



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2014

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 4 pages (i – iv). 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, 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 Give the correct biological term for each of the following descriptions:

2.1.1 A pack of breeding wild dogs living in Kruger Park in 2014. (1)

2.1.2 The types of plants that colonise land that has never been occupied before. (1)

2.1.3 A strategy where the competing species in a community coexist in the same habitat and share resources in slightly different ways. (1)

2.1.4 A particular area in which there is a close interaction between the animals, plants and environment. (1)

2.1.5 The movement of some of the individuals of a population out of a habitat. (1)

2.2 2.2.1 Define a predator. (3)

2.2.2 Explain predation as a density-dependent relationship. (3)

2.2.3 Why is a solitary zebra easy prey to lions whereas when in a herd they confuse the predator? (3)

2.3 Read the following information below and then answer the questions that follow, referring to the article and your own knowledge.

Extinction fears as lions are slaughtered faster than rhinos

People are responsible for 90% of lion deaths and the legal bone exports for the Asian market are a growing threat to the survival of lions says the African Lion Working Group. Livestock farmers shoot hundreds of lions on sight each year whether or not the lions are habitual or opportunistic killers. The African lion population has dropped from 100 000 only 50 years ago to 32 000 presently and at this rate they may be extinct by 2020.

In South Africa there are about 20 000 rhinos in comparison to 2 500 wild lions and 4 000 in captivity programmes for canned hunting (captured lions released for hunters to kill).

There is no easy solution to ensuring lions do not impact on farmers and that the legal export trade of lion products does not obliterate the species.

[Adapted: *Saturday Star*, 10 August 2013]

2.3.1 What is a growing cause of lion deaths? (2)

2.3.2 By which year may lions become extinct? (1)

2.3.3 Describe TWO ways in which people are responsible for lion deaths. (4)

2.3.4 By how many lions has the African population decreased in 50 years? Show your calculations. (2)

- 2.3.5 In your opinion, discuss what you think could be reasonably done to prevent lion extinction. (4)
- 2.3.6 Suggest a difference in the type of trade between lion and rhino products and explain the impact on lions. (3)
- [30]

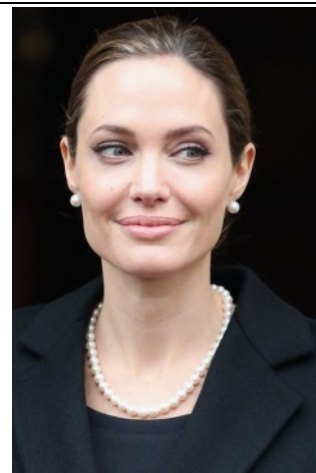
QUESTION 3

- 3.1 Read the article below and answer the questions that follow.

When you need an elective mastectomy (Surgical removal of a breast by choice rather than necessity.)

In May 2013 actress Angelina Jolie announced that she had undergone a double mastectomy in February after testing positive for a genetic mutation that put her at a high risk for breast and ovarian cancer. She later also had reconstructive surgery.

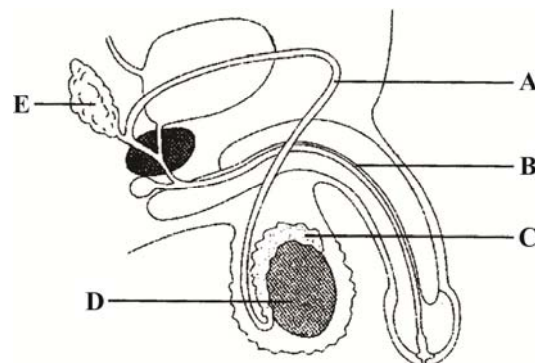
Her disclosure was praised as a bold move that could inspire women to be proactive about their health. Women should learn about their family histories and if necessary consider genetic testing.



[Adapted: Discovery Winter/Summer issue 2013]

- 3.1.1 (a) What is the important role of the mammary glands? (1)
- (b) Name the hormone which stimulates the mammary glands to carry out the role stated in Question 3.1.1 (a). (1)
- 3.1.2 Explain clearly why Angelina Jolie choose to have a double mastectomy. (3)
- 3.1.3 Do you support Angelina Jolie's decision? Explain. (2)

3.2

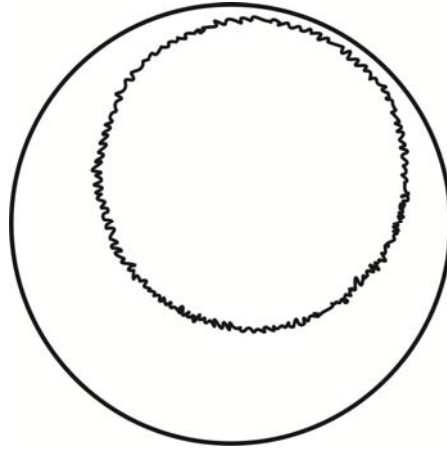


The structure of the male reproductive system

- 3.2.1 Identify the structures A, B and C in the diagram above. (3)
- 3.2.2 What is the function of each of D and E in the diagram above? (2)
- 3.2.3 Define semen. (2)

3.3 Various physical and physiological (functional) changes occur during puberty. Identify and describe TWO physiological changes that occur during puberty in females. (4)

3.4 Redraw the diagram outline that represents one menstrual cycle:



Add the following information to the diagram:

- Show day 0, day 14 and day 28.
- Label the endometrium.
- Label the point of ovulation; and indicate the area at which the concentration levels of FHS and LH are highest. (one area for each hormone)
- The point at which the corpus luteum forms. (8)

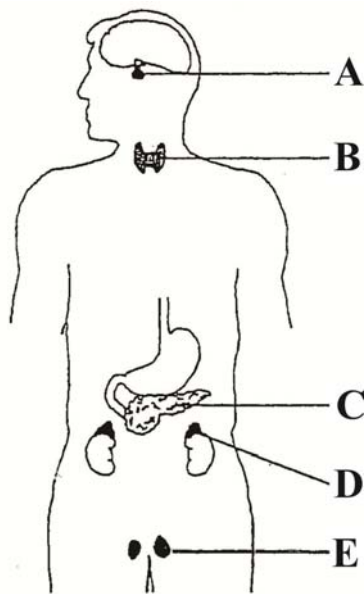
3.5 Choose ONE of the following contraceptive methods:

- male condom
- female condom
- diaphragm

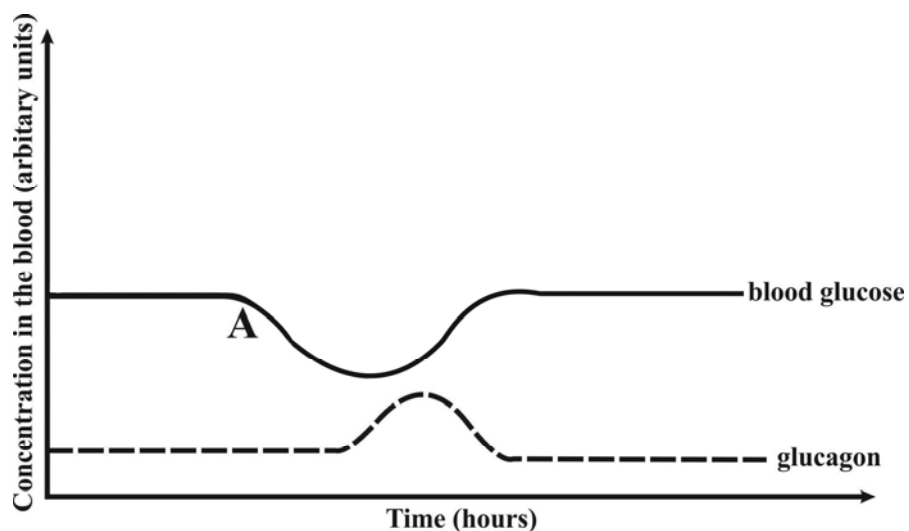
and explain how it is used/applied and how it prevents pregnancy. (4)
[30]

QUESTION 4

4.1

**Diagram showing some parts of the endocrine system**

- 4.1.1 What is a hormone? (2)
- 4.1.2 Name the gland where insulin is produced. (1)
- 4.1.3 With reference to the diagram above, give the letter that indicates the position of the gland named in Question 4.1.2. (1)
- 4.1.4 Describe the function of insulin in the human body. (2)
- 4.1.5 Use the graph below to answer the questions that follow.

**Concentration of two substances in the blood over a period of time**

- (a) Give ONE event that could cause the change in blood sugar levels at A. (1)
- (b) What is the relationship between glucagon and blood sugar levels? (2)
- (c) Name the control mechanism that illustrates the interaction on the graph. (1)

4.2 Read the passage below and use it to answer the questions that follow.

Peregrine Falcons (*Falco peregrines*)

The Peregrine Falcon is a bird of prey (raptor) with a hooked beak and strong claws (talons). They are the fastest flying birds in the world (about 380 km/h). The female can be 30% larger than the male. They prey on smaller birds and bats which they catch mid-air. Some falcons migrate from northern Africa to southern Africa for nesting season.



[Google images]

Peregrine Falcons mate for life and establish nests on high cliffs. They breed in the same territory yearly which they defend vigorously. The male courts the female for about a month using aerial displays and passing food to her mid-air. The female lays 3 – 4 eggs on average of which 2,5 eggs hatch and 1,5 fledge (fly from the nest).

Both the male and female incubate the eggs for about a month. The male and female both gather prey to feed the young. The life span of the Peregrine Falcon in the wild is about 15 years. Mortality in the first year is about 65%, declining steadily annually as adults. They are killed by large owls and eagles or collisions with human-made objects. They became an endangered species in the 1970s due to the use of pesticides (bio-accumulation) which resulted in thinner egg shells.

[Adapted: <www.defenders.org>]

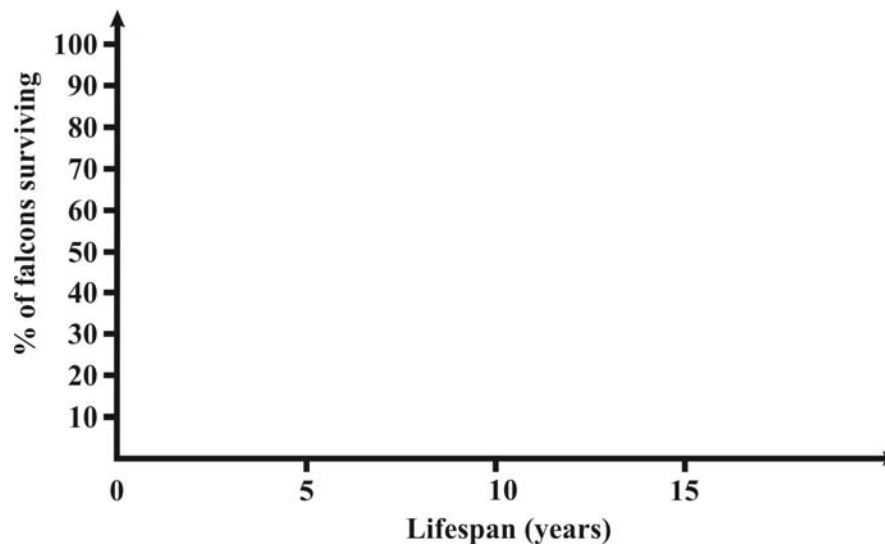
4.2.1 Write down the term which applies to the Peregrine Falcon.

(a) internal fertilisation OR external fertilisation (1)

(b) ovipary OR vivipary OR ovovivipary (1)

4.2.2 State TWO reproductive strategies used by the Peregrine Falcon and explain how each ensures successful breeding. (4)

4.2.3 Redraw the outline of the graph below and complete the survivorship curve using the information in the passage above.



Survivorship Curve of the Peregrine Falcon

(5)

4.2.4 Explain the consequences of thinner egg shells and why it led to the falcon species becoming endangered. (2)

4.2.5 (a) A researcher carried out a study to establish the size of the Peregrine Falcon population in Southern Africa. He captured 20 birds; tagged and released them. The following breeding season the researcher captured 24 birds of which 8 had been tagged. Calculate an estimation of the population size. Show your working. (3)

(b) Explain TWO reasons, using the data given in both the information on the previous page and in Question 4.2.5 (a), why the estimated population size calculated in Question 4.2.5 (a) may be very different to the actual population size. (4)

[30]

QUESTION 5

Do you think the South African natural environment will survive the human population increase in this country?

- Read the source material carefully and present a debated argument to illustrate your point of view.
- To answer this question you are expected to:
 - Select relevant information from Sources A to G 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**A comment on world-wide global warming**

136 large coastal cities now at risk from sea level rise.

40 million people at risk in these cities.

\$3 trillion value of assets at risk.

As the planet warms the sea rises.

Coastlines flood.

What will we abandon?

What will we protect?

How will we face the dangers of **RISING SEAS**?

Sea levels didn't change much for nearly 2 000 years judging from sediment cores. It began to rise in the 19th century as the Earth started to warm. It could rise 0,9 m or more by 2100. The great unknown: the future of the ice sheets.

[Adapted: *National Geographic*, September 2013]

SOURCE B**Frequently asked questions.****What is an ecological footprint?**

The ecological footprint is considered to be the impact that human activities have on the environment. It can therefore be referred to as the area of land required to support an individual's lifestyle.

Individuals in a developed country tend to have a higher ecological footprint compared to a person in a developing country.

People in more affluent nations use more resources and this excessive consumption degrades the environment faster.

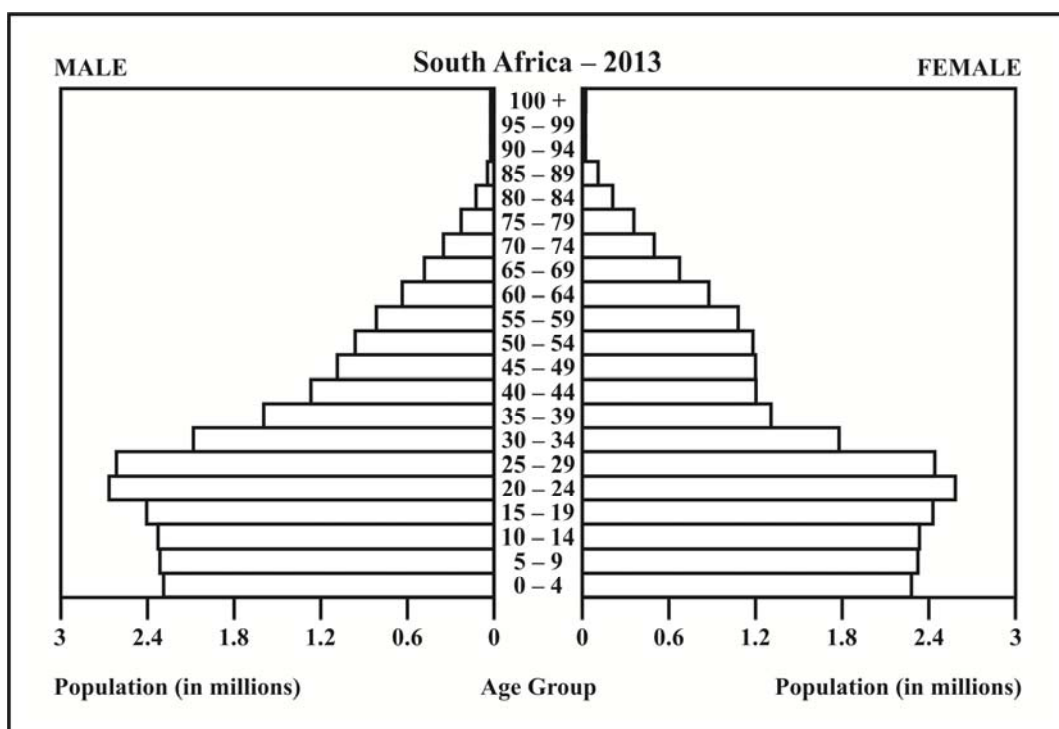
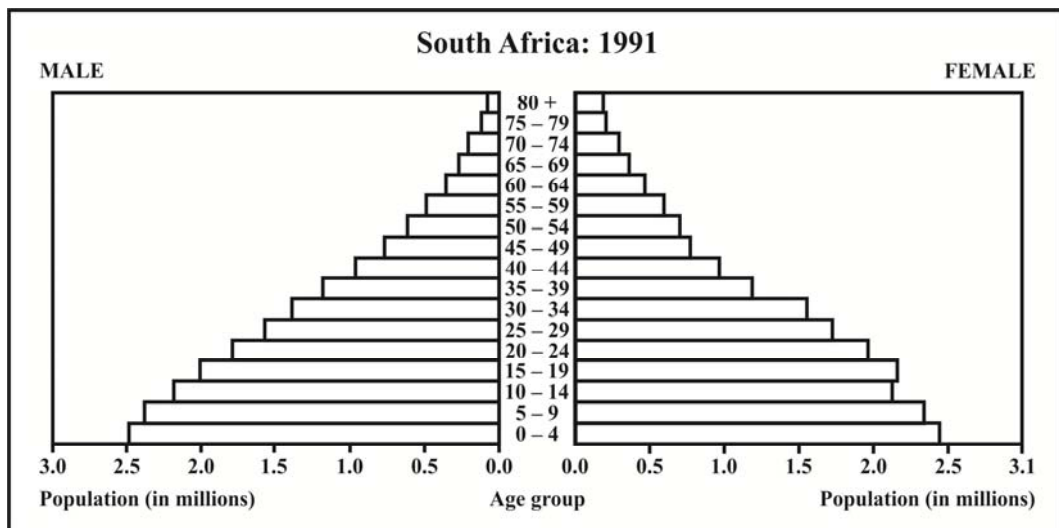
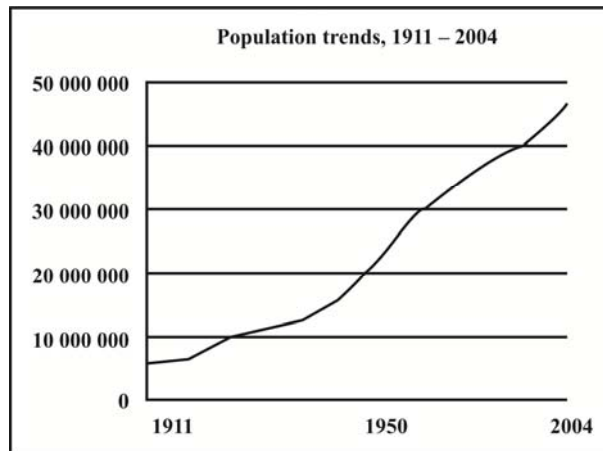
However, any larger population has a substantial ecological footprint.

How have human settlements changed the natural environment?

A few examples of human impact follow:

Cutting down of trees for firewood increases erosion and dense shrubs encroach into the natural savanna (grasslands) and marshes causing them to dry up. Grazing cattle deteriorate the savanna. Small plants and animals disappear with the clearing of natural vegetation to plant crops. Weeds flourish. Frogs disappear.

[Examiners comments]

SOURCE C**Human population pyramids and graphs for South Africa**

SOURCE D

Pick n Pay are encouraging their customers to 'go green' by joining the One Million Acts of Green campaign. This new campaign encourages people and businesses to affect changes through making small changes in their lifestyle and sharing them with others on Facebook. The efforts could be sorting and recycling waste or installing solar heating – anything to green the world.

[Adapted: *Environmental Management*, May/June 2013]

SOURCE E**Food shortage**

Urban food insecurity is one of the emerging developmental challenges associated with population growth in urban areas. Often international and national policy agendas are more concerned with food security in rural areas, while food security of the urban poor is left unattended and under-researched.

[*HSR Review*, November 2013]

SOURCE F

During Construction of a Reinforced Soil Structure using Green Terramesh® which provides an engineered environmental solution

Established vegetation six months later

[*Environmental Management*, May/June 2013]

SOURCE G**Fracking and water supply in South Africa****Regulating Fracking in South Africa**

The Cabinet placed a moratorium on the acceptance of applications for shale gas exploration (fracking) in February 2011. In some circles, shale gas is considered to be the solution to the energy demands and/or economic development for the growing South African population.

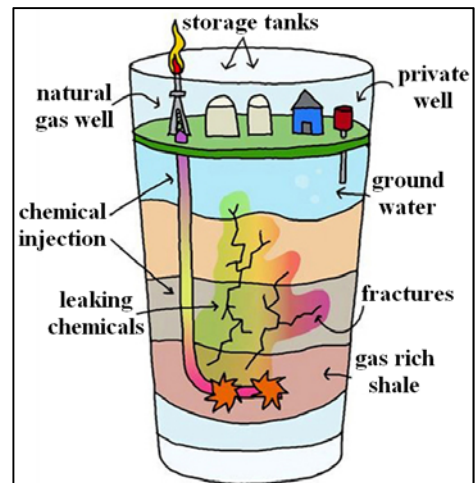
Whilst the discovery of shale gas resources has the potential to stimulate economic development and provide a source of energy, the submission of applications to harvest the gas has sparked public concern around the environmental impact associated with the fracking process that would be used. The process involves pumping vast amounts of water containing hazardous chemicals into drilled wells under huge pressure. This fractures the shale and so the trapped gas is released.

The hazardous water left in the wells poses a great threat to underground water sources. Potential spills and leakage of waste products and frack fluids may cause soil and water contamination.

Other concerns include potential water scarcity issues, traffic impacts, landscape impacts as well as the impact on local communities and agriculture.

The February moratorium was imposed in order to allow further investigation into the potential risks of allowing fracking to be used for shale gas development in South Africa.

Environmental law specialists are very concerned that there is not sufficient legislation in place presently and that environmental degradation already experienced through mining, e.g. acid water drainage, could be made worse with the introduction of fracking.



[Adapted: *Environmental Management*, January/February 2013]

Total: 150 marks