"REACH YOUR PEAK" 2021

PEAK PHYS ED PRACTICE EXAMINATION

and

ANSWERS

for VCE Unit 3 PHYSICAL EDUCATION

This Practice Exam is NOT an official VCAA paper for the Physical Education written examination. It may take slightly longer than 90 minutes to complete.

Reading Time: 10 minutes **Writing Time: 90 minutes**

Question and Answer Book- Structure of Book

Number of questions	*Number of questions to be answered*	*Number of Marks*
Multiple Choice - 10	**10**	**10**
Short Answer - 10	**10**	**100**
Totals	**20**	**110 Marks**

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers
- Students are not permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape
- No calculator is allowed in this examination
- **STUDENTS ARE NOT PERMITTED TO BRING MOBILE PHONES AND/OR ANY OTHER ELECTRONIC COMMUNICATION DEVICES INTO THE EXAMINATION ROOM**

Materials Supplied

- Question and answer book

Instructions

- Answer all parts of all questions
- Tick the correct/most accurate multiple-choice responses in this book
- Questions should be answered in the spaces provided in this book
- All written responses must be in English

SECTION A - Multiple-choice questions and correct responses

Instructions

- Answer **all** questions on this exam paper or on the answer sheet provided (end of year exam).
- Tick the correct multiple-choice response; in exam ~ place answer sheet inside front cover of this book.
- One mark will be awarded for a correct response & no marks deducted for an incorrect response.
- No marks awarded if more than one response is completed for any question.

The correct responses are highlighted in Blue.

Question 1

During a 100m sprint, which of the following **is not** an acute cardiovascular response?

- ☐ **A.** Increased heart rate
- ☐ **B.** Increased blood pressure
- ☐ **C. Increased maximum heart rate**
- ☐ **D.** Increased cardiac output

Question 2

Random practice has slower rates of improvement during the training period, than at the cognitive and associative stages, yet is preferred by elite performers because it contributes to:

- ☐ **A. Greater problem-solving ability specific to game situations**
- ☐ **B.** Increased concentration
- ☐ **C.** More opportunities to receive augmented feedback
- ☐ **D.** Attention shifting from narrow internal to broad external

Question 3

A 20km race walker trains by walking at a pace that is just below his LIP. This means that:

- ☐ **A. Any lactic acid that is produced will be oxidised before it gets a chance to accumulate**
- ☐ **B.** He is likely to be able to walk at this pace for longer periods of time the more he trains
- ☐ **C.** He will develop increased lactate tolerance the longer he trains for
- ☐ **D**. His anaerobic glycolysis system will not be activated until later on in the training session/competition.

Question 4

Athletes are increasingly consuming carbohydrates and proteins within 30-45mins of finishing a competition or training in order to:

- [ ] **A. Restore glycogen and muscle tissue to pre-exercise levels as quickly as possible**
- [ ] **B.** Resynthesize ATP as quickly as possible
- [ ] **C.** Repair muscle tissue and rebuild enzymes
- [ ] **D.** Refuel whilst the circulatory system is still active and capable of higher absorption rates

Question 5

Two students stand at the free-throw line on a basketball court – a Year 3 student and a Year 12 student. They both attempt to score by shooting the ball through the basket. The Year 3 student will need a:

- [ ] **A.** Greater amount of impulse than the Y12 student to succeed
- [ ] **B. Greater angle of release than the Y12 student to succeed**
- [ ] **C.** Lower height of release than the Y12 student to succeed
- [ ] **D.** Greater speed of release than the Y12 student to succeed

Question 6

During the final 200m sprint at the end of the Tour de France last stage, the energy systems supplying most of the ATP fuelling muscles would be the:

- [ ] **A.** PC system
- [ ] **B.** ATP system
- [ ] **C.** Anaerobic glycolysis system
- [ ] **D. Aerobic energy system**

Question 7

For a primary student in Grade 3, a teacher might consider making a skill such as a basketball dribble move to being more “open” on the closed ➲ open skill continuum by:

- [ ] **A.** Moving from the gym to dribbling outdoors in the quadrangle
- [ ] **B.** Providing the student with a size 5 basketball instead of a size 4 basketball
- [ ] **C. Asking the student to dribble around a classmate who is trying to ‘get the ball’**
- [ ] **D.** Asking the student to dribble with their non-preferred hand

Question 8

A discus thrower using the rotational/spin technique is able to throw the discus further than athletes not using this technique due to producing greater:

- **A.** Torque
- **B. Impulse**
- **C.** Acceleration
- **D.** Summation of force

Question 9

When providing augmented feedback to elite baseball players, the following would bring about the largest improvements in performance:

- **A.** Knowledge of results
- **B. Knowledge of performance**
- **C.** Knowledge of concentration
- **D.** Knowledge of arousal levels

Question 10

To improve LIP a soccer midfielder would:

- **A.** Train above LIP in an effort to adapt to increased workloads
- **B.** Swim continuously for 30 minutes every day in addition to team training
- **C.** Run at 75% maxHR for 30 minutes on at least 3 days/week
- **D. Train at or slightly below LIP for the majority of each session**

END OF SECTION A – Multiple choice questions

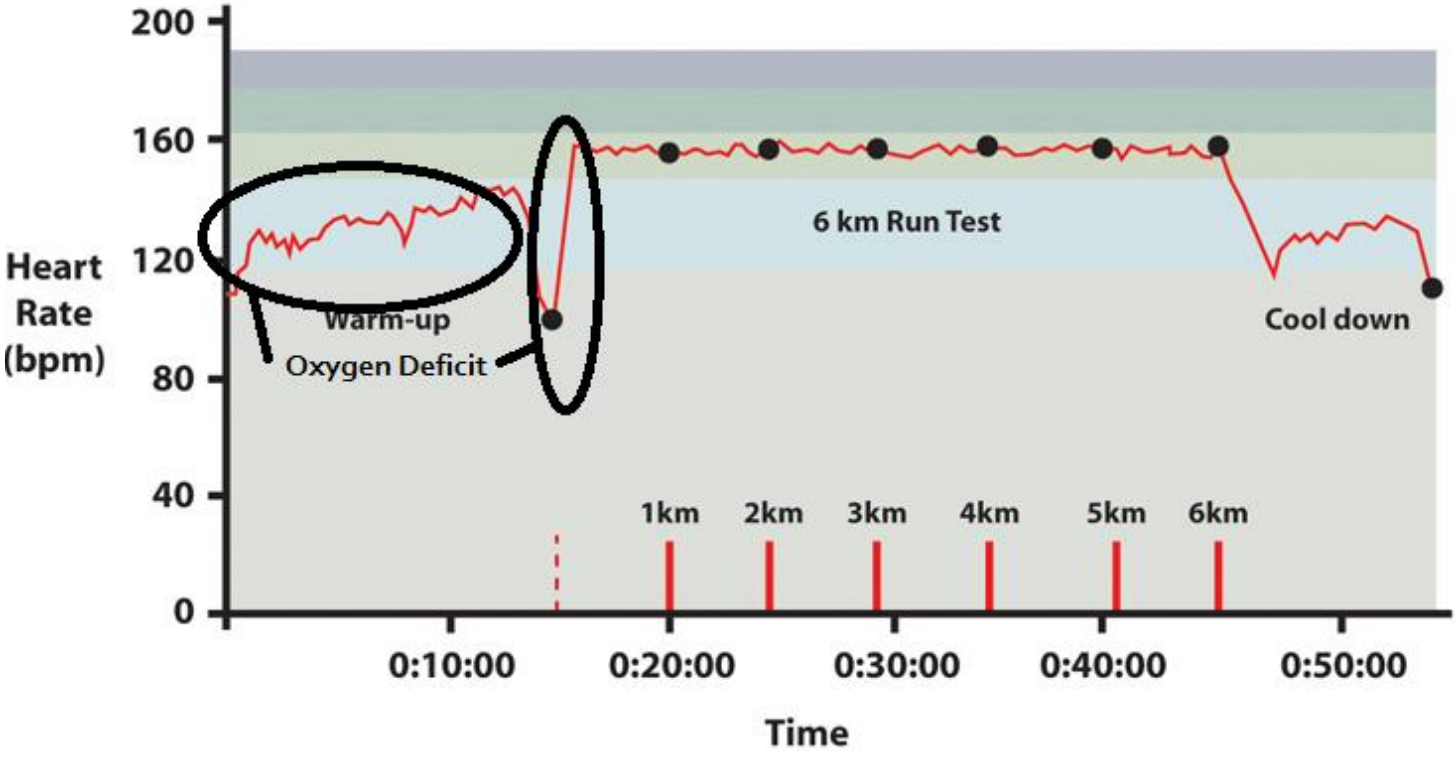
SECTION B - Short answer questions and suggested responses

Question 1 (4 marks)

The following graph shows the heart rate during both the warm-up and cool down as well as during the 6km run test for an untrained, but active 25 year old.

a. On the above graph, clearly indicate **two** instances where oxygen deficit occurs.

2 marks



b. By referring to the graph, discuss the type of recovery completed at the end of the warm-up as well as the end of the 6 km run. 2 marks

End of warm-up = passive as the HR drops markedly in short period of time

End of 6 km run = passive as above, but then additional cool down involves active as we can see the HR increaes by 10-12 bpm suggesting stretching most likely being undertaken.

Question 2 (10 marks)

The world record for the 4 x 200m relay was set on 24th May 2014 by Jamaica in a time of 1:18.63. The world record for the 800m was set on 9th August 2012 by David Rudisha of Kenya at the London Olympics in a time of 1:40.91 (22 seconds slower than the relay time)

a. Discuss the most likely reason for the differences in running times for the 800m events, by referring to the contribution from the energy systems in each situation. 4 marks

Rudisa would mainly be using his aerobic energy system as he cannot run at speeds above his LIP for long periods of time, and this tends to occur at the end of the race for the final sprint to the finish line.
The Jamaican relay team members predominantly use their anaerobic glycolysis system with significant contribution from their PC systems when sprinting 200m and hence their production of ATP occurs at a faster rate than what is possible by Rudisha in his running of the 800m.

b. Apart from increased muscle temperature, list **two** acute muscular responses the runners would experience whilst performing their events. 2 marks

Increased enzyme activity, decreased fuels (PC and muscle glycogen), increased a-VO2 diff, increased fibre recruitment

c. **(i)** The Kenyan runner, David Rudisha, spends a lot of his training involved in intermediate interval training trying to improve his anaerobic capacity.

Briefly discuss how improvements in this area would contribute to improved 800m times.

2 marks

Improved anaerobic capacity is the same as improving lactate tolerance. This is especially useful in the last 100-200m when Rudisha works above LIP and keeps working at high intensities without fatiguing/slowing down.
This means he can sustain speed over longer periods of time at this stage of the race and this results in higher running speeds/quicker times.

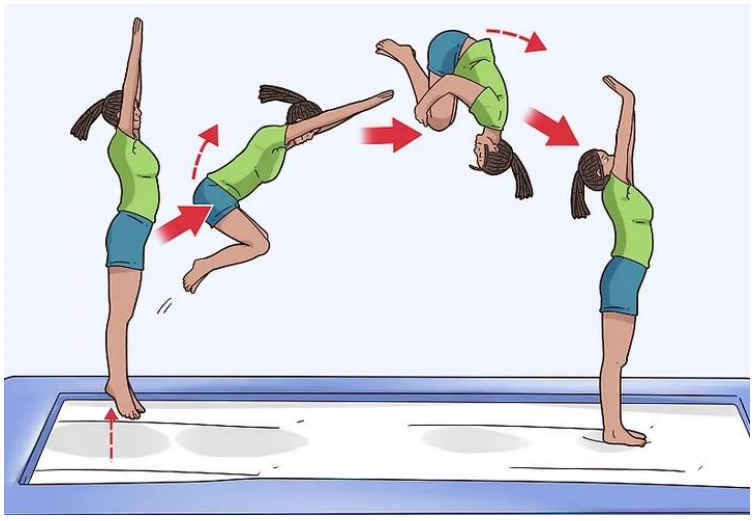
(ii) Discuss why Rudisha would use a combination of active and passive recovery strategies during his training

2 marks

During intermediate interval training Rudisha needs to firstly oxidise and remove accumulated H+ which is achieved via an active recovery and deliberately increasing EPOC. He needs to perform a passive recovery following this and prior to his next and subsequent repetitions in order to restore PC to enable sprints to occur at intensities above LIP.

Question 3 (10 marks)

The following diagram shows a person performing a front flip on a trampoline:



a. The person on the trampoline weights 60kg and she bounces off the trampoline at 6 m/s. Calculate her momentum upon bouncing off the trampoline. 1 mark

Momentum = mass x velocity Momentum = 60 kg x 6 m/s = 360 kg/m/s

b. Clearly state how Newton's third law of motion applies to this trampolining example. 2 marks

Third law or motion: For every action there is an equal and opposite reaction. As the trampolinist lands and pushes down on the mat, there will be an equal and opposite force in the upwards (opposite direction)

c. What happens to angular momentum once the person leaves the trampoline mat?

1 mark

Angular momentum is conserved or Angular momentum remains constant

d. What can the person on the trampoline do as she makes contact with the trampoline matting to assist her in performing the forward somersault/flip? Briefly discuss the biomechanical principle associated with your suggestion that allows her to flip with greater ease. 1 + 2 = 3 marks

The person should lean forwards and bring their arms and legs into a tuck position just after they have made contact with the trampoline mat(1 mark)
Biomechanical principles: By leaning forwards the centre of gravity falls outside their base of support enabling them to start moving forwards easier/quicker.
By moving body parts into a 'tuck' position, the moment of inertia decreases whilst at the same time the angular velocity increases resulting in a quicker rotation/forward somersault of the body. (Either principle correctly discussed = 2 marks)

e. The person on the trampoline wanted to rebound higher in an effort to perform a double somersault/flip. What biomechanical principle would they be using if she rebounds to greater heights than she has in the

image and then performs her somersault/flip. Discuss how this contributes to greater height after taking off. 1 + 2 = 3marks

Biomechanical principle: For every action there is an equal and opposite reaction. As the trampolinist lands and pushes down on the mat, there will be an equal and opposite force in the upwards (opposite direction)
Upon landing, the trampolinist moves their arms upwards which contributes to greater height being achieved and this has a cumulative effect with repeat efforts.

Question 4 (11 marks)

The following data shows the 50m split times for two freestyle swimmers (Sun Yang and James Guy) at the 2015 World Championships.

Sun Yang: Men's 400m FC World Championships 2015

Distance	Time	50m split	Difference
50m	00:26.06	26.06	
100m	00:54.15	28.09	2.03
150m	01:22.06	27.91	-0.18
200m	01:50.68	28.62	0.71
250m	02:18.81	28.13	-0.49
300m	02:47.19	28.38	0.25
350m	03:15.07	27.88	-0.50
400m	03:42.58	27.51	-0.37

James Guy: Men's 200m FC World Championships 2015

Distance	Time	50m split	Difference
50m	00:24.53	24.53	
100m	00:50.99	26.46	1.93
150m	01:18.33	27.34	0.88
200m	01:45.14	26.81	-0.53

a. At what stage of the race is Sun Yang (400m) accelerating the most?
Provide evidence from the above data to support your answer.

3 marks

Accelerating the most from 300 – 350m stage of race (1 mark) The data reveals that this stage of the race is associated with the greatest difference in consecutive lap times (2 marks)

b. Briefly discuss a biomechanical reason why the first 50m for both swimmers is considerably faster than any other 50m split during the race. 2 marks

Answers cannot refer to anything that is not biomechanical – for example, they cannot state that the swimmer uses their PC system more at this stage than any other sin the race, or the swimmer 'goes out quickly and then reduces their pace' waiting for a sprint finish/faster last lap.

Biomechanically:

- **Swimmer able to dive into the water from the blocks resulting in greater forward force than simply pushing off the pool wall during turns**
- **The somersault turns at each end of the pool slow swimmers down due to increased drag/water resistance (this does not happen in first 50m)**

c. It is likely that James Guy produces larger amounts of lactate / H+ in the first 50m than whilst standing on the blocks waiting for the race to commence. Discuss a reason why this does not cause him to fatigue after the first 50m of the race. 2 marks

James Guy reduces his intensity slightly after the first 50m to be working at or just below his LIP – this stops additional lactate accumulation and allows for some of it to be oxidised and removed from his muscles.

d. How would having a highly developed anaerobic capacity be of benefit to both swimmers?

2 marks

A highly developed anaerobic capacity is vital for both swimmers. For Guy, most of his race is performed utilising the anaerobic glycolysis system until the aerobic energy system takes over as the major ATP producer in the last 50-60m of the race. For Yang, the last 20-30m of his race, where he works above LIP and speeds up to the finish line the highly developed anaerobic capacity enables him to sustain this intensity until the race is finished.

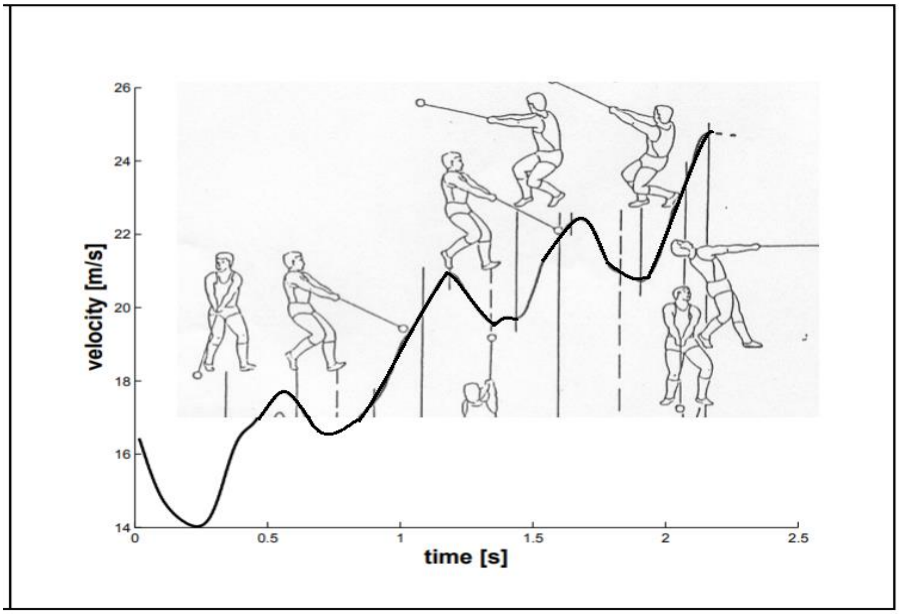
e. Which of the two swimmers will have the highest oxygen deficit – make sure you refer to the data to support your answer.

2 marks

The swimmer who has the highest speed in the first stages of the race will experience the highest oxygen deficit – when comparing the two swimmers this is definitely James Guy.

Question 5 (7 marks)

The following image and graph reveals the velocity of the hammer (sporting implement) during the preparation and release phase of the hammer throw:



a. Does this performance require more/greater muscular strength or muscular power? Briefly justify your answer. 2 marks

To enable the athlete to develop force over the period of time the athletes 'winds up' = 2.5 sec, there is a greater reliance on muscular strength than power.

b. How would impulse be calculated for this performance? 2 marks

Impulse is calculated by multiplying the amount of force applied over the period of time the hammer is in contact with the athlete's hand.

c. During the 'spin' phase of the hammer throw, the performer tries to keep his feet at least shoulder width apart. Discuss what would happen if this gap was lessened and his feet actually came together during the 'spin' phase. 2 marks

There would be a decrease in stability, but an associated increase in spinning speed – increased rotation (there is a bit of a trade-off between the two variables)

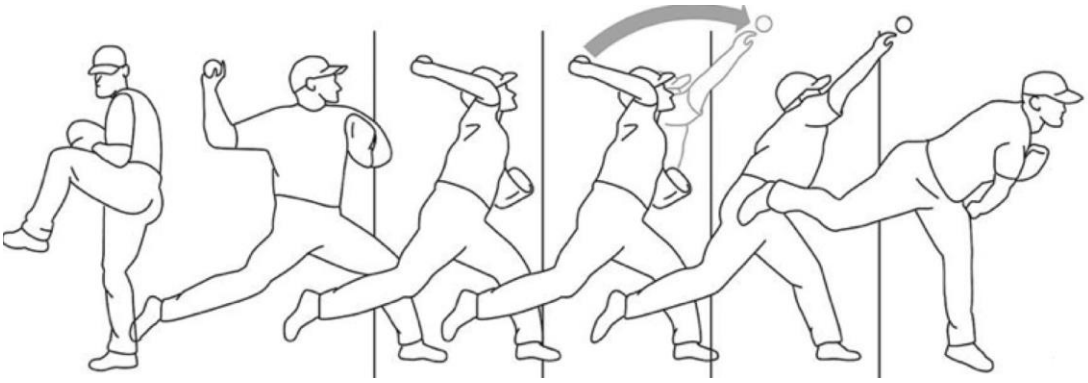
d. **Tick** the correct response. During the spin phase, the hammer acceleration: 1 mark

Increases ☑ decreases ☐ remains unchanged ☐

QUESTION 6 (14 marks)

Baseball is a very popular sport which is played in most countries. The next set of questions relate to that sport.

a. The following image shows a baseball pitcher moving through the different phases during a pitch**.**



(i) Discuss how the player uses the principle of summation of momentum to pitch the baseball as fast as he can? 2 marks

Momentum is generated in a sequential manner with largest muscle groups closer to the centre of gravity moving first but slowest. As the momentum is then 'passed on' to linked smaller body parts because they are lighter they will then move with greater velocity, until maximal velocity occurs at point of ball release. Large muscles located at the hips and the shoulder move first, then the upper arms and upper legs through to the lower arms and lower legs and finally the lower arm, wrist and fingers to pitch the ball at maximal speed.

(ii) From a biomechanical perspective, why does the player bend his leg/flex his knee before he then steps forwards at the start of his pitch. 2 marks

By bending his leg the moment of inertia is reduced / angular velocity is increased allowing it to be moved forwards quickly to contribute more to forward movement/momentum.

(iii) When considering skill acquisition principles, discuss two reasons why someone learning how to pitch will not be able to pitch the ball with the same speed or accuracy as an elite performer. 4 marks

Someone learning how to pitch would be at the cognitive stage of learning, whereas someone at the elite level would not need to focus as much on body movements because they are at the autonomous stage.
The beginner will:

- **Not know how to accurately move/sequence body parts in the correct sequence to maximise speed developed when pitched.**
- **Not have developed 'muscle memory' through repeated practice sessions where maximal speed has been developed.**
- **Not know how to correctly hold the ball, flick their wrist, etc…at point of release until more practice has occurred.**

Answers must refer to skill acquisition principles to be awarded marks. Students cannot state that the elite performer has more mass and thus can generate greater force when pitching as it is not skill related.

b. The following images show a batter performing a drive (LEFT) as well as a bunt (RIGHT).

(i) The baseball player moves his right hand up the bat, higher than the mid-way point, when he wants to perform a bunt. What effect does this have on the 'resistance arm' and the amount of force that can be applied to the ball at point of contact? 2 marks

When performing the bunt, the arm movement up the bat results in a decrease in the resistance arm which slows the bat down and also decreases the force applied at point of contact

(ii) It is common for the batter to swing and make contact with the ball resulting in an eccentric force. Describe the flight of a baseball that has had an eccentric force applied to it. 2marks

An eccentric force is applied 'off-centre' and not directly through the ball's centre of gravity. Because of this the ball will be hit with topspin, which will see the ball quickly move to the field/ground as a ground ball. If hit with backspin the ball will lift after being hit and move upwards.

(iii) After hitting the pitched ball, the player must sprint 27.5m to first base before the fielding team returns the ball to the first base person to get the runner out. List **two** acute respiratory responses that would occur in the runner. 2 marks

Any <u>two</u> from:

- **Increased tidal volume**
- **Increased respiratory rate**
- **Increased gaseous exchange at the lungs**
- **Increased minute ventilation**

QUESTION 7 (14 marks)

A physical education teacher in a large school takes the Year 3 students for a 4-week Basketball unit (2 classes per week) in Term 1. Later that year (Term 3) he takes the Year 10 students for a Basketball unit consisting of 4 x 2 classes over the same time period.

a. Complete the following table to highlight the differences between the Year 3 students and the Year 10 students. 8 marks

Skill Acquisition Consideration	Year 3 Students	Year 10 Students
Stage of Learning (most students likely to be experiencing)	**Cognitive**	**Associative**
Stability of environment	**Closed**	**More Open**
Most suitable practice type for skill development	**Blocked or Massed**	**Distributed or Random**
Most effective type of feedback	**Knowledge of Results External/augmented**	**Knowledge of Performance External/augmented or Intrinsic**

b. When working with the Year 10 students, the PE teacher introduces some task constraints in an effort to encourage them to develop new skills and strategies. Clearly describe **two** task constraints the teacher might use and discuss how these bring about increased skill development. 3 marks

Several examples include:

TASK CONSTRAINT (1 mark)	HOW IT IMPROVES SKILLS (2 marks)
Rules changed to only allow shots at goal from a certain area on the court	**This aims to encourage players to shoot from specific parts of the court to develop shooting skills as opposed to lay-ups, or shots closer in**
Players required to set-up defensive zone	**Teaches players how to keep opponents away from the goal and ow they need to move to cover any gaps that may occur**
Players expected to shoot for goal with both hands (L & R)	**Encourages students to be able to use both sides of their body in case they are forced to do this during the game.**
Players cannot use the middle third of the court when bringing the ball from defence to offence	**Players encouraged to retain possession and create opportunity by using side entries to the goal – less likely to experience turn-over**

QUESTION 8 (12 marks)

The following photograph shows the time lapse movements performed by a female long jumper using the 'hang' technique.

a. By referring to the image above, clearly discuss how Newton's 3 Laws of Motion apply to the long jump.

6 marks

Answers must refer to the image of the long jump performer

Newton's 1st Law

LAW OF INERTIA - a body will remain at rest, or uniform motion, unless acted upon by an external force.

The jumper will continue to be a projectile and move forwards/upwards until acted on by gravity.

Newton's 2nd Law

LAW OF ACCELERATION - F = m x a

In long jump, the greater the acceleration on run up, the greater the force produced after hitting the take-off board.

Newton's 3rd Law

ACTION REACTION – for every action there is an equal and opposite reaction.

In the long jump, think of the athlete's body divided at the waist – when the jumper moves their arms forward and downwards, her legs react by moving upwards and forwards.

OR

When pushing down on the take-off board, there is an equal and opposite reaction upwards and the athlete takes off/upwards.

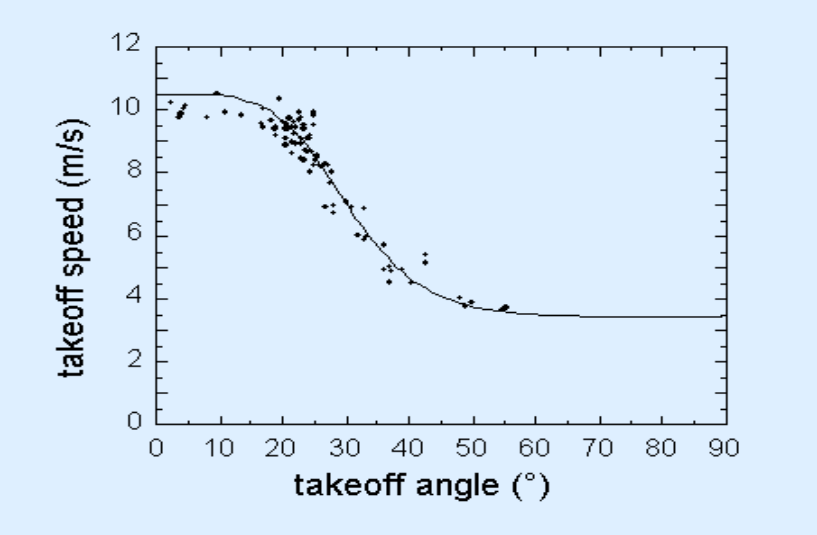
b. Discuss the reasons for any differences in the optimal take off angle that the long jumper would use contrasted to that used by a volleyball player jumping to perform a spike. Make sure you tick the optimal take-off angles for each performer in relation to 45 degrees (< 45 degrees; = 45 degrees or >45 degrees**)**

2+2=4 marks

Volleyball Spike	**< 45 degrees ☐**	**= 45 degrees ☐**	**>45 degrees ☑**
Long Jump Hang Technique	**< 45 degrees ☑**	**= 45 degrees ☐**	**>45 degrees ☐**

The volleyball spike needs to get as much vertical height as possible to position them above the net when spiking so angle needs to be greater than 45 degrees. Conversely, the long jumper needs to gain as much horizontal distance as possible and thus needs to have a take-off angle much less than 45 degrees.

c. The distance obtained by the long jumper is a combination of horizontal and vertical components. The following image shows the take off speed the long jumper achieved by varying her take off angle.

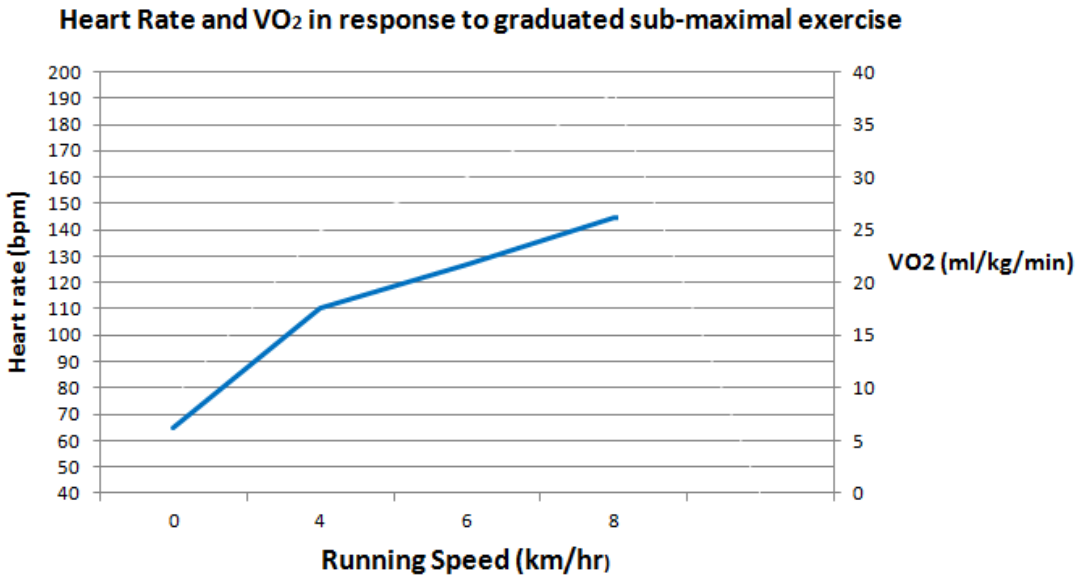


By referring to the above graph and your knowledge of projectile motions, what take off angle do you believe will result in the longest distances jumped. What effect does this have on the long jump performance? 2 marks

The graph reveals the optimal take off angle for long jump would be between 18 – 24 degrees. When athletes take-off using these angles, it results in them having the highest take-off speed which is critical in producing the greatest forces on the take-off board. This will result in the longest distances being achieved by the jumpers.

QUESTION 9 (8 marks)

The following graph reveals the heart rate and oxygen uptake for a 20 year old female running on a treadmill.



a. In the table below some of the answers have already been completed, and you are required to complete the others. Each acute response to the treadmill test must be different.

4 marks

Body System	Acute Response 1	Acute Response 2	Acute Response 3
Cardiovascular	Increased heart rate	**Increased stroke volume**	Increased systolic blood pressure
Respiratory	**Increased respiratory rate**	Increased oxygen uptake	**Increased minute ventilation**
Muscular	Increased muscle temperature	**Increased fuel usage** **Increased a-VO2 diff**	Increased enzyme activity

b. A closer look at the graph reveals that the female's heart rate from the 4 minute stage of the test increases at a slower rate than for the first 4 minutes of the test. Discuss **two** reasons why this may be the case.

2 marks

Reason 1

The demands for oxygen and fuel is very high at the start of any activity and hence the rapid increase, as the supply of these gets closer to the demand the cardiovascular and respiratory systems both combine to supply oxygen at a slower, but still increasing rate. This is one reason why a warm-up is performed before most sports in terms of increasing the body's ability to take up and transport oxygen and fuels when exercise commences.

Reason 2 2 marks

Students may state that the heart rate increases slower as the subject approaches steady state.

Question 10. (10 marks)

Badminton is a sport that can be played as singles or doubles and a match generally takes between 30 and 45 minutes. Players are involved in high-intensity, short-duration movements, such as serving, smashing, scampering forwards and backwards and rapid directional changes. The game is explosive in nature with rest periods between points.

a. Using the information provided, and the graph below, describe the interplay of the three energy systems in badminton. Your response should also make reference to the rate and capacity of the energy systems at various stages of the badminton match. 6 marks

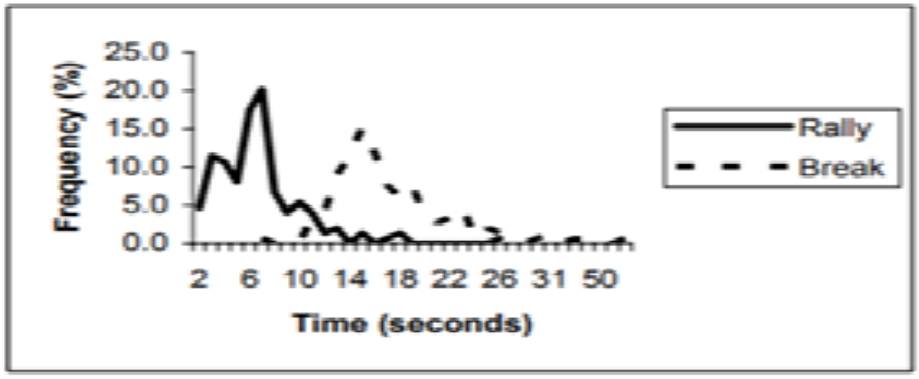


Figure 1 – Most frequent value of rally and break duration

The graph reveals that most rally's last for 6 seconds and breaks last for 14 seconds, with matches generally going for 30-45 minutes.

The duration of the rallies and breaks, together with the high intensity performance results, allow us to conclude that badminton is a sport with high intensity, intermittent efforts predominantly calling upon the PC energy system followed by breaks to partially restore the same. The longer a rally goes for the greater the contribution from the anaerobic glycolysis system as well as the aerobic energy system.

Match duration indicates the aerobic energy system is significant, whilst the two anaerobic energy systems produce most of the ATP for muscle contractions during rallies.
When the break between rallies is less than 10 seconds it is likely that the anaerobic glycolysis system produces most of the ATP until the PC system has a chance to replenish PC stores (end of games).

The PC system provides ATP/energy at the fastest rate during the first high intensity efforts involving sprints, directional changes and strokes such as smashes and powerful forehands/backhands hit deep into opposite court space. PC depletes quickly without significant rest/recovery in between strokes/movements and this contributes to increased contribution from the anaerobic glycolysis system which also has a finite capacity as more and more by-products accumulate the longer rallies go for and the less rest in between points.

b. Some badminton matches can go for over 60 minutes if games are close and consist of long rallies. Briefly discuss the food fuel usage (fats and carbohydrates) during a badminton match lasting 70 minutes.

2 marks

The longer the matches go for and the more CHO depletion leading to greater use of fats to produce ATP. Initially. Most of the ATP would be produced from the breakdown of CHO's but this lessens the longer the match goes for and sees more contribution of fats to ATP production

c. Following a match lasting 70 minutes, discuss why consuming carbohydrates and proteins would be better for the player's recovery than simply consuming carbohydrates. 2 marks

Co-ingestion of proteins and carbohydrates accelerates the rate at which CHO's are absorbed and converted to glycogen to be stored at the muscles and liver. Additionally, CHO's alone cannot contribute to protein resynthesis required for muscle repair, RBC and enzyme rebuilding.

END OF EXAM

See you next Thursday at 8pm – DO NOT TAKE SOMEONE ELSE' PLACE ONLY REGISTER IF YOU CAN MAKE IT!