NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – MARCH 2018

SPORT AND EXERCISE SCIENCE

MARKING GUIDELINES

Time: 3 hours 300 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

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. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

SECTION A

QUESTION 1

Allocate 2 marks per answer.

1.1	H
1.2	I
1.3	K
1.4	C
1.5	N
1.6	O
1.7	B
1.8	E
1.9	F
1.10	M
1.11	J
1.12	L
1.13	G
1.14	D
1.15	A

[30]

QUESTION 2

Match the following muscles with the relevant action.

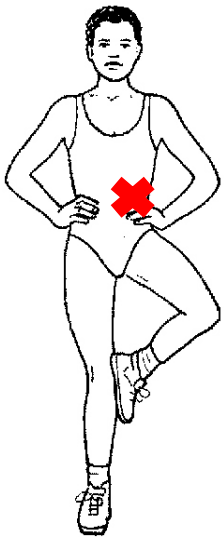
2.1 b (2)
2.2 d (2)
2.3 e (2)
2.4 c (2)
2.5 a (2)
[10]

QUESTION 3

Picture A

Picture B

Picture C



Picture D

[8]

QUESTION 4

4.1

Energy system	**Advantages** Allocate 2 marks per advantage.	**Disadvantages** Allocate 2 marks per disadvantage.
ATP/PC system	Accept any TWO of the following: Doesn't need oxygen OR No fatiguing by-products OR PC stored in muscles are easily available OR PC can quickly resynthesize so recovery time is quick OR Provides energy for explosive high-intensity activities (4)	Accept any TWO of the following: 1 PC resynthesizes only 1 ATP OR Only small amounts of ATP & PC are stored OR Provides energy for explosive high intensity activities OR Only provides energy to resynthesise ATP for up to about 3–10 seconds (4)

4.2

Energy system	**Advantages** Allocate 2 marks per advantage.	**Disadvantages** Allocate 2 marks per disadvantage.
Aerobic system	Accept any TWO of the following: Large glycogen stores available as energy fuel OR Large ATP resynthesis OR No fatiguing byproducts OR Provides energy for low/moderate intensity, high-duration exercise (3 min – 1 hr) (4)	Accept any TWO of the following: Slower rate of ATP resynthesis OR Needs more oxygen OR Cannot resynthesise ATP at start of exercise (4)

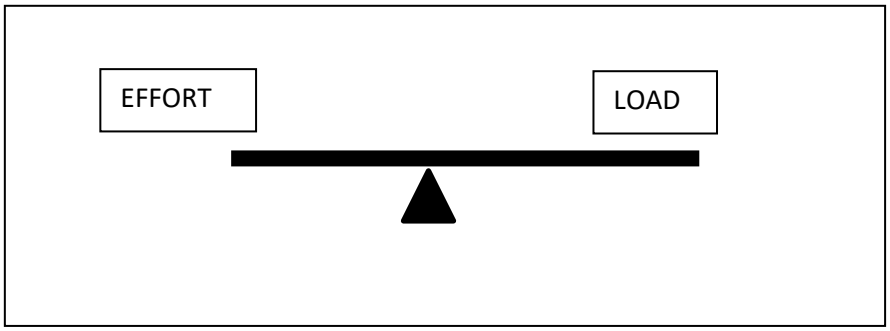
4.3

Energy system	Amount of ATP formed	Name *ONE* sport most suited to the system
Aerobic system	38 (1)	Marathon run Low-Impact Aerobic Class Triathlon 800 m, 1 500 m and longer (1)
Lactic acid system	2 (1)	50 m swim 200 m; 400 m run (1)
ATP/PC system	1 (1)	High intensity, very short duration events, e.g. 100 m sprint, LJ, triple jump & team games needing explosive jumping to header, catch or dive for a ball. Athletic throws (1)

[22]

QUESTION 5

1st class lever



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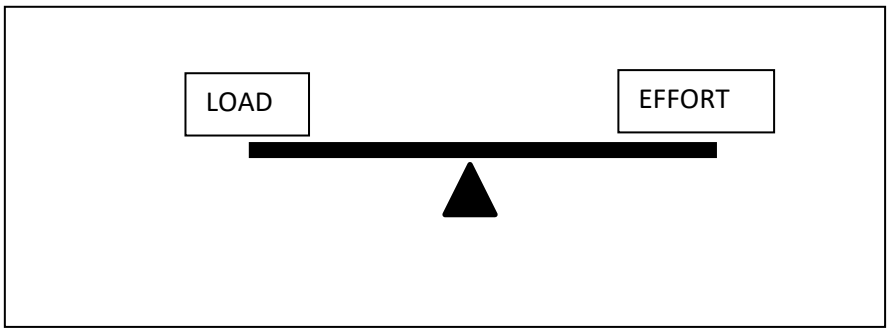
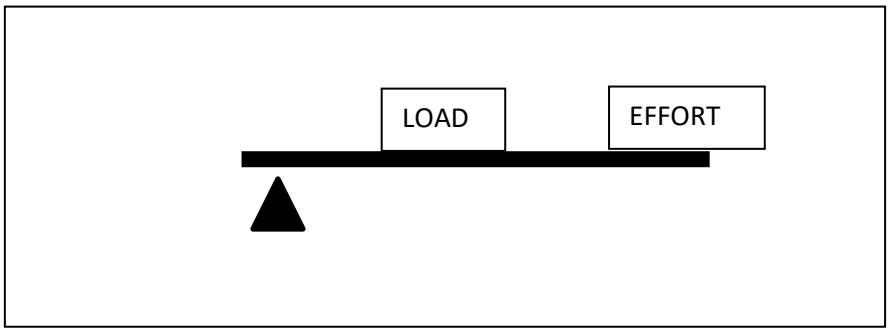


(3)

2nd class lever



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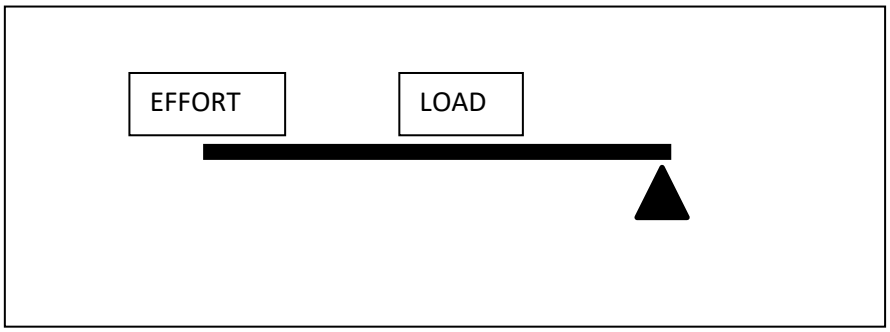
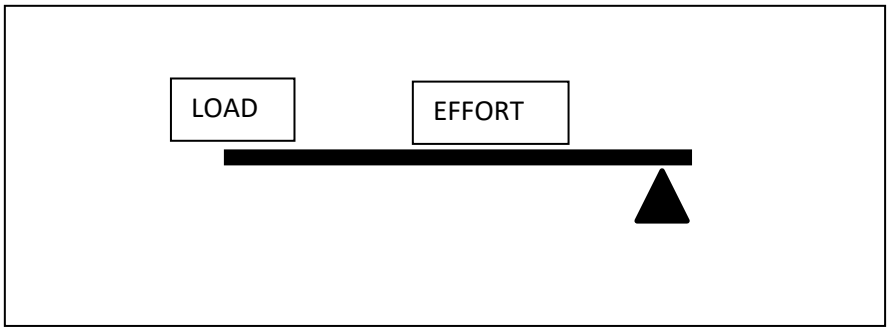


(3)

3rd class lever



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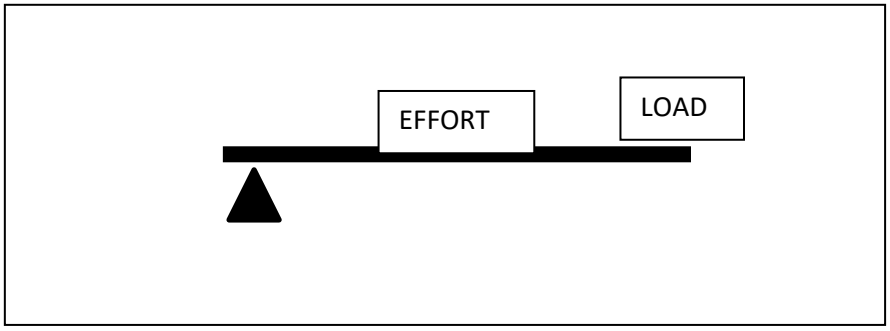


(3)
[9]

79 marks

SECTION B

QUESTION 6

6.1 6.1.1 Allocate one mark for any four of the following:
The fact that they are required to carry a:
compass,
survival blanket,
anti-venom kit proves it.
The compulsory calories to be consumed.
The fact that they have to finish within a certain time period each day.
To enter the athletes need to prove that they are fit and healthy enough.
ECG.
The medical tent. (4)

6.1.2 Allocate 1 mark for any three of the following:
Getting lost in the desert.
Snake bite.
Dehydration.
Heart attack from heat exhaustion.
Accept feasible. (3)

6.1.3 Allocate 1 mark for naming an item.
Allocate 2 marks for explanation.
Accept any of the following:
Flare – if injured or in distress, they can attract attention and help.
Matches – to light a fire for warmth if lost at night.
Satellite phone – to use in an emergency to get help.
Small first-aid kit – in case of a minor injury.
Accept feasible. (3)

6.2 Allocate 2 marks per answer.
No seconders.
Not knowing where the race ends. (4)

6.3 6.3.1 Hyperthermia (1)

6.3.2 Body temperature greater than 37,5–38,3 °C OR
When the core body temperature increases above approximately 39 °C. (2)

6.3.3 Accept any six of the following facts:
The hypothalamus sends the warmed blood to the skin's surface to try and cool it.
The body will also try to get rid of the increased internal heat by producing more perspiration. Perspiration gets released from the sweat glands for evaporation at the skin surface.
The blood vessels in the skin dilate.
The volume of blood returning to the heart is less.
✓ Cardiac output is reduced.
The circulatory system is strained. (6)

6.4 Allocate 1 mark for the word 'vasodilation'.
Allocate 4 marks for explanation of vasodilation.
Arterioles supplying the skeletal muscles increase the blood flow to them by increasing the internal diameter.

Allocate 1 mark for the word 'Vasoconstriction'.
Allocate 4 marks for explanation of vasoconstriction.
Arterioles supplying the organs (e.g. kidneys, liver) reduce blood flow to these organs by constricting.

Allocate 1 mark for 'pre-capillary sphincters'.
Allocate 1 mark for stating that the sphincters supplying skeletal muscles open.
Allocate 1 mark for stating that the sphincters supplying the other organs close. (13)

6.5 More of the cardiac output will be redistributed to the skin to counter the increasing body temperature – this limits the amount of blood going to muscle OR More blood goes to the skin to try and cool the person down. (2)

6.6 6.6.1 (a) B (2)
(b) C (2)
(c) E (2)
(d) D (2)

6.6.2 Veins carry blood towards the heart. (E)
When our muscles contract (C) and relax (B), the veins get squeezed (picture 2) and this pushes the blood towards the heart.
Within the veins we have pocket valves that stop the blood from flowing backwards. (5)

6.7 6.7.1 Pupils need to 'evaluate'.
Carbo-loading maximises glycogen storage that can provide enough energy for about two hours of low-intensity exercise like jogging. So carbo-loading for this particular event will only really help the athlete on the first day and then only for a couple of hours. In other words, carbo-loading won't have an impact on the overall result BUT it could get the athlete who carbo-loaded a big time gap on day 1. (3)

6.7.2 Accept any 5 of the following:
Pupils can either list food groups or specific food or a combination of both.
High energy gels (e.g. GU) and energy bars.
Food high in carbohydrate.
Before exercise is low GI (GI values 55 & less), e.g. fruit.
After exercise intermediate (GI values 56–69) or high GI (GI values 70 and above).
Fats, e.g. nuts, legumes.
Protein.

Matthew Dove's actual diet:
Cashew, macadamian, almonds, dates
Soup
Rehidrat sachet
Recovery fuel
Ready-made oats
Muesli, milk powder, chia seeds
Expedition food
Peanut butter sachet
Trek bar
Smash, stock cube, biltong
Hot chocolate
Racefood bar (5)

6.8 6.8.1 ATP/PC system OR Alactic system (2)
6.8.2 Lactic acid system OR Glycolytic (2)
6.8.3 Aerobic system OR Oxidative system (2)
6.8.4 ATP/PC system OR Alactic system (2)
6.8.5 Lactic acid system OR Glycolytic (2)
[69]

QUESTION 7

7.1 Accept any 3 of the following:
The intensity of the training sessions,
The duration of the training sessions,
The force or load used in training,
The person's initial level of fitness. (3)

7.2 Allocate 2 marks for any two of the following adaptations:
The heart hypertrophies/gets bigger.
The left ventricle changes the most.
The cardiac muscle gets thicker and stronger.
More capillaries develop around the heart. (4)

7.3 Accept any ONE of the following facts:
A bigger and stronger heart can pump more blood per beat.
A larger stroke volume allows the heart to pump slower.
The more blood pumped around the body per minute, the faster oxygen is delivered to the working muscles.
Increase in heart volume. (2)
[9]

QUESTION 8

8.1 Pupils need to show evidence of understanding what peripheral vision is – 1 mark.
Allocate 2 marks for cycling explanation.
Allocate 2 marks for squash explanation.
For example:
Much of what happens in sports does not happen directly in front of you. It's important to increase your ability to see action to the side without having to turn your head.

A cyclist in a road race needs to keep their eyes on the road but when within the peloton, they need to be aware of where the other cyclists are in relation to them.

A squash player has their eyes on the ball but wants to catch their opponent flatfooted. By being aware of their opponent's position, without making it obvious, the player can hit the ball into a spot that makes it difficult for the opponent. (5)

8.2 Picture B (1)

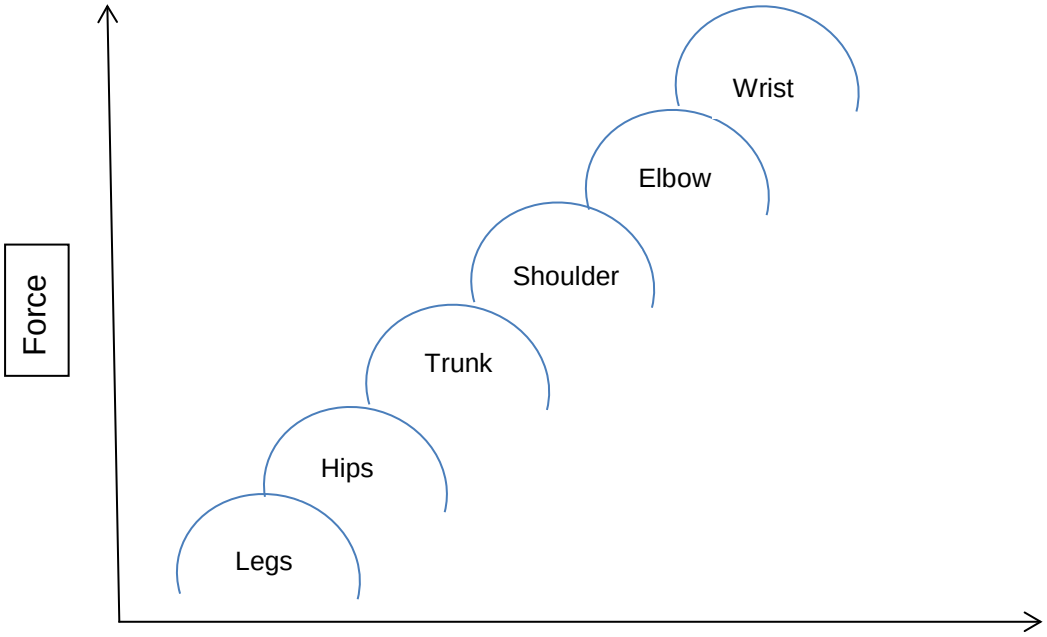
8.3 Squash involves a fast-moving ball and often also a fast-moving opponent.
It is important that you are able to follow objects without much head motion.
Eye tracking helps you maintain better balance and react to the situation more quickly. (2)
[8]

QUESTION 9

9.1 Allocate 2 marks per fact:
The athlete has used the wrist before using the elbow.
The 2nd to last action (which should be the elbow movement) has been started too late in the movement. (4)

9.2 Allocate one mark for each 'curve' starting in the middle of the previous one with the correct body part.
Allocate 1 mark for knowing to swop the wrist and elbow action around.

SEQUENTIAL FORCE SUMMATION



(7)

9.3 Allocate 2 marks for accuracy and 2 marks for injury.
Accuracy:
Ensures a movement is completed at maximum force.
If no follow-through occurs, the body parts are slowing down before the movement has been completed.
The body parts are projected in the same direction as the movement, improving its accuracy.

Injury:
Gives the body segments involved time to slow down after the movement has been performed, decreasing the possibility of injury. (4)
[15]

QUESTION 10

10.1 Allocate 2 marks per type:
Hawk eye.
Snicko referral used in cricket.
Technology used on goal lines.
Accept feasible. (4)

10.2 Pupils need to provide both advantages **and** disadvantages of technology
Allocate 4 marks for advantages
Marks allocated to any 4 of the following points or similar:
It allows the rules to be fairly and consistently applied.
Officials can communicate with one another.
Ensures correct decisions are made; less controversy.
The players trust the decision-making process.
It could be used after the game to cite illegal play not seen by the officials.
Timing/measuring is more precise. (4)

10.3 Allocate 4 marks for disadvantages.
Marks allocated to any 4 of the following points or similar:
Time delays while officials are checking.
Slows the game down.
Only available in select sports.
Very expensive.
The equipment needs to be well maintained to ensure accuracy.
Players and spectators don't trust an official if no technology is available, i.e. no respect.
It doesn't always clearly assist the official and they then have to use own judgement. (4)

10.4 10.4.1 Swimming:
Clothing went from heavy material to light Lycra.
Now 'sharkskin' suits.
Swimming caps moved from material to Lycra to silicone. (3)

10.4.2 Rugby:
Boots have changed – studs can be removed and replaced.
Rugby jersey fabric and design have changed – more lightweight.
Most recent jerseys have no collars. (3)

10.4.3 Track athletics:
Track shoes have spikes now.
Lighter and brighter shoes.
Female clothing has got skimpier and Lycra used.
Males run in Lycra or fabric that takes sweat away from the skin. (3)

[21]

QUESTION 11

Allocate 2 marks per response.
Possible answers could include:
Many schools do not offer physical education and/or extramural sport.
Sedentary lifestyle.
Urban children seldom walk or cycle anywhere.
Fast foods/junk food.
Diets high in sugar, fats and salt.
Children are no longer safe playing in parks.
Increased screen time (TV, computers, etc.).
Accept feasible. **[8]**

QUESTION 12

Pupils could answer in 2 ways. They could either refer to the various cycles OR they could refer to the phases.
Allocate 2 marks per cycle or phase.
- 1 mark for naming it.
- 1 mark for description.

- Macro-cycles – involve long-term planning that could be yearly OR if preparing for the Olympics could be every two yearly cycle.
- Meso-cycles – involve two to eight weeks OR could be months.
- Micro-cycles – involve periods of a week OR could involve individual training sessions.

OR

- Preparation phase/pre-season training – getting a base of fitness OR general conditioning.
- Competitive phase – swimming skills and technique are refined OR
- maintain fitness levels.
- Tapering/peaking – prepare for competition OR
- focus on skill not fitness.
- Transition phase – active rest OR out-of-season recovery period.

[8]

QUESTION 13

Allocate 2 marks per factor provided.
Allocate 2 marks for reason.
Accept any 4 of the following:
Age – younger people generally have more energy so play more sport.
Gender – females are often compelled to look after the children so have less time for sport.
Physical condition of the person – an injured or sick person will train less.
Somatotype – endomorph less likely to do a lot of exercise. Ecto & Mesomorphs will chose sports suited to body type.
A person's ability – higher-ability athletes will need to train more. A person who has tried a sport and failed will often stop playing.
Time available – less exercise due to other commitments like work or family.
Wealth/cost – equipment and memberships are expensive.
Motivation – those less motivated will exercise less.
Environment – there are no facilities or open space to enable them to take part.
Accept feasible. **[16]**

QUESTION 14

Allocate 4 marks per Law:
- 2 marks for describing the Law.
- 2 marks for applying the Law to netball or basketball pass.

Newton's First Law states that 'an object will remain at rest or in uniform motion in a straight line unless acted upon by an external force'.
Newton's 1st law can be applied when the player applies a force through the hand to throw the ball – otherwise the ball will remain at rest in the player's hand.

Newton's 2nd Law states '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.
Newton's 2nd law – a faster, more powerful throw/pass will result in a large amount of force.

Newton's 3rd Law states that 'for every action there is an equal and opposite reaction.'
Newton's 3rd law – when the ball is thrown (i.e. the action), it causes the ball to react by pushing back against the hand. **[12]**

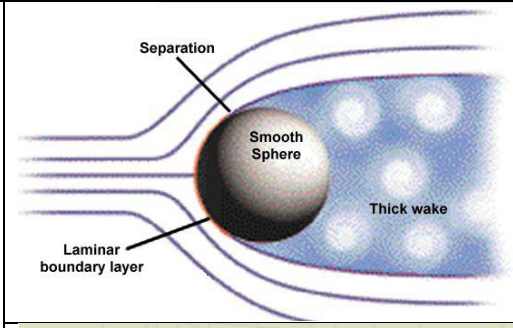
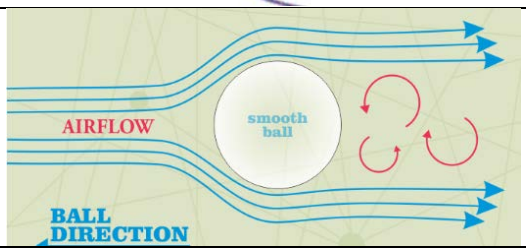
QUESTION 15

15.1 15.1.1 Allocate 1 mark for selecting picture A.
Allocate 2 marks for reason.
Any 2 of the following facts:
The object is not aerodynamic.
It provides a large surface area for resistance to impact upon.
The shape causes drag/turbulence behind it. (3)

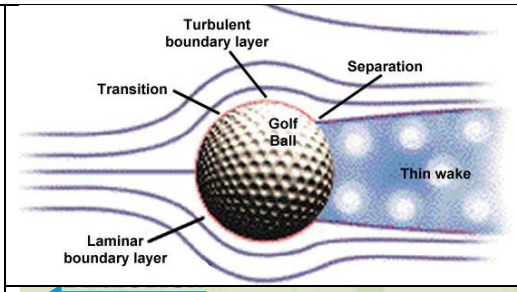
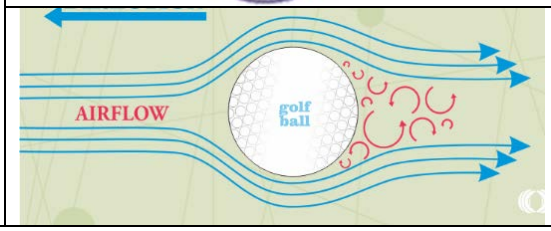
15.1.2 Allocate 1 mark for selecting picture C.
Allocate 2 marks for reason.
The object is aerodynamic.
The frontal surface area is small.
The shape allows minimal drag. (3)

15.1.3 Allocate 1 mark for selecting picture A.
Allocate 2 marks for reason.
A cyclist sitting upright presents a large 'flat' surface area to the resistance. (3)

15.2 Accept feasible.

Smooth ball: Allocate 1 mark for the lines at the separation point continuing on rather than dipping down. Allocate 1 mark for correctly labelling where the separation occurs. Allocate 1 mark for correctly labelling the thick wake. Allocate 1 mark for representing the thick wake.	 

(4)

Golf ball: Allocate 1 mark for the lines at the separation point dipping down. Allocate 1 mark for correctly labelling where the separation occurs. Allocate 1 mark for correctly labelling the thin wake. Allocate 1 mark for representing the thin wake.	 

(4)

15.3. 15.3.1 (i) Upward force, occurring in fluid, acting on a body. (2)

(ii) This is a force causing resistance in the water. Drag acts in the opposite direction to the movement of the object. (2)

(iii) A propulsive force to overcome drag. (2)

15.3.2 Allocate 2 marks per answer.
Possible answers:
Wear smooth, tight costume.
Swimming cap.
Shave arms and legs.
Swim close to the surface.
Streamline their body.
Swim in warmer water. (6)

15.3.3 Allocate 2 marks per answer.
Possible answers:
Wear smooth, tight clothing.
Get body as streamlined as possible by crouching down.
Booties over socks and shoes.
Aerodynamic helmet.
Tyres either solid or with fewer spokes.
Ride close to rider in front of them. (6)

[35]

QUESTION 16

ESSAY RUBRIC

	1 mark	2 marks	3 marks	4 marks	Possible mark (20)
Use of knowledge from sources	Reference made to one source only.	Reference made to 2 sources only.	Several and appropriate references made to all sources.	Source detail very close to full potential used to support argument.	4
Quality of argument decision	Writing consists of facts with little linkage or reasoning.	Reasoning correct but hard to follow. Some linkage evident.	Supports the position. Reasoning is clear. Minor errors in flow. Linkage is sometimes missed.	Strongly supports a clear position. Reasoning is very clear and succinct. Flow is logical. Compelling with regular linkage. Well-integrated argument.	4
Use of real-life examples	Vague reference to examples but no integration.	Examples are given but most are not clear and specific nor integrated into the argument.	Several specific examples are given but not well integrated into the argument **OR** One or two specific examples are given that are well integrated into the argument.	Several specific examples are given **AND** well integrated into argument.	4
Use of own knowledge × 2	Some relevant facts given beyond the sources to support argument.	Some relevant facts given beyond the sources to support argument **AND** integrated into the argument.	Many relevant facts given beyond the sources to support argument.	Many relevant facts given beyond the sources to support argument **AND** integrated into the argument.	8

[20]

221 marks

Total: 300 marks