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TOTAL MARKS

NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2022

SPORT AND EXERCISE SCIENCE

EXAMINATION NUMBER

Time: 3 hours 200 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 28 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. It is in your own interest to write legibly and to present your work neatly.
6. THREE blank pages (pages 26, 27 and 28) are included at the end of the question paper. If you run out of space for a question, use these pages. Clearly indicate the question number of your answer should you use this extra space.

FOR MARKER'S USE ONLY

Question	1	2	3	4	5	6	7	8	**Total**
Marks	21	23	25	10	30	29	42	20	**200**
Obtained									

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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 table below.

COLUMN A		COLUMN B	
1.1.1	Assertive behaviour	A	A condition in which the body's core temperature drops below that needed for normal metabolism and body functions
1.1.2	Bulimia Nervosa	B	A thick protein filament
1.1.3	Hypothermia	C	The amount of motion that an object has
1.1.4	Actin	D	When the body produce or absorbs more heat than it can dissipate
1.1.5	Myosin	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	The Golgi tendon organ	F	Involves forceful, robust but functional play
1.1.7	Momentum	G	Slower air flow under an aeroplane wing
1.1.8	Hyperthermia	H	A thin protein filament
1.1.9	Bernoulli Principle	I	Senses changes in muscle tension
1.1.10	Magnus Effect	J	A condition involving regular and frequent food binges

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)

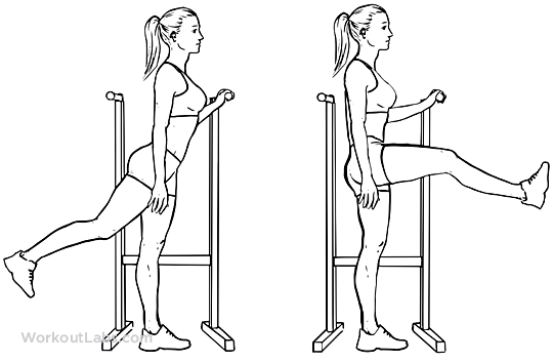
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1.2 In the pictures below, state which body plane each movement is occurring in. Write your answer in the space provided below.

Picture A



Picture B



[<https://www.muscleandfitness.com/workouts/abs-and-core-exercises> / <https://www.google.com/q=leg+swings> Accessed 25/8/21 / 22/8/21]

Picture C



[<https://www.google.com/search?q=side+bends> Accessed 25/8/21]

ANSWERS:

Picture A: _____ (1)

Picture B: _____ (1)

Picture C: _____ (1)

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1.3 Outline **AND** shade in the base of support in each of the following pictures.

Picture A



Picture B



[<https://www.google.com/=contemporary+dance> / < https://www.google.com/para+snow> Accessed 26/8/21 / 26/8/21]

(8)
[21]

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QUESTION 2

2.1 Complete the table below.

Athletic event	Main source of stored energy for an athlete	Reason why the identified source is used
2.1.1 Tour de France		
2.1.2 5-minute jog		
2.1.3 Comrades Marathon		
2.1.4 1 000 m swim or Midmar Mile		

(8)

2.2 Examine the data in the table below and answer the questions that follow.

Sport	Sex	Carbohydrate %	Protein %	Lipids %
Triathlon	Male	66,2	11,6	29
	Female	59,2	11,4	21,2
Basketball	Male	49	16	36
	Female	45,3	15	34,7
Gymnastics	Male	49,8	15,3	34,9
	Female	44	15	30
Weightlifting	Male	40,3	20	39,7

[Source: <https://www./health-nutrition/> Accessed 26/8/21]

2.2.1 What sport requires the highest percentage of protein to be consumed?

_____

(1)

2.2.2 Explain why the sport answered in Question 2.2.1 requires so much protein.

_____

_____

_____

(2)

2.2.3 What sport requires the highest percentage of carbohydrates to be consumed?

_____

(1)

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2.2.4 Explain why the sport answered in Question 2.2.3 requires so much carbohydrates.

(4)

2.2.5 Name the form of carbohydrates stored by the body.

(1)

2.2.6 List four criteria used by a dietician when calculating the amount of carbohydrates that should be eaten by a person.

(4)

2.2.7 State why females require fewer calories than males even though they are participating in the same sports.

(2)
[23]

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QUESTION 3

Read the extract below and then answer the questions that follow.

A study to assess the reaction time of individuals with Down's syndrome

The study included 20 Down's syndrome individuals, aged 12–15 years. Twelve participants were boys and eight were girls. The group was divided in half with 10 forming a control group and 10 the exercise group. The sport of table tennis was used in this experiment.

Both groups were coached 3 times a week by expert table tennis coaches. The control group performed general exercises such as jogging, throwing a ball at a wall while the exercise group performed table tennis specific drills such as forehand exercises, backhand exercises, correct service techniques as well as jogging.

Table tennis is an activity that needs to be played fast, the player needs to be able to quickly detect the ball and its flight path and then respond.

In order to find out whether the reaction times had improved or not, all 20 individuals were subjected to reaction tests before starting the 12-week program. The same tests were repeated at the conclusion of the training schedule.

The results: The reaction times of the children in the exercise group had improved dramatically in comparison to the control group. Interestingly though was the general happiness level in both groups.

In our society, the way of inactive life is very common for individuals with a mental disability like Down's syndrome. The result of inactivity in children with Down's syndrome results in obesity, slower reaction times and unstable postural control. If we want mentally disabled people to live a more active and healthy life, we should encourage them to do sports and provide support.

[Extract from 'Universal Journal of Educational Research'. Accessed 23/8/21]

Down's syndrome (Trisomy 21) is a condition in which a child is born with an extra copy of their 21st chromosome. This causes physical and mental developmental delays and disabilities.

3.1 List 2 activities performed by the exercise group that were not performed by the control group.

_____

_____

_____

(2)

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3.2 Provide two reasons why table tennis was used in this study.

(2)

3.3 Explain why the reaction time tests used after the 12-week training programme were the same as the baseline test.

(2)

3.4 Which group's reaction time improved the most? Provide a possible explanation for this improvement.

(2)

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3.5 Why is it that people with a mental disability are often obese and lack muscle tone?

(4)

3.6 Suggest two ways in which people with a mental disability can be encouraged to become more active.

(2)

3.7 What is meant by the term 'sport specific' drills?

(2)

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3.8 Provide 2 possible drills, not mentioned in the extract, that could be used specifically for table tennis.

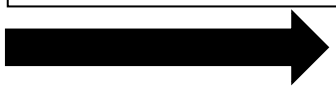
(2)

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3.9 Use the diagram below to indicate the following factors on a table tennis ball served with a backspin:

- Rotation of the ball
- Air pressure above the ball
- Air pressure below the ball
- Velocity above the ball
- Velocity below the ball

Direction the ball is being served



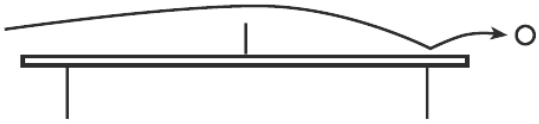


[Source: <https://www.google.com/q=table+tennis+ball> Accessed 27/8/21]

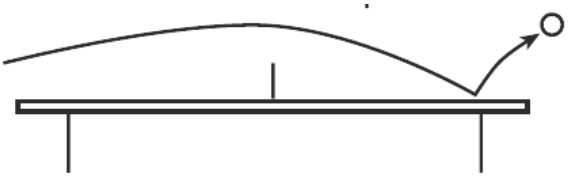
(5)

3.10 On the pictures below indicate which represents back spin and which represents top spin.

Picture A



Picture B



_____ _____

(2)

[25]

QUESTION 4

Read the extract below and then answer the questions that follow.

> A 2016 survey on adolescent girls in India found that those from lower socio-economic groups tended to have low bone mineral density as compared to those from higher socio-economic groups.

4.1 Explain why socio-economic factors may have a negative effect on the condition of bones in adolescents in developing countries.

(6)

4.2 Provide 4 environmental factors, not mentioned in Question 4.1 that could possibly cause an eating disorder in Indian women.

(4)
[10]

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QUESTION 5

Use the pictures provided below to answer the questions that follow.

Picture A



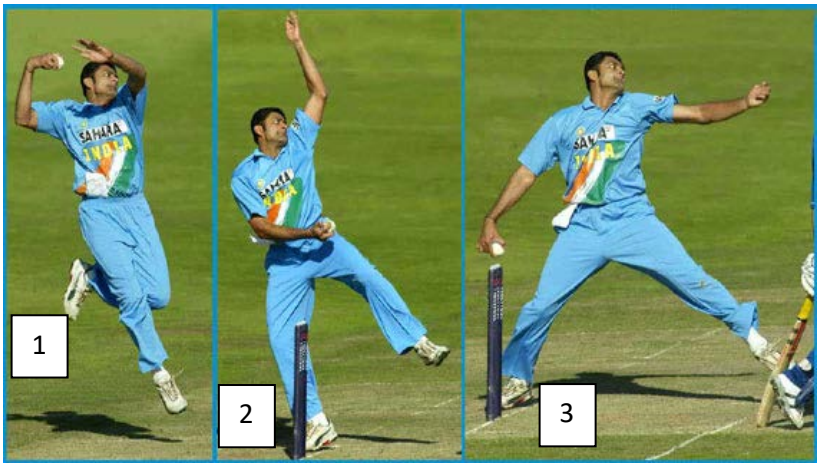
[<https://www.google.com/djokovic+tennis+stretch> Accessed 31/8/21]

Picture B



[<https://www.google.com/q=gymnastics> Accessed 31/8/21]

Picture C



[<https://www.google.com/indian+cricket+bowler> Accessed 31/8/2]

5.1 Use Picture A to explain the functions of Golgi tendons.

(6)

5.2 Use Picture B to explain the functions of muscle spindles.

(8)

5.3 Discuss the cricket bowler's use of force summation in Picture C.

(8)

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5.4 Explain why a swing bowler in cricket applies shine to one side of the ball and favours the other to become rough. Use a diagram to help explain your response.

(8)
[30]

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QUESTION 6

6.1 Complete the table below relating to the effect of fluid forces on a swimmer.

Fluid forces involved in swimming frontal crawl	Effect of fluid force on swimmer
1.	
2.	
3.	
4.	

(8)

6.2 Use the diagram below to label the forces acting on the swimmer in the water.

Direction of swimmer ⟶



[<https://www.google.com/=freestyle stroke> Accessed 31/8/21]

(8)

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6.3 Describe the techniques needed by a swimmer performing front crawl in order to reduce drag.

(7)

6.4 Explain why a successful cricket batsman needs good visual concentration and a Freestyle 50 m sprint swimmer needs good peripheral vision.

(6)
[29]

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QUESTION 7

7.1 Name the three phases that the training year is divided into when a coach is using periodisation.

_____

_____

_____ (3)

7.2 When planning a training programme a coach will use three basic structures namely the macro-cycle; the meso-cycle and the micro-cycle.

Explain each of these structures and its purpose.

Macro-cycle:

Purpose:

_____

_____ (1)

Structure:

_____

_____

_____

_____ (2)

Meso-cycle:

Purpose:

_____

_____ (1)

Structure:

_____

_____

_____

_____ (2)

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Micro-cycle:

Purpose:

(1)

Structure:

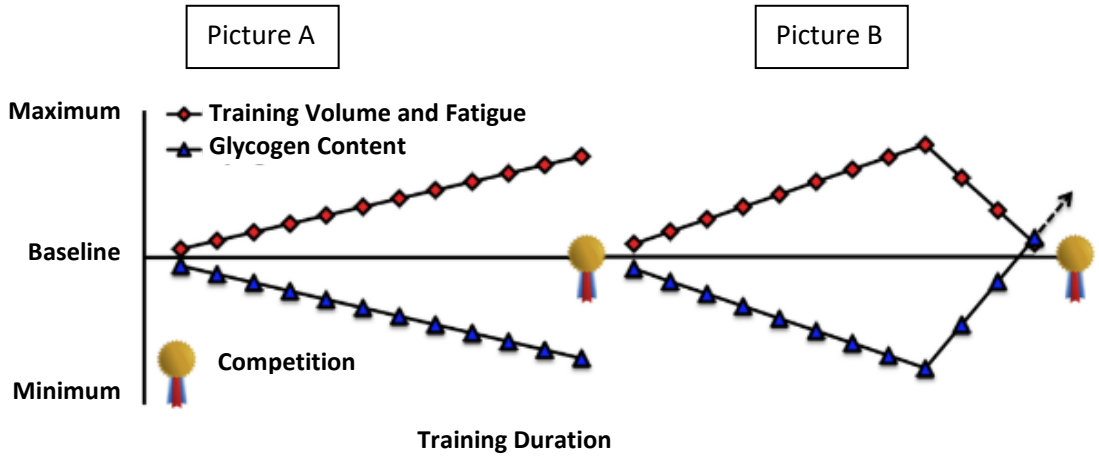
(2)

7.3 What is meant by the term 'taper'?

(4)

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7.4 The graphs below compare an athlete not using a taper with an athlete using a taper. Examine the data and answer the questions that follow.



[<https://www.google.com/searchtaper+in+sport> Accessed 31/8/21]

7.4.1 State which picture represents an effective taper AND provide a reason for your answer.

(2)

7.4.2 Interpret the data in the graphs provided.

(10)

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7.5 Name the 2 parts that make up EPOC and outline the function of each part.

(10)

7.6 Compare the following two terms:

Oxygen deficit
Oxygen debt

(4)
[42]

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QUESTION 8

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

Friction and resistance can be both an advantage and a disadvantage in sport.

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 marks	1 mark	2 marks	3 marks	4 marks	Possible mark (20)
Quality of content X 2	Little or no content relevance.	Significant important information missing AND Facts not related closely to the topic AND Some serious factual errors. No examples provided.	Some vital information missing OR Many irrelevant facts OR Errors affecting the quality of the essay. No examples provided or examples are not integrated into the discussion.	Sufficient facts provided. Most information is relevant, appropriate and accurate. Real-life examples integrated into the discussion.	Content is detailed. All information is relevant, appropriate and accurate. Real-life examples integrated into the discussion.	8
Use of own knowledge/ experience X 2	No own knowledge provided.	Very few facts and little information provided from own knowledge/ experience.	Includes some facts and information from own knowledge / experience but not integrated well into the discussion (add on).	Some facts and information from own knowledge / experience integrated into the discussion.	Many facts and much information from own knowledge / experience integrated into the discussion.	8
Quality of discussion	The discussion is meaningless.	Flawed in all respects.	Flawed in 2 respects.	Flawed in one respect.	Discussion is consistently focussed, clear and concise (not longwinded or rambling or repetitious). Flow is logical.	4

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SOURCE A

Fluid mechanics is the study of forces that develop when an object moves through a fluid medium.

Fluid forces impact on sports equipment and athletic performance. From the pattern design of dimples on a golf ball, the latest swimsuits, the curved flight path of a tennis, cricket or baseball, to the planning of a surfboard through water, fluid dynamics affects speed, motion and ultimately athletic performance.

SOURCE B



[<https://www.teamsa.co.za/sprint-world-championships> Accessed 1/9/21]

SOURCE C



[<https://www.nytimes.com> Accessed 1/9/21]

SOURCE D

The physics of ice skating – a lesson in friction

We know ice is slippery. One of the theories is that there is always an extremely thin layer of water on top of the ice that lubricates the ice and reduces friction causing the slippery falls.

In order to prevent falls, there has to be enough friction to create traction to prevent falling and allow the skater to move forward. Those two things are accomplished by the sharp blades on ice skates. The blades dig into the ice that allows the skater to stand and push off with their leg muscles to create the force necessary to move forward.

[<www.learninghypothesis.com> Accessed 28/11/21]

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[20]

Total: 200 marks

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

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