



**SPORT AND EXERCISE SCIENCE: PAPER I**

**EXAMINATION NUMBER**

|  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|

Time: 2 hours

150 marks

**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY**

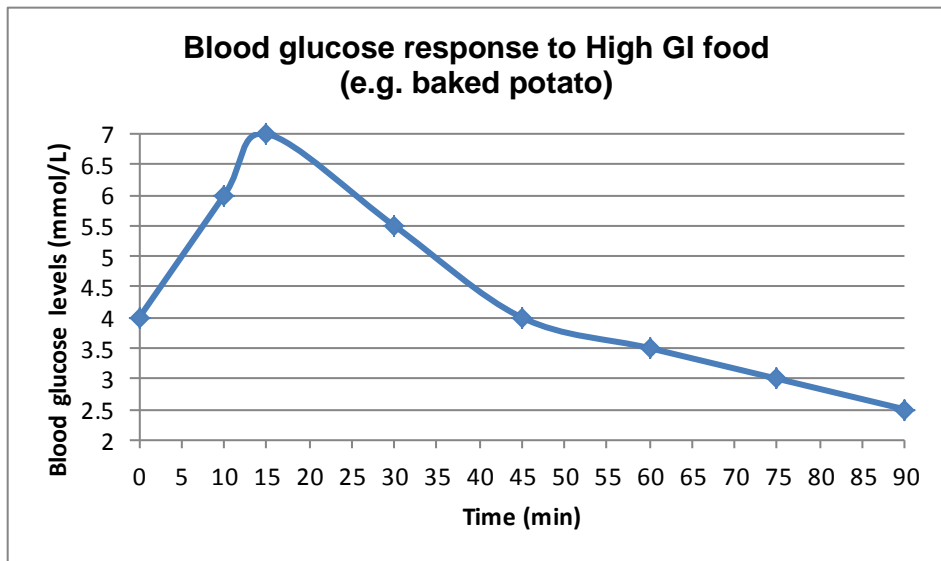
1. This question paper consists of 19 pages. Please check that your question paper is complete.
2. All the questions must be answered on the question paper.
3. Read the questions carefully.
4. Use the total marks awarded for each question as an indication of the detail required.
5. It is in your own interest to write legibly and to present your work neatly.

| <b>Question</b> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | <b>Total</b> |
|-----------------|---|---|---|---|---|---|---|---|---|--------------|
| <b>Marks</b>    |   |   |   |   |   |   |   |   |   |              |

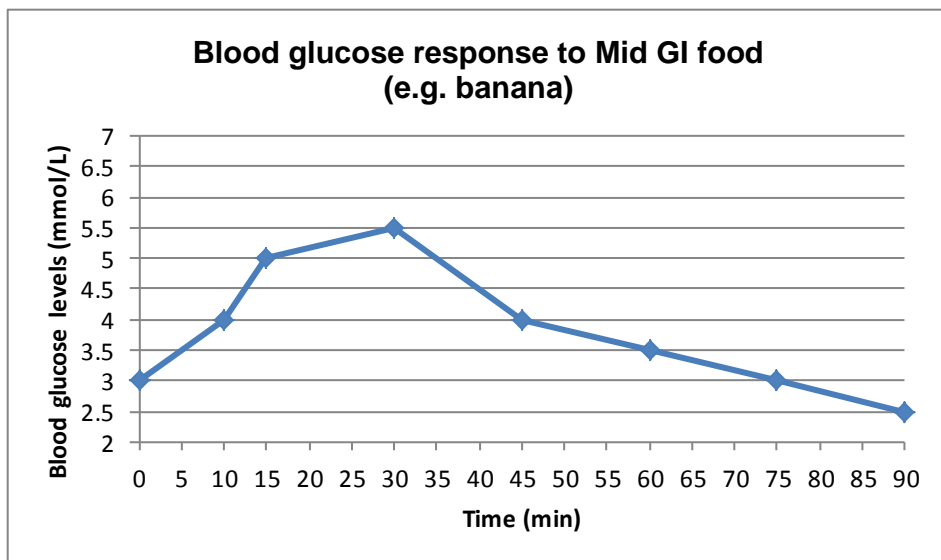
**QUESTION 1**

- (a) The **THREE** graphs below indicate how different types of food affect an athlete's blood glucose levels.

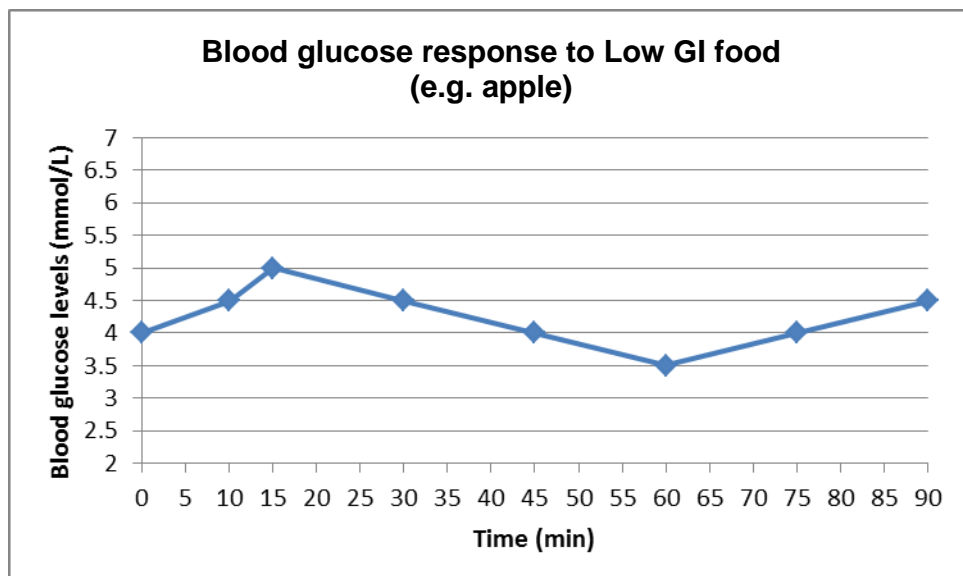
**Graph A**



**Graph B**



**Graph C**



- (i) Interpret Graphs A, B and C in terms of the blood glucose response to high, medium and low Glycemic Index (GI) foods.

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(3)

- (ii) Explain the physiological response experienced by an athlete depicted in Graph A.

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(4)

- (iii) Explain why the regulation of blood glucose levels for an endurance-type athlete is important. Refer to Graph C.

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(5)

(b)

Some sport scientists recommend that replacing carbohydrates, immediately following sustained, vigorous exercise, can increase the rate at which glycogen stores in muscles are replenished. The current guideline recommended is that an athlete should consume 1 gram of carbohydrate per kg of body weight following exercise, within 15 – 30 minutes. Further intake of 50 – 100 g of carbohydrate should be repeated every 2 hours following exercise until the athlete is back to his/her usual eating pattern.

What is the application of this recommendation in events such as a hockey or rugby tournament/festival where it is common for an athlete to participate in three matches a day over three consecutive days?

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(6)

(c)

The relative proportion of the energy system used will depend on the physical demands of the activity. Complete the table below to demonstrate your understanding of energy systems relative to exercise intensity, duration and provide an example of a sport type for each.

| Energy System | Exercise intensity | Time of involvement | Example of sport type |
|---------------|--------------------|---------------------|-----------------------|
|               |                    |                     |                       |
|               |                    |                     |                       |
|               |                    |                     |                       |

(12)

(d) 

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|---|
| A balanced diet and regular physical activity are the building blocks of good health. |
|---|

Critically analyse this statement from the following standpoints:

(i) **Beliefs:** Give your personal opinion.

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(1)

(ii) **Evidence:** Substantiate with a scientific fact why this statement is correct or incorrect.

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(1)

(iii) **Positives:** Motivate why this statement should be advocated and endorsed.

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(2)

(iv) **Negatives:** Motivate the limitations of this statement.

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(2)  
**[36]**

**QUESTION 2**

**To Creatine or Not to Creatine? That is the question.**

Since the 1992 Barcelona Olympic Games, studies have shown the benefits of creatine 'doping' for high intensity, short duration physical activities.

Creatine is a compound found naturally in the body. About half of the daily needs of creatine are obtained from the diet, mainly from meat, fish and animal products. It can also be obtained by supplementing the diet with artificial/synthetic creatine.

Higher creatine phosphate concentrations in muscles increases anaerobic ATP production during maximal exercise via the ATP-CP energy system and improves resynthesis of creatine phosphate in the recovery periods following short bursts of maximal exercise.

The benefits of creatine supplementation are mixed. The moral-value issue of creatine 'doping' comes into question: is it fair?

- (a) An athlete who is supplementing with synthetic creatine may experience enhanced performance. Explain the **potential psychological** advantages that this athlete may experience.

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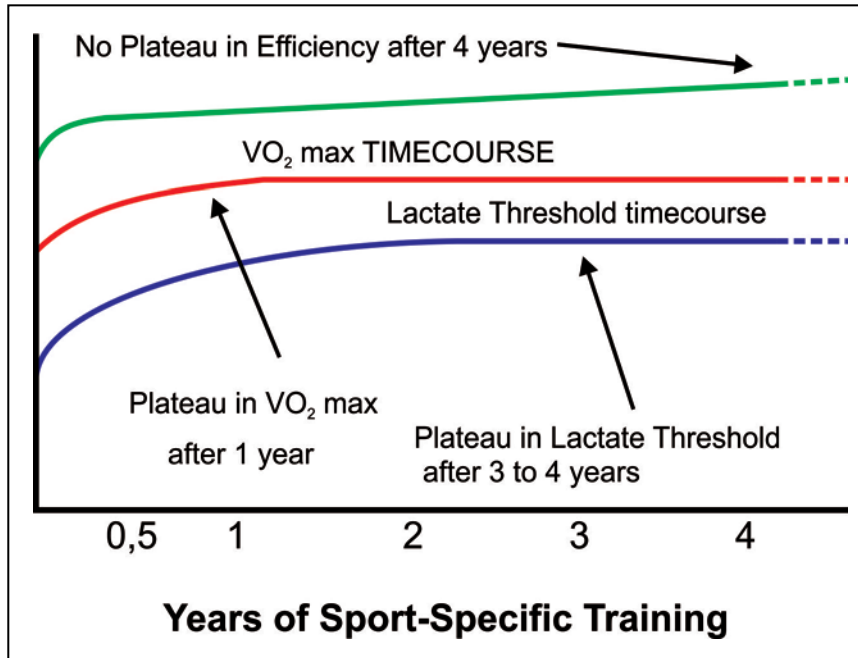
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**QUESTION 3**

The graph below forecasts the development of exceptional endurance fitness for elite swimmers on structured training programmes over 4 years.



[<<http://rambos-locker.blogspot/time-course-of-training-adaptations>>]  
(Accessed 11 March 2013)

(a) What is the relationship between VO<sub>2</sub> max and Lactate Threshold (LT)?

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(3)

(b) Account for the slow increment in the efficiency of elite swimmers (depicted in the forecast above) notwithstanding the VO<sub>2</sub> max and LT plateaus reached.

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(2)



(c) List **FOUR** reasons why elite swimmers should follow an appropriate (sport-specific) post-exercise 'cool-down' session.

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(4)  
[9]

### QUESTION 4

Serena Williams' scale of influence is significant.



[<<http://www.trbimg.com/img-50fa416d/turbine/la-sp-australian-open>>] (Accessed 12 March 2013)

(a) Comment on the extent of her influence on:

Tournament Revenue:

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Media Interest:

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Fan Appeal:

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Being a role model for girls and women:

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(4)

- (b) Venus and Serena Williams' success in tennis can, to a large extent, be attributed to their father's enabling support. Sport Psychologists agree that performance outcomes are influenced by positive enablers and/or negative barriers. This applies to both individual and team players.

Consider the **SITUATIONS** in the table below then briefly motivate your answer.

| <b>SITUATIONS</b>                            | <b>Positive enablers (tick if this applies)</b> | <b>Negative barriers (tick if this applies)</b> | <b>Motivate why this 'situation' is an enabler or barrier</b> |
|--|---|---|---|
| Coach with a 'win at all costs' attitude     |   |   |   |
| Teammates providing encouragement            |   |   |   |
| Coach giving positive criticism              |   |   |   |
| Coach ridiculing players for making mistakes |   |   |   |

(8)

- (c) Over the past 20 years, women's participation in sport and fitness activities such as tennis, aerobics, resistance training and touch rugby has grown. Suggest reasons for this growth.

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(5)  
[17]

**QUESTION 5**

- (a) Sue Bird is a leading American basketball player and was named 'Most Valuable Player' of the Year 2012.



[<<http://Sue%2BBird>>] (Accessed 6 February 2013)

- (i) When performing a jump shot, what is the most important fitness component which Sue would depend on to augment her performance?

\_\_\_\_\_ (1)

- (ii) Name **ONE** appropriate standard fitness test for assessing this fitness component.

\_\_\_\_\_ (1)

- (iii) What is the most effective training method that can be used to improve this fitness component?

\_\_\_\_\_ (1)

- (iv) Which muscle fibre type is predominantly recruited when performing a jump shot?

\_\_\_\_\_ (1)

- (v) What criteria could be associated with the 'Most Valuable Player' award?

\_\_\_\_\_  
\_\_\_\_\_ (2)

(b) As part of her fitness training for basketball, Sue participates regularly in the **THREE** different exercises

- 0 = non-existent
- 1 = at a very low level
- 2 = at a low level
- 3 = at a medium level
- 4 = at a high level
- 5 = at a very high level

| Exercise Modalities  | Speed | Agility | Aerobic fitness | Power | Mental toughness | Co-ordination | Decision making | Team work | Muscular strength | Flexibility |
|----------------------|-------|---------|-----------------|-------|------------------|---------------|-----------------|-----------|-------------------|-------------|
| Push Ups             |       |         |                 |       |                  |               |                 |           |                   |             |
| Ladder Work/Agility  |       |         |                 |       |                  |               |                 |           |                   |             |
| Group Spinning Class |       |         |                 |       |                  |               |                 |           |                   |             |

(15)

(c) Link the most appropriate fitness assessment to each condition/activity listed below. Fill in **ONLY** the correct number next to the letter supplied.

| Condition/Activity                                       | Fitness Assessment         |
|--|----------------------------|
| A Basketball   | (i) 3 km run               |
| B Volleyball   | (ii) 10 m sprint           |
| C Standing in a rugby tackle                             | (iii) Sit and reach        |
| D Triple jump  | (iv) Vertical jump         |
| E Sprint start   | (v) Straight leg lift      |
| F Abdominal muscle weakness                              | (vi) Reaction time         |
| G 10 km running road race                                | (vii) Isometric prone hold |
| H Recovering from lower back and hamstring muscle injury | (viii) Standing broad jump |

- A \_\_\_\_\_ E \_\_\_\_\_
- B \_\_\_\_\_ F \_\_\_\_\_
- C \_\_\_\_\_ G \_\_\_\_\_
- D \_\_\_\_\_ H \_\_\_\_\_

(4)

- (d) Explain why the following age-predicted Training Heart Rate (THR) graph should be viewed with caution.



[<<http://www.briody-fitnesshealth.com/targetheartrate.html>>]  
 (Accessed 8 February 2013)

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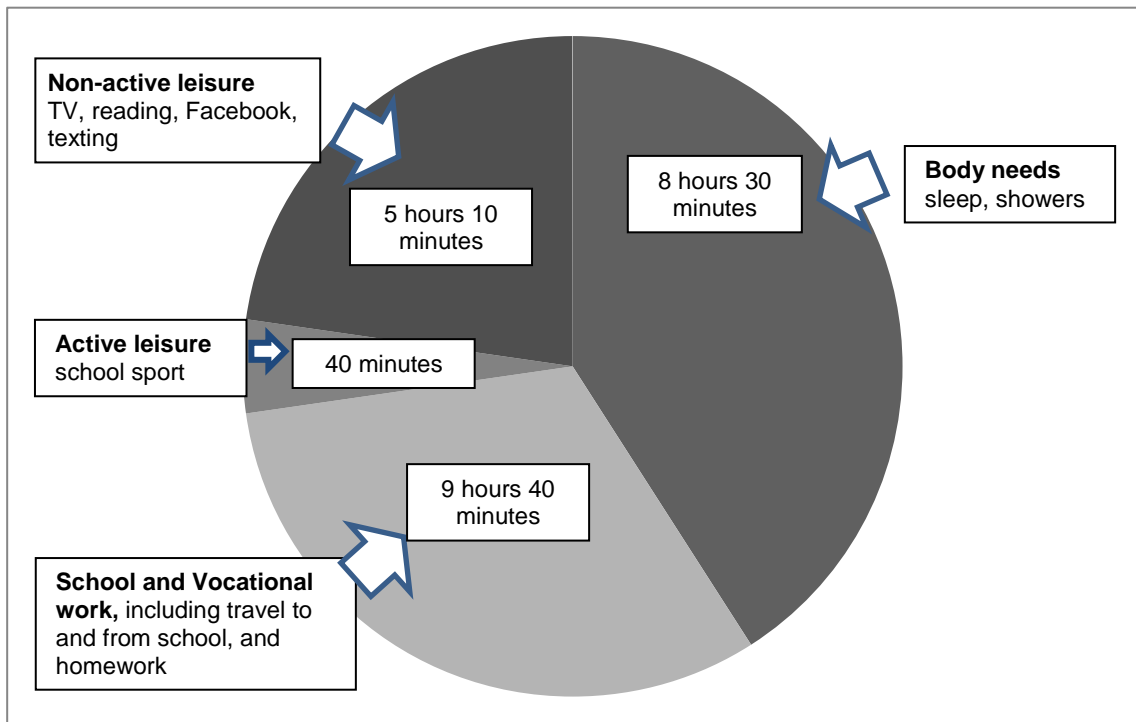
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(6)  
[31]

**QUESTION 6**



The data above represents a sample of matriculants whose school and place of residence is located in a high density urban setting.

(a) Comment on the proportion of time spent in active leisure.

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(2)

(b) Comment on the health compromise of the matriculants in this sample.

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(2)

(c) Comment on the influence of location and circumstance on the choice of leisure time activities.

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(4)

(d) The Department of Basic Education (DBE) in South Africa has prescribed a minimum exposure of 30 minutes of physical activity, per learner, per week.

(i) What should an optimum physical activity dose be for learners between 15 – 18 years of age? Motivate your answer.

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(3)

(ii) How should the current physical activity dose requirement be managed and monitored?

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(3)

**[14]**

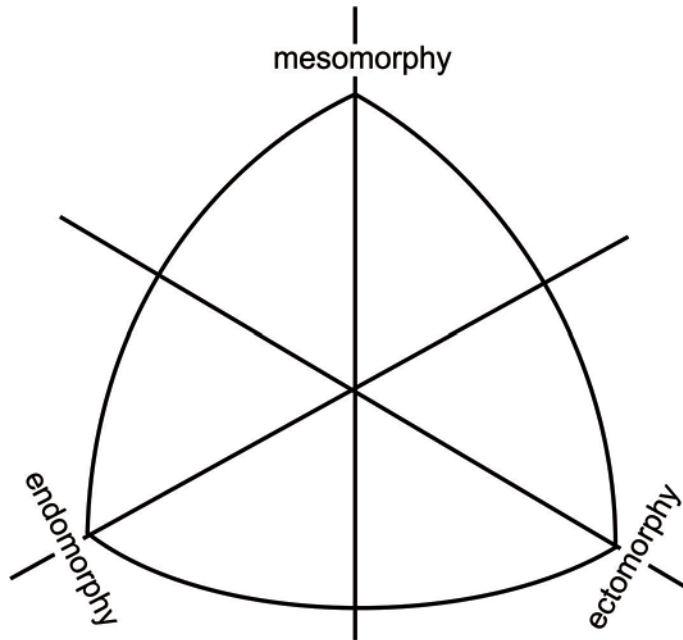


**QUESTION 7**

Plot the following athletes onto the graph below by using the symbols provided.

- A = high jumper
- C = rugby prop
- E = basketball guard

- B = body builder
- D = triathlete
- F = sumo wrestler



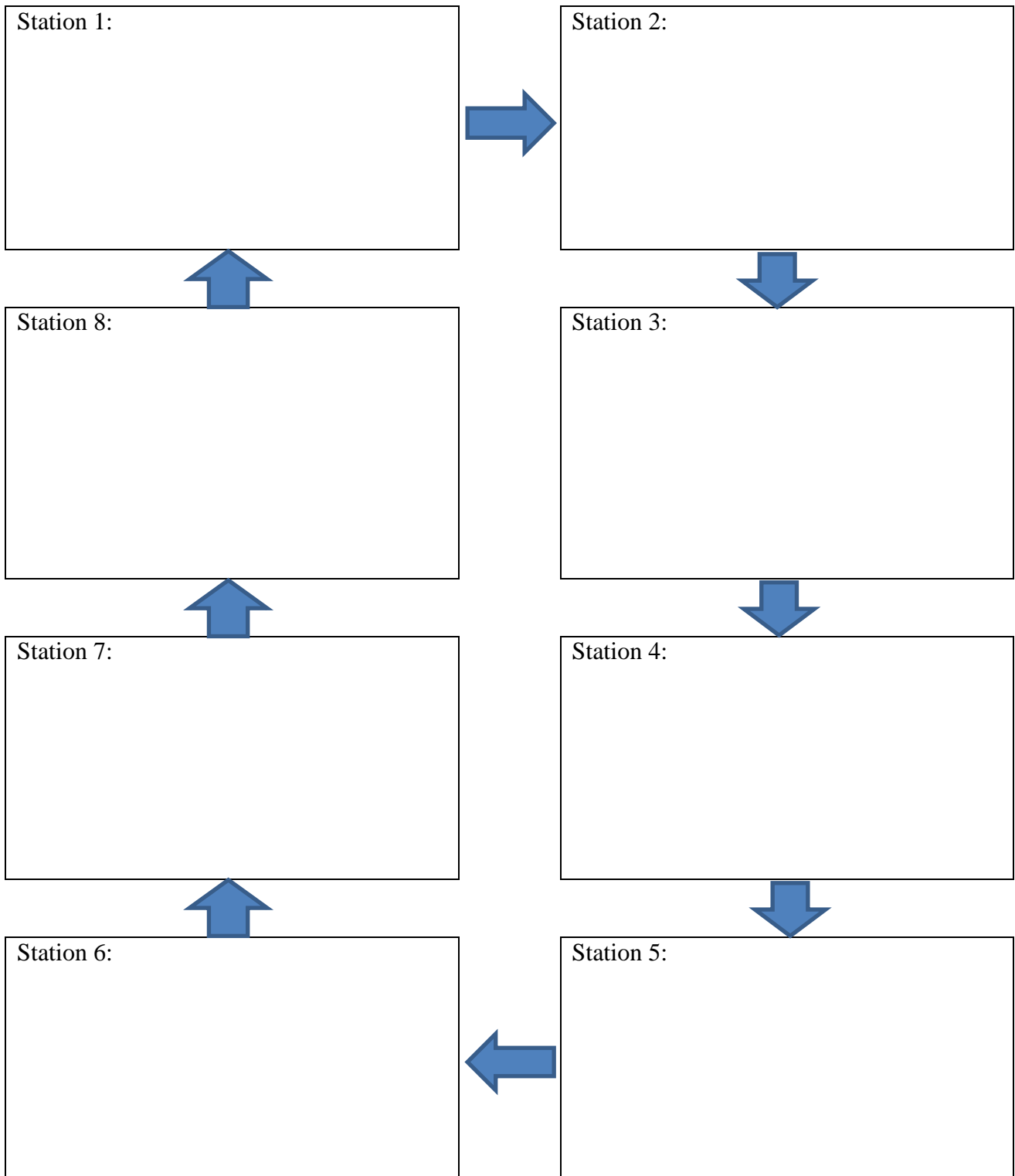
[3]

### QUESTION 8

Design a sport-specific fitness circuit for basketball **OR** rugby.

The fitness circuit training session is 60 minutes in duration. The players will spend 7 minutes at each station, with 4 minute rest periods between each station. Demonstrate the application of the **Principle of Specificity** in the selection of fitness activities for either basketball or rugby.

Fitness circuit for \_\_\_\_\_



[10]

**QUESTION 9**

(a) Many sports have developed modified versions of the sport to encourage participation across age, gender and ability.

(i) Select **ONE** sport and identify **TWO** modifications that favour accessibility for children.

Sport: \_\_\_\_\_

Modification 1: \_\_\_\_\_

Modification 2: \_\_\_\_\_ (2)

(ii) Explain how **ONE** of these modifications (mentioned in (i) above) would increase a younger child's ability to perform the skills needed in this sport.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

(iii) Select **ONE** sport and identify **TWO** modifications that make the sport more accessible to elderly (60+) participants.

Sport: \_\_\_\_\_

Modification 1: \_\_\_\_\_

Modification 2: \_\_\_\_\_ (2)

(b) Osteoporosis is a health compromising condition which is a cause for concern.

(i) What is osteoporosis?

\_\_\_\_\_  
\_\_\_\_\_ (2)

(ii) How is this condition developed?

\_\_\_\_\_  
\_\_\_\_\_ (2)

(iii) Suggest a preventative strategy which could delay the onset of this progressive condition.

\_\_\_\_\_  
\_\_\_\_\_ (2)  
**[12]**

**Total: 150 marks**