



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2010

SPORT AND EXERCISE SCIENCE: PAPER I

MARKING GUIDELINES

Time: 2 hours

150 marks

These marking guidelines were used as the basis for the official IEB marking session. They were prepared for use by examiners and sub-examiners, all of whom were required to attend a rigorous standardisation meeting to ensure that the guidelines were consistently and fairly interpreted and applied in the marking of candidates' scripts.

At standardisation meetings, decisions are taken regarding the allocation of marks in the interests of fairness to all candidates in the context of an entirely summative assessment.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines, and different interpretations of the application thereof. Hence, the specific mark allocations have been omitted.

QUESTION 1 MULTIPLE CHOICE

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
A	D	B	B	B	B	C	A	C	D

[10]**QUESTION 2**

Athletic Event	Body stores that provide main source of energy	Reason for the choice of food group for the event
2.1 Tour de France	Fats	Once the carbs have been used up, the body will draw on fat for energy.
2.2 5 minute jog	Mostly carbs (69%)	Carbs get broken down into glucose and stored as glycogen in the muscles. When the stores of glycogen drop, the athlete will get tired quickly.
2.3 Comrades Marathon	Mostly fats (85%) and then carbs (15%)	Once the carbs have been used up, the body will draw on fat for energy. Carbs get broken down into glucose and stored as glycogen in the muscles. When the stores of glycogen drop, the athlete will get tired quickly.
2.4 1 000 m swim or Midmar Mile	Mostly carbs (63%) and fats (37%)	Carbs get broken down into glucose and stored as glycogen in the muscles. When the stores of glycogen drop, the athlete will get tired quickly.

[8]

QUESTION 3 DEFINITIONS/EXPLANATIONS

3.1

The body needs energy to make it work.

When doing extra physical activity the body needs more energy (food intake) to maintain its present weight and to perform at peak.

If the athlete is not eating enough of the correct food that means that they won't have the energy needed to perform.

(3)

3.2

Any 3 of ...

Metabolic rate is the speed at which a body uses up energy.

Metabolic rate rises and falls according to activity.

Basal metabolic rate is the lowest level of energy required in order to keep the body warm and the internal organs functioning.

Basal metabolic rate is the rate of energy expenditure of a person who has not had food for 15 hours, lying at complete rest in a warm environment.

Basal accounts for about two-thirds of a person's energy output. It varies greatly between people.

(3)

3.3

You will improve your level of fitness only if you 'overload' your body.

You make your body work harder than normal by increasing the amount of work it has to perform.

The body will then gradually adapt to the new level of work and your level of fitness will improve.

Overload can be achieved in several ways:

Any 2 of these ...

Increasing the number of times that you train – frequency.

Increasing the intensity of the activity you are doing, e.g. running faster.

Increasing the duration/time of each individual session, e.g. go for 40 minute run instead of a 30 minute run.

(5)

3.4

Every activity requires a specific mix of fitness components and your training needs to reflect the contribution made by each of these.

Three factors must be considered:

The individual – training should be specific to the individual. It is important to assess your initial state of fitness so that the workload can be accurately set.

The activity – identify the mix of fitness components required and then identify the major joints and muscles that are used.

Make sure that your training uses these joints and muscle groups and try to reproduce the movement patterns that you would use in competition.

The energy systems – identify the energy systems used during the activity and their overall contribution to total energy expenditure.

(5)

3.5

Where performance neither increases nor decreases.

There is little or no change in the measured performance.

(2)

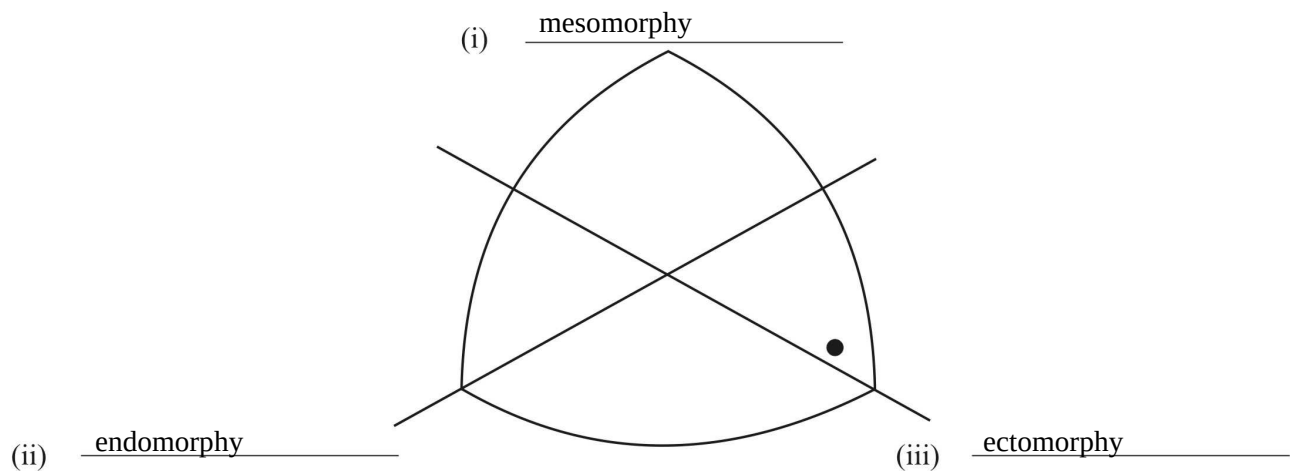
3.6

An individual's performances are low in the early stages but increase in later competitions/trials.

(2)

[20]**QUESTION 4**

4.1



[<<http://www.topendsports.com/testing/somatotype.htm>>]

4.1.1

Title is 'somatotype' diagram.

Labels shown above. One mark for each.

(4)

4.1.2

Small shoulders, thin, lean muscle mass

Workouts should be short and intense focusing on big muscle groups

Any of these sports:

Rugby scrum-half

Female gymnast

Jockey

Long distance running

Cycling

Basketball

High jumper

(3)

- 4.1.3 Successful athletes in different sports tend to have different body types.
A predominantly **endomorph** individual typically has short arms and legs, as well as a large amount of mass on their shorter than normal frame. This hampers their ability to compete in sports requiring high levels of agility or speed.
Sports of pure strength, like power lifting, hammer and rugby are perfect for an endomorph.
A predominantly **mesomorph** individual does well in strength, agility and speed sports.
An **ectomorph** is not suited to power or strength sports but dominate in endurance sports and gymnastics.
- (5)

4.2

- 4.2.1 This graph shows the effect that altitude has on a body.
At Mexico City the barometric pressure is at approximately 600 mmHg and this results in an athlete feeling lightheaded – not conducive to peak performance
Should an athlete attempt to compete at Morococha where the barometric pressure is approximately 435 mmHg they could suffer from nausea, vomiting and worse.
- (5)

- 4.2.2 At 2 240 m the air is 25% thinner than at sea level.
At high altitude the active muscles are partially starved of oxygen. This means that an athlete not used to thin air, will battle to perform at their peak.
Thinner air means less air resistance, so athletes who sprint, jump or cycle will perform better at high-altitude venues. But thinner air also means less oxygen, so the pace of hard endurance training and competition – which depends on high rates of oxygen consumption – gets slower at altitude.
- (5)

- 4.2.3 An athlete's ability to take in and absorb oxygen will be impaired without prior altitude training.
The athlete's need to acclimatise, not only when at rest, but also when exercising.
By staying at altitude for a period of time, the body gradually starts to compensate by encouraging the red blood cells to produce more in order to carry oxygen. This increases the level of oxygen available for activity.
As the red blood cells remain the body for several days when returning to a lower altitude, the athletes will find competing much easier and is to their advantage.
- (5)

4.3

- 4.3.1 (a) Long events (1)
 (b) Aerobic glycolysis
Either one of these: Krebs's cycle/TCA/citric acid
Either one of these: Electron transport chain/electron transport system (3)
 (c) Aerobic system (1)
- 4.3.2 (a) Short sprint/triple jump/long jump, etc. (1)
 (b) Phosphate and creatine (2)
 (c) **Either one of these:** Alactic system/ATP-PC/Phosphocreatine system (1)
- 4.3.3 Intermediate Energy Systems:
- (a) Energy for approximately 1 minute/400 m/any sport like hockey or soccer where the athlete runs for short time, has brief rest and runs again (1)
 (b) Glucose and oxygen (2)
 (c) lactic (1)
- [40]**

QUESTION 5

5.1

- 5.1.1 The stations need to be ordered appropriately, selected logically and managed effectively.
Consider number of repetitions and sets.

Any similar example is fine. Award 20 marks for circuit set-up with logical progression, appropriate reps, equipment mentioned. Not all equipment needs to be used, e.g. there is only 1 wobble board so could be a problem to use. However, should a pupil have a 'creative' solution, award a mark for its use.

Station 1: cardio	Station 2: stretches	Station 3: speed/fast feet
		Station 4: ball accuracy
Station 10: arms		Station 5: cardio
Station 9: cardio		Station 6: leg strength
Station 8: abdominals		Station 7: dribbling skills

(20)

- 5.1.2 Every training session must start with a warm up and end with a cool down.
The coach would need to warm up and cool down the group as a whole, as each person will be starting the circuit at the different point.
The warm up may be from 5 to 20 minutes, depending on the nature of the training activity.
Immediately after the training, a period of low intensity exercises are performed.

The length of the cool down may vary from 10 to 30 minutes.

(10)

5.2 Obesity around the world.

Family	Health status	Education
Culture	Environment	Physical aptitude
Economic status	Physical engagement	Nutritional status

Pupils need to respond to each of the blocks

Suggested responses

Family	There may be stressful events in the teenager's life such as death, divorce, or even abuse. <i>Safety</i> = children are driven to school these days as it is so unsafe to walk or cycle in South Africa. <i>Stress</i> = Teenagers are under tremendous peer pressure at school and in their everyday lives. Many teenagers react to stress by overeating. Parental involvement or interest. If the parents are sporty, the chances of their children being sporty too, follows. <i>Genetics</i>.
Culture	Different cultures have different beliefs about sport participation. <i>Religion</i> = some women who follow Muslim faith are still restricted in the range of sports that they can participate in. Their religion dictates their dress code, which in turn can restrict participation. Some individuals cannot compete on a Sunday as they feel that this would go against their religious beliefs. <i>Gender</i> = men participate more than females. Research has shown that only approximately 10% of the female population play sport as opposed to approximately 33% of males. Women are expected to be feminine and many sports don't adhere to this. Myths say things like a woman's insides will fall out if she plays sport – luckily people no longer believe this, but there is still doubt about the ability of a sportswoman to be feminine. They are considered butch or lesbian.
Economic status	<i>Class</i> = Historically the upper class have more leisure time. The middle class controlled sport and therefore imposed their values. The lower class became the spectators or only got involved in mob sports. Some sports need expensive equipment (e.g. golf) and this tends to 'select' who can afford to play the sport or not. <i>Race</i> = depending on the country you live in, there could be racial discrimination whereby certain race groups are/were prevented from participating. Although the number of non-white players in a wide range of sports has increased, some resentment towards these players is still evident. <i>Poverty</i> = if a person is trying to provide the basics for their family or if their family only have the basics, then sport is a luxury.
Health status	An unhealthy person is less likely to participate Diseases like diabetes will affect the type of sport played depending on the severity of the condition Injury will also affect participation

Environment	Weather will affect participation. <i>Fashion</i> = if an international event is taking place, children are more likely to take an interest in that sport, e.g. during Wimbledon more children play tennis.
Physical engagement	<i>Inactive lifestyle</i> = too many hours spent inside, in front of TV and computers, using car instead of walking short distances. Some teenagers can sit and watch television while text messaging friends. Many teenagers now own a car, so the chance for walking is also reduced.
Education	Those with better education, have a wider selection of sports to choose from. If a school offers a comprehensive physical education programme, the pupils are more likely to be physically active. <i>School</i> = what sports are offered and what facilities are available? What coaches are there?
Physical aptitude	<i>Ability</i> = Some clubs/teams are elitist and only have the most talented athletes. Trials are held to ensure this. Those with less talent were left with fewer alternatives. <i>Disability</i> = depends on the type of disability. Facilities available for disabled. Nearly all sporting facilities were built for able bodied athletes. Nowadays there are more opportunities for disabled athletes and all new facilities cater for them. <i>Age</i> = most people participate in sport from the ages 16 to 24 years. The drop off rate increases proportionally with age, with only about 16% of those older than 60 exercising.
Nutritional status	<i>Poor diet</i> = More food is eaten than the body uses as energy, this gets stored as excess fat. High fat fast foods, fizzy drinks, sugar-laden snacks are eaten more and more. Fast food restaurants and quick fix meals are convenient in our busy lives. Overweight children are teased more than thin children and this could also lead to bullying, either verbally or physically.

Rubric

	7 – 7½	5 – 6	3 – 4	0 – 2
Content: Knowledge Thoroughness	All blocks/main topics covered. Significant instances of information that show insight.	¾ of blocks/main topics covered. Some instances of information that shows insight.	About half of the blocks/main topics covered. Very little evidence of insight.	Up to 1/3 of the blocks/main topics covered. Little evidence of insight.
Content: Relevance	Isolated incidences of minor repetition. All of the examples given are relevant and appropriate.	Repetition mostly avoided. Most of the examples given are relevant and appropriate.	Some repetition. Some of the examples given are relevant and appropriate.	Lots of repetition and waffle. Few or no relevant examples given.
Proper understanding of the problem	Reasoning is clear and succinct	Reasoning is clear but lengthy.	Very little understanding of the problem.	Little evidence of understanding.
Presentation	Tone is mature and suitable for the media. Flow is logical.	Tone is consistent and suitable. Flow has minor errors.	Tone is inconsistent and/or inappropriate. Language is weak.	Tone is inappropriate and unsuitable. The language is weak.

(30)

5.3

5.3.1

Any two of these:

Cut back on the starch, fizzy drinks; dairy and dessert
 Cut out the afternoon snack
 Breakfast needs to be more healthy
 Have brown or wholewheat bread/rolls
 Drink water

(2)

5.3.2

Be high in carbohydrate rich foods – breakfast cereal, bread, muffins, crackers and crisp breads, muesli bars, rice, pasta, potatoes, fruit, smoothies. These should form the basis for most meals and snacks. This will help with performance, recovery from training, and muscle gain.

Be moderate in protein rich foods – meat, poultry, fish, dairy products, beans, peas, lentils, unsalted nuts. There is no need to eat masses of extra protein to 'bulk up'.

Make sure meals are low in fat – try to avoid too much margarine, fatty meats, high fat takeaway and snacks, fried food and creamy sauces.

Include at least 5 servings of fruit and vegetables each day – necessary for preventing illness, building muscles and repairing injury.

Be low in alcohol as it leads to poor recovery, slow repair of injury, and contribute to excess weight.

(5)

5.3.3

Marathon runners and athletes in general should eat a diet high in carbohydrates, moderate in protein and low in fat.

Add more carbs into the diet:

The body's preferred fuel for any endurance sport is muscle glycogen. Glycogen is the body's storage form of carbohydrate. If muscle glycogen breakdown exceeds its replacement, glycogen stores become depleted.

If not enough carbs are eaten, the result is fatigue and inability to maintain training and racing intensity. In order to replenish and maintain glycogen stores, the endurance athletes' diet needs to be carbohydrate-rich.

Protein is needed for muscle growth and repair. Regular physical training tends to reduce muscle protein breakdown and protein loss from the body. While some protein breakdown may occur during exercise, protein build-up is enhanced during the recovery and the effectiveness of protein synthesis is increased.

Drink more fluids, mainly in the form of water.

(5)

[72]

Total: 150 marks