

NATIONAL SENIOR CERTIFICATE EXAMINATION

NOVEMBER 2015

SPORTS & EXERCISE SCIENCE: PAPER 2 MEMO

Time: 2 hours

Marks: 150

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of **12** pages. Please check that your question paper is complete.
 2. **All the questions must be answered in the Answer Book.**
 3. Read the questions carefully.
 4. Use the total marks that can be 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.
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QUESTION 1

1.1 Learner must discuss **negative** impact.

Allocate 1 mark for stating the negative impact.

Allocate 2 marks for explaining how this stated impact will negatively affect performance.

If goals are poorly planned it can result in stress, anxiety

No sense of ownership

If the goals are focused on a specific area that needs improvement/correction

If the goals do not allow progression it can cause demotivation or lack of commitment

(3)

1.2

Mental Qualities	The influence of goal setting
Concentration	With specific goals the athlete will have more clarity about what they are trying to achieve and improve on in their performance. This will allow them to focus on the important aspects and will reduce distractions.
Confidence	When an athlete believes that the goals match their capabilities it will increase confidence. Realistic, achievable goals improve confidence.
Control	It is only possible to focus on a number of things at one time, so an athlete needs to be selective about what to focus on. Goal setting helps to choose what information or cues to focus on and what can be ignored.
Commitment	If an athlete was involved in the goal setting process, they will take ownership of it. This means they will be more committed to improving and achieving the goals.

(2)

(2)

(2)

(2)

QUESTION 2

SKIPPING with a skipping rope
(elbows)

Movement Pattern/s:

Flexion; circumduction

Circular; rotational

Reason/s:

Flexion - Angle between the articulating bones decreases

Circumduction – circle is described by a body part & is a combination of flexion, extension, abduction & adduction
rotate

(2)

STAR JUMPS/
JUMPING JACKS
(shoulder)

Answer:

Movement Pattern/s:

Abduction & adduction

Linear

Reason/s:

Abduction- Moving a body part away from the midline e.g. lift arm away from body

Adduction - Bringing the body part back to the centre line

(2)

CALF RAISERS when
elevated
(ankles)

Movement Pattern/s:

Plantarflexion

Vertical

Elevate up and down vertically

Reason/s:

The toes are 'pointed'

(2)

QUESTION 3

3.1 Sport is not damaging (accept any THREE facts)

- Hyaline cartilage thickens as a result of exercise which then protects the joints. During exercise articular cartilage will soak up synovial fluid that is released from the synovial membrane. This improves joint mobility.
- The bones are designed to withstand impacts and force.
- A toned body/muscles help with support and posture. To keep an upright position, many muscles in the legs and torso are contracting statically to ensure that the body is balanced.
- Children that are active become healthy adults.
- Exercise prevents skeletal disorders like osteoporosis and osteoarthritis.
- Weight bearing activities like jogging promote bone growth = strong, dense bones.
- Exercise stresses bones = improved tensile stress of the bone
- Flexibility work enables greater range of joint movement

(3)

Sport is damaging (accept any THREE facts).

- Ligaments are plastic not elastic. Once stretched, they remain the same length. If damaged e.g. dislocated shoulder in rugby, it can lead to joint instability
- If done incorrectly, exercise can cause long term injury and damage
- Growth plate disorders result if some exercises are performed too young
- Repetitive actions like jogging can lead to wear and tear of articular cartilage. This can cause inflammation of the bursa, at the point of tendon attachment to the bone. Tendonitis.
- External forces cause injury

(3)

Learner comes to clear conclusion – 2 marks

Uses debate format – 2 marks

- | | | | |
|-----|-----|-----------------|-----|
| 3.2 | (a) | (i) hamstring | (1) |
| | | (ii) quadriceps | (1) |
| | (b) | (i) tricep | (1) |
| | | (ii) bicep | (1) |
| | (c) | (i) bicep | (1) |
| | | (ii) tricep | (1) |

3.3 Any FOUR of the following:

- Ensure the team is warmed up correctly
- Ensure the players are fit enough/sport specific
- Inspect the area where play will happen for glass, obstacles, uneven surface etc
- Do not allowed sick or injured players to participate
- Have a training programme where intensity increases at a steady rate

- Ensure that players of similar age groups or weight categories are competing against each other when the sport is a contact sport
- Ensure that appropriate protective clothing is worn
- Ensure that correct clothing is worn ie swimming costume for swimming rather than shorts and shirt that could weigh a person down.
- Understand previous injuries

(4)

QUESTION 4

4.1 Allocate 2 marks per keyword used.

Learner must relate the explanation to a rugby tackle. Learner's explanation must show that the word is used correctly, for example:

Force - a force can make a moving object change direction. A tackler will apply a force to the runner making him either fall over or change direction, or the tackler will cause the runner to decelerate.

Momentum – depends on its mass and velocity, so a larger player running at speed will be harder to stop.

Newton's Laws – learner can use any one of Newton's Laws and apply it to a rugby tackle.

1st Law - rugby player will keep running until acted on by the tackler.

2nd Law – the harder the player gets tackled, the greater the effect on the player.

Action – the tackler will grab hold of the runner to try and stop him. Should the tackler be smaller, he will rebound off the bigger player = reaction.

Resistance – a tackled player will try to resist the force by digging their boots in or by leaning backwards to create resistance and make it harder for the tackler.

(12)

4.2 Learner must display an understanding of force summation, for example:

- The more body parts involved in the throw, the greater the force
- discus thrower must transfer forces from the muscles through the body and into the discus.
- all the forces get added together.
- In order to get the correct sequence, the thrower must use large muscles of the body first.
- This force will get transferred to the smaller muscle groups of the arms.
- Correct timing means the right body segment is adding to the overall momentum at the right time.

(6)

4.3 2 marks allocated to each explanation, for example:

- Basically the more stable a person is, the harder it is for an opponent to push them over.
- When standing with your feet together a person has a very small base of support so requires very little force to push over, hence only 35N being needed.
- By leaning in towards an opponent the fighter absorbs the push and can offer more resistance. This makes it harder to push the fighter off balance and the highest amount of force needed – 75N.
- By standing with the feet shoulder width apart, the fighter has widened the base of support making it harder to push over.
- When standing, we typically have two feet in contact with the ground. If our feet are close together, we are less stable than when the feet are spread apart. Increasing the distance between the feet increases what is termed our **base of support**, defined as the area within an outline of all ground contact points.

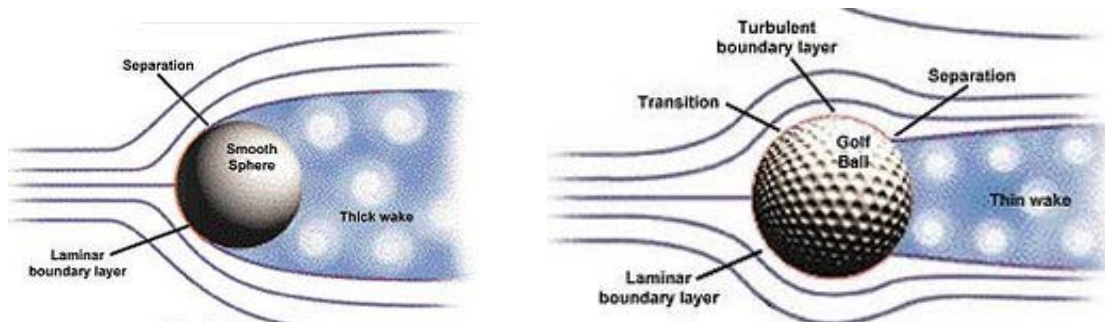
(6)

4.4 Allocate 1 mark per reason. Accept any THREE of the following:

- Large muscles of the torso generate the force that causes the ball to be thrown further
- Short distance – small muscles used in isolation
- Using the entire arm created a longer lever = greater distance thrown
- Summation of force

(3)

4.5 Learner must show knowledge of why a dimpled ball travels further than a smooth ball, for example: Golf ball with dimples has a rougher surface that traps tiny pockets of air. The turbulent air flows around the trapped air and gives a smoother, quicker flight that makes the ball travel further.



(4)

QUESTION 5

5.1 Response must relate to length of lever and its effect. Allocate 1 mark for mentioning that a racket creates a longer lever. Allocate 1 mark for the explanation, for example: the longer lever ensures greater acceleration.

Allocate 2 marks for either of the following:

- The racket increases the distance of the point of contact
- The racket increased the load arm and increases the moment of the force.

(4)

5.2 Learners must provide a comparison.

Allocate 2 marks for this.

Allocate 1 mark for the effect on performance, for example: longer limbed thrower has more speed of rotation, whereas a short limbed thrower will move slower and therefore longer limbed thrower will throw further OR a longer limbed person's hand will move further compared to a shorter limbed person's hand.

(3)

5.3

Activity	Linear motion	Angular motion	General motion
Sprinting			√
Throwing a ball underhand.		√	
Driving a Formula 1 car	√		√

(3)

QUESTION 6

6.1. Allocate 2 marks for references and use of the data on the graph.

For example: the data indicates that the average age of athletes has increased from 1988 to 2004. In 1988 athletes were 22 – 24 years old but in 2004 they were 26 years old.

Allocate 1 mark each to information regarding technology and socio-economic factors, for example:

Technology has improved the training methods and equipment to allow the body to continue competing for longer, so 'older' athletes can be competing for 10 years.

Socio-economic – females are marrying later and having children when they are older allowing them to compete for longer.

(5)

6.2 Any THREE of the following:

Knowledge of performance through digital devices or coach's observations will provide more specific details relating to strength and weaknesses and fault in technique.

Understanding performance will help the athlete to self-check and correct performance and actions. This will improve consistency of skill execution.

Using results as a measure of improvement may not always be accurate – your opponent could be weaker.

(3)

QUESTION 7

7.1 A

(1)

7.2 C

(1)

7.3 Any ONE of the following:

- Reduce frontal area of the Frisbee. ie throw it so that it flies as seen in picture A
- Angle of release
- Its speed (the faster the better)
- The air itself – dense air gives more lift
- The most important aspect is the speed of release.
- Use more muscle groups
- Throw it horizontally

(1)

7.4 Any TWO examples, for example:

- To slow an object down (end of bobsled run, end of downhill ski)
- To provide direction (toes digging in to change direction in skeleton, ice skating – before a jump – toe pick is used, curling)
- Rugby tackle
- F1 – the rear foil on the car that the driver can manipulate. Also called DRS

(4)

QUESTION 8

Learners need to refer to and compare both pictures.

Allocate 1 mark for identifying that picture A is an endurance or Tour de France cyclist.

Allocate 1 mark for identifying that picture B is a sprinter,

Allocate 3 marks for describing and explaining the effect of clothing, tyres, somatotype on the aerodynamics of the endurance cyclist.

Allocate 4 marks for describing and explaining the effect of clothing, tyres, somatotype on the aerodynamics of the sprint cyclist.

For example:

Time trial bike (picture B) –

Everything about this bike and the rider's clothing is designed to reduce friction and increase speed. They will adopt a streamlined position low on the bike with elbows tucked in, head low to decrease the surface area being affected by wind/air resistance. They will try and be streamlined.

- The helmet is tear drop in shape so that it looks like an aerofoil and the wind flows over it smoothly. Helmet is smooth and designed aerodynamically.
- The clothing is tightfitting with no bumps to increase air resistance.
- (Time trial bike is lighter – only cyclists will know this)
- Large disc wheel eliminates air resistance and drag that is caused by the many spokes. A standard spoked wheel has been described as an "egg beater," creating many small eddies as the tire rotates--creating drag. Disc wheels, while generally heavier than their spoked counterparts, produce less wind drag and turbulence when they spin

- Shoes have 'booties' over them to keep them smooth.
- A time trial rider is a speed/power cyclist which means they will have larger quad muscles and will be larger physically compared to an endurance cyclist who is lean and smaller physically.

Road bike (picture A) –

- Helmet had ridges (ribbed helmet) designed to be as aerodynamic as possible but also allows heat to escape. Recently several helmet manufacturers (e.g., LG, Lazer and Giro) have introduced dimples on the outer shell of helmet mimicking the so called 'Golf-ball' dimple effects with a view to further reduce aerodynamic drag of the helmet
- Clothing is tight fitting but not totally smooth – number on the back. They have pockets for water bottles etc.
- Has place for a water bottle to clip in as they will need to hydrate over the race course.

(9)

QUESTION 9

9.1 Allocate 2 marks for making a comparison between intrinsic and extrinsic motivation. Allocate 1 mark for each example.

Intrinsic:

A person who is intrinsically motivated will want to take part for its own sake, for pure love of the sport. They will focus on the enjoyment & fun of competition, try to develop their skills to the highest possible level (pursuit of excellence) & enjoy the action & excitement of new challenges.

Extrinsic:

A person looks for materialistic / tangible rewards (e.g. trophy, money, prize) BUT it could also be intangible e.g. a pat on the back, publicity, praise, social status.

(4)

9.2 There are many possible answers to this question.

Accept ONE of the following:

shin splints, torn or damaged ligaments or tendons, stress fractures, torn muscles, joint injuries

(1)

9.3 Learner must provide an action or strategy and then state why that strategy will prevent overuse. Allocate 1 mark for stating the action and 1 mark for the reason.

Any ONE of the following:

- Correct training techniques
- No overtraining or overloading
- Ensure adequate rest and recovery
- Progressive intensity of training to build the muscles and fitness levels up gradually

- Ensure correct nutrition to allow for muscle repair
- Ensure agonist and antagonist muscles are both trained
- Cool down

(2)

9.4 Unbalanced force would act on one side of the swimmer causing them to move in a sideways direction. Swim into the lane ropes.

(1)

9.5 Allocate 1 mark for stating a technique relating to fluid forces and 1 mark for explaining why that technique will improve performance.

Accept any THREE of the following:

- By staying close behind a lead swimmer, you can save effort by 'surfing' on the slipstream they've created in the water. Skilled drafting can reduce perceived effort by 1/5th
- The size of the lead swimmer matters – the larger they are, the larger the bow wave they create.
- Don't draft directly behind them. You will get splashed in the face but more importantly may get slowed down in the eddies created by their legs. The perfect spot is just beside the swimmer with your head in line with their waist.
- Staying close is important. You should stay about 50cm from them – close enough to feel the bubbles from their kick.
- If the lead swimmer speeds up by kicking faster, you will need to move closer to avoid the eddies.
- Drag is also created due to the waves generated by the motion of the swimmer and other swimmers around them. Waves will obstruct the efforts of the swimmer.
- Drag force causes a backwards force to be applied as water comes into contact with the swimmer's body
- A swimmer wants their body as smooth as possible because smooth surfaces cause less resistance.

(6)

QUESTION 10

10.1 Allocate 3 marks for explaining the theory.

Allocate 2 marks for the impact on the athlete.

For example: This theory says that as the athlete's somatic arousal increases, the athlete performs better but if a problem arises and performance drops, the athlete won't be able to return back to the optimum point immediately. The athlete will have negative thoughts and their performance will decline.

(5)

10.2 The coach and athlete will need to rehearse catastrophe type scenarios so that the athlete is prepared and doesn't freeze if it does occur during competition.

(2)

10.3 Allocate 3 marks for definition of the term 'arousal' for example: the mental state of readiness of the individual to perform a task, motivating them to direct their behaviour in a particular manner.

Allocate 3 marks for explanation of the term, for example: If arousal is too low, the athlete will not be psyched up enough and performance will be poor. If too aroused, the athlete will become anxious and performance will decline. Optimal performance gives perfect performance.

Allocate 2 marks for an appropriate example, for shooting, archery, darts lower arousal levels are needed OR for rugby, boxing, karate higher arousal levels are needed.

Learners may refer to simple and complex tasks.

(8)

10.4 10.4.1 Any activity where there is danger e.g. mountain climbing; white water rafting in big water OR where a quick decision is needed
OR when dealing with beginners

(1)

10.4.2 Autocratic leader is task oriented and makes all the decisions. In the activity mentioned there is a certain degree of danger and taking too long to discuss and make decisions can put everyone in danger.

OR Autocratic leader also wants to complete the task as quickly and effectively as possible.

OR This type of leader won't delegate and is best for quick decisions for large groups.

(2)

10.5 10.5.1 Aggression in sport is an intent to harm that is outside the rules of the game and is uncontrolled, often reactive, behaviour. An example is a foul tackle in football that is aimed at a player's leg rather than the ball.

(2)

10.5.2 Allocate 2 marks for the explanation of a theory OR 1 mark for name of theory and 1 mark for explanation.

Allocate 1 mark for appropriate sporting example for each theory.

Accept any THREE of the following, for example:

- Instinct theory suggests that an aggressive instinct is innate. Players react when provoked.
- Frustration aggression theory states that when our goals are blocked, we become frustrated when a good player marks you very closely so that you can't receive a pass and you hit them.
- Aggressive cue hypothesis caused by learned cues. Players pull shirts and commit fouls.
- Social learning caused by copying aggression from someone you admire. Senior player foul opponent so younger players copy that.

(9)

QUESTION 11

11.1 Accept any ONE of the following:

- Muscle spindles detect changes in the length of a muscle.
- The muscle spindles send information to the CNS about muscle length, which helps the nervous system know how joint angles are changing and where the different body parts are located.
- Muscle spindles protect the muscle from injury due to the muscle lengthening too much and too fast.

(1)

11.2 The A band remains the same length.

The H zone disappears (myosin).

Actin pull closer together

Z lines move inwards

(2)

11.3 Once activated, all the muscle fibres in that motor unit will contract maximally to produce a muscle twitch that lasts for a fraction of a second OR the all-or-none law is a principle that states that the strength of a response of a nerve cell or muscle fibre doesn't depend upon the strength of the stimulus. If a stimulus is above a certain threshold, a nerve or muscle fibre will fire. Essentially, there will either be a full response (ALL) or there will be no response at all (NONE).

(2)