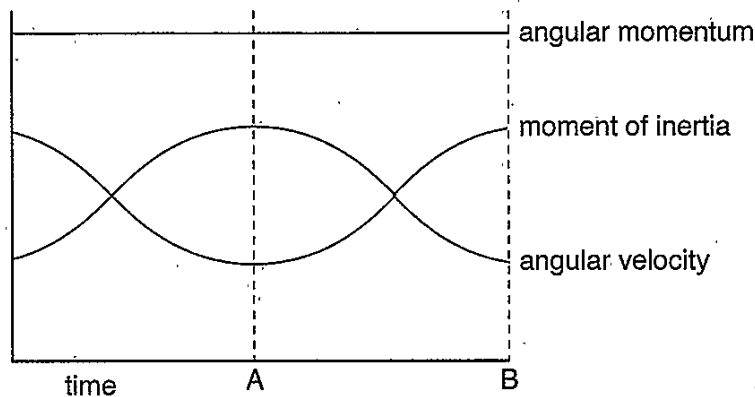


Fig. 3

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

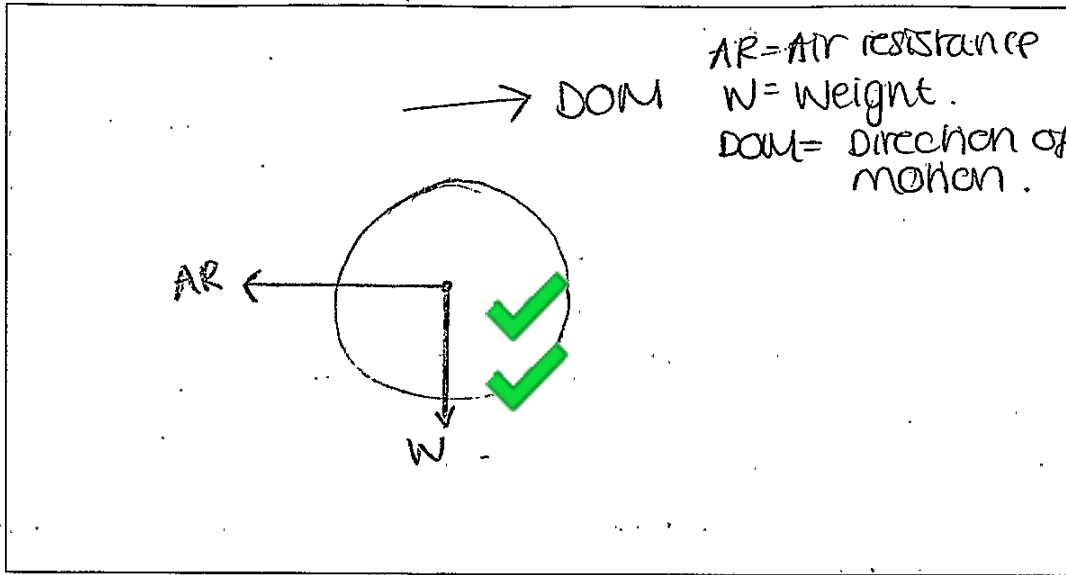
Angular momentum is a conserved amount. Therefore at point A they are in the tucked position, so the moment of inertia is low, therefore angular velocity is high. As they start to come out of the position (ready to land) they increase the moment of inertia by coming out of the tucked position, decreasing 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 rate of rest until acted upon by an external force. Therefore as very little external forces apply to the body, the angular momentum is conserved (continuous) until the performer reaches the ground. [3]

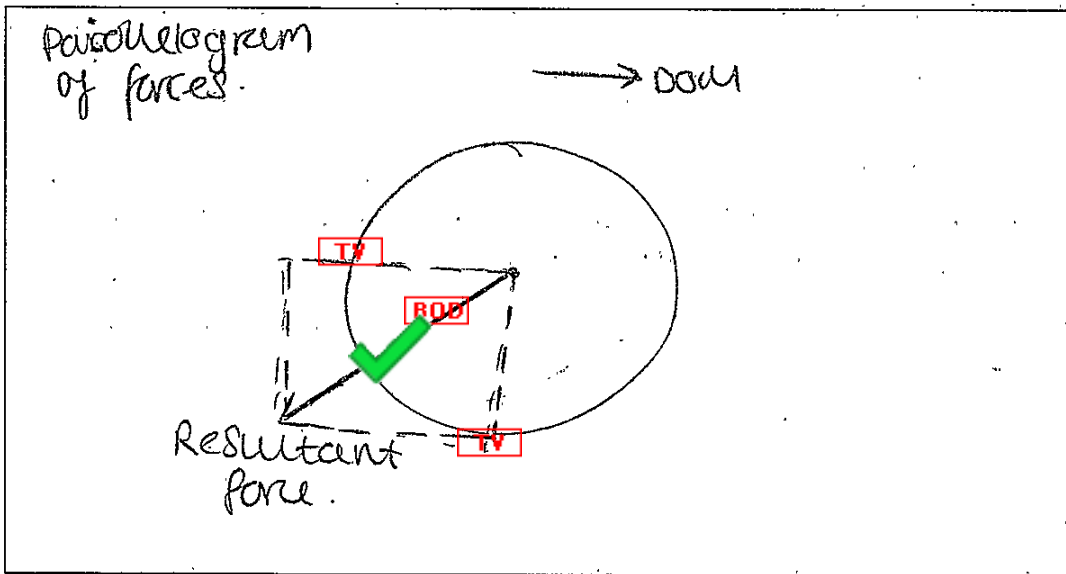


- (d) (i) Sketch a free-body diagram in the box below, showing the horizontal and vertical forces acting on a football in flight.



[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]



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e.g. → Netball  
→ Football

SEEN

Section C

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

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.

SEEN

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, substitutes and other techniques to aid recovery.

EG

EG

EG

Recovery occurs in 2 stages, ~~the~~ <sup>in</sup> the first 3 minutes, the anaerobic component occurs. This

KU

uses 1-4% of oxygen to first resaturate the haemoglobin with oxygen, then the myoglobin to partially

KU

KU

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

KU

KU

energy for various reactions to aid recovery, e.g. removal (or conversion) of lactic acid. However,

KU

This stage also regenerates 100% of PC (phosphocreatine) stores. This is the most important for

KU

Team games that have breaks in (e.g. netball time-outs can be called) ~~or~~ allow coaches to

use techniques 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

KU

Turn over



performance and therefore allow 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.

**EG** Another tactic some players use is **injury time**.

For example, in netball if players get knocked over they can take breaks in the period of that player getting back up. This would allow

**DEV** some resynthesis of PC stores as 50% of stores are regenerated within 30 seconds.

The stores of <sup>phospho-</sup>creatine can be enhanced by ~~many~~ other factors, ~~namely~~ for example

**KU** taking **creatine supplements**. This is an example of an ergogenic aid that can be used to benefit performance. Other aids include <sup>nutritional</sup> ~~other~~ ~~aids~~ <sup>in</sup> aids.

Nutritional aids include the time, amount and composition of the meals, **hydration**, and

**KU** some chemicals like **bicarbonate** and

**KU** **nitrate**. Firstly, the **timing of meals** is critical

**KU** for energy stores <sup>event</sup> ~~pre-game~~. For example, an

**KU** endurance runner would use **glycogen loading**

**DEV** pre-event to increase the stores of glycogen in the muscles. This would increase the ~~stores of~~ 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, this can lead to ~~hyperglycaemia~~ <sup>hypoglycaemia</sup> ~~internal~~ <sup>100m</sup>

problems. ~~the~~ For other events, e.g. a sprint

~~me~~ <sup>small amounts of</sup> athlete would use simple sugars up

to 30 minutes before to supply instant energy.

~~athletes use bicarbonate~~ and therefore ~~de~~

allow them to work at a higher intensity

for longer without as much fatigue. Bicarb-

onate is used largely by athletes which

use the ~~glyc~~ glycolytic system. This is

because lactic acid build up (OBLA) is a

major problem and ~~is what~~ if delayed,

performance improves. Bicarbonate is an

alkaline solution that increases the

buffering capacity, and therefore allows

athletes (such as 400m <sup>runner</sup> and a Centre

position in netball) to work more efficiently.

~~However, this is~~ due to lower ~~in~~ blood

~~lactate~~ ~~levels~~ and lactate levels, so it aids

the recovery process as less lactate needs to

be converted ~~back~~ back to pyruvate or oxidised

during the lactic acid component of recovery.

Lastly, eating carbohydrates and protein

high foods within 30 minutes after the

event aids the recovery process as it provides













## Off Page Comments

Item Name	Comment
6c	Explain how and why... may suggest receptors and VCC are relevant?
9	Level 3 = 13. Good range of nutritional aids explained with some evaluation. Reasonable knowledge of alactacied component. Some strategies to aid recovery with links to netball, but repetitive and lacks evaluation.
6dii	Would this first tick be ok for point 2?2
8dii	Tick (Bod) given as the line is in the correct place with the arrow in the right direction.
8a	Equal and opposite required for point 3?