



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**LIFE SCIENCES P1  
VERSION 2 (OLD CONTENT) FOR PART-TIME CANDIDATES**

**NOVEMBER 2011**

**FINAL MEMORANDUM – 24/11/11**

**MARKS: 150**

**This memorandum consists of 12 pages.**

**PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2011**

1. **If more information than marks allocated is given**  
Stop marking when maximum marks is reached and put a wavy line and 'max' in the right hand margin.
2. **If, for example, three reasons are required and five are given**  
Mark the first three irrespective of whether all or some are correct/incorrect.
3. **If whole process is given when only part of it is required**  
Read all and credit relevant part.
4. **If comparisons are asked for and descriptions are given**  
Accept if differences/similarities are clear.
5. **If tabulation is required but paragraphs are given**  
Candidates will lose marks for not tabulating.
6. **If diagrams are given with annotations when descriptions are required**  
Candidates will lose marks.
7. **If flow charts are given instead of descriptions**  
Candidates will lose marks.
8. **If sequence is muddled and links do not make sense**  
Where sequence and links are correct, credit. Where sequence and links is incorrect, do not credit. If sequence and links becomes correct again, resume credit.
9. **Non-recognized abbreviations**  
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of answer if correct.
10. **Wrong numbering**  
If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable. Indicate that the candidate's numbering is wrong.
11. **If language used changes the intended meaning**  
Do not accept.
12. **Spelling errors**  
If recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names given in terminology**  
Accept, provided it was accepted at the National memo discussion meeting.

14. **If only letter is asked for and only name is given (and vice versa)**  
No credit.
15. **If units are not given in measurements**  
Memorandum will allocate marks for units separately, except where it is already given in the question.
16. Be sensitive to **the sense of an answer, which may be stated in a different way.**
17. **Caption**  
Credit will be given for captions to all illustrations (diagrams, graphs, tables, etc.) except where it is already given in the question.
18. **Code-switching of official languages (terms and concepts)**  
A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.
19. No changes must be made to the marking memoranda. In exceptional cases, the Provincial Internal Moderator will consult with the National Internal Moderator (and the External moderators if necessary).
20. Only memoranda bearing the signatures of the National Internal Moderator and the UMALUSI moderators and distributed by the National Department of Basic Education via the Provinces must be used in the training of markers and in the marking.

## SECTION A

## QUESTION 1

1.1

- 1.1.1 A✓✓  
 1.1.2 C✓✓  
 1.1.3 C✓✓  
 1.1.4 B✓✓  
 1.1.5 B✓✓

(5 x 2) (10)

1.2

- 1.2.1 Dihybrid✓  
 1.2.2 Acrosome✓  
 1.2.3 Albinism✓  
 1.2.4 Gestation✓/(pregnancy)  
 1.2.5 Genetic engineering✓/biotechnology/gene manipulation/genetic modification/DNA recombination  
 1.2.6 (DNA) Replication✓  
 1.2.7 (DNA) finger-printing✓/profiling

(7)

1.3

- 1.3.1 B only✓✓/B  
 1.3.2 Both A & B✓✓/A & B  
 1.3.3 B only✓✓/B  
 1.3.4 A only✓✓/A  
 1.3.5 None✓✓  
 1.3.6 None✓✓

(12)

1.4

- 1.4.1 A - Spindle fibre✓/thread  
 B - Centriole✓/centrosome  
 C - Bivalent✓/**homologous chromosomes**  
 D - Daughter✓ cells/gametes/cell membrane  
 E - Chromatid✓

(5)

- 1.4.2 (a) **Metaphase 1**✓  
 (b) **Anaphase 2**✓

(1)

(1)

- 1.4.3 3 - 1 - 5 - 2 - 4✓✓✓

(3)

- 1.4.4 - Exchange of genetic material✓ introduces genetic variation✓  
 - Reduction of chromosome number to haploid number✓  
 to keep the chromosome number constant from generation  
 to generation✓  
 - Forms four haploid cells✓ which function as gametes✓  
 - Independent assortment✓ to bring about genetic variation✓  
 - Form gametes✓ for sexual reproduction✓

(any) (4)

**(Mark first TWO only)****(14)**

1.5

1.5.1 (a) 44XX✓  
(b) 44XY✓ (2)

1.5.2 (c) Girl✓/female  
(d) Boy✓/male (2)

1.5.3 50% ✓ /equal chance that the fourth child would be a boy or a girl  
Half of all the sperm of the father carry the X chromosome✓ and half  
of all the sperm carry the Y chromosome✓

(Answer might be given in a Punnett square/line diagram) (3)  
**(7)**

**TOTAL SECTION A: 50**

**SECTION B****QUESTION 2**

2.1

2.1.1 In early interphase the DNA is starting to replicate✓/has not replicated

In mitosis prophase replication has been completed✓ (2)

2.1.2 Meiosis I prophase the cell is still diploid✓/2n

Meiosis II prophase the chromosome number is halved✓/n (2)  
**(4)**

2.2

2.2.1 AB✓ (1)

2.2.2 4✓/four (1)

2.2.3 I<sup>B</sup>✓ /B (1)

2.2.4 People from blood groups AB and B✓ possess the B allele and since people with blood group AB and B together are less frequent than A or O✓ the B allele is the least frequent (2)

2.2.5 Many people that are of blood groups A and B✓ might be heterozygous✓/ I<sup>A</sup>i and I<sup>B</sup>i many offspring could end up with ii combination✓**OR**Since the proportion of the population with O type is the greatest✓ the possibility of reproduction✓ between individuals with O group is greater and many offspring could end up with O blood group✓ (3)  
**(8)**

2.3

2.3.1 A - Nuclear membrane✓  
B - mRNA✓  
D - DNA✓ (3)2.3.2 - Carries hereditary characteristics✓ from parents to their offspring  
- Controls the synthesis (manufacturing) of proteins✓/ controls the structure and functioning of cells  
- Acts as template for formation of mRNA✓**(Mark first ONE only)** (any) (1)

2.3.3 Transcription✓ (1)

2.3.4 Ribosome✓ (1)  
**(6)**

## 2.4

2.4.1 The percentage of X chromosomes with lethal mutations✓ increases✓/  
decreases when the dosage of X-rays increases✓/decreases

**OR**

A change in the amount of X-rays✓ has no effect✓ on the percentage X  
chromosomes with lethal mutations✓ (3)

2.4.2 Radiation✓/Amount of X-rays (1)  
**(Mark first ONE only)**

2.4.3 4✓ (1)

2.4.4 Use chromosomes from the same species✓  
Use X chromosomes only✓  
Time exposed to radiation✓  
Environmental conditions✓ e.g. temperature, CO<sub>2</sub>, O<sub>2</sub> and humidity  
Ensure that no lethal mutations are present before the investigation✓  
**(Mark first THREE only)**  
any (3)

2.4.5 An increase in the amount of radiation of X-rays✓ leads to an increase  
in the percentage of X chromosomes showing lethal mutations✓  
**OR**  
A decrease in the amount of X-rays✓ leads to a decrease  
in the percentage of X chromosomes with lethal mutations✓ (2)

2.4.6 - Take many readings✓ at each X-ray amount and find the average✓  
reading  
- Certain factors✓/example of factors must be kept constant✓ (2)  
**(Mark first ONE only)** (12)  
[30]

**QUESTION 3**

3.1

3.1.1 2 - Black✓  
4 - White✓ (2)

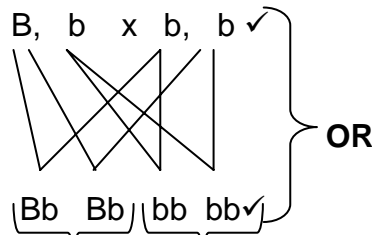
3.1.2 1BB: 2Bb: 1bb✓/ 1:2:1 (1)

3.1.3 18✓/all/100% (1)

3.1.4 P<sub>1</sub> phenotype Black x White✓  
genotype Bb x bb✓

Meiosis

G



gametes	b	b
B	Bb	Bb
b	bb	bb

1 mark for correct gametes  
1 mark for correct genotypes

Fertilisation

F<sub>1</sub> genotype Bb Bb bb bb✓  
phenotype Black , White✓

Parents and offspring✓/P<sub>1</sub> & F<sub>1</sub>  
Meiosis and fertilisation✓ any (6)  
**(10)**

3.2

3.2.1 A - Umbilical cord✓  
B - Amnion✓ (2)

3.2.2 (a) Food✓/nutrients/glucose/ amino acids,  
oxygen✓, water✓, antibodies✓  
**(Mark first TWO only)** any (2)

(b) Drugs✓/ nicotine/ heroin,  
CO<sub>2</sub>✓, alcohol✓, viruses✓/ named viruses e.g. HIV  
**(Mark first TWO only)** any (2)

3.2.3 Shock absorber✓/prevents physical or mechanical damage  
Protects✓ the foetus from drying out  
Insulates✓ the foetus against temperature fluctuations  
Allows foetal movement✓/ growth and development (1)  
**(Mark first ONE only)**

3.2.4 Amniocentesis✓ (1)

3.2.5 - Parents will know whether the foetus grows normal✓  
- It is used to determine the sex✓ of the foetus  
- To detect diseases✓ /abnormalities/disorders of the foetus/any e.g  
of diseases /abnormalities/disorders (3)  
**(Mark first THREE only)**

3.2.6 Down's syndrome✓/trisomy (21) (1)  
**(12)**



3.3

3.3.1 In this pedigree diagram, haemophilia occurs in males✓ only✓ (2)

3.3.2 (a)  $X^hY$ ✓✓ (2)(b)  $X^HX^h$ ✓✓ (2)(c)  $X^HY$ ✓✓ (2)**(8)**  
**[30]****TOTAL SECTION B: 60**

**SECTION C****QUESTION 4**

4.1

4.1.1 To insert the DNA✓/nucleus of sheep that you want to clone✓into the egg cell of the recipient (2)

4.1.2 First✓ (1)

4.1.3 Dolly will have exactly the same DNA✓ as the first donor sheep✓/  
DNA/nucleus of the second donor was removed and replaced (2)

4.1.4 Mitosis✓ (1)

4.1.5 (a) **In favour of genetic engineering**

- enhanced taste/quality of food✓
- reduced/ increased maturation time✓
- increased yield of plants (fruit, vegetables)✓
- improved resistance to disease, pests, drought and herbicides✓
- increased food security for growing populations✓
- increased shelf life✓ (any) (3)

**(Mark first THREE only)**

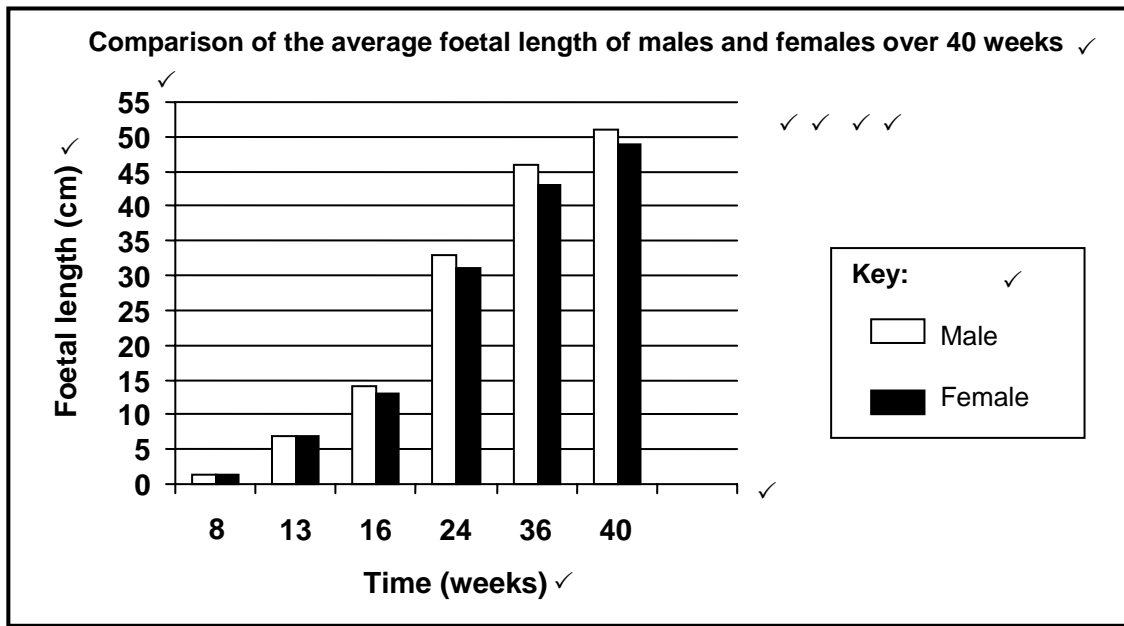
(b) **Against cloning**

- They might feel that scientists want to play God✓
- The clones might be used for 'spare' organs✓ etc./
- Could be sold to anybody that can pay for it – lead to exploitation✓
- Reducing the gene pool by reducing variation✓
- Cloned organisms may have developmental✓/morphological problems
- Costly process✓
- May generate more experimental waste✓

**(Mark first THREE only)**

(any) (3)  
**(12)**

4.2  
4.2.1



**Rubric for the mark allocation of the graph**

Correct type of graph	1
Caption of graph	1
Correct label and units for X-axis	1
Correct label and units for Y-axis	1
Graphs labelled/key provided for 2 graphs	1
Appropriate width and interval of bars	1
Appropriate scale for Y-axis	1
Drawing of the bars	1: 1 to 3 bars plotted correctly 2: 4 to 7 bars plotted correctly 3: 8 to 11 bars plotted correctly 4: all 12 bars plotted accurately

(11)

**NOTE:**

- If the wrong type of graph is drawn: marks will be lost for 'correct type of graph'
- If graphs are not drawn on the same system of axes, mark the first graph only using the given criteria
- If axes are transposed then marks will be lost for correct labels and units for X and Y axes

- 4.2.2 - Average foetal length of both males and females are the same at 8 and 13 weeks ✓  
 - Average foetal length of males is greater than the average foetal length of females from 16 to 40 weeks ✓  
 - Average foetal length increases for males and females ✓ over the 40 week period

any (2)

**(Mark first TWO only)**

**(13)**

## 4.3 Possible answers for the mini essay

**Causes:****Gonorrhoea**

Bacterium✓ (1)

**AIDS**

HIV✓ (1)

**Symptoms:****Gonorrhoea**

- Pain or burning when passing urine✓
  - Abnormal discharge from the genital openings✓
  - Inflammation of the testicles✓
  - Sores✓
  - Painful/swollen joints✓ (3)
- (Mark first THREE only)**

**AIDS**

- Flu✓ like symptoms in early stages
  - Failure of the immune system✓ which results in
  - e.g. fungal infection of the lungs✓/any other correct disease
  - Weight loss✓
  - Sores✓ (any) (3)
- (Mark first THREE only)**

**Possible treatment:****Gonorrhoea**

Antibiotics✓/ Penicillin

**AIDS**No cure✓/Anti-retroviral treatment slows down the progression/ARV's/  
nutrition (2)**Prevention:**

- Abstain✓ from sexual activity/promiscuous behaviour
  - Use of condoms✓ can reduce the risks of STDs
  - Be faithful to your partner✓
  - Cautious handling of body fluids✓
  - Know your status✓ (any) (2)
- (12)**

**Synthesis**

Marks	Descriptions
3	Well structured – demonstrates insight and understanding of question
2	Minor gaps in the logic and flow of the answer
1	Attempted but with significant gaps in the logic and flow of the answer
0	Not attempted/nothing written other than question number

(3)  
(15)**TOTAL SECTION 4: 40**  
**GRAND TOTAL: 150**