



NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – MARCH 2018

SPORT AND EXERCISE SCIENCE

EXAMINATION NUMBER

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Time: 3 hours

300 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 32 pages. Please check that your question paper is complete.
 2. Read the questions carefully.
 3. Use the total marks awarded for each question as an indication of the detail required.
 4. It is in your own interest to write legibly and to present your work neatly.
-

FOR MARKER'S USE ONLY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Marks	30	10	8	22	9	69	9	8	15	21	8	8	16	12	35	20	300
Obtained																	

SECTION A**QUESTION 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 Positive stress	A Processes within a team
1.2 Anorexia	B Training arranged into organised divisions
1.3 Negative stress	C Sleep disturbance
1.4 A behavioural sign of anxiety	D Above 5 000 m
1.5 An action performed in the frontal plane	E The amount of blood pumped out of the heart in 1 minute
1.6 Low GI food	F A gymnast performs a 360° turn (pirouette)
1.7 Periodisation	G Altitude training – living and training high
1.8 Cardiac output	H An important element of an athlete's preparation, heightening the senses
1.9 An example of vertical rotation	I Characterised by body-image distortion
1.10 An action performed in the sagittal plane	J An impairment that limits fine or gross motor ability
1.11 Physical disability	K Can cause self-doubt
1.12 Tapering	L A progressive reduction of training load
1.13 LHTH	M A cartwheel
1.14 Hypoxia will result	N Leg action when cycling
1.15 Group dynamics	O Slow-release carbohydrate

ANSWERS:

1.1	
1.2	
1.3	
1.4	
1.5	
1.6	
1.7	
1.8	
1.9	
1.10	
1.11	
1.12	
1.13	
1.14	
1.15	

QUESTION 2

Match the following muscles with the relevant action. Write only the letter of your chosen action in the space provided below.

Muscle	Action
2.1 Deltoid	(a) Trunk flexion
2.2 Gastrocnemius or Soleus	(b) Abduction, flexion and extension of shoulder
2.3 Gluteus maximus	(c) Extension of elbow and shoulder
2.4 Triceps	(d) Plantar flexion
2.5 Rectus Abdominis	(e) Extension and external rotation of hip

2.1 _____ (2)

2.2 _____ (2)

2.3 _____ (2)

2.4 _____ (2)

2.5 _____ (2)

[10]

QUESTION 3

Indicate clearly with an 'X' where the Centre of Gravity would be found in the following pictures.

Ensure that the 'X' is clearly visible to the marker.

Picture A



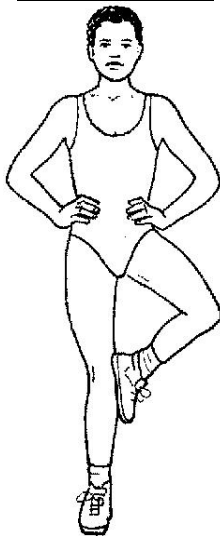
[Source: <www.yoga-teacher-training.org>]

Picture B



[Source: <shespokefitness.files.wordpress.com>]

Picture C



[Source: <zakrussell94.blogspot.co.za/2010/11>]

Picture D



[Source: <www.womenshealthmag.com/fitness/basic-workout-side-plank>]

[8]

QUESTION 4

Complete the following tables relating to energy systems.

4.1

Energy system	Advantages	Disadvantages
ATP/PC system	Advantage 1:	Disadvantage 1:
	Advantage 2:	Disadvantage 2:

(8)

4.2

Energy system	Advantages	Disadvantages
Aerobic system	Advantage 1:	Disadvantage 1:
	Advantage 2:	Disadvantage 2:

(8)

4.3

Energy system	Amount of ATP formed	Name <i>ONE</i> sport most suited to the system
Aerobic system	(1)	(1)
Lactic acid system	(1)	(1)
ATP/PC system	(1)	(1)

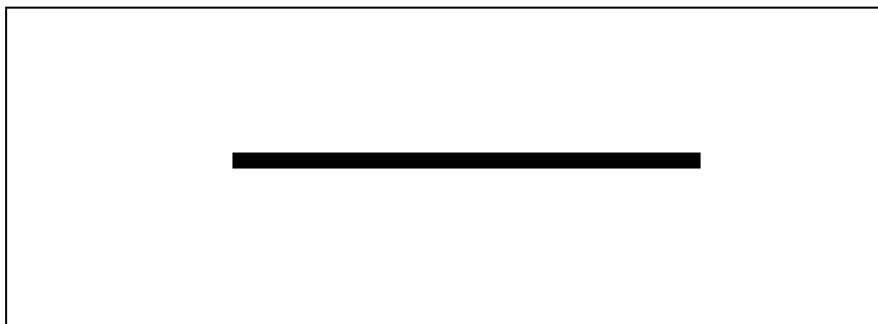
(6)

[22]

QUESTION 5

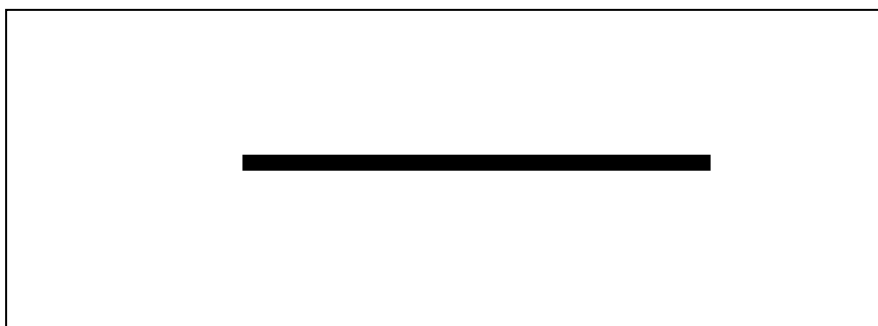
Label the **lever** diagrams below by indicating where the fulcrum, load/resistance and effort/force are placed.

1st class lever



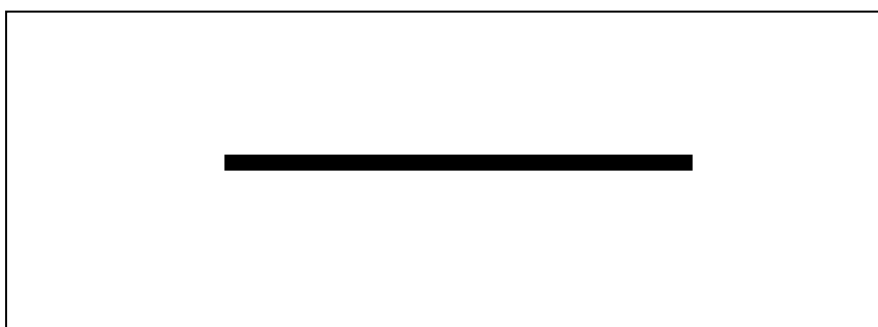
(3)

2nd class lever



(3)

3rd class lever



(3)
[9]

79 marks

SECTION B**QUESTION 6**

Read the information in the article below and then answer the questions that follow.

Runners on a highway to hell

Matthew Dove, strength and conditioning coach at Velocity Sports Lab in Hilton, competed in the 'Marathon Des Sables' race.

The Marathon Des Sables is a seven-day, 257 km ultra-marathon that takes place in Southern Morocco in the Sahara Desert.

The athletes have no idea where the marathon ends. There are no seconders, no phones and temperatures reach 50 degrees Celsius.

Dove says they have to carry their water, food, sleeping bag, compass, survival blanket, anti-venom pump and a knife – the total weight should be about 9 kg. It is compulsory to eat 2 000 calories a day, which is checked by the doctors. If any athlete sheds any equipment during the race, they incur time penalties. Each stage has to be finished in a certain time.

Tents are set up each night by the military and eight people sleep on the floor, wake up the next day and go again. There is a medical tent where runners can see a doctor to have blisters popped or toenails removed. To ensure that athletes are medically fit to run the race, they have to produce a medical certificate and an ECG report.

Dove followed a rigorous training regime to get himself to peak condition for this gruelling foot race, consisting of a daily 20 km run, followed by either a gym session or swim. Over the weekends, he ran two back-to-back 30 km each day, carrying an 8 kg pack on his back.

Dove went to Morocco to acclimatise before starting the race dubbed the toughest foot race on Earth.

[Adapted from *The Witness*, March 3 2017]

6.1 An extreme event such as the Marathon Des Sables requires a risk assessment to be performed.

6.1.1 Provide **FOUR** pieces of evidence from the article, indicating that a risk assessment was indeed conducted.

(4)

6.1.2 List **THREE** possible life-threatening risks to competitors.

(3)

6.1.3 If you were the race organiser, name **ONE** other item, not mentioned in the article, that you would insist that the competitors carry with them **AND** explain why you believe that item is necessary.

(3)

6.2 Name the **TWO** factors, mentioned in the article, that could have a negative **psychological** effect on the athletes.

(4)

6.3 The article states: 'temperatures reach 50 degrees Celsius'.

6.3.1 Provide the medical term for someone suffering from an elevated temperature due to hot and humid conditions.

(1)

6.3.2 What body temperature does a person need to reach in order to suffer from the condition named in question 6.3.1?

(2)

6.3.3 Describe what occurs **physiologically** when an athlete's body is overheating.

(6)

6.4 Describe the **vascular shunt** that occurs in Matthew Dove's circulatory system when running this marathon.

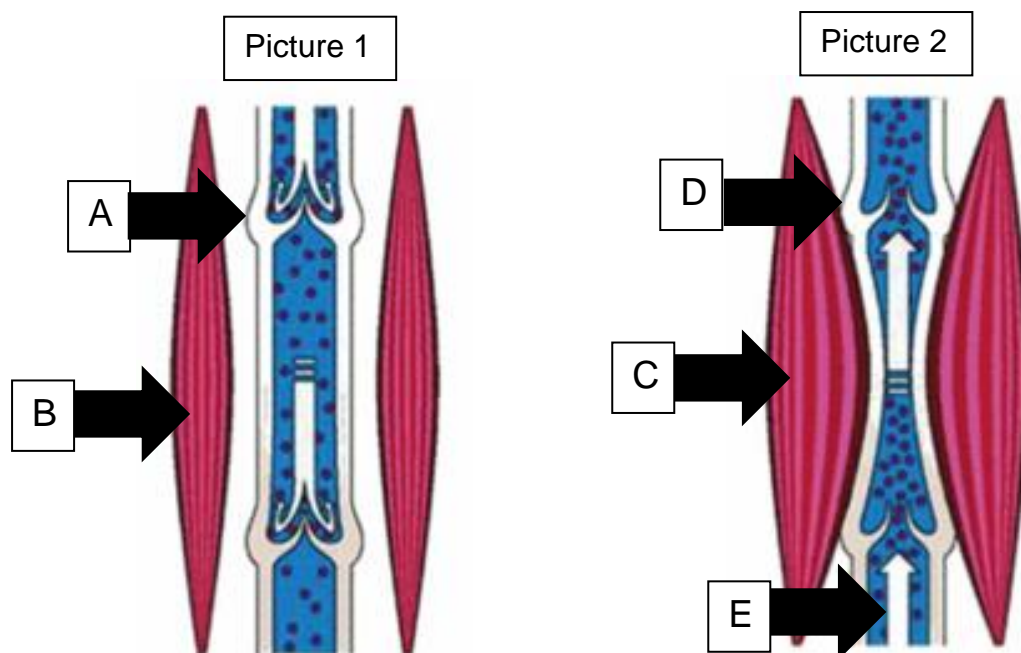
[illegible]

(13)

6.5 Explain the impact of the hot and humid environment on blood distribution when running this marathon.

(2)

- 6.6 Study the diagram below and answer the questions that follow.
Matthew Dove's leg muscles will also assist with blood distribution.



[Source: <<http://www.graduated-compression-stockings.html>> Accessed 6/6/17.]

- 6.6.1 Using the pictures provided, give the letter that represents:

- | | | | |
|-----|------------------------------|-------|-----|
| (a) | A relaxed muscle | _____ | (2) |
| (b) | A contracted muscle | _____ | (2) |
| (c) | Blood flow towards the heart | _____ | (2) |
| (d) | A non-return valve | _____ | (2) |

- 6.6.2 Using the letters provided to help in your explanation, describe the movement of the blood in Matthew Dove's veins when running.

(5)

6.7 The athletes involved in this ultra-marathon would require a special diet.

6.7.1 Evaluate the effectiveness of 'carbo-loading' **prior** to a race such as the Marathon Des Sables.

(3)

6.7.2 Recommend the types of food these athletes would eat, given that they are required to consume 2 000 calories a day **AND** the fact that they need to carry their own food.

(5)

6.8 Predict the **predominant** energy system that comes into play in the scenarios listed below:

- 6.8.1 At the start of the race: _____ (2)
- 6.8.2 Approximately 5 minutes into the race: _____ (2)
- 6.8.3 2 hours into the race: _____ (2)
- 6.8.4 At the bottom of a steep sand dune: _____ (2)
- 6.8.5 Half way up a steep sand dune: _____ (2)

[69]

QUESTION 7

When a body engages in training several times a week, the cardiovascular and respiratory systems adapt in order to increase the body's efficiency.

- 7.1 List **THREE** factors related to training that will impact on the degree to which the cardiovascular and respiratory systems adapt.

(3)

- 7.2 Briefly explain **TWO physical adaptations** that occur in the heart of a trained athlete.

(4)

- 7.3 What impact would this adaptation have on the functioning of the heart?

(2)

[9]

QUESTION 8

Examine the following pictures and then answer the questions that follow.

Picture A



[Source: <<http://bikelifecities.tour-de-france>> Accessed 6/6/17.]

Picture B



[Source: <<https://en.wikipedia.org/wiki/Squash>> Accessed 6/6/17.]

8.1 Explain why both sports depicted in the pictures above require peripheral vision.

(5)

8.2 Which picture depicted above would require the athletes to use eye-tracking?

(1)

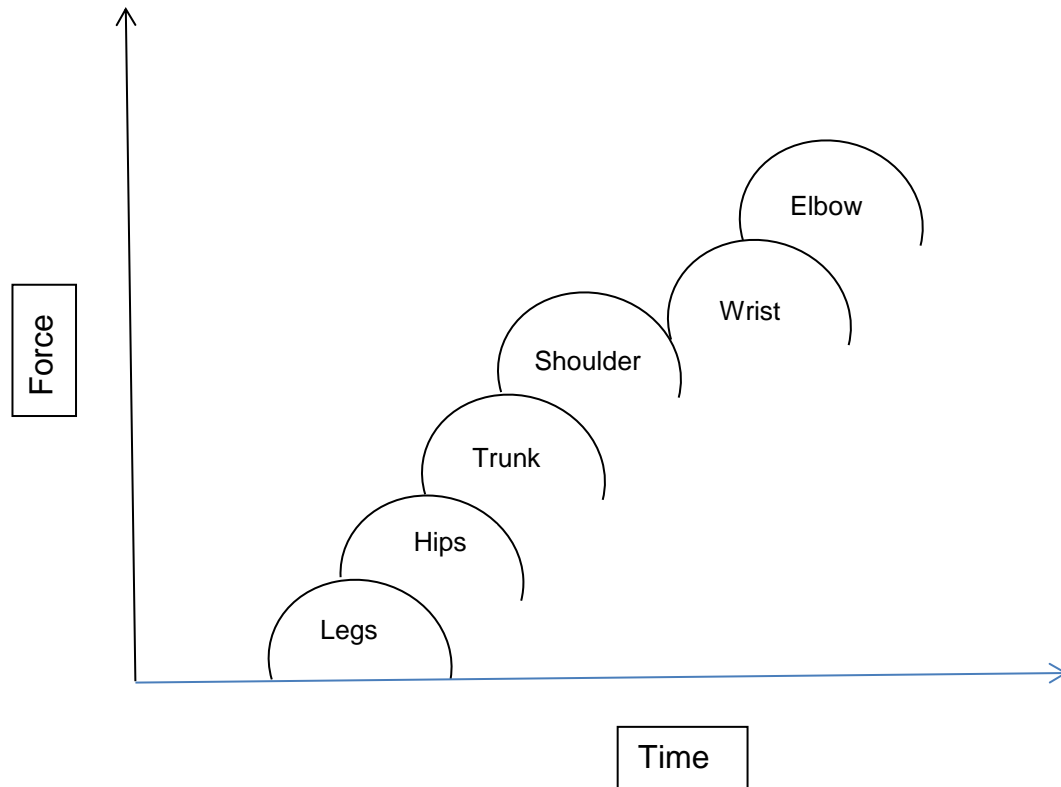
8.3 Provide a reason for your answer in question 8.2.

(2)

[8]

QUESTION 9

Examine the graph below and answer the questions that follow.

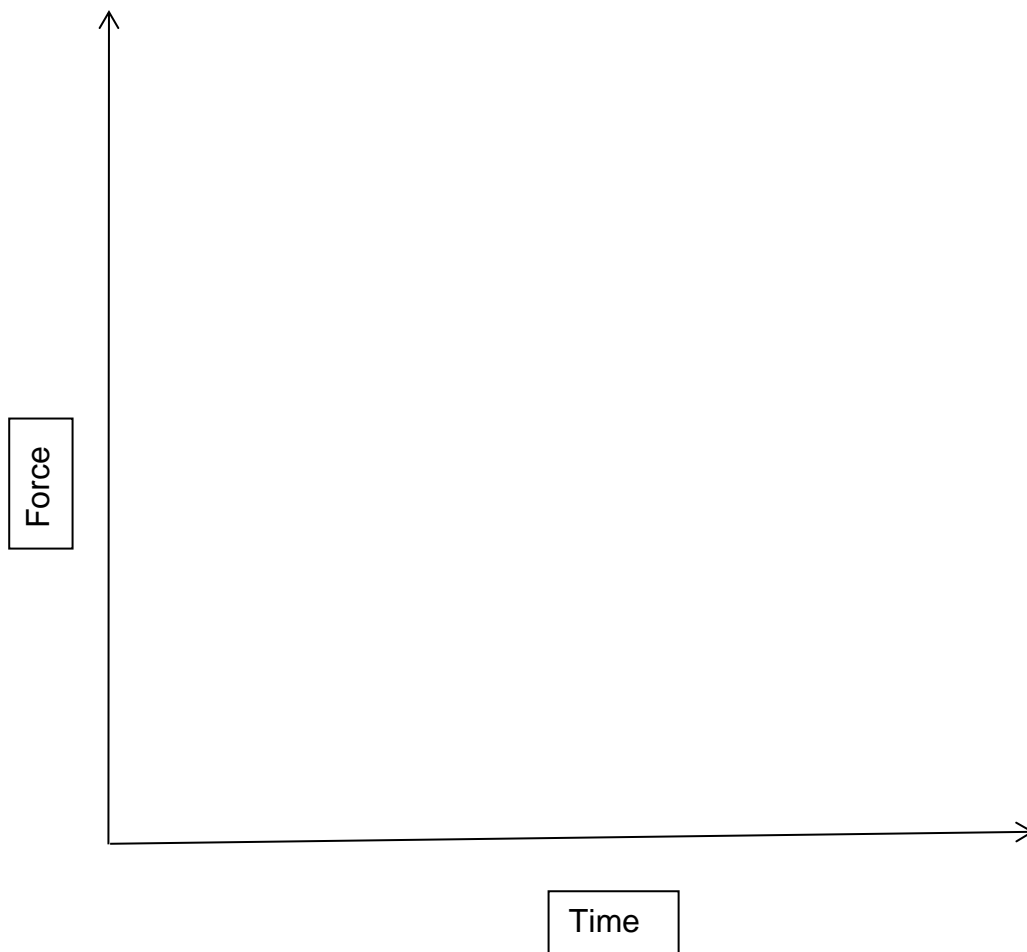
SEQUENTIAL FORCE SUMMATION OF A TENNIS PLAYER WHEN SERVING

- 9.1 Using the graph on force summation above, describe what the tennis player is doing **incorrectly** when trying to serve a ball with force.

(4)

- 9.2 In the blank graph below sketch the **ideal movement** needed to serve a ball with speed in tennis.

SEQUENTIAL FORCE SUMMATION



(7)

- 9.3 How does a follow-through after kicking a soccer ball both improve the accuracy of the kick **as well as** prevent an injury to the kicker?

(4)
[15]

QUESTION 10

- 10.1 Identify **TWO** types of technological equipment that are used by officials in sporting competitions to assist with the decision-making process.

(4)

- 10.2 Provide **FOUR** advantages of the use of technology by **officials** in sport.

(4)

- 10.3 Provide **FOUR** disadvantages of the use of technology by **officials** in sport.

(4)

10.4 Describe how technology has improved **clothing** in the following sports:

10.4.1 Swimming

(3)

10.4.2 Rugby

(3)

10.4.3 Track athletics

(3)
[21]

QUESTION 11

The World Health Organisation (WHO) is monitoring childhood obesity as it has reached epidemic proportions worldwide. They predict that there will be more than 70 million obese children within the next 10 years.

Identify **FOUR** reasons why South African children are becoming unhealthy and obese.

[8]

QUESTION 12

Explain how an elite swimmer would use **periodisation** in order to prepare for competitions, including World Championships and the Olympics.

[illegible]

[8]

QUESTION 13

List **FOUR** factors that will impact on an individual's participation in sport or physical activity **AND** provide reasons why these factors will have an impact.

Factor 1:

(2)

Reason:

(2)

Factor 2:

(2)

Reason:

(2)

Factor 3:

(2)

Reason:

(2)

Factor 4:

(2)

Reason:

(2)

[16]

QUESTION 14

Explain each of Newton's Laws and apply each law to the activity of a netball or basketball pass.

Newton's First Law:

(2)

Application of law:

(2)

Newton's Second Law:

(2)

Application of law:

(2)

Newton's Third Law:

(2)

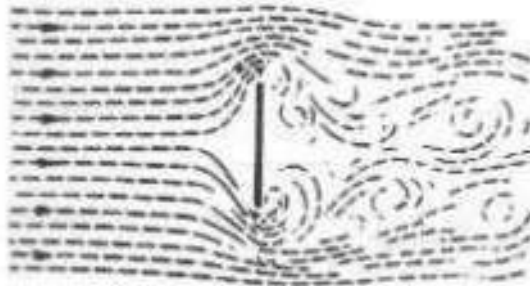
Application of law:

(2)
[12]

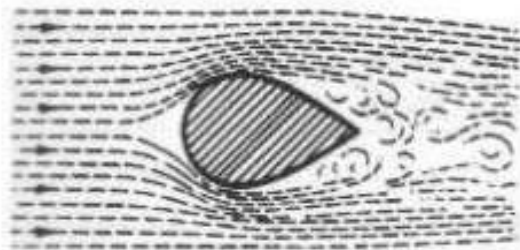
QUESTION 15

- 15.1 Examine the following pictures showing the effects of resistance on different shapes and then answer the questions that follow.

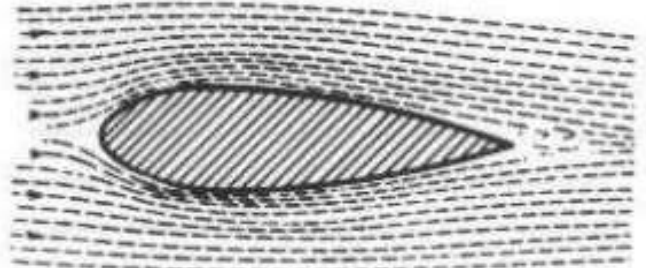
Picture A



Picture B



Picture C



[Source: <<http://air-flow-in-streamlines.html>> Accessed 7/7/17.]

- 15.1.1 Which picture provides the greatest amount of resistance to the object **AND** why?

(3)

- 15.1.2 Which picture provides the least amount of resistance to the object **AND** why?

(3)

15.1.3 Which picture could represent the air resistance on a cyclist's body when sitting upright while pedalling **AND** why?

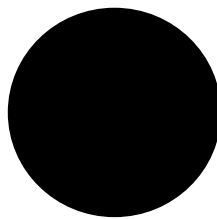
(3)

15.2 Using the pictures below, draw in the expected airflow around a smooth ball and a golf ball. Label the additions you have made to the pictures.
Ensure that you have included where the 'separation' will occur and the 'wake'.

Direction of both balls



Smooth ball:



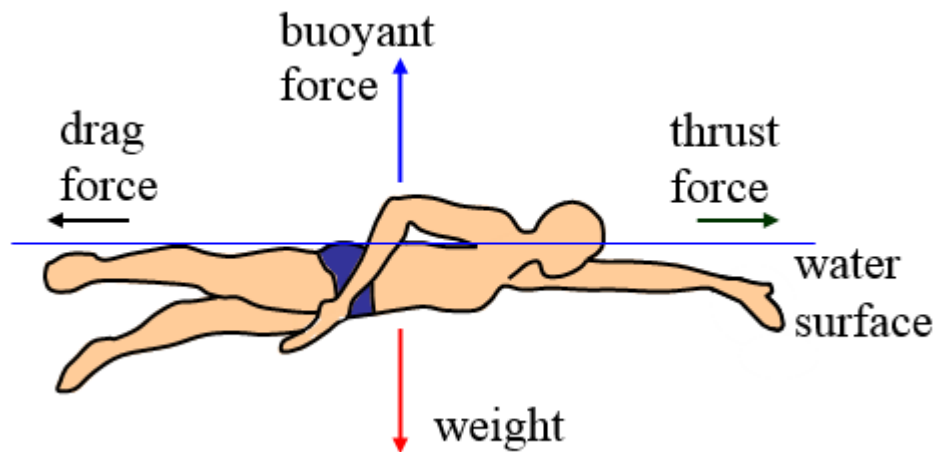
(4)

Golf ball:



(4)

15.3 Examine the following picture and then answer the questions that follow.



15.3.1 Briefly explain the following terms:

(i) Buoyant force

(2)

(ii) Drag force

(2)

(iii) Thrust force

(2)

15.3.2 Describe **THREE** ways by which a swimmer could reduce the amount of drag she experiences when swimming in a swimming pool.

(6)

15.3.3 Describe **THREE** ways by which a cyclist could reduce the amount of drag he experiences when racing.

(6)
[35]

QUESTION 16

Examine the data provided.

Write an essay in which you argue that there is gender bias in sport.

To answer this question you are expected to:

- Present an in-depth argument that convincingly supports this viewpoint.
- Examine the source material carefully and use the information in the sources to best develop your argument.
- Integrate your own relevant sport science knowledge into your argument.
- Use real-life examples to support your argument.

SOURCE 1**American Mark Cuban may draft Brittney Griner**

Dallas Mavericks owner Mark Cuban would be willing to give Baylor women's star Brittney Griner the opportunity to prove she could play in the NBA (National Basketball Association).

Cuban said he would consider selecting Griner, a 6-foot-8 Player of the Year. Cuban said he would have 'no problem whatsoever' inviting Griner to try out for a spot on Dallas' team.

'Right now, I'd lean toward yes, just to see if she can do it. You never know unless you give somebody a chance.'

Griner has dominated women's college basketball with her size and athleticism, scoring 3,283 points and blocking 748 shots in her career. She also had 18 dunks.

Griner would love the opportunity. 'I would hold my own! Let's do it.' she wrote on Twitter in response to Cuban.

[Source: <<http://www.espn.com/mark-cuban-give-brittney-griner-opportunity-dallas-mavericks>>]

SOURCE 2

Tennis star Caroline Wozniacki says women players don't get to compete on the main tennis courts at Wimbledon – Centre Court and No. 1 Court – as much as the men do.

The Danish player says female competitors work hard too, so they deserve to play on the big courts as well.

For a long time the men and women players were treated quite differently in tennis.

Men used to be paid more prize money than women, but in 2007 Wimbledon changed this and made it equal for both.

The men and women's singles champions will collect £1,88 million. The runner-up gets £940,000.

But now the debate is on the prominence of the women's matches and whether they should get to play on the big courts, in front of the biggest crowds, as much as the men do.

So should the number of matches on Wimbledon's big courts be equal too?

[Source: <www.bbc.co.uk/newsround/33462943> Accessed 27/06/17.]

SOURCE 3

Football is one of the sports which has the biggest difference in pay between male and female players. In fact in almost a third of all sports women win less prize money than men, and football is one of them.

For example, for winning last year's football World Cup in Brazil, Germany's team received about £23m – but this year the USA team that won the Women's World Cup only received around £1,3m.

This season's winners of the men's FA Cup, a competition watched in more than 120 countries, secured around £1,8m in prize money. But the team who won the FA Women's Cup only got £5,000.

[Source: <www.bbc.co.uk/newsround/33462943> Accessed 27/06/17.]

[illegible]

[illegible]

[illegible]

[20]

221 marks

Total: 300 marks