education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

FEBRUARY/MARCH 2010

MEMORANDUM

MARKS: 150

This memorandum consists of 10 pages.

SECTION A

QUESTION 1

1.1

1.1.1 D✓✓
1.1.2 D✓✓
1.1.3 A✓✓
1.1.4 C✓✓
1.1.5 B✓✓ (5 x 2) **(10)**

1.2

1.2.1 Gestation✓
1.2.2 Corpus luteum✓
1.2.3 Acrosome✓
1.2.4 Pollination✓
1.2.5 Dihybrid✓
1.2.6 Genetic engineering✓/biotechnology/gene manipulation/genetic modification/DNA recombination
1.2.7 Amniocentesis✓ (7 x 1) **(7)**

1.3

1.3.1 Both A & B✓✓/A & B
1.3.2 A only✓✓/A
1.3.3 B only✓✓/B
1.3.4 A only✓✓/A
1.3.5 Both A & B✓✓/A & B
1.3.6 None (6 x 2) **(12)**

1.4

1.4.1 (a) Spindle fibres✓ (1)
(b) Centromere✓ (1)

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

1.4.3 Crossing over✓ (1)

1.4.4 2✓ (1)

1.4.5
- 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 cause genetic variation✓ any 2 x 2 (4)

(10)

1.5

1.5.1 10✓ (1)

1.5.2 Heterozygous✓ (1)

1.5.3 Bent little finger✓ (1)

1.5.4 Only two parents showing dominant features✓ can produce offspring showing both✓ phenotypes✓/bent and straight little finger
OR
Two parents with straight little fingers ✓ must be homozygous recessive ✓ to produce offspring all with only straight little fingers ✓. (3)

1.5.5 25✓%✓ / ¼ (2)

1.5.6 No✓ (1)

1.5.7 - G is male and F is female✓/different sexes/non-identical/fraternal
- F has a bent little finger and G has a straight little finger✓ (2)
(Mark first TWO only) **(11)**

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1

2.1.1 37✓ ºC ✓ (accept 36,9 to 37,1) (2)

2.1.2 (37,1 – 36,2) ✓ = 0,9 ✓ºC (2)

2.1.3 The temperature rose✓
The oestrogen level decreased✓
The progesterone levels starts to increase✓ (3)
(Mark first THREE only)

2.1.4 Starts secreting progesterone to maintain the thickness✓
of the endometrium/uterus lining✓/prepare the uterus lining for the embryo (2)
(9)

2.2

2.2.1 A – Nuclear membrane✓
B – mRNA/RNA✓
D – DNA✓ (3)

2.2.2 - Carrying hereditary characteristics from parents to their offspring✓
- Controls the synthesis (manufacturing) of proteins✓/controls the structure and functioning of cells
(Mark first ONE only) (1)

2.2.3 Transcription✓ (1)

2.2.4 Enzymes✓ (1)

2.2.5 Ribosome✓ (1)

2.2.6 Translation✓ (1)

- The mRNA strand from the nucleus becomes attached✓ to a ribosome with its codons exposed✓
- each tRNA molecule carrying a specific amino acid ✓ according to its anticodon✓
- matches up with/complements the codon of the mRNA✓
- so that the amino acids are placed in the correct sequence✓
- adjacent amino acids are linked ✓
- to form a protein ✓

any (5)
(13)

2.3

2.3.1 3✓ (1)

2.3.2 The DNA profile of the semen✓ found on the female victim matches the DNA profile of the blood of suspect 3✓ (2)

2.3.3 Everybody, except for identical siblings, has a unique DNA profile✓ (1)
(Mark first ONE only)

2.3.4 Require a large length of DNA to get accurate profile✓
Deliberate swopping of specimens in the laboratory✓
Human error in laboratory✓ any (2)
(Mark first TWO only)

2.3.5 Determine genetic disorders✓
Paternity tests✓
Determine identity of dead persons✓
Research into variation in populations✓
Tracking individuals in population e.g. cycads in South Africa✓ (2)
(Mark first TWO only) **(8)**
[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 12✓ (1)

3.1.4 **P_1** phenotype Black x Black✓
genotype Bb x Bb✓

Meiosis

G B, b x B, b ✓

Fertilisation

OR

gametes	B	b
B	BB	Bb
b	Bb	bb

1 mark for correct gametes
1 mark for correct genotypes

F_1 genotype BB Bb Bb bb✓
phenotype Black and White✓

Parents and offspring✓/P_1 & F_1
Meiosis and fertilisation✓ any (6)
(10)

3.2

3.2.1 As age of mother increases✓
chances of having a Down's syndrome baby increases✓ (2)

3.2.2 8✓ (1)

3.2.3 47✓ (1)

3.2.4 During gamete formation✓/Anaphase I/meiosis I
the chromosome pair 21 does not separate ✓
Could also occur during meiosis II non-disjunction✓
Failure of chromatids to separate ✓
One gamete will have an extra chromosome✓/24 chromosome
If this gamete fuses with a normal gamete with 23 chromosomes✓
the resulting zygote will have 47 chromosomes✓ any (4)
(8)

3.3

3.3.1 Available wordwide✓
Children/people like to eat it✓
Nutritious/contains carbohydrates, vitamins, etc.✓
Can be locally grown✓
(Mark first THREE only) (3)

3.3.2 Risk to human health not yet known✓
Religious objection✓to genetic engineering
Do not eat bananas/allergic to bananas✓
Increase price of bananas✓
Shelf life of bananas/vaccine✓
(Mark first THREE only) (3)
(6)

3.4

3.4.1 To allow air to pass in and out✓/oxygen and carbon dioxide/gaseous exchange
To prevent the fruit flies from escaping✓
(Mark first TWO only) (2)

3.4.2 Repeat the investigation✓
Use a bigger sample✓/more flasks
Use other organisms✓ (1)
(Mark first ONE only)

3.4.3 (a) RR✓ Rr✓
(b) rr✓ (3)
(6)
[30]

TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1

4.1.1 Increasing the number of eggs developing, would increase✓ the chances of locating/removing✓ the eggs

OR

Would increase✓ the chances of success✓/because more than one egg is fertilised (2)

4.1.2 This simulates the normal✓ temperature inside the human body (1)

4.1.3 Embryo develops to a stage that implantation✓ can take place successfully/Can be sure that the ova are fertilised (1)

4.1.4 (a)
- To help people with infertility problems✓ to have children of their own✓
- Surrogate mother✓ gives birth to another couple's child if the mother cannot carry ✓ the foetus
- Extra embryos✓ may be used for research✓if legally sanctioned
- Can save extra embryos for later stage ✓ so they only need to go through the process once ✓

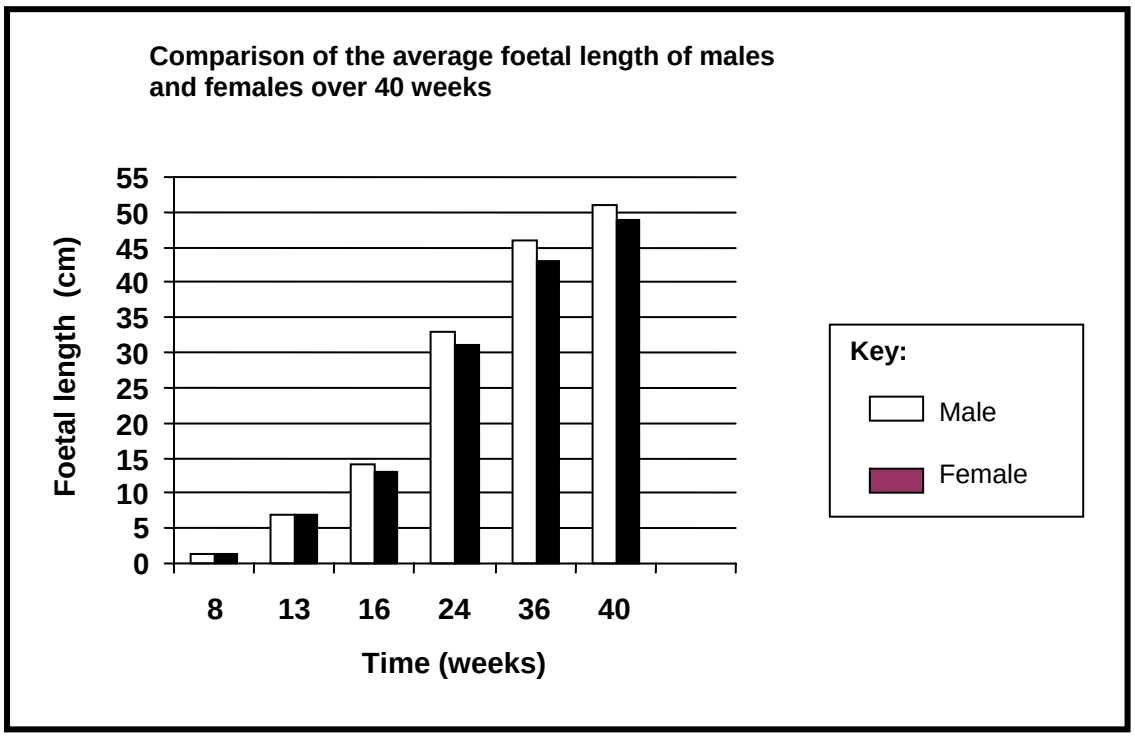
(Mark first TWO only) any 2 x 2 (4)

4.1.4 (b)
- Religious/cultural objection✓against God's will✓
- Expensive✓ only the rich will be able to afford it✓
- It is experimentation/unethical✓ with human life✓/unnatural
- Abuse of human embryos ✓ left over ✓

(Mark first TWO only) any 2 x 2 (4)
(12)

4.2

4.2.1



Rubric for the mark allocation of the graph

Correct type of graph	1
Title of graph	1
Correct label and unit for X-axis	1
Correct label and unit 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.

4.2.2 Average foetal length of both males and females are the same from 8 to 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)
(13)

4.2 **NATURAL**✓/Abstinence/behavioural

Completely prevents pregnancy✓/has no side-effects
Protects against sexually transmitted diseases (STDs) ✓ (3)

NATURAL ✓/withdrawal ✓
Is not a 100% reliable ✓
Does not protect agaist STDs ✓ (3)

RHYTHM METHOD✓

Not 100%✓/females may ovulate at unpredictable times
does not protect against STDs✓ (3)

CHEMICAL✓ /Spermicides

On their own, they are not reliable✓
Does not protect against STDs ✓ (3)

MECHANICAL✓ /Condom

Very reliable✓
Protects against STDs✓ (3)

SURGICAL✓ /Vasectomy

Completely prevents pregnancy✓/very reliable
Does not protect against STDs✓ (3)

Any 4 methods x 3 **(12)**

Synthesis

DESCRIPTION	**MARKS**
Not attempted/No relevant information provided	0
ONE or TWO methods explained with some irrelevant information	1
THREE methods explained with no irrelevant information/ All FOUR methods explained with some irrelevant information	2
All FOUR methods explained with no irrelevant information	3

(3)
(15)

TOTAL SECTION C: 40

GRAND TOTAL: 150