education

Department:
Education
REPUBLIC OF SOUTH AFRICA

# NATIONAL SENIOR CERTIFICATE

## GRADE 12

## LIFE SCIENCES P1

## NOVEMBER 2009

## MEMORANDUM

**MARKS: 150**

**This memorandum consists of 10 pages.**

## SECTION A

## QUESTION 1

| | | | | |
|---|---|---|---|---|
| 1.1 | 1.1.1 | D✓✓ | | |
| | 1.1.2 | B✓✓ | | |
| | 1.1.3 | C✓✓ | | |
| | 1.1.4 | C✓✓ | | |
| | 1.1.5 | A✓✓ | (5 x 2) | **(10)** |
| 1.2 | 1.2.1 | Fallopian tube✓/oviduct | | |
| | 1.2.2 | Graafian follicle✓ | | |
| | 1.2.3 | Umbilical vein✓ | | |
| | 1.2.4 | Oxytocin✓ | | |
| | 1.2.5 | Seed✓ | | |
| | 1.2.6 | Cervix✓ | | **(6)** |
| 1.3 | 1.3.1 | E✓ | | |
| | 1.3.2 | G✓ | | |
| | 1.3.3 | F✓ | | |
| | 1.3.4 | I✓ | | |
| | 1.3.5 | A✓ | | |
| | 1.3.6 | D✓ | | **(6)** |
| 1.4 | 1.4.1 | Transcription✓ | | (1) |
| | 1.4.2 | 5✓ | | (1) |
| | 1.4.3 | GCU✓ – CAU✓ – UGG✓ | | (3) |
| | 1.4.4 | (a) The sequence of the amino acids will change✓/the actual amino acids could change and a new/different protein could form✓ | | (2) |
| | | (b) Mutation✓ | | (1) **(8)** |

| | | | |
|---|---|---|---|
| 1.5 | 1.5.1 | Anaphase II✓ | (1) |
| | 1.5.2 | Chromatids✓ are pulled towards the poles✓ | (2) |
| | 1.5.3 | A Spindle fibre✓<br>B Cell membrane✓ | (2) |
| | 1.5.4 | (a) 8✓<br>(b) 4✓ | (1)<br>(1) |
| | 1.5.5 | Ovary✓ | (1) |
| | 1.5.6 | No✓ | (1) |
| | 1.5.7 | Humans would have 23✓ chromosomes/46 chromatids in this phase. In this diagram only 4 chromosomes✓/8 chromatids are shown/incorrect✓ number ✓of chromosomes | (2) |
| | 1.5.8 | - Reduction/halving of chromosome number✓/keep chromosome number constant from generation to generation/prevents doubling of chromosome number at fertilisation<br>- Promotes/contributes to genetic variation✓<br>Formation of gametes/cells containing one allele of a gene pair✓<br>***(Mark first TWO only)*** | (2)<br>**(13)** |
| 1.6 | 1.6.1 | The flowers with petals attracted more insects✓ for pollination✓ than the flowers without petals<br>OR<br>The flowers without petals may not have attracted insects✓ therefore less pollination✓ | (2) |
| | 1.6.2 | Some of the pollen tubes that developed were from the same flower ✓/self-pollination occurred and only make little growth into the style✓ /not all pollen grains make it to the ovary/does not fertilise the ovule | (2) |
| | 1.6.3 | Repeat the investigation and use the average✓<br>Increasing the size of the sample✓<br>Use the same size flowers✓<br>Use the same colour flowers✓<br>Use the flowers of the same apple tree✓<br>Ensure that all the flowers are pollen-free at the beginning of the investigation✓<br>Use the same number of flowers✓<br>The same number of days for pollination✓/prevention of pollination/ for fertilisation to take place any<br>***(Mark first THREE only)*** | (3)<br>**(7)** |
| | | | **TOTAL SECTION A: 50** |

## SECTION B

## QUESTION 2

2.1 2.1.1
A - prostate gland✓
B - vas deferens / sperm duct✓
E - urethra✓
G - nucleus✓ (4)

2.1.2
C - Stores sperms temporarily✓/sperms mature here
***(Mark first ONE only)***

F - Contain enzymes to break down the cell membrane of the egg cell✓
***(Mark first ONE only)*** (2)

2.1.3
D✓ testis ✓/seminiferous tubules (2)

2.1.4
To keep the testes at a temperature that is (about 3 $^{o}$C) lower than body temperature✓
A lower temperature is necessary for the production of healthy sperm✓/so that healthy sperms can survive (2)

2.1.5
(a) Interstitial cells✓/Cells of Leydig (1)
(b) Testosterone✓ (1)

2.1.6
(a) Severing of the vas deferens✓
Will not allow sperms to pass to urethra and into the female✓
and hence no fertilisation results✓ any (2)

(b) Yes✓ (1)

(c) HI virus is carried in body fluids✓/ seminal fluids/saliva/blood
Can infect a person through open wounds✓/blood transfusion/ sexual intercourse
Therefore vasectomy does not stop the transmission of HIV (2)
**(17)**

2.2 2.2.1
Accept day 14 or day 15✓ (1)

2.2.2
Days 0 - 7✓ (1)

2.2.3
- Causes the follicle to burst open✓/stimulates ovulation
- Stimulates the formation of the corpus luteum✓
***(Mark first ONE only)*** (1)

2.2.4
- LH levels remain low up to day 12/13 ✓
- Then it increases sharply up to day 14✓
- After which it decreases and remains low✓ (3)

2.2.5 As the oestrogen level increases ✓
the thickness of the endometrium also increases✓ (2)

2.2.6 Maintain the increase in the thickness of the endometrium✓
for greater chance of implantation✓ (2)

2.2.7 No✓ (1)

2.2.8 The progesterone level✓has dropped✓/not maintained/corpus luteum has started to degenerate (2)
**(13)**
**[30]**

## QUESTION 3

3.1
3.1.1

(a) $I^AI^B$ ✓✓ | AB✓✓ (2)

(b) $I^Ai$✓✓/ $I^AI^o$ $I^Bi$ ✓✓/ $I^BI^o$ ii✓✓/ $I^oI^o$ | AO✓✓ BO✓✓ OO✓✓ (6)

3.1.2 It is a sex-linked✓disease
caused by a recessive allele✓
carried on the X✓ chromosome
Males need only one recessive allele✓to have the disease because they have XY combination,
while females have to have both recessive alleles✓ to have haemophilia because they have an XX combination any (4)
**(12)**

3.2
3.2.1 Normal female: Chromosome pair 23 = XX ✓
Female with Turner's syndrome: Only one X✓ chromosome (2)

3.2.2 She will not be able to have children✓ since her sex organs will not develop✓/no menstrual cycle because there are underdeveloped gonads and therefore no hormones (2)
***(Mark first ONE only)***
**(4)**

3.3
3.3.1 $\frac{102}{120}$✓ x $\frac{100}{1}$%
= 85✓% (2)

3.3.2 Equal number of boys and girls✓
Take a much larger sample✓/repeat samples in another school/ another population (2)
***(Mark first TWO only)*** **(4)**

3.4

**$P_1$** phenotype Black x Brown✓
genotype Bb x bb✓

*Meiosis*

**G** B, b x b ✓

*Fertilisation*

**$F_1$** genotype Bb and bb✓
phenotype Black and brown✓

**OR**

| gametes | b |
|---|---|
| B | Bb |
| b | bb |

1 mark for correct gametes
1 mark for correct genotypes

1 mark for stating $P_1$ and $F_1$
1 mark for stating meiosis and fertilisation any **(6)**

3.5 - Although contraceptives are easily available nowadays, many teenagers are not well informed about them✓
- Some people feel that morality has decreased significantly✓
- Families, nowadays, are less likely to provide teenagers with care and discipline✓
- Teenagers are more exposed to sex in the media in these days✓
- Teenagers are increasingly able to make their own decisions✓
- Abortions are now legal and easily available✓

***(Mark first FOUR only)*** any **(4)**

**30**

**TOTAL SECTION B: 60**

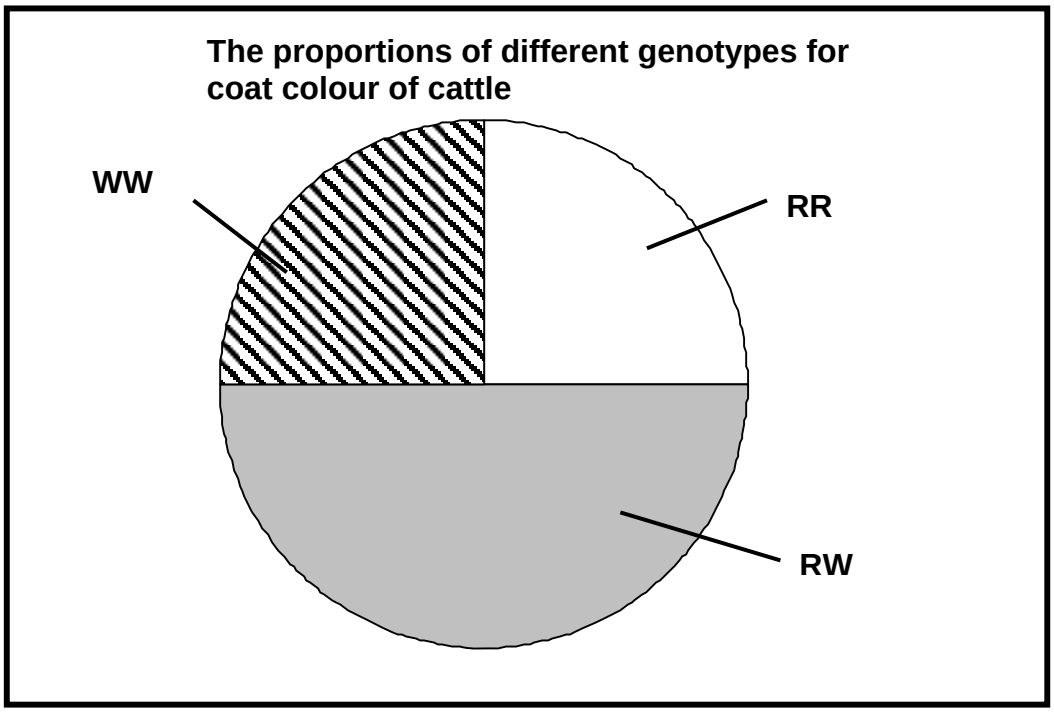
## SECTION C

## QUESTION 4

4.1

4.1.1 1 : 2 : 1✓ ✓ (2)

4.1.2




***Rubric for the mark allocation of the pie chart***

| | |
|---|---|
| Correct type of graph | 1 |
| Caption | 1 |
| Correct proportions of slices | 1: 1 correct slice<br>2: 2 to 3 correct slices |
| Label / key for each slice | 1 mark for each label |

NOTE: If the wrong type of graph is drawn: marks will be lost for "correct type of graph" as well as for drawing the slices in correct proportions. (7)

4.1.3 Both alleles✓ for fur colour are equally dominant✓ and therefore both are expressed in the phenotype✓

**OR**

Neither of the alleles✓ for red or white colour are dominant over each other✓ and therefore no one colour alone is expressed/ masked in the phenotype✓ (3)
**(12)**

4.2 4.2.1
- Determine the sample size✓/ number of boys and girls per grade
- Design a table to record the results✓
- Organise the ink pad and paper to take the fingerprint type of each learner✓/organise a way to obtain fingerprints
- Time and place to be arranged✓

**(Mark first FOUR only)** (4)

4.2.2 (a) Number of learners✓ with different fingerprint types✓ (2)

(b) No✓ (1)

(c) Results indicate✓ that most learners✓ have the plain loop type✓ of fingerprinting any 2

**OR**

Results indicate✓ that learners with a plain arch✓ do not make up the largest number✓ any 2

**OR**

Results ✓ are not in line with the conclusion✓ (2)

4.2.3 (a) **Advantages**
Criminals can be identified✓/biological evidence
Deceased bodies can be identified✓ (2)
***(Mark first TWO only)***

(b) **Disadvantages**
People can be framed✓
Infringing on the rights of people✓/invasion of privacy
It is costly✓ (2)
***(Mark first TWO only)*** **(13)**

4.3 **Advantages of using GMO's as a source of food**

- Control pests with specific genes inserted into the crop✓ which is less harmful to the environment than pesticides✓/ Reduce the need for the use of chemicals
- Selecting the best genes to produce better resistant crops✓/stronger offspring to withstand harsh environmental conditions✓
- Using specific genes to increase crop yields✓/life stock improvement for food security✓
- Selecting genes to increase shelf life of plant products✓ so that there is minimal waste✓
- Selecting genes that delay ripening of fruits✓ to meet the demand✓ locally and internationally
- Using specific genes to improve nutritional value✓of food for better health✓
- Using specific genes to introduce new traits in crops✓ to suit specific needs✓ of a population (e.g. to increase vitamin A in food) any (6 x 2) (12)

**ASSESSING THE PRESENTATION OF THE ESSAY**

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

(3)
**(15)**
**[40]**

**TOTAL SECTION C: 40**

**GRAND TOTAL: 150**