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SPORT AND EXERCISE SCIENCE

EXAMINATION NUMBER

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Time: 3 hours

200 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 40 pages. Please check that your question paper is complete.
2. **All the questions must be answered on the question paper.**
3. Read the questions carefully.
4. Use the total marks awarded for each question as an indication of the detail required.
5. There is one blank page at the end of this paper. In case you run out of space when answering a question, use this page. Clearly indicate the number of the question you are working on.
6. It is in your own interest to write legibly and to present your work neatly.

FOR MARKER'S USE ONLY

Question	1	2	3	4	5	6	7	8	9	Total
Marks	54	12	8	20	20	22	21	23	20	200
Obtained										

QUESTION 1

- 1.1 Match the term in column A to a description in column B. Write only the letter of your chosen description in the answer grid below.

COLUMN A	COLUMN B
1.1.1 OBLA	A An instrument that measures joint range of motion
1.1.2 Meso-cycle	B Slower air flow under an aeroplane wing
1.1.3 Anorexia	C Typically lasts 4–16 weeks
1.1.4 Micro-cycle	D Smooth flow of air around an object
1.1.5 Tapering	E Spinning motion that causes air pressure on one side of a ball to be less than on the other side of the ball
1.1.6 Goniometer	F Typically lasts 1 week
1.1.7 Drag	G A force causing resistance in water or in the air
1.1.8 Bernoulli Principle	H The point during exercise where blood lactate accumulates above resting levels
1.1.9 Magnus Effect	I Characterised by body image distortion
1.1.10 Laminar flow	J A progressive reduction of training load in an attempt to reduce the demands of training and to optimise performance

Answers:

1.1.1	
1.1.2	
1.1.3	
1.1.4	
1.1.5	
1.1.6	
1.1.7	
1.1.8	
1.1.9	
1.1.10	

(10)

1.2 The table below relates to Energy Systems.

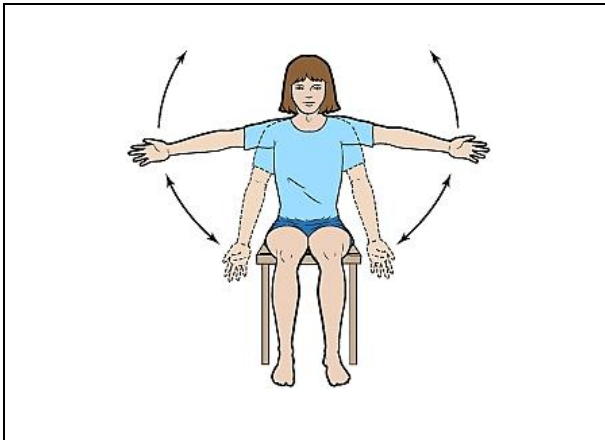
Give the correct term for the following descriptors.

Descriptors	Term
1.2.1 Carbohydrate stored in the liver	
1.2.2 A waste product that causes muscle fatigue	
1.2.3 A chemical compound that releases energy for exercise	
1.2.4 The enzyme that breaks the bonds between phosphates to release stored potential energy	
1.2.5 The system that needs oxygen	
1.2.6 The point where one energy system stops being the main provider for the resynthesis of ATP	
1.2.7 The system that breaks down glycogen, glucose and fats to provide energy	

(7)

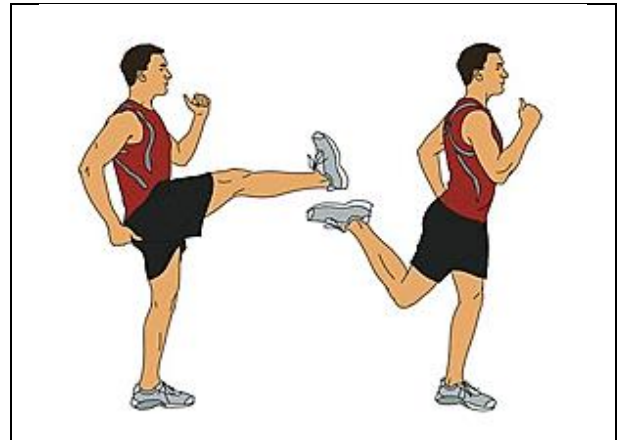
1.3 In the pictures below, state in which body plane each movement is occurring. Write your answer in the space provided below.

Picture A



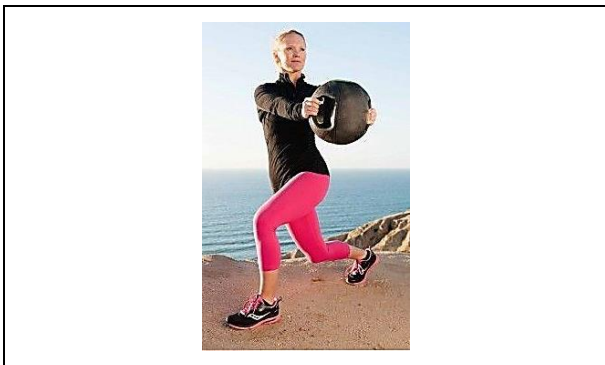
[Source: <<https://www.google.arm+exercises&safe>> (Accessed 5/2/19)]

Picture B



[Source: <<https://www.google.co.za leg+swings>> (Accessed 5/2/19)]

Picture C



[Source: <<https://www.google.co.za/q=transverse+plane+exercise&>> (Accessed 5/2/19)]

Answers:

Picture A: _____ (1)

Picture B: _____ (1)

Picture C: _____ (1)

1.4 Outline **AND** shade in the Base of Support in each of the following pictures.

Picture A



[Source: <<https://www.google.co.za/=dance+balance&oq?>>
(Accessed 5/2/19)]

(5)

Picture B



(3)

Picture C

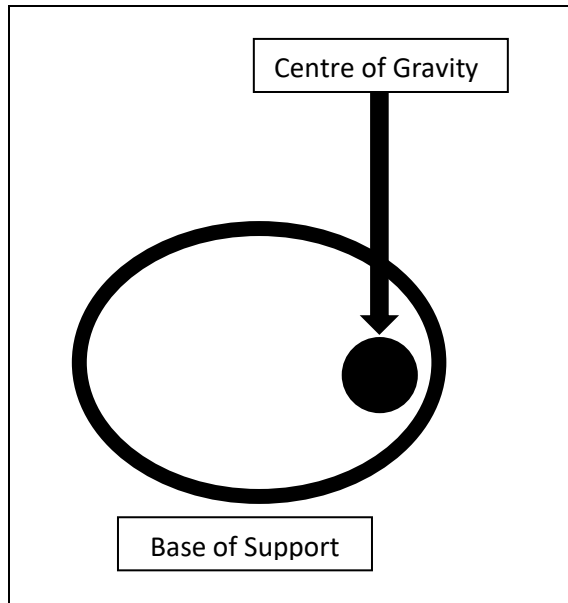


[Source: <<https://www.google.co.za/wheelchair+basketball>>
(Accessed 5/2/19)]

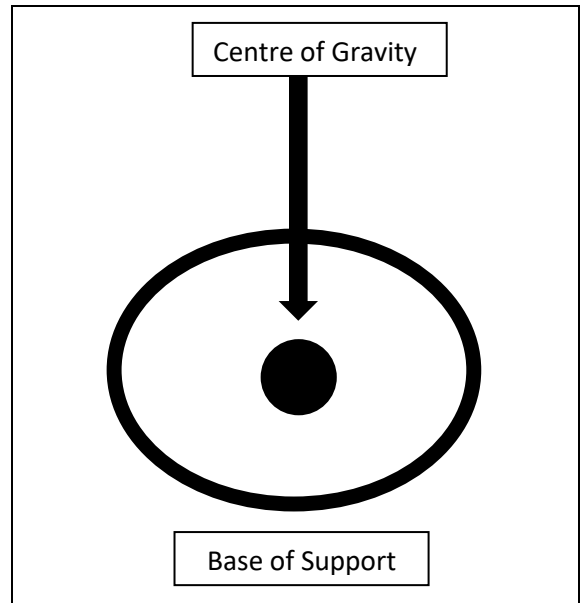
(2)

1.5 Study the diagrams below and then answer the questions that follow.

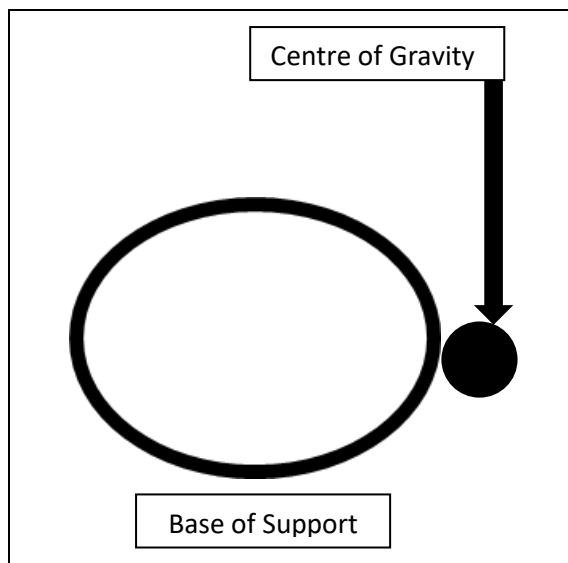
Picture A



Picture B



Picture C



1.5.1 Which picture – A, B or C – represents an athlete in perfect balance? Provide a reason for your answer.

(1)

Reason: _____

(2)

1.5.2 Which picture – A, B or C – represents an athlete out of balance, about to fall over? Provide a reason for your answer.

(1)

Reason: _____

(2)

1.6 Study the pictures below and answer the questions that follow.

A



[Source: <<https://www.google.co.za.golf+swing>> (Accessed 7/2/19)]

B



[Source: <<https://www.google.co.za/cricket+fast+bowlers>> (Accessed 7/2/19)]

C



[Source: <<https://www.google.co.za/search+push+up>> (Accessed 7/2/19)]

1.6.1 For each of the actions shown in the pictures on page 8:

- Draw in the fulcrum (▲)
- State what the load is
- State what muscles are making the effort

Picture A:

Load: _____

Effort: _____

(3)

Picture B:

Load: _____

Effort: _____

(3)

Picture C:

Load: _____

Effort: _____

(3)

1.6.2 State what class of lever is represented in each picture.

Picture A: _____

Picture B: _____

Picture C: _____

(3)

1.6.3 Identify the purpose of each lever – is it speed or force?

Picture A: _____

Picture B: _____

Picture C: _____

(3)

1.7 Label the following diagram with appropriate arrows indicating:

- Reaction force(s)
- Friction force(s)
- Resistance

Ensure that you label each arrow.



[Source: <<https://www.google.co.za/search?q=sprint+start&>>
(Accessed 22/3/19)]

(3)
[54]

QUESTION 2

- 2.1 The three pictures below show the stages of a rugby player kicking the ball. Explain the principles of lever length in each stage.

A

[Source:
<<https://www.google.co.za/rugby+penalty>>
(Accessed 7/2/19)]

B

[Source:
<<https://www.google.co.za/Penaltykick+dancarter>>
(Accessed 7/2/19)]

C

[Source:
<<https://www.google.co.za/rugby+penalty+kicksafe>>
(Accessed 7/2/19)]

Picture A – Backswing:

(3)

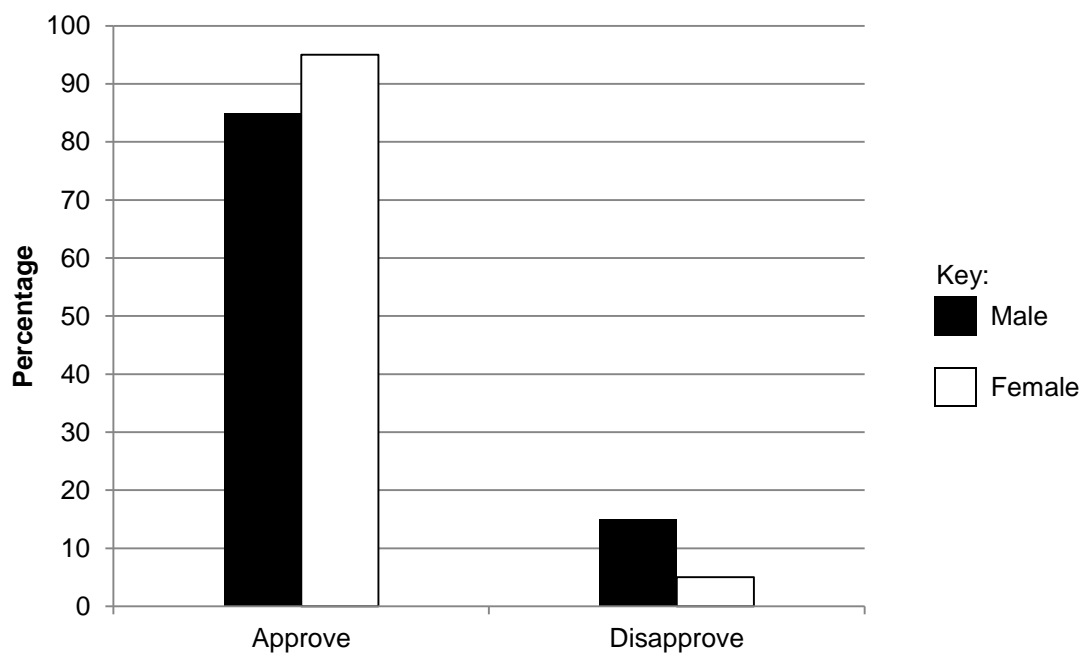
Picture B – Connecting with the ball:

(3)

Picture C – Follow through:

(2)

2.2 Below is a graph which shows peoples' opinions on females playing rugby.



2.2.1 Analyse the data depicted in the graph above.

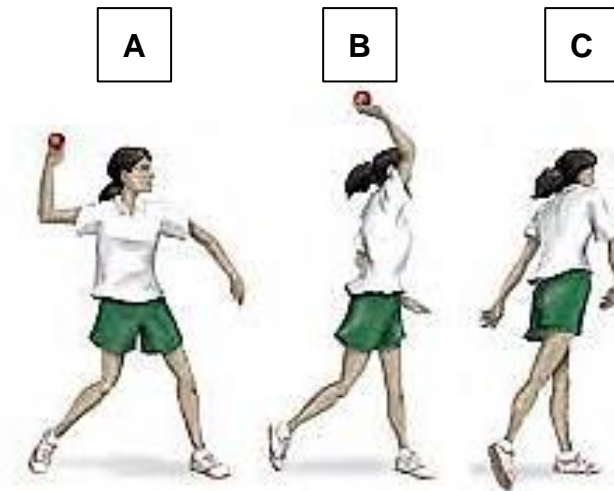
(2)

2.2.2 Suggest TWO possible reasons for the data depicted.

(2)
[12]

QUESTION 3

Study the pictures below and then answer the questions that follow.



[Source: <<https://www.google.co.za/force+summation>>
(Accessed 12/3/19)]

3.1 Discuss the girl's use of force summation.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

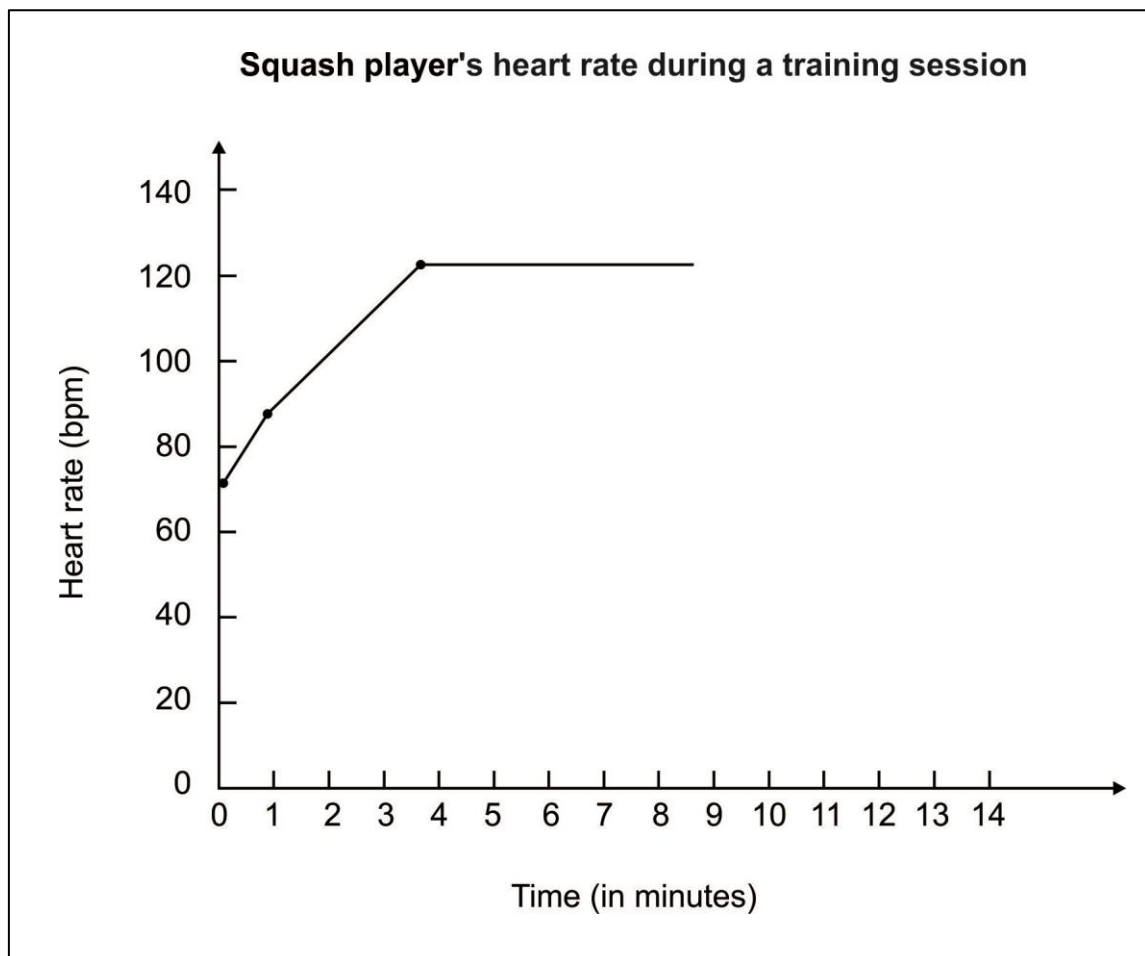
(6)

3.2 What recommendation will enable her to throw with more force?

(2)
[8]

QUESTION 4

- 4.1 Below is a graph depicting a squash player's heart rate during a training session. Examine the data and answer the questions that follow.



- 4.1.1 What is the player's resting heart rate?

(1)

- 4.1.2 When is the player physically working at their hardest?

(1)

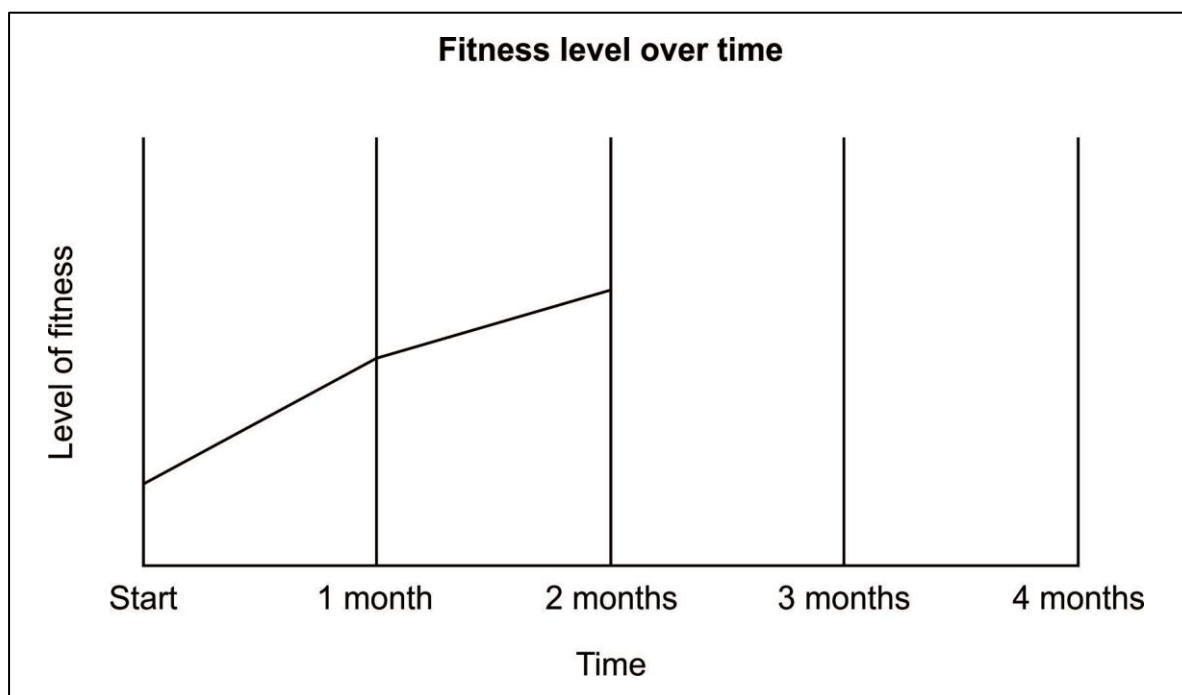
- 4.1.3 The player's heart rate remains constant for several minutes. What does this suggest about the training session?

(2)

- 4.1.4 The graph is not complete. Describe what would happen to the player's heart rate after finishing the training session.

(2)

- 4.2 Below is a graph depicting a squash player's fitness levels over a time period. Examine the data and answer the questions that follow.



- 4.2.1 Complete the graph, predicting what will happen to the player's fitness level if she maintains the same training programme for 4 months.

(2)

- 4.2.2 Provide a reason for your response to Question 4.2.1.

(1)

- 4.3 To maintain peak performance, elite squash players should eat an appropriate diet. State TWO ways in which an elite squash player's diet might differ from that of an untrained adult AND provide reasons for the differences.

(4)

- 4.4 What is the function of muscle spindle?

(3)

- 4.5 Describe what occurs within a muscle when a muscle spindle is activated.

(4)

[20]

QUESTION 5

Examine the sources provided below and then answer the questions that follow.

Source A**Australian Open: Organisers defend heat policy after extreme temperatures**

Australian Open organisers have defended the decision not to stop play for extreme temperatures during the tournament after player criticism. Temperatures on day five reached 40° C in Melbourne while six-time champion Novak Djokovic called conditions "brutal" and "right on the limit".

Officials said they "came close" to enforcing their heat rule on Friday which would have halted play. Director Craig Tiley said: "We are, at the end of the day, an outdoor event." He added: "We want it to stay an outdoor event as long as possible but at the same time ensuring that the health and wellbeing of players is taken care of."

The extreme heat policy at the Australian Open does not use a simple maximum heat, rather a combination of factors including temperature, humidity and wind speed. It was last enforced in 2014 when play was suspended after Melbourne had three consecutive days with temperatures above 40° C.

Croatia's Petra Martic said she took painkillers to deal with blisters caused by the heat coming through her shoes from the court surface of Melbourne's main show court, the Rod Laver Arena.

After her match, Martic said: "You just need to be mentally tough and ready to just suffer out there and try to make it through."

Djokovic's third-round opponent Gael Monfils said he was "dying on court" in the hot conditions. Five-time winner in Melbourne Roger Federer, who avoided the worst of the heat by playing in Thursday's night session, played down the issue saying players have to be able to play in "all conditions". "We know it can be very hot here in Australia," Federer said. "I remember the days when we had four days of 40 degrees in a row a few years back. Now we got two. "It's definitely a challenge."

[Source: <<http://www.bbc.com/sport/tennis/42728087>>]

Source B**Australian Open 2018: Novak Djokovic beats Gael Monfils in "brutal" Melbourne heat**

Gael Monfils said he was "dying on the court" and Novak Djokovic felt conditions were "right on the limit" of safety as the temperature soared at the Australian Open. Djokovic won their second-round match 4-6 6-3 6-1 6-3 in two hours and 45 minutes as the temperature hit 39° C. Monfils took the first set but suffered in the second, complaining of dizziness and leaving the court with a doctor.

Djokovic used an ice towel as he attempted to cool down. With the temperature peaking at 17:00, the pair entered the arena in mid-afternoon and played through the worst of the heat. Djokovic could not have asked for a more punishing examination of his fitness after six months out with an elbow injury.

Asked afterwards about his elbow, the Serb said: "It's still not 100%, but building." Seeded 14th after sliding down the rankings during his lay-off, he found himself up against an in-form Monfils, hopeful of finally beating Djokovic at the 15th attempt.

The former world number one, who has a new service action to take pressure off his elbow, began poorly, making four double faults in the opening two games. But he clawed his way back as the pair shared 36 errors between them across the first set.

Monfils managed to hold on after seeing his 3-0 lead disappear, edging through another tense service game and wasting his first set point with a woeful drop shot. It was midway through the second set that the Frenchman started to struggle with conditions, and Djokovic took advantage. He broke the ailing Frenchman's serve three times in the third set and saw off five break points on his way to clinching victory in the fourth.

"It was just one of these days where you had to stay tough mentally," Djokovic added.

"I think physically it was obvious that you just have to try to hang in there."

[Source: <<http://www.bbc.com/sport/tennis/42728087>>]

5.1 In which Australian city is the Australian Open played?

(1)

5.2 Name the tennis arena in which the Australian Open is played.

(1)

5.3 Provide the medical name for the condition that these tennis players will suffer from when playing in the extreme heat.

(1)

5.4 What reason did the tournament directors give for not stopping play at the Australian Open?

(1)

5.5 What factors are taken into account when the organisers of the Australian Open are considering stopping play because of the heat?

(3)

5.6 When it came to playing in this tournament, what advantage did Federer have over Gael Monfils?

(1)

5.7 Provide TWO strategies that tennis players could use to prepare themselves for the Australian Open, knowing that the tournament is played in extremely high temperatures every year.

(2)

5.8 Suggest ONE strategy that the players could put into place *before* the tournament to reduce the risk of heat exhaustion.

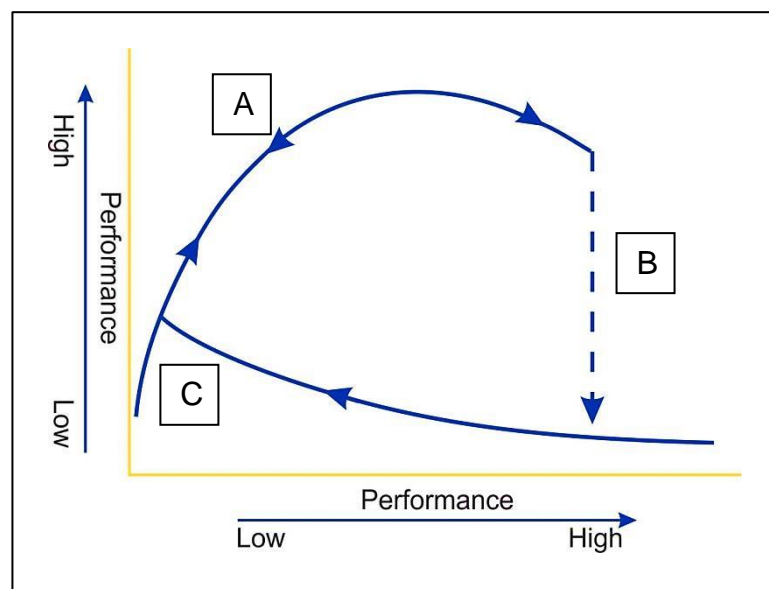
(1)

- 5.9 Suggest ONE strategy that the players could use *during* the tournament to reduce the risk of heat exhaustion.

(1)

- 5.10 In Source B it states that Monfils was leading 3–0 when he started making mistakes and losing. This is known as the Catastrophe Theory.

Using the graph below, briefly explain what is meant by this term, the impact on performance and the subsequent arousal levels.



[Source: <<https://www.google.co.za/catastrophe+theory+in+sport&>>
(Accessed 8/2/19)]

(4)

5.11 Roger Federer is 6 foot 1" / 1,85m tall. How would this advantage him in tennis?

(4)
[20]

6.2 Describe the following during a tennis forehand shot hit with backspin.

- The racquet movement that is ideal:

(2)

- The ball flight through the air:

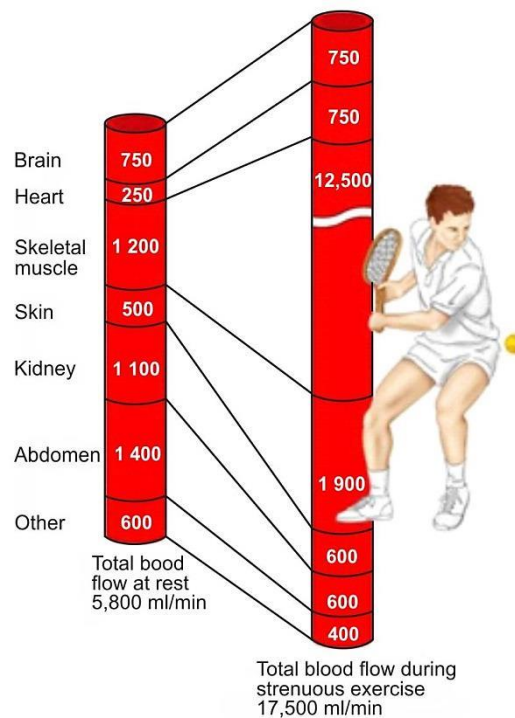
(2)

- The ball flight on landing:

(2)

6.3 Below is a graph showing blood redistribution during an intensive tennis training session.

Examine the data and answer the questions that follow.



6.3.1 Why does cardiac output increase from 5,800ml/min at rest to 17,500ml/min when exercising?

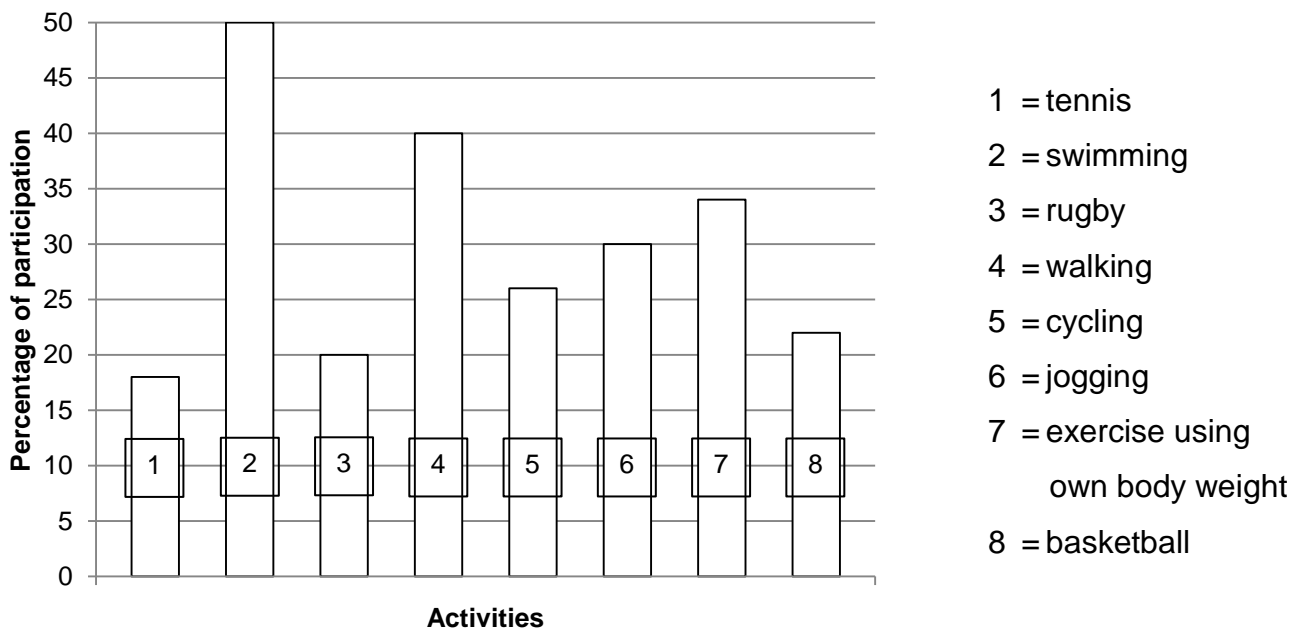
(3)

6.3.2 Explain the impact that pre-capillary sphincters have on the vascular shunt.

(6)
[22]

QUESTION 7

In a South African survey conducted with people aged 16-24 years, the following results were gathered over a 12-month period.



7.1 Name the FOUR most popular activities.

(4)

7.2 Explain how these top 4 activities are similar to each other.

(3)

7.3 What is the most popular activity according to the data?

(1)

7.4 Give reasons why this sport named in Question 7.3 is so popular.

(3)

7.5 Which activity is the least popular according to the data?

(1)

7.6 Provide a reason as to why this activity is least popular.

(2)

7.7 Name two activities, not necessarily depicted in the graph, that people aged 60 and over would participate in. Explain your answer.

(3)

7.8 Explain the Ringelmann effect AND provide an appropriate sporting example.

(4)
[21]

QUESTION 8

8.1 Describe the progression of the energy systems that are used by the body when competing in a 50 km road cycle race.

[illegible]

(6)

8.2 Elite cyclists will often use high altitude training when preparing for a major competition.

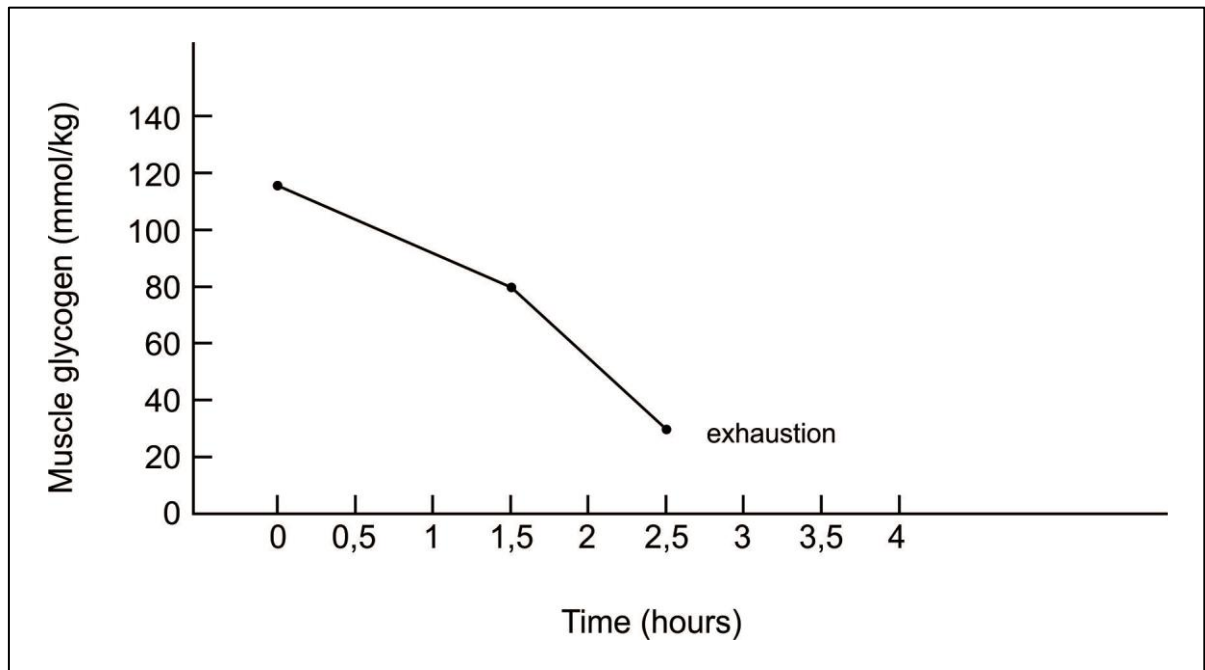
8.2.1 Briefly explain the term "altitude training".

(2)

8.2.2 What occurs physiologically when an athlete trains at higher altitudes?

(1)

- 8.3 The graph below depicts a cyclist's muscle glycogen levels during a treadmill test run at 70% VO_2max .



- 8.3.1 Predict where the muscle glycogen levels would be, had the cyclist undertaken carbohydrate loading three days before the test. Place a clear dot on the graph at this point. (1)
- 8.3.2 State one other physical difference that the cyclist could experience after carbohydrate-loading.

(1)

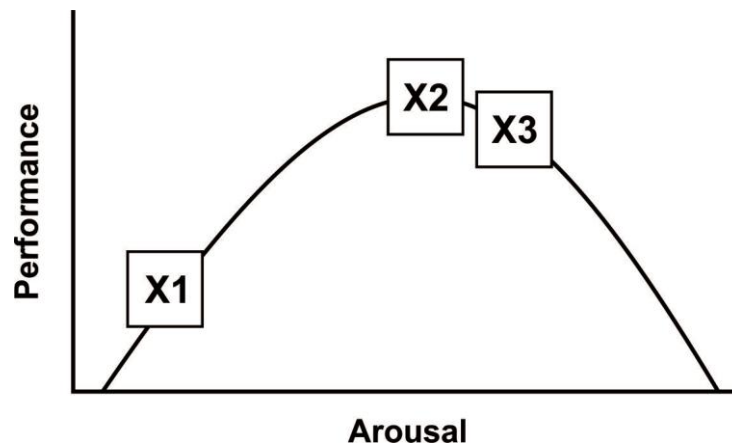
- 8.4 Sarah and Jill are friends. Sarah belongs to a cycling club and does single trail riding through the bush most weekends. One weekend she invited Jill to join her on a ride. Although Jill had cycled near her house before, she had never cycled off road.

During the ride, Jill had to stop and rest several times while Sarah cycled with ease without becoming too breathless.

Write a paragraph explaining the different physiological responses of Sarah AND Jill's bodies' responses to the same exercise.

(6)

8.5 The Yerkes & Dodson Arousal Graph is shown below.



Briefly describe the cyclist's mental AND physical state at each demarcated spot on the graph.

(6)
[23]

QUESTION 9

Examine the information provided in the sources below, as well as the rubric. Use them to write an essay of 1–1½ pages on the following topic:

Provide effective strategies for coaches to use to ensure that players stay at peak physiological and psychological levels all season. Justify your strategies.

To answer this question you are expected to:

- examine the source material carefully and use the information in the sources to best develop your essay.
- integrate your own relevant sport science knowledge.
- use real-life examples where applicable.
- make use of the rubric to shape your response.

ESSAY RUBRIC

	0 mark	1 mark	2 marks	3 marks	4 marks	Possible mark (20)
Use of sources	No reference to sources.	Reference made to some sources only.	Source detail very close to full potential used to support strategy and reasoning.			2
Content relevance X2	Little or no content relevance.	Significant important information missing AND Facts not related closely to the topic AND Some serious factual errors.	Some vital information missing OR Many irrelevant facts OR Errors affecting the quality of the essay.	Slightly flawed in some facts missing OR Facts mostly relevant to topic OR Few errors.	Sufficient facts provided. All information is relevant and accurate.	8
Effective strategies X2	No strategies provided.	Ineffective and unrealistic strategy/ies provided.	One effective strategy provided.	Several strategies provided – most are effective.	Several effective strategies provided.	8
Quality of discussion	Question not answered. Missed the point.	Reasoning correct but hard to follow. Some linkage evident.	Reasoning is very clear and succinct. Flow is logical. Compelling with regular linkage.			2

Source A**Cricket stats:**

10 ODIs (One Day Internationals) were played during 1978. This increased to 66 in 1983, then 89 in 1992 and 127 in 1996. The glut reached a peak in 1999, when the world watched no fewer than 154 ODIs, of which 37 featured Australia and 41 involved India.

Indeed, over the past few years, on average, the Indians have appeared in a 1-day international every 9 days.

[Source: GLORY DAYS – Forty years of one-day cricket by Edward Griffiths, Published 2003]

Source B

The body is more resilient than people think, but the mental pressure is silently debilitating and a few major players are starting to calculate that, if they can skip a few 1-day games, they could extend their careers for many years to come.

[Source: GLORY DAYS – Forty years of one-day cricket by Edward Griffiths, Published 2003]

Source C**Nadal blames tour organiser for injury that cost him Australian Open chance**

Rafael Nadal has bitterly questioned the heavy workload of the tennis schedule for a spate of injuries that are jeopardising tennis stars' futures after he was forced to retire in the 5th set of his quarter final after yet another injury.

[Source: *Sydney Morning Herald*, 24 Jan 2018]

Source D

China's No. 1 Wang Qiang has been left really tired at the end of a punishing season on the WTA tour and believes she has played too many matches. "It's really too much" she said. "Too many tournaments for me, too many matches."

[Source: Sport24, 31/10/18]

Source E**MARITZBURG COLLEGE RUGBY FIXTURE LIST 2019**

DATE	OPPOSITION	VENUE
10 MARCH – SATURDAY	"Internal Trials"	Home
17 MARCH – SATURDAY	Pmb Day (St Charles, Voortrekker, Linpark, Carter)	Home
24 MARCH – SATURDAY	Glenwood	Home
28 – 31 MARCH	Vryheid Festival 2nd/3rd	Away
28 MARCH – 2 APRIL	St Stithian's U18 Festival	Away
14 APRIL – SATURDAY	PBHS	Home
21 APRIL – SATURDAY	Hilton	Home
26 APRIL – THURSDAY	Northwood	Away
5 MAY – SATURDAY	King Edward VII	Away
12 MAY – SATURDAY	Kearsney	Home
19 MAY – SATURDAY	DHS	Away
26/27 MAY	Free Weekend	
2 JUNE – SATURDAY	Michaelhouse	Away
9 JUNE – SATURDAY	Westville	Away
16 JUNE – SATURDAY	Glenwood	Away
21 JULY – SATURDAY	Affies	Home
28 July – SATURDAY	PBHS	Away
4 AUGUST – SATURDAY	King Edward VII (REUNION WEEKEND)	Home
11 AUGUST – SATURDAY	Skonk /rugby 7's	Home

Source F**GREY COLLEGE RUGBY FIXTURES 2019**

Date	Opposition
9 March	Welkom Gymnasium
16 March	Menlopark
19 March	Garsfontein High School
6 April	Middelburg
13 April	Selborne College
11 May	Paarl Boys High
18 May	Afrikaanse Hoër Seunskool
13 July	Waterkloof
20 July	Grey High
27 July	Glenwood High
3 August	Oakdale Agricultural school
17 August	Paul Roos Gimnasium

[illegible]

[illegible]

[20]

Total: 200 marks

ADDITIONAL SPACE (ALL questions)

REMEMBER TO CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE THAT ALL ANSWERS ARE MARKED.

[illegible]