basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

SPORT AND EXERCISE SCIENCE

NOVEMBER 2022

MARKS: 200

TIME: 3 hours

EXAMINATION NUMBER													

CENTRE NUMBER								

This question paper consists of 32 pages and a Source Material Booklet of 2 pages (i–ii).

INSTRUCTIONS AND INFORMATION

1. Please check that your question paper is complete.

2. **Answer all questions on the question paper** and hand it in at the end of the examination. Remember to write your examination number and centre number in the space provided on page 1.

3. Read the questions carefully.

4. Use the total marks awarded for each question as an indication of the detail required.

5. It is in your own interest to write legibly and to present your work neatly.

6. TWO blank pages (pages 31–32) are included at the end of the question paper. If you run out of space for a question, use these pages. Clearly indicate the number of your answer should you use this extra space.

FOR MARKERS' USE ONLY

Question	1	2	3	4	5	6	7	8	**Total**
Marks	38	44	16	23	21	22	16	20	**200**
Obtained									

QUESTION 1

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

COLUMN A	COLUMN B	
1.1.1 Vegetarian	A	Avoid animal flesh and eggs but eat dairy
1.1.2 Vegan	B	Avoid all animal products except eggs
1.1.3 Lacto-ovo vegetarian	C	Does not eat meat, poultry, game, fish, shellfish or by-products of animal slaughter
1.1.4 Pescatarian	D	Avoid all animal products and animal-derived products
1.1.5 Ovo vegetarian	E	Avoid meat and poultry but eat fish
1.1.6 Lacto vegetarian	F	Avoid animal flesh but eat dairy and egg products

ANSWERS:

1.1.1	
1.1.2	
1.1.3	
1.1.4	
1.1.5	
1.1.6	

(6)

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

Picture A

[<https://www.google.com/=yoga>, Accessed 14/3/22]

(3)

Picture B

[<https://www.google.com/forward+lunge+on+a+pad>, Accessed 14/3/22]

(3)

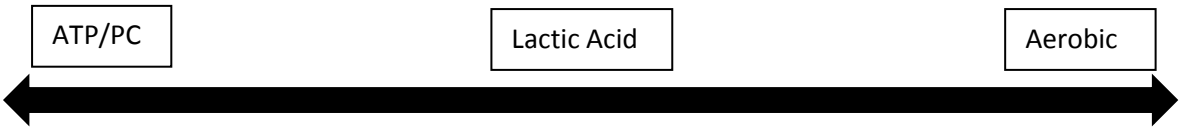
Picture C

[<https://www.google.com/20partnerbalances>, Accessed 14/3/22]

(7)

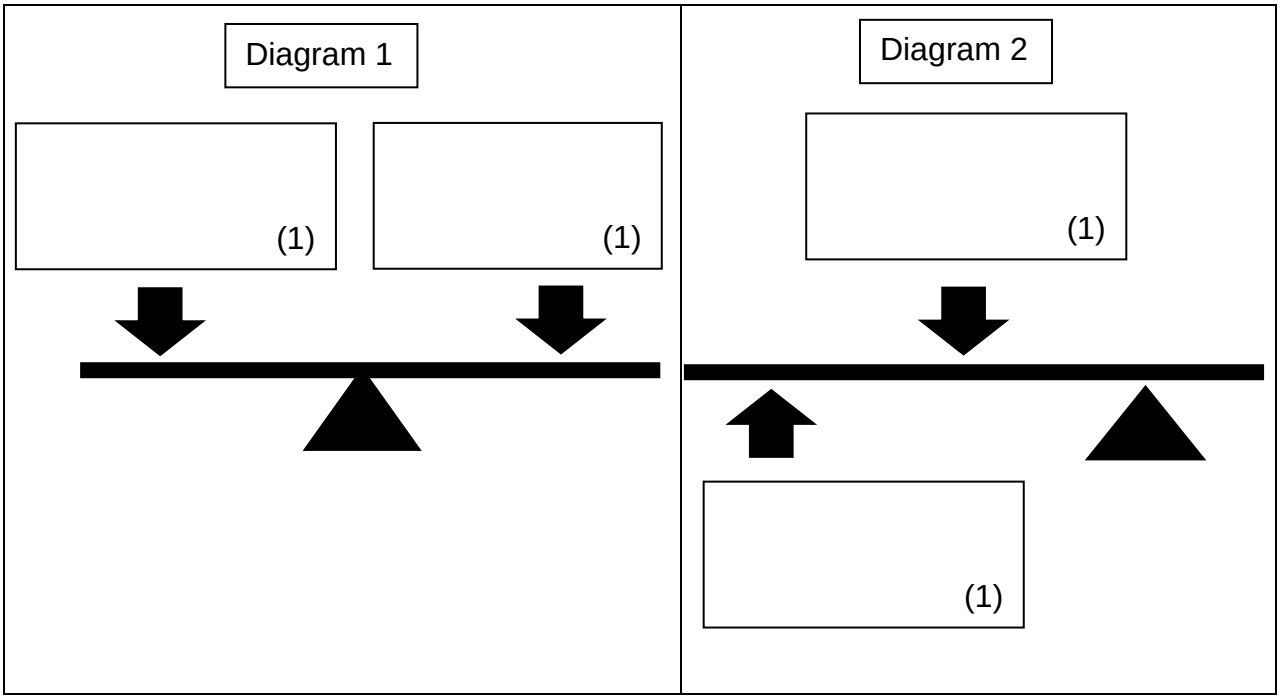
1.3 Place the activities listed below on the provided continuum according to their energy demands. Write just the letter of your choice on the continuum

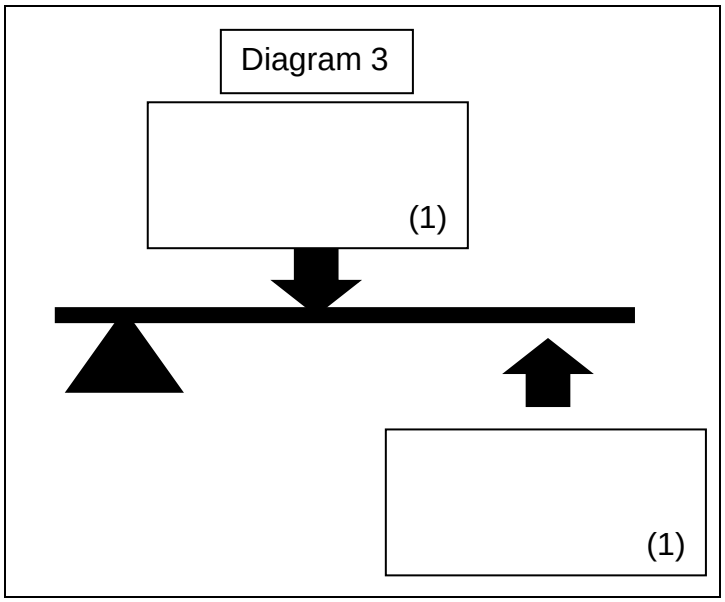
A – A basketball quarter of 7 minutes
B – Vertical jump
C – 2-minute HIIT training interval
D – Tennis smash
E – A 2 km open water swim
F – 400 m sprint done in a time of 43,03 seconds



(6)

1.4 1.4.1 Provide the labels for each diagram.





1.4.2 State which diagram represents the following levers as a result of the way you labelled them:

(a) A first class/order lever _____
(1)

(b) A second class/order lever _____
(1)

(c) A third class/order lever _____
(1)

1.4.3 Provide an example of an exercise that uses a second-class lever.

_____

(1)

1.4.4 Using the example provided in question 1.4.3, name what body part or joint is serving as the fulcrum.

_____

(1)

1.4.5 Using the example provided in question 1.4.3, name what muscle serves as the effort.

_____

(1)

1.4.6 Using the example provided in question 1.4.3, explain what serves as the load.

_____

(1)
[38]

QUESTION 2

Examine sources A and B provided in this question and use them to answer the questions posed.

The following extracts are adapted from Peter Sagan's book titled *Sagan, my world*. Peter Sagan is a professional cyclist whose successes include 12 Tour de France stage wins as well as being World Champion 3 times for road cycling.

Source A

'2 km to go … so I gave it everything I had and reached the top of the hill maybe 5 m in front of Greg van Avermaet. My calves were screaming at me with all the accumulated pain of 260 km. Fortunately the next section was downhill and I squatted flat on the crossbar.

How badly did I want to win? That's the challenge I asked myself. This was the first race I had been waiting for – the whole year, my whole career, my whole life.'

Source B

'I headed back to America for some quality training at altitude – a couple of weeks riding, eating and sleeping at 2 200 m above sea level. The first few days your legs feel like lead and your lungs feel so tiny that you would struggle to blow up a child's balloon. But by the time my next races started to loom up, I was flying.'

2.1 Provide the correct term for 'calf muscle'.

_____

(1)

2.2 Account for the 'accumulated pain' in Sagan's calves.

_____

_____

_____

_____

_____

_____

(3)

2.3 Explain how Sagan would benefit when he 'squatted flat on the crossbar'.

(3)

2.4 Describe the progression of Sagan's energy systems during the course of the race until with '2 km to go I gave it everything I had and reached the top of the hill'.

(9)

2.5 Describe how Sagan could increase his body's tolerance to Lactic Acid and what impact this would have on his performance.

(4)

2.6 What occurs physiologically to Sagan when he lives and trains at high altitude?

(15)

2.7 Sagan states that he is living high and training high (LHTH). List another method of altitude training.

_____

_____

(1)

2.8 Explain how each of the following sports would benefit the athlete when competing at high altitude:

2.8.1 Discus thrower

_____

_____

_____

_____

(2)

2.8.2 Long Jumper

_____

_____

_____

_____

(2)

2.9 Name TWO sports that would be negatively affected at high altitude AND explain why each would be negatively affected.

Sport 1: _____

(1)

_____

_____

_____

_____

(1)

Sport 2: _____

(1)

_____

_____

_____

_____

(1)
[44]

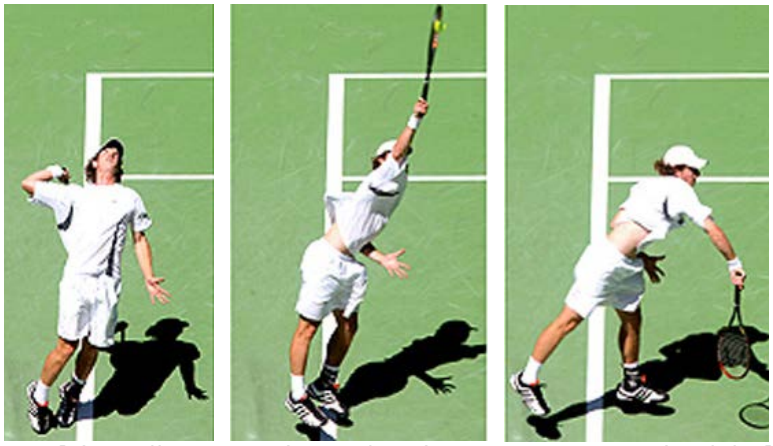
QUESTION 3

Use the diagrams below to answer the questions that follow:

Picture D

[<https://www.google.com/frisbee:throwing:>, Accessed 14/3/22]

Picture E (i) **Picture E (ii)** **Picture E (iii)**



[<https://www.google.com/tennis+serve>, Accessed 14/3/22]

3.1 Discuss the frisbee thrower's use of the force summation concept.

(4)

3.2 Provide TWO suggestions on how the frisbee thrower can increase the force of the throw.

(2)

3.3 Use pictures E of the tennis player to explain how levers can maximise performance.

(6)

3.4 How can the concepts of force summation and of levers be used together in order to improve performance?

(4)
[16]

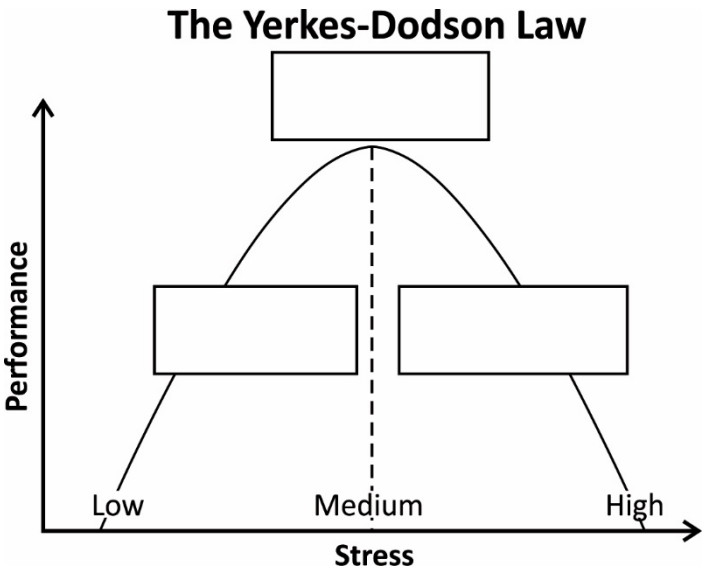
QUESTION 4

4.1 Complete the table below relating to arousal in sport.

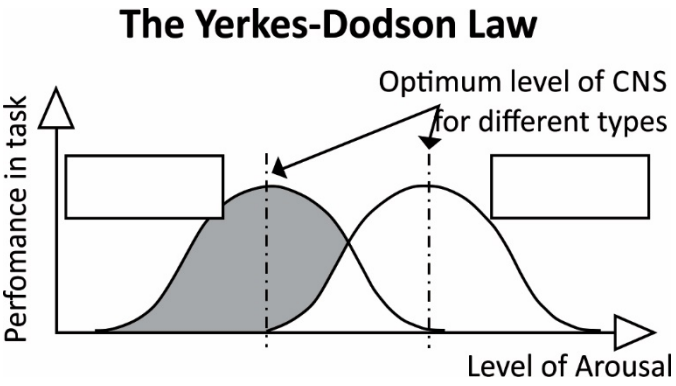
Level of arousal		Example of sport or activity
Sports or activities needing higher arousal levels		Example 1: Example 2: (2)
Sports or activities needing lower arousal levels		Example 1: Example 2: (2)

4.2 Examine the Yerkes and Dodson arousal graphs below and answer the questions that follow.

Graph A



Graph B



4.2.1 On Graph A place labels indicating the area of
- optimal arousal
- good stress
- bad stress

(3)

4.2.2 On Graph B indicate which arch indicates a complex task.

(1)

4.2.3 Provide a sporting example of a complex task.

_____

(1)

4.2.4 On Graph B indicate which arch indicates a simple task.

(1)

4.2.5 Provide a sporting example of a simple task.

_____

(1)

4.2.6 Explain why the two athletes depicted in Graph B might psych themselves up very differently from each other before a major competition.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

4.2.7 Provide ONE possible method that each of the athletes would use to pysch themselves up AND briefly explain why that method is suitable to the athlete.

Complex task:

_____

_____

_____

_____

(2)

Simple task:

(2)

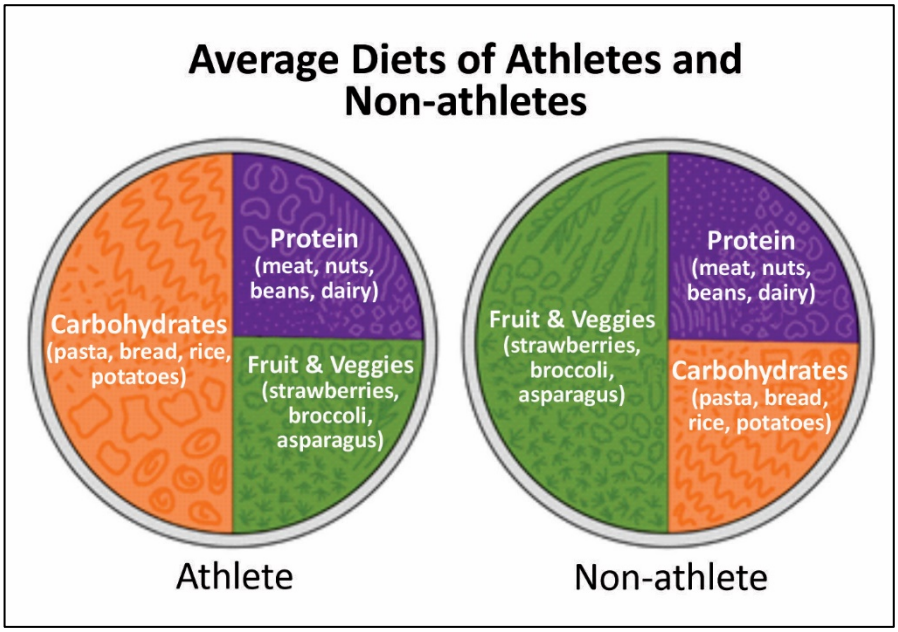
4.3 Clarify the differences between the terms 'arousal' and 'anxiety' and their impact on competition performance.

(4)
[23]

QUESTION 5

Examine the sources below and answer the questions that follow.

Source C



[<https://www.google.com/athletes+vs+non+athletes>, Accessed 26/1/22]

Source D

'What to feed a hungry Bear'

'What to feed a hungry Bear' is the name of the brochure Missouri State University team dietician Natalie Allen, gives out to recruits and current Bear athletes. (Bears is the nickname for the university athletes)

College athletes work long, hard hours every day, so it is important for them to keep their bodies fueled and hydrated at all times with the proper diet.

So, what does the typical Division I athlete consume?

For an endurance athlete — swimmer or runner — carbohydrates are their main source of fuel. These athletes eat a lot of pasta, rice, bread, potatoes and starchy vegetables.

Allen said an endurance athlete should eat three meals and three snacks every day with carbohydrates in every meal and snack.

Allen said a male swimmer, for example, could easily be eating 4,000 calories a day due to the intensity of his workouts. She said he would need a very high carbohydrate, high energy and high calorie diet.

Other athletes, such as softball and baseball players, still need carbohydrates but not as many calories.

These athletes are focused on strength and power. Therefore, they need more protein than the average athlete to build up their muscle.

Allen said half of an athlete's plate should be carbohydrates, one fourth should be protein and the last fourth should be fruits and vegetables.

Obviously, exact calorie intakes are different for everyone. Calorie needs are based on how big you are and how much muscle you have, so it is not the same for everyone.

[Adapted from: <https://www.google.com/athletes+vs+non+athletes>, Accessed 26/1/22]

5.1 According to Source C what is the main difference between an athletic diet and a non-athletic diet?

(2)

5.2 Provide a reason for the differences stated in your response to Question 5.1.

(2)

5.3 Provide the correct term for a diet high in fats.

(1)

5.4 Approximately how long can an athlete, who has consumed enough carbohydrates, train for when doing high intensity exercise?

(1)

5.5 Why would a softball or baseball player need to eat less calories compared to a swimmer?

(4)

5.6 When a dietician is calculating the amount of calories needed what would have an impact on the amount of calories required?

(3)

5.7 According to Allen how much of an athlete's plate should be allocated to protein?

(1)

5.8 Briefly outline the correct hydration protocol that an athlete should follow.

(5)

5.9 What proof is there that a vegetarian diet is suitable for elite athletes?

(2)
[21]

QUESTION 6

6.1 Match an action and then a description to one of Newton's laws. Write only the letters of your chosen action and description in the answer grid below.

Table relating to the application of Newton's laws in Netball				
Number of Newton's law	Action applied to Netball		Description of Newton's law	
6.1.1 1st	A	The goal shooter who is close to the goal post only requires a small amount of force in the direction of the ring.	i	For every action there is an equal and opposite reaction.
6.1.2 2nd	B	A player using a bounce pass exerts a downward action force on the ball and the ball exerts an upward reaction force on the player.	ii	When a force acts on an object, the rate of change of momentum experienced by the object is proportional to the size of the force and takes place in the direction in which the force acts.
6.1.3 3rd	C	At a centre pass, the ball will remain in the Centre's hands until she applies a force to the ball to throw to a teammate.	iii	A body continues at a state of rest or uniform velocity unless acted upon by an external force

ANSWERS:

Number of Newton's law	Action	Description
6.1.1 1st		
6.1.2 2nd		
6.1.2 3rd		

(6)

6.2 Examine the pictures below and answer the questions that follow.

Picture F

[<https://www.google.com/search?q=F1+cars> Accessed 15/3/22]

Picture G

[<https://www.google.com/F1+tyre+warmers>, Accessed 15/3/22]

6.2.1 Explain the Bernoulli principle as applied on a Formula 1 car.

(6)

6.2.2 Use the diagram below to indicate the effect of the following factors on a rear foil on a Formula 1 car when racing in a straight line.

- Air pressure above the foil
- Air pressure below the foil
- Velocity above the foil
- Velocity below the foil
- Downward force

Direction the car is travelling

(5)

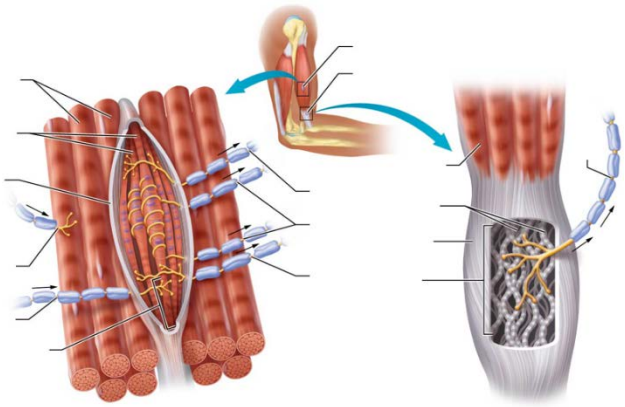
6.2.3 Explain why it is that the cars have tyre blankets on them.

(5)
[22]

QUESTION 7

Examine the pictures below and answer the questions that follow.

Picture H **Picture I**



[<https://www.google.com/muscle+spindles+golgi+tendon+organs>, Accessed 10/3/22]

7.1 Which picture depicts a Golgi tendon organ?

_____

(1)

7.2 Which picture depicts a muscle spindle?

_____

(1)

7.3 Compare the functions of both the Golgi tendon organ and muscle spindles.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(10)

7.4 Describe the impact of both the Golgi tendon organ and muscle spindle on athletic performance.

(4)
[16]

QUESTION 8

Examine the information provided in the Source Material Booklet. Use it to write an essay of 1–1½ pages on the following topic:

The quality and quantity of resources available to disabled people will affect their participation in physical activity and the likely success of competitive athletes.

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 and Exercise Science knowledge.
- Use real-life examples where applicable.
- Make use of the rubric to shape your response.

ESSAY RUBRIC

	0 marks	**1 mark**	**2 marks**	**3 marks**	**4 marks**	**Possible mark (20)**
Decision	No decision made	Decision clearly stated	Decision clearly stated and supported by essay			2
Reference made to sources	No reference to sources	Reference made to half the sources	All sources referred to			2
Use of sources	Sources not expanded on at all	Only 1 source expanded on	Two sources expanded on	Sources expanded on but not integrated	Source detail very close to full potential	4
Content relevance and quality of discussion × 2	No content relevance Missed the point	Little linkage evident	Some content provided but not integrated into discussion		Content provided and integrated into the discussion Flow is logical	8
Use of own knowledge	No own knowledge provided	Some facts and information given beyond the sources	Some facts and information given beyond the sources AND integrated into the discussion	Most information is relevant, appropriate and accurate	All information provided is relevant, appropriate and accurate Excellent strategy	4

[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.