



NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION 2015

LIFE SCIENCES: PAPER II

Time: 2½ hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 11 pages and a yellow Answer Booklet of 6 pages (i – vi). 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. Questions 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 that can be awarded for Questions 2, 3, 4 and 5, as an indicator of the amount of detail required.
 7. It is in your own interests to write legibly and to present your work neatly.
 8. **Please hand in this question paper with your Answer Booklet.**
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QUESTION 2

2.1 The following results were obtained when four pots of the same size (A, B, C, D) were filled with the same type of soil. Seeds were planted in each pot. The pots contained the following seeds:

- Pot A – 24 bean seeds
- Pot B – 3 bean seeds
- Pot C – 6 bean seeds
- Pot D – 8 bean seeds

The pots were watered and left in a sunny place. After three weeks, the number of plants in each pot was counted. The average height of the plants above soil level was calculated for each pot. The results were written into a table.

Table recording the number of plants surviving and their average height in each pot

Pot	Number of plants after three weeks	Average height of plants (cm)
A	8 beans	4
B	3 beans	8
C	5 beans	6
D	6 beans	5

2.1.1 Identify the independent variable in this experiment. (2)

2.1.2 Identify TWO variables that ensured this was a fair test experiment. (2)

2.1.3 Write a hypothesis for this experiment. (4)

2.1.4 (a) Identify the population phenomenon occurring in the pots. (1)

(b) Explain your answer in (a) by making use of the recorded results. (2)

2.1.5 Define carrying capacity. Identify ONE factor that would affect the carrying capacity of plants in the pots. (3)

2.1.6 Animals also compete for resources.

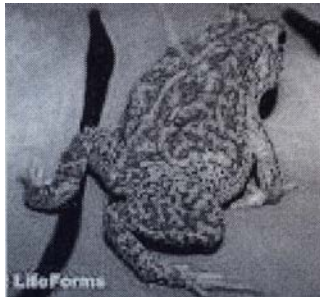
Explain ONE example of a strategy to reduce competition between two coexisting species of animals that you have studied. In your explanation, give a specific example in which you name the animals. (6)

- 2.2 Read the passage below and use this and your own knowledge to answer the questions that follow.

A class of Life Sciences learners decided to set up a study of a small dam that was close to the school. Their initial observations recorded the presence of African Clawed Frogs inhabiting the dam. They also saw two Yellow-billed Storks feeding in the shallow water. Yellow-billed Storks feed on frogs.

The class decided to monitor the dam over the year and pass their findings onto the following class so that the study would continue over a number of years. Throughout the warm months they collected data on the frogs and storks. During the first winter they noted that there were few frogs and no storks in the dam.

African Clawed Frog



[<<http://frogforum.net>>]

Yellow-billed Stork



[<<http://telegraph.co.uk>>]

- 2.2.1 Draw a simple graph to show the relationship between the frog and stork populations over a period of time. Label the axes of the graph but do NOT add any values to the axes. (5)
- 2.2.2 Explain the low numbers of frogs in the winter months. (3)
- 2.2.3 Give a reasonable explanation for the lack of storks in the dam during winter. (2)
- [30]

QUESTION 3

3.1 Read the passage below and answer the questions that follow.

Babies are kept deep in the 'doo' as moms keep watch

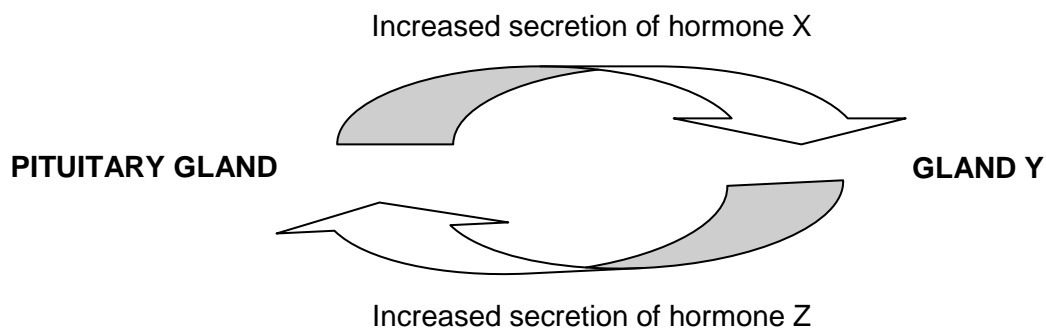
DUNG BEETLES CARE FOR THEIR YOUNG

Dung beetles are one of the few insect species to care for their young. The mother beetle carefully lays one egg at a time in a brood ball of dung. Tests of these brood balls have indicated higher concentrations of nitrogen compared to other dung balls. For three months the mother dung beetle remains with the ball appearing to make sounds to her young.

[Adapted: *The Star*, 13 February 2013]

- 3.1.1 What element is in a high concentration in a brood dung ball? (1)
- 3.1.2 Are dung beetles oviparous or viviparous? Explain the difference between these two terms. (3)
- 3.1.3 Explain how the reproductive strategy of parental care maximises reproductive success. Use a South African example you have studied to answer this question (other than the dung beetle). (4)

3.2 The diagram below shows the regulation of the production of two hormones. Study the diagram and answer the questions that follow.



- 3.2.1 Hormone Z increases metabolic rate. Name the hormone. (1)
- 3.2.2 Name: (2)
- (a) Gland Y and
- (b) Hormone X
- 3.2.3 Explain the effect of the increased secretion of hormone Z on the pituitary gland. (2)

- 3.3 Read the information below and use this information as well as your own knowledge to answer the questions that follow.

Proportionate dwarfism is a disorder of the body as a result of insufficient production of a certain hormone. Low muscle tone is common in dwarfs, but intelligence and lifespan are usually normal. As children their growth is slow and puberty may be delayed for several years.

The most common type of dwarfism however is disproportionate dwarfism where the body is not in normal proportion. The most noticeable feature is the larger head. This type of dwarfism results from chromosomal mutations.



[Google images]

Females with disproportionate dwarfism may develop respiratory problems during pregnancy. A Caesarean delivery is usually necessary because the size and shape of the pelvis often will not allow for a successful vaginal delivery.

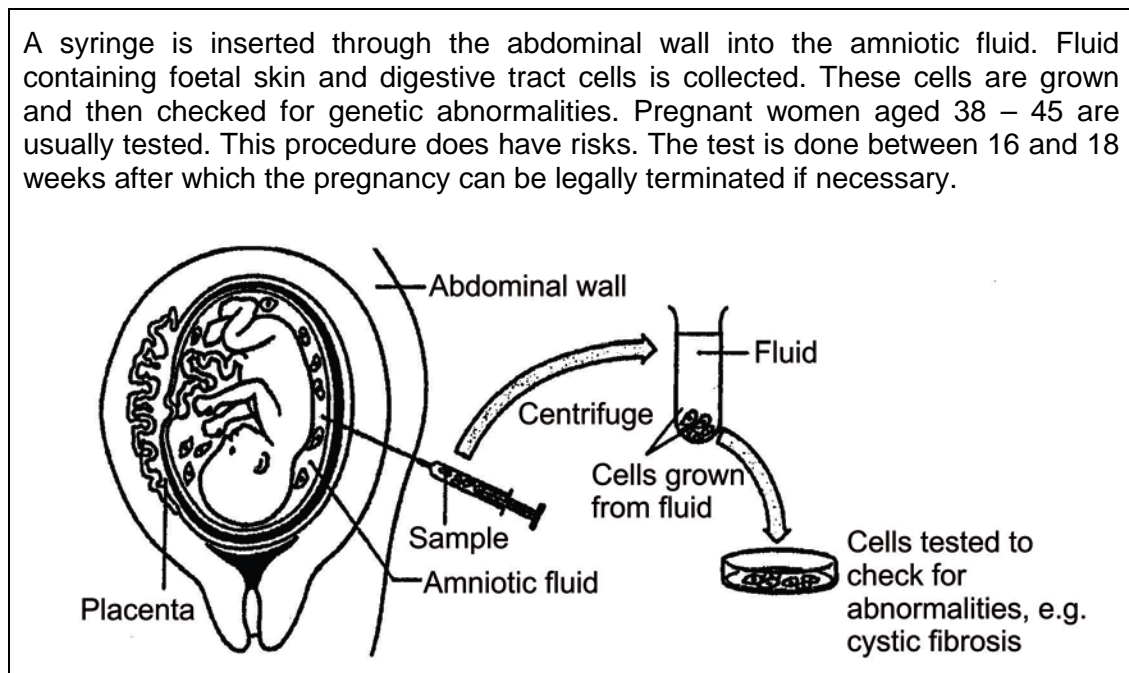
[Examiner's comments]

- 3.3.1 Name the hormone which is lacking in people suffering from proportionate dwarfism. (1)
- 3.3.2 Name the endocrine gland which produces the hormone named in Question 3.3.1. (1)
- 3.3.3 Describe TWO secondary sexual characteristics that will be absent in teenage males who have delayed puberty due to dwarfism. (2)
- 3.3.4 Give a possible explanation for a female with disproportionate dwarfism developing respiratory problems during pregnancy. (2)
- 3.3.5 Some people suggest that a female dwarf should be sterilised before puberty in the best interests of her future health. Do you agree or disagree with this statement? Justify your answer clearly. (3)
- 3.4 3.4.1 Draw a diagram of a mature human sperm cell. Include TWO important organelles in the diagram. Label any THREE structures. (5)
- 3.4.2 Is the structure you have drawn in Question 3.4.1 haploid or diploid? Explain the significance of this. (3)

[30]

QUESTION 4

- 4.1 4.1.1 In what organ is the endometrium normally found? (1)
- 4.1.2 The corpus luteum maintains the thick endometrium for about two weeks in every menstrual cycle. Describe these changes to the endometrium and explain how the corpus luteum does this. (3)
- 4.1.3 Sometimes the embryo implants in the fallopian tube/oviduct instead of the endometrium. This endangers the life of the mother and the foetus. Describe how this is so for the ... (4)
- (a) mother
- (b) foetus
- 4.2 Read the information given below. It describes amniocentesis which is used to check whether a foetus has any genetic abnormalities.

[Adapted from *Pickering*]

- 4.2.1 Describe TWO functions of the amniotic fluid. (2)
- 4.2.2 Explain how the structure of the placenta is suited to its function. (4)
- 4.2.3 What is ONE risk of the amniocentesis procedure? (2)
- 4.2.4 In your opinion, would a couple be justified in aborting the foetus if the test was positive for a serious genetic disease, e.g. cystic fibrosis or Down's Syndrome? Give a clearly explained reason for your opinion. (2)
- 4.2.5 Refer to the diagram above. Describe TWO changes which would occur in the structures shown once labour commenced and the birthing process started. (2)

4.3 The following table shows the effectiveness of some contraceptive methods.

Method of contraception	Number of pregnancies (per 100 women per year)
None	89
Rhythm method	48
Diaphragm	17
Condom (correctly used)	14
Contraceptive pill (correctly used)	0

[Examiner's data]

- 4.3.1 Explain the data for the number of pregnancies where the contraceptive pill was used correctly. (2)
- 4.3.2 Give THREE reasons why condom use is encouraged by the South African Health Department. (3)
- 4.3.3 Briefly discuss the impact on population growth in South Africa and the implications for the natural environment should the youth of today become committed to responsible use of contraception. (5)

[30]

QUESTION 5

Testosterone is a hormone that can be manufactured by pharmaceutical companies. It has been used in the medical field and sporting world. Its use is often controversial.

Do you think the use of testosterone by teenage boys should be condoned?

- Read the source material carefully and present a debated argument to illustrate your point of view to the question.
- To answer this question you are expected to:
 - Select relevant information from Sources A to E below. Do not attempt to use all the detail provided.
 - Integrate your own biological knowledge. However, do not write an essay based solely on your own knowledge.
 - Take a definite stand on the question and arrange the information to best develop your argument.
 - Write in a way that is scientifically appropriate and communicates your point of view clearly.

Write an essay of not more than 1½ to 2 pages to answer the question.

[20]

SOURCE A**Becoming a father linked to less testosterone in men**

Lower levels of testosterone may help men focus more on family commitments. Researchers have found in a study involving 400 men that their testosterone level dropped and they had less sex for about the first year after the first child was born.

Tests on the men also showed an increase in prolactin which remained high in the first year of their baby's life.

Physiological changes are not exclusive to motherhood – fatherhood brings them as well.

[Adapted: *The Guardian*, Ian Sample 14 February 2014]

SOURCE B**Testosterone**

The hormone, testosterone, helps maintain male bone density, fat distribution, muscle strength and mass, red blood cell production, sex drive and sperm count.

Testosterone levels in the blood peaks during adolescence and early adulthood. After that the testosterone levels gradually decline by about 1% by the age of 30. It is important in older men to determine if a low testosterone level is simply due to the decline of normal aging or if it is due to hypogonadism.

Hypogonadism is a disease in which the body is unable to produce normal amounts of testosterone due to a problem with the testes or the pituitary gland. Symptoms include reduced sex drive, infertility, sleep disturbances and various physical changes. These can be increased body fat, reduced muscle bulk and strength, decreased bone density, swollen or tender breasts and hair loss. These symptoms can only assist with a diagnosis of low testosterone which must be confirmed by a blood test.

Testosterone replacement therapy can improve the signs and symptoms of low testosterone in these men. A doctor may prescribe testosterone as injections, pellets, patches or gels. The possibilities of testosterone therapy are enticing – increased muscle mass, sharpened memory/concentration, boosted sex drive as well as energy levels. With aging, testosterone therapy may sound like the ultimate anti-aging formula.

Negative side effects of testosterone therapy:

- Fluid retention leading to ankle and leg swelling
- Worsening of high blood pressure and heart failure
- Liver toxicity
- Problems with fertility. If testosterone is given from outside the body, the testes will stop producing their own testosterone and this will shut down sperm production.

[Adapted: <<http://www.mayoclinic.com>>]

SOURCE C**An interview with Greg Valentino by Chris Shugart**

Greg is not a liked man. In fact he is quite probably the most despised man in bodybuilding.

Chris: Greg, I heard you were arrested.

Greg: I have been in jail. I had a lot of problems obviously, but I am ok now.

Chris: Was it selling drugs that got you arrested?

Greg: I was arrested because I was a big time drug dealer. I was accused of taking Synthol. But I was taking Equipoise into the muscle itself. You get the stretch from the oil as well as the localised growth from the drug.

Chris: Really?

Greg: Yes. I trained for 25 years without using drugs. I am in my 40s. Then when I took steroids – I have had them for over six years – my body just exploded. I fell in love with the steroids because my body responded incredibly.

Chris: Pictures of you from the eighties show you as a normal bodybuilder. After so many years of natural training, why did you start using steroids?

Greg: To be honest with you, I saw a lot of guys passing me. After a few years of training they were already huge. It is frustrating.

Chris: Give us an idea of what you did exactly to get your arms that way.

Greg: I did lots of testosterone. I did about 3 000 mg per week. I love testosterone.

Chris: Any health problems from all this?

Greg: Oh yeah! Together with the testosterone I was taking 500 mg Equipoise and so you've got about 3 500 mg of drugs. In jail I got no drugs so my testicles shrunk and it destroyed my libido. My body is recovering now. Some guys just sniff steroids and their nipples get sore.



[Adapted: Interview with *T-magazine's* Chris Shugart]

SOURCE D

Equipoise causes slow and constant build-up of quality muscle, rather than quick, watery gains. However, it will cause suppression of your own hormones, such as LH, FSH and testosterone. Typically, as injected hormone levels rise, natural hormone levels drop. This is why Equipoise is almost never taken alone. Some form of injectable testosterone is usually added to the Equipoise.



[Adapted: <<http://www.isteroids.com>>]

SOURCE E

Testosterone Week: How I doubled my testosterone levels naturally and you can too

Posted by Brett on January 18, 2013 @ 12:14 am in Health & Sports Wellness

At last we have reached the final post of Testosterone Week and based on the comments from you all, this is the post you've been most looking forward to. Today I am going to share what I did during my 90-day experiment in order to double my total and free testosterone levels.

I am afraid I have no super cool 'secrets' to share and there are no easy shortcuts to increasing your T. Despite what some companies or websites might tell you, there is no single thing that will boost your testosterone *naturally* for the long term.

The good news here is that while the things I recommend below will boost your T, their effect is hardly limited to testosterone. They will greatly increase your overall health at the same time.

What did I do?

Diet: Eat a lot of bacon, eggs and steak
 Salad with nuts, olive oil and meat for lunch
 Snacks of nuts, pumpkin seeds and broccoli
 Dinner of a small portion of what the family eat

Supplements: Vitamin D
 Omega-3 oils
 Whey (milk) protein and Creatine



[Adapted: <<http://www.artomanliness.com>>]

Total: 150 marks