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National Senior Certificate

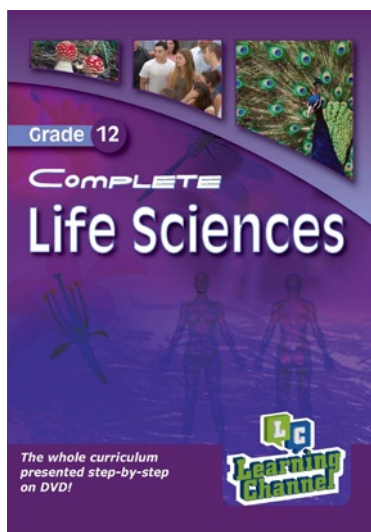
Grade 12

Life Sciences

Paper 1

MEMORANDUM

Other products for Life Sciences available from Learning Channel:



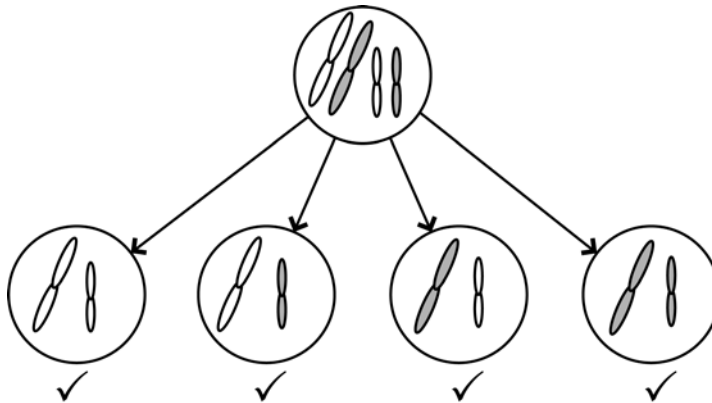
MARKS: 150**TIME 2 ½ hours**

This memorandum consists of 8 pages.

SECTION A**Question 1**

- 1.1 1.1.1 C ✓✓
 1.1.2 B ✓✓
 1.1.3 A ✓✓
 1.1.4 D ✓✓
 1.1.5 D ✓✓ 5 × 2 = (10)
- 1.2 1.2.1 Autosome✓
 1.2.2 Test cross or back cross✓
 1.2.3 Homozygous✓
 1.2.4 Ovule✓
 1.2.5 Implantation✓
 1.2.6 Fraternal twins/dizygotic twins✓ (6)
- 1.3 1.3.1 D✓
 1.3.2 G✓
 1.3.3 H✓
 1.3.4 B✓
 1.3.5 A✓ (5)
- 1.4 1.4.1 Sperm is $24 \div 800 \checkmark = 0,03 \checkmark$ mm (2)
 1.4.2 Chicken egg is 60 mm; human egg is $4\text{mm} \div 4 = 1 \text{ mm}$.
 60/1✓
 Chicken egg is therefore 60 times✓ larger than the human egg (2)
 1.4.3 Human embryos get nourishment from the placenta, ✓ so do not need to store much food✓;
 chicken embryos get all their nourishment ✓ from the egg, so it has to contain enough for the complete development of the chick (3)
(7)
- 1.5 1.5.1 A karyotype is the arrangement of a person's chromosome by number and size.✓ (1)
 1.5.2 It cannot be from a gamete as it consists of pairs of homologous chromosomes✓ – a gamete only has a single set of chromosomes.✓ (2)
 1.5.3 The person has an extra chromosome/3 sex chromosomes/two × chromosomes and one Y chromosome.✓ (1)
 1.5.4 The sex chromosomes did not separate✓ during meiosis/during the formation of one of the gametes.✓ (2) (6)
-

- 1.6 1.6.1 An enzyme✓ (restriction enzyme) is used to cut✓ the gene from the chromosome. (2)
- 1.6.2 Bacteria can be replicated very quickly/contain simple DNA or plasmids which are easy to modify.✓ (any ONE) (1)
- 1.6.3 A clone is an organism that is identical✓ to the one that is used to produce it.✓ (2)
- 1.6.4 Can be made available in large quantities on demand✓
A lot less likely to cause allergic reaction✓
No animals involved, so vegetarians, etc. can use it/less cultural or religious objections✓
Less need to kill animals✓ (any ONE) (1) (6)
- 1.7 1.7.1 (a) 6✓
(b) 12✓
(c) 42✓
(d) 30✓
(e) 46✓
(f) 47✓ (6)
- 1.7.2 Any arrangement of 4 cells as shown below:



(4) (10)

Total Question 1: [50]
TOTAL SECTION A: [50]

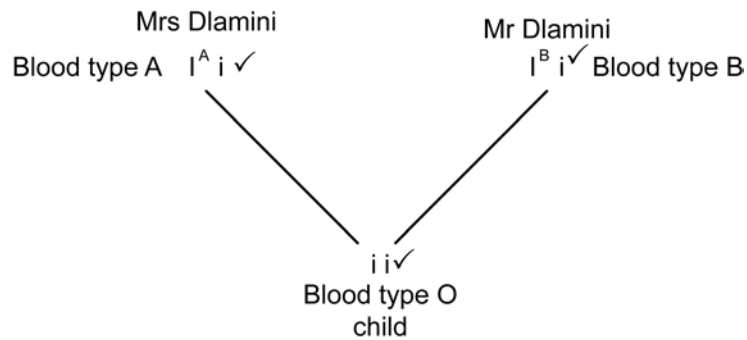
SECTION B**Question 2**

- 2.1 2.1.1 1 – thymine✓, 2 – guanine✓, 3 – adenine✓ (3)
- 2.1.2 CUG✓/AUG✓ (2)
- 2.1.3 Transcription✓ (1) (6)
- 2.2 (i)✓ and (iii)✓ (Mark first TWO only) (2)
- 2.3 2.3.1 C✓ and F✓ (Mark first TWO only) (2)
- 2.3.2 A✓ and ✓E (Mark first TWO only) (2)
- 2.3.3 A DNA fingerprint is made from semen/other tissue✓ found on the scene; from the victim✓ and from the cheek cells/blood/tissue✓ of a suspect.
- If the DNA fingerprints match✓ those of a suspect, this confirms that the suspect is most probably the rapist. (Any THREE) (3) (7)
- 2.4 2.4.1 Alanine – leucine ✓- phenylalanine – lysine ✓ (one mark for each pair of codons) (2)
- 2.4.2 Mutation 1 – deletion✓; mutation 2 – substitution✓ (2)
- 2.4.3 Mutation 2 ✓ – because the new codon codes for the same amino acid ✓ – whereas in mutation 1 the amino acids from the mutation point will all be different✓. (3) (7)
- 2.5 2.5.1 A✓, C✓ and F✓ (Mark first THREE only) (3)
- 2.5.2 A – anaphase 1✓
C – metaphase 1✓
F – prophase 2✓ (3)
- 2.5.3 X – centromere; ✓ Y – chromatid✓ (2) (8)

Total Question 2: [30]**Question 3**

- 3.1 3.1.1 Muscular dystrophy is a recessive characteristic✓. We can work this out because A and partner are normal✓ and have a child with muscular dystrophy✓. (If muscular dystrophy was dominant then at least one parent of D would have had this condition in order to get the result shown in the diagram.) (3)
- 3.1.2 A – Nn✓
B – Nn✓
C – nn✓ (3)
- 3.1.3 There is a 50% chance ✓✓ of having a child with muscular dystrophy. (Nn × nn will produce 50% Nn and 50% nn.) (2) (8)

3.2 3.2.1



(3)

3.2.2 DNA fingerprinting will give more conclusive results✓ because 50% of the father's DNA will be the same as the child's✓. In blood grouping many other men may have the same blood type✓ and so even if the blood types match there is no guarantee that the child is the man who is disputing paternity.

(Any TWO)

(2) (5)

3.3 3.3.1 26 days✓

(1)

3.3.2 A – oestrogen✓

B – FSH/follicle stimulating hormone✓

C – progesterone✓

D – LH/luteinizing hormone✓

(4)

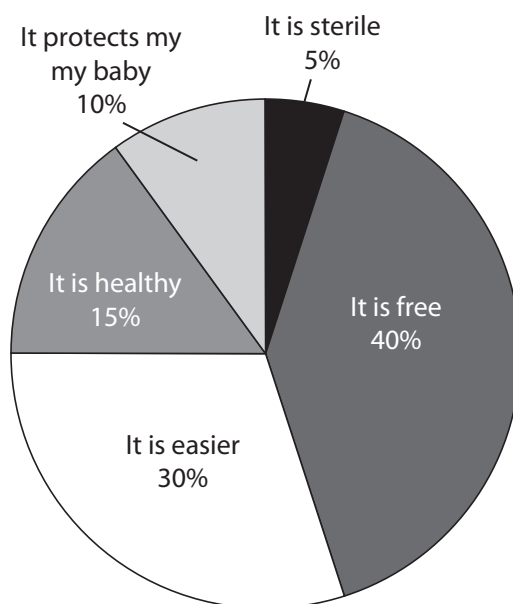
3.3.3 Day 13✓ – this is the day when LH peaks and LH stimulates ovulation.✓

(2)

3.3.4 Progesterone causes the endometrium to thicken/increases blood supply to the endometrium.✓

(1) (8)

3.4 3.4.1 Main reason for breastfeeding in a sample of women



Rubric for the mark allocation of the graph

Correct type of graph	1
Title of graph	1
Correct proportions for each labelled sector/slice	1 mark for each sector/slice (4)
Each sector/slice labelled or key given	1
Amount/Percentages on graph	1

(6)

3.4.2 3 ✓ (the last 3 reasons in the table)

(1)

3.4.3 Yes✓ – women who had problems breastfeeding their babies can now feed them with formula milk, which gives them the correct nutrition✓ – previously they might have been given cow or goat's milk, which is not as suitable (or any other reasonable answer)

OR

No ✓ – as more women rely on formula milk instead of breastfeeding and their babies are more susceptible to disease ✓ (or any other reasonable answer)

(Correct explanation must match up with answer to get 2 marks)

(2)

(9)

Total Question 3: [30]**TOTAL SECTION B: [60]**

SECTION C

Question 4

- 4.1 4.1.1 'The older a woman, the less likely she is to fall pregnant/the less her fertility.'✓ OR
 'The younger the woman, the more likely she is to fall pregnant/higher fertility.'✓
 OR

'The age of a woman does not affect the likelihood of her falling pregnant/ her fertility.'✓

However if the question states "provide an accepted hypothesis" Then in this question only the first TWO would be correct as this is what is suggested by the results. (1)

- 4.1.2 Table showing the percentage of women from different age groups who became pregnant within a year of trying to fall pregnant:

Age group of women (years)	Percentage of women who became pregnant
20–24	85✓
25–29	75✓
30–34	60✓
35–39	60✓
40–44	30✓
45–49	5✓

Assessment tool for assessing the table		
Table is drawn correctly	No – 0 mark	Yes – 1 mark
First column is labelled correctly	No – 0 mark	Yes – 1 mark
Second column is labelled correctly	No – 0 mark	Yes – 1 mark
Percentages are calculated correctly	1 mark for each correct calculation – 6 marks	
Correct heading/title	No – 0 mark	Yes – 1 mark

(10)

- 4.1.3 The results showed an overall decrease✓ in fertility with increasing✓ age. (2)
- 4.1.4 The percentage for the 35–39 age group did not fit in with this trend.✓ (1)
- 4.1.5 The sample size for this group was much smaller than for the others/some of the women in this group could have been getting fertility treatment (or any other reasonable suggestion) ✓ (1)
- 4.1.6 Women past 50 have usually reached menopause✓ and so will usually not be able to fall pregnant✓. (2)
- 4.1.7 Use women from the same area/country✓ and the same income group✓; try to survey the same number of women✓ from each age group; check that none of the women are on fertility treatment✓ or all are receiving the same kind of medical care/advice ✓ (or any other reasonable suggestions) (Mark first TWO only) (2) (19)

- 4.2 4.2.1 In a vasectomy the sperm ducts/vas deferens✓ are cut✓ and tied. Sperm are produced but their passage is blocked✓ and they will not appear in the ejaculated semen. (3)
- 4.2.2 The contraceptive pill contains female sex hormones✓ – oestrogen and progesterone✓. These hormones prevent women from ovulating.✓ (3)
- 4.3 Possible answers: (6)

Debate	Supporting debate	Opposing debate
There is far too much money being spent on helping infertile couples have a natural child of their own.	There are many orphans who need homes and could be adopted.✓	All people have the right to have their own children,✓
	A lot of this money could be spent on children or other people who do not have access to good or any medical care.✓	If people want to spend their own money on treatment that should be their choice and no one should interfere with it,✓
	Good genes can be handed on to a new generation and not be lost forever.✓	Some people need to have their own biological child to give their life meaning,✓
We should soon be able to add or remove specific genes to the chromosomes of an egg/sperm/zygote to produce a designer baby.	This will prevent genetic diseases such as Down's syndrome in babies.✓	It supports the idea of discrimination against certain physical attributes as these will not be selected by the majority of people,✓
	We can select good genes to ensure that the baby will have a better chance of having a healthy life.✓	Genetic variation is decreased as many people will select the same genetic characteristics,✓
	We might be able to select genes for certain characteristics that will enable people to live in conditions that they are presently not adapted for, e.g. living in extreme temperatures or in the sea.✓	Children who are not designer babies may end up as second-class citizens,✓
		We might be tempted to mix genes from other species to create hybrids or monsters. ✓

A surrogate mother (a woman carrying a baby for another woman) should be paid for the service that she is providing.	She has to carry a baby for nine months and deserves payment for physical stress and discomfort.✓	Poor women might be exploited for use of their uterus as this may be the only way they can make money legally even though they might not feel comfortable about doing it.✓
	The baby will need additional nutrients so the mother will have to eat more – and this costs money.✓	It turns babies into a commodity – this gives the impression that they can be bought and sold.✓
	Complications might occur during pregnancy and she needs to be compensated for this risk.✓	Motherhood is a precious experience that should not be a way to make money.✓

(12)

Mark TWO reasons supporting each debate and TWO reasons opposing it. Accept any other well argued reasons in addition to the suggested reasons in the above table.

Marks	Descriptions
3	TWO reasons supporting and TWO reasons opposing EACH statement given with very little/no irrelevant information
2	TWO reasons supporting and TWO reasons opposing EACH statement given with MUCH irrelevant information /TWO reasons supporting and TWO reasons opposing at least TWO statements given with very little/no irrelevant information
1	TWO reasons supporting and TWO reasons opposing at least TWO statements given with MUCH irrelevant information/TWO reasons supporting and TWO reasons opposing only ONE statements given with very little/no irrelevant information
0	Not attempted/nothing written other than question number/all information irrelevant

(3)

(15)

Total Question 4: [40]
TOTAL SECTION C: [40]