



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2012

**LIFE SCIENCES: PAPER II**

Time: 2½ hours

150 marks

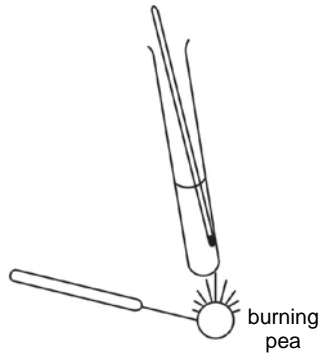
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**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY**

1. This question paper consists of 12 pages and a yellow Answer Booklet of 4 (i – iv) pages. Please check that your question paper is complete. Detach the Answer Booklet from the middle of your question paper.
  2. This question paper consists of five questions.
  3. Question 1 must be answered in the Answer Booklet. Question 2, 3, 4 and 5 must be answered in your Answer Book.
  4. Read the questions carefully.
  5. Number the answers exactly as the questions are numbered.
  6. Use the total marks, which can be awarded for Questions 1, 2, 3 and 4, as an indicator of the amount of detail required.
  7. It is in your own interest to write legibly and to present your work neatly.
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**QUESTION 2**

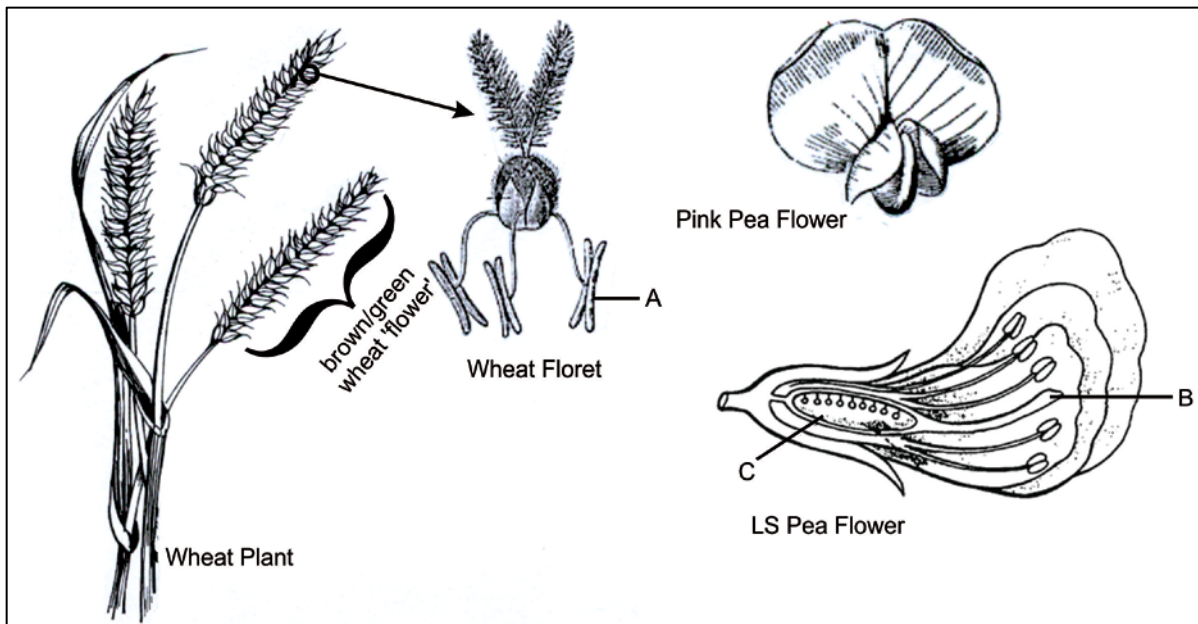
- 2.1 Some students wished to investigate the amount of energy stored in peas and wheat. In order to do this they carried out a simple experiment where they used burning peas as a source of energy to heat up some water in a test tube. They measured the temperature of the water with a thermometer. They repeated the process using burning wheat. The results are given in the table below.



| Type of seed | Starting temperature of water (°C) | Final temperature of water (°C) |
|--------------|------------------------------------|---------------------------------|
| Pea          | 20                                 | 28                              |
| Wheat        | 20                                 | 50                              |

- 2.1.1 Identify the dependent variable in this experiment. (1)
- 2.1.2 In order for this experiment to be a fair test, state TWO variables that must be controlled and how this would have been done. (4)
- 2.1.3 Refer to the data given in the table and explain what you can conclude from this experiment. (3)
- 2.1.4 Briefly explain the value of ONE of these specific seeds as a food source. (2)
- 2.2 Peas and wheat grains are seeds. Sexual reproduction has taken place in order to produce the seeds.
- Describe:
- 2.2.1 ONE advantage of sexual reproduction. (2)
- 2.2.2 ONE disadvantage of sexual reproduction. (2)
- 2.3 Draw a **flow chart** to show the sequence of the FOUR main processes that take place in the pea flower that results in the production of a pea seed. (6)

2.4 Using the information in the diagrams below, answer the following questions.



2.4.1 Identify structures A, B and C and state the function of A and B. (5)

2.4.2 Give the method of pollination in wheat. (1)

2.5

Seed banks are collections of indigenous, particularly endangered species of plants that aim to protect the plant diversity of different habitats around the world. South Africa has a seed bank (National Plant Genetic Resources Centre) near Pretoria. The Millennium Seed Bank Project in Kew Gardens in London aimed to collect 10% of the world's wild seeds by 2010. The seed bank in Norway collects food crop seeds.

Do you believe all the money spent on establishing seed banks is justifiable?  
Explain your opinion from a biologist's point of view.

(4)  
[30]

**QUESTION 3**

Refer to the following text and use this to assist you in answering Question 3.1.

3.1

Social organisation is one way in which a species can increase its chance of survival. Each member of the species has a specific role to play within the group.

Beehives contain different castes (types) of bees each with a particular job to do in the hive. The many hundreds of worker bees (infertile females) look after the larvae, collect nectar and pollen and maintain the hive. The drones are fertile males and they mate with the fertile queen bee who lays about 2 500 eggs per day and dominates the hive. The drones die after mating with the queen. Scout bees look for new nesting sites. The hive requires these jobs to be done in order to survive.

The birth rate and death rate of bees is fairly constant at any time during their life span.

3.1.1 Define 'infertile'.

(1)

3.1.2 Redraw and complete the table below in your Answer Book. Make use of information in the passage above and your own knowledge of termites and wild dogs.

| <b>Social organisation</b> | <b>Bees</b> | <b>Termites</b> | <b>Wild dogs</b> |
|----------------------------|-------------|-----------------|------------------|
| Similarity                 |             |                 |                  |
| Differences                | 1.<br>2.    | 1.<br>2.        | 1.<br>2.         |

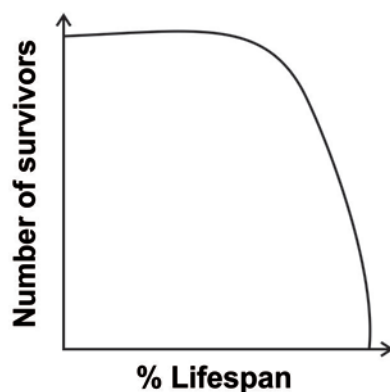
(2)

(6)

3.1.3 Explain briefly how wild dogs improve their survival rate through co-operative hunting.

(4)

3.1.4 The following survivorship curve shows the survival rates of individuals over time.

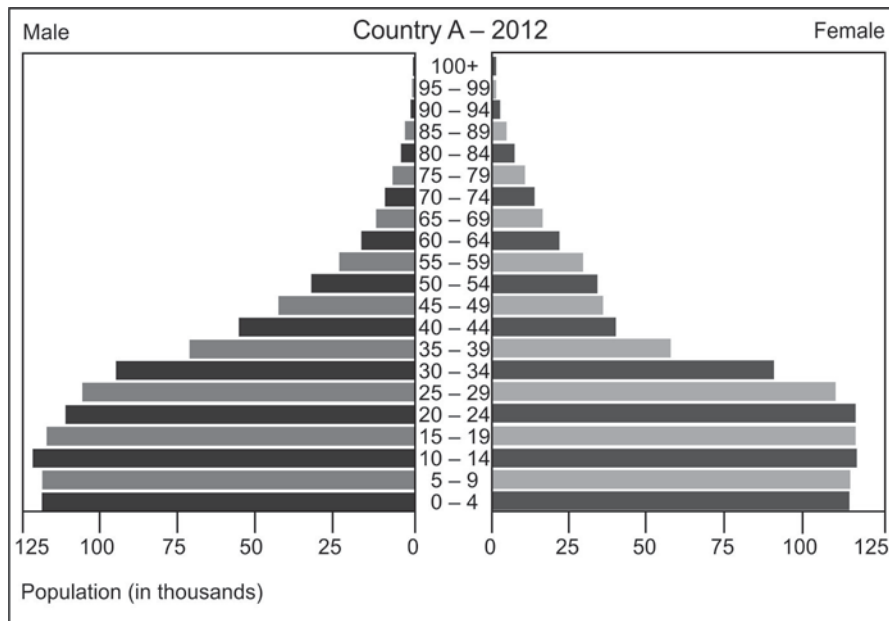


How does this graph represent survivorship in wild dogs?

(2)

- 3.2 Human populations can be illustrated using age-gender pyramids. Study the pyramid/graph below and answer the questions that follow.

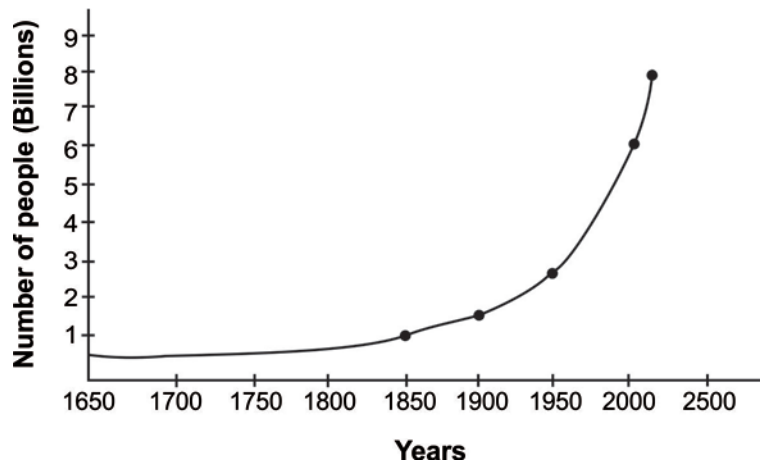
### Human Population Pyramid



[Source: US Census Bureau, International Data Base]

- 3.2.1 Information for the graph/pyramid was obtained using a census.
- Briefly describe how a human census is carried out. (2)
  - Describe ONE limitation of a census. (2)
- 3.2.2 Is this pyramid typical of a developed or developing country? (1)
- 3.2.3 State TWO conclusions, other than that in Question 3.2.2, which can be drawn from the pyramid above. (4)

3.3 The graph below illustrates the exponential growth of the human population.



Total human population growth

Describe THREE changes that have taken place in human society in the past 200 years that account for this growth.

(3)

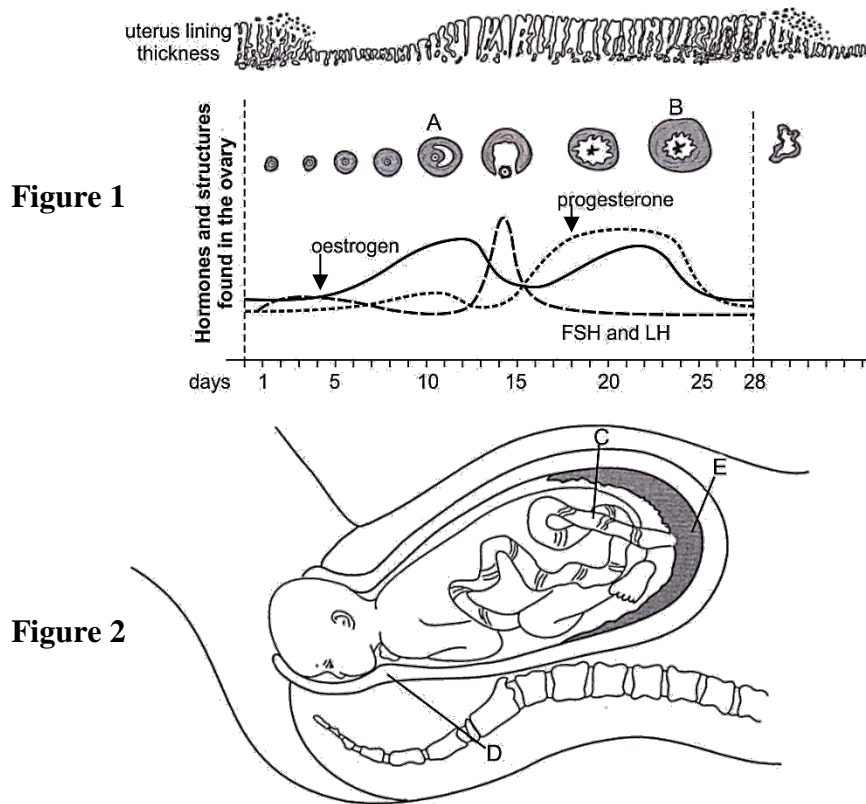
3.4 TB causes the death of many people between the ages of 20 and 35 years. Predict the future population growth in South Africa over the next 15 years if a cure is found for TB. Explain your prediction.

(3)

[30]

**QUESTION 4**

4.1 Study Figure 1 and Figure 2 below and answer the following questions.



- 4.1.1 Define menstruation. (2)
- 4.1.2 With reference to Figure 1, on which day(s) is progesterone at its highest level in the blood? (2)
- 4.1.3 Identify structures A and B in Figure 1. (2)
- 4.1.4 Identify structures C, D and E and give ONE function of structure E in Figure 2. (4)
- 4.1.5 Give a simple description of the human egg that is released during ovulation. (2)
- 4.1.6 Explain what initiates the process shown in Figure 2. (2)
- 4.1.7 Should a couple not wish to have a baby they would have to use a method of contraception. (2)
- (a) Explain in ONE sentence the
- (i) rhythm method
- (ii) IUD method of contraception (2)
- (b) Recommend ONE of the methods of contraception mentioned in Question 4.1.7 (a) to the couple and give the reason for this choice in terms of **your** belief system. (3)

4.2 Read the source material below and answer the questions that follow.

### WiFi link to low sperm count

Using laptops with a wireless connection could affect a man's fertility, according to a recent study published in the journal *Fertility and Sterility*.



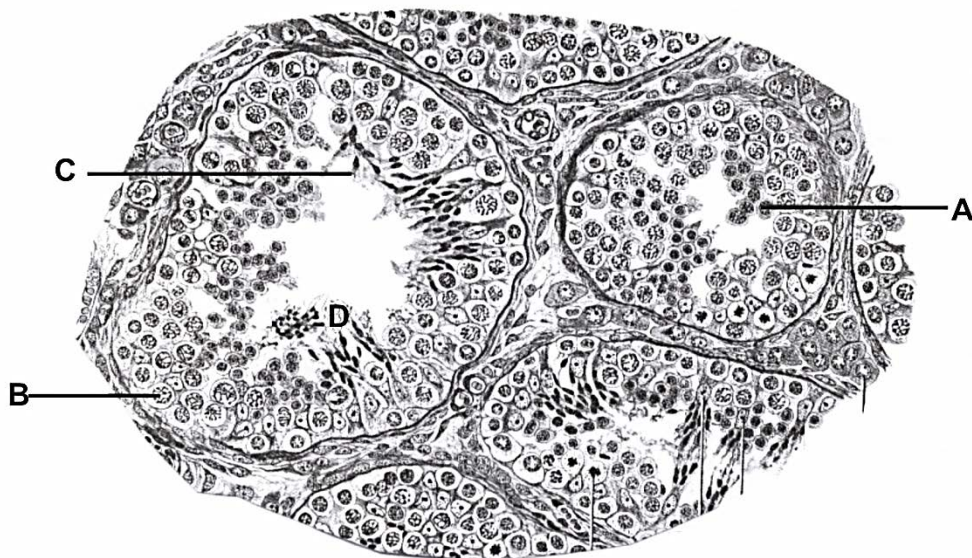
Argentinean scientists took semen samples from 29 healthy men, put the samples under a laptop connected to the Internet via WiFi and began downloading files. After four hours 25% of the sperm were inactive and 9% had DNA damage. Of the sperm saved at the same temperature but kept away from the computer 14% were inactive and 3% had DNA damage.

Experts say electromagnetic radiation generated during wireless (WiFi) communication could be the cause of the reduced quality of the sperm.

[Adapted from: *YOU*, 29 December 2011]

- 4.2.1 What was the control in this investigation and why was it necessary to use a control? (2)
- 4.2.2 Suggest ONE possible reason for the inactivity of the sperm. (1)
- 4.2.3 What 'DNA damage' could be caused? (1)
- 4.2.4 Give some advice to the laptop computer user to reduce this problem. (2)
- 4.2.5 Do you consider this research to be reliable? Explain your answer. (2)

4.3 The micrograph below shows the T.S. of a seminiferous tubule.



[The textbook of histology, Bloom and Fawcett 1968]

- 4.3.1 Where exactly is the seminiferous tubule found in the male reproductive system? (1)
- 4.3.2 Of the cells found at A, B and C, which are haploid? (1)
- 4.3.3 Some cells collect at point D to receive nutrients. Why? (1)

[30]



**QUESTION 5**

**Do you think it is a good idea to take steroid supplements to enhance a person's looks and improve sporting ability?**

**Present a debated argument to support your decision.**

To answer this question you are expected to:

- read the source material (A – E) in order to help you **add to your knowledge** and respond to the question.
- select **only** the facts from the information given that will assist your answer; **do not** attempt to use all the material.
- integrate authentic biological knowledge from the source material. Do **not** write a response based entirely on your own knowledge.
- provide a clear written response of not more than two pages explaining your decision and the reasons/motivation for it.

**[20]**

**SOURCE A MYTH BUSTERS – steroid hormones have many good uses that improve the health and beauty of the user.**

**Steroids are valuable in treating Rheumatoid Arthritis**

Adequate doses of cortisone quickly relieve the pain and acute inflammation of the joints bringing relief to the patient. It is noted that treatments have to be repeated as the cortisone effect is not permanent.

[<<http://www.annals.org/content/43/6/1341>>]

In a study of patients with moderated **tuberculosis** (TB) it was found that by giving a four month treatment of steroid hormones before the antituberculosis drug treatment greatly helped in controlling the disease and patient recovery.

[Noted in: Chest Journal, 1962]

**Cortisone**

This is a steroid hormone naturally released by the adrenal glands in response to stress. It reduces inflammation, pain and swelling and suppresses the immune system.

**Allergies, eczema, Multiple Sclerosis ...**

"Without steroids such as cortisone in pills, creams, injection these people would have little relief from their ailment and some might even die."


[Medical student]

**Human Growth Hormone (HGH)**

Growth hormone levels decrease as a person ages. Taking HGH supplements works to raise the person's levels to aid weight loss and increase the number of muscle cells. It will help you get the body you want with less fat and more muscle definition. The side effects are minimal.

[Extract from: <Somatropin.net> 2006]

**SOURCE B BEST SOURCES OF STEROIDS and FAMOUS BODYBUILDERS**




# STEROID SOURCES

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**Steroid Blog - Breaking News!** **Steroid Articles**

**Brazil's WADA-Approved Lab Suspended for Erroneous Steroid Result Thu, 26 Jan 2012 23:07:04 +0000**

After mistakenly accusing a beach volleyball player of doping, Ladetec, the only WADA accredited laboratory in Brazil received a 6-month suspension. The penalty pertains to the case of the Brazilian player, Pedro Solberg, who was drawn into the issue of [...]

**Strikeforce's King Mo Claims Supplement Contains Anabolic Steroids Wed, 25 Jan 2012 22:32:49 +0000**

Earlier reports hinted that Muhammed "King Mo" Lawal will contest the result of his positive steroid test. However, recent interviews showed that Lawal will not refute the test result. Instead he will just explain to the commission the possible [...]

**New Jersey Tracks Steroids and HGH Abusers with Drug Monitoring Program Tue, 24 Jan 2012 21:05:55 +0000**

The effort to curb abuse of prescription medication is now in effect in New Jersey. People who are using illegally obtained prescriptions for painkillers, steroids and HGH can be easily detected with the new drug monitoring program. The [...]

**Steroids Provide Health Benefits, Possible? Mon, 17 Nov 2008 22:07:14 +0000**

the news media have placed steroid under a dim light - they have constantly portrayed steroids as drugs with dangerous health effects. For sometime now, steroids have been directly synonymous to muscle growth. People often hear all about the negatives about [...]

**10 Do's and Don'ts of Using Steroids: Mon, 17 Nov 2008 22:06:43 +0000**

It is a fact. Hormones play important functions in the body. They regulate vital processes to ensure normal functioning of our system. Too much or too little production of these hormones could lead to disastrous consequences in our life [...]

**Side Effects of Steroids: The Myths and Facts Mon, 17 Nov 2008 22:06:08 +0000**

The question on how safe steroids are is still a debatable issue. Those who are against this supplement would definitely argue that steroids are not safe. They say that users would suffer side effects. That constant users will damage body organs and so [...]

**Want To Learn More About Steroids? Read Below ...**

POPULAR STEROIDS

**SOURCE C****Pupils on steroids**

A great evil has been exposed at South African's leading schools. A survey shows that one in six boys tested positive for illegal steroids. These drugs build mass and muscle thereby giving an illegal advantage to rugby players.

The article goes on to say that any schoolboy testing positive for steroids should be banned from sporting contests and any teacher found giving them to schoolboys should be imprisoned.

Drug taking has corrupted international sports and it would be sad if school sport was going the same way.

[Adapted: *The Citizen*, 30 May 2011]

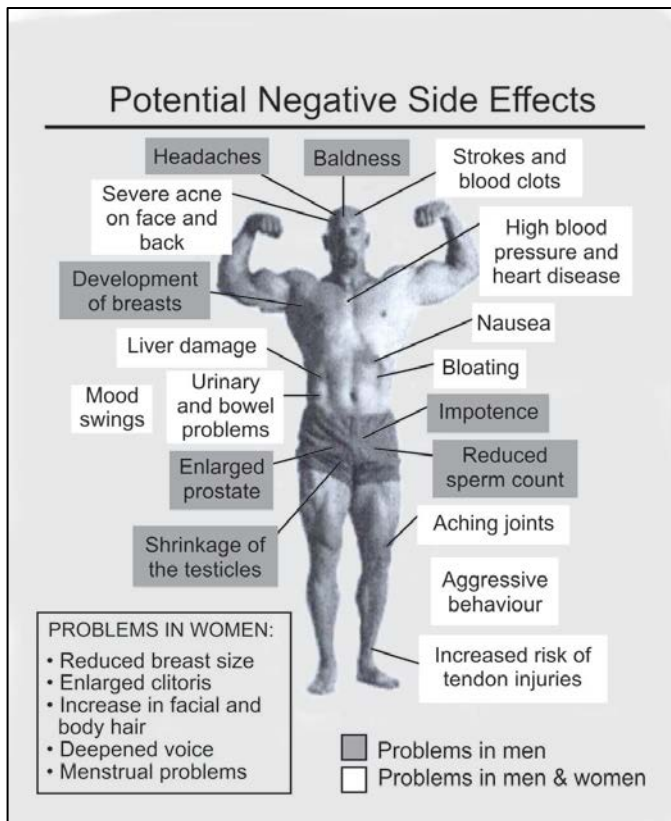
**Say no to drugs in schools sport**

The SA Institute for Drug Free Sport launched its 'I Play Fair – Say NO! To Doping' initiative in June (2011) aiming at tackling doping in sport and spreading the message of ethics, fair-play and anti-doping sport.

The institute chairman says that the statistics clearly show the use of performance enhancing substances are on the increase in adolescent athletes. He says this is due to the easy availability of sport supplements some of which contain anabolic steroids, pro-hormones and stimulants. The institute has launched a massive education programme for athletes and coaches.

The institute is encouraging all South African sportsmen and women, coaches and fans to take the 'I Play Fair' pledge. It is hoped that all SA athletes at the 2012 Olympics in London will be drug free.

[Adapted: *Education Southern Africa*, October 2011]

**SOURCE D THE DOWN SIDE OF USING STEROIDS**

Without doubt male and female athletes can increase muscle mass and body weight with anabolic steroids as long as they participate in a regular hard-training exercise programme. The long term side-effects of steroid use are severe. Of greatest concern are the negative effects that can be delayed until middle age, e.g. increased rate of atherosclerosis. Tumour formation in the liver and kidneys of user athletes has been established. Sperm production falls by 73% whilst steroids are taken and it is thought that the testis tissue never recovers. There is great concern for the prepubertal children of athletic promise who are given HGH in the hope that they grow into super-athlete giants.

[Human Physiology. Andrew Davies, A Blakley, C Kidd]

**SOURCE E**

The following information was seen on the Home Page of a company in Australia that sells steroids supplements 'on line'.

Steroidology.com

Beauty tip: Acne Skin Care Treatment – anabolic steroids

[<<http://www.steriodology.com/forum/women>>]

**Total: 150 marks**