



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2009

LIFE SCIENCES: PAPER I

MARKING GUIDELINES

Time: 2½ hours

150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

QUESTION 2

2.1

2.1.1 uterus ✓ (1)

2.1.2 mm/millimetres ✓ (1)

2.1.3 (a) day 5 ✓
 (b) accept inclusive of day 10 – day 12 ✓
 (c) day 24 ✓
 (d) day 10 ✓ (11 – 12) (4)

2.1.4 corpus luteum releases progesterone ✓
 progesterone maintains endometrium ✓
 corpus luteum stays healthy/maintains because of sufficient LH levels ✓ (3)

2.1.5 (a) not enough space to grow/suffer internal injury ✓ or other reasonable
 (b) not enough area for placenta/suffer deformity/tissue unsuitable ✓
 Award 1 mark total if 'not enough space' for both, i.e. vague or other reasonable (2)

2.2

2.2.1 2 ✓ (1)

2.2.2 ovulation ✓ (1)

2.2.3 (E), B, D, C, A ✓✓ (–1 pr transposition) (2)

2.2.4 ANY 2 of ... 6-year old does not ... ovulate ✓ have developing follicles ✓
 have corpus luteum present ✓ (2)

2.2.5 Scale= image/scale line X scale ref = $97/17 \times 2$ (formula will work; ✓
 measurements ± 0.1 mm ✓), = 11.4 mm ✓ (i.e. 11 to 12)
 OR 11 to 12 ✓✓ mm ✓ (3)

2.3

2.3.1 keeps foetus in uterus/prevents infection/helps initiate labour ✓ (1)

2.3.2 (a) F ✓
 (b) F ✓
 (c) F ✓
 (d) T ✓ (4)

2.3.3 (a) reduced promiscuity/casual sex/monogamy/no sex before marriage,/etc. ✓
 (b) any example of 'good' healthcare ✓ (2)

2.3.4 You should go because ... ANY 2 of ... its fatal ✓ second most common
 cancer under 45 ✓ third leading cause of cancer deaths ✓ up to 80%
 infected ✓ might not fight it off ✓ easily contracted through sex/contact ✓
 PLUS Only necessary if .../not necessary until she's become sexually
 active. ✓ (3)

30 marks

QUESTION 3

3.1

- 3.1.1 translation ✓ (1)
- 3.1.2 1=amino acid ✓, 2=tRNA ✓, 3=mRNA ✓, 4=ribosome (1 mark can be given if both RNA given but muddled or no 't' or 'm' specified) (4)
- 3.1.3 protein/polypeptide/amino acid chain ✓ (1)

3.2

- 3.2.1 any **2 of** ...
a sudden/rapid ✓
unexpected/random/unpredictable ✓
change/mistake ✓
in DNA ✓ (2)
- 3.2.2 it affects chromosome 1/no indication it is sex-linked or affects gonosomes ✓ (1)
- 3.2.3 genetic counsellor/geneticist ✓ (1)
- 3.2.4 (a) DNA/genetic fingerprint ✓ (1)
(b) both kids and brother have the mutation (✓✓ if all three correctly identified; ✓ if one missing)
OR
only ✓ wife does not have mutation ✓ (2)
(c) Unavailable/dead/unwilling ✓ (1)
- 3.2.5 If we can understand our genetic history/pedigree/family tree, i.e. first part) ✓ we will know what diseases we are/are not at risk of getting, i.e. second part). ✓ (2)

3.3

- 3.3.1 May 7 2003 (full date) ✓ (1)
- 3.3.2 Futhi means replica/repeat ✓
A replica is an exact ✓ copy ✓
The calf is a genetically identical/a clone of/has the same DNA as the parent ✓ (3)
- 3.3.3 (a) sexual reproduction (or explanation thereof) ✓ (1)
(b) **Any 2 of** ... crossing over ✓, random fusion of gametes; ✓ independent assortment/random alignment during meiosis ✓ (2)
- 3.3.4 Protective covering of the egg left on in normal cloning ✓ (1)
- 3.3.5 uterus ✓ (1)
- 3.3.6 Many (clones) can be made ✓ of highly productive livestock ✓ (1)
- 3.3.7 Producing the clone, i.e. viable embryo itself ✓
OR
When the egg is inserted into the recipient ✓ (1)
- 3.3.8 Isolation phase: Any 1 of ... Remove gene for high yield ✓ from high yielding donor ✓
Engineer phase: Any 1 of ... Genetically engineer a bacterium/plasmid to contain this gene ✓
Insertion phase: Any 1 of ... Infect the cow with the bacterium ✓
OR any other reasonable 3 step process (3)

30 marks

QUESTION 4**4.1**

- 4.1.1 (a) ovule ✓
(b) ovary/carpels ✓ (2)
- 4.1.2 Any 2 of ... hardier, ✓ bigger fruit or more flesh, ✓ no hard seeds ✓ (2)
- 4.1.3 3n/triploid ✓ (1)
- 4.1.4 Cannot mix with wild populations ✓ quality of his crop not affected ✓ (2)
- 4.1.5 Asexual reprod/vegetative reprod/cuttings/description thereof ✓ (1)
- 4.1.6 **4 of ...**
 Piece of plant taken ✓
 Broken up ✓
 Put into suitable growth medium ✓
 Callus/plantlets result ✓
 Plantlets planted out ✓ (4)

4.2

- 4.2.1 vas deferens is cut SO no sperm can get through ✓ so 100% safe/no risk ✓ (2)
- 4.2.2 latex dissolving lubricant/put on too late/not on properly/no withdrawal after ejaculation/reused, etc./damaged. ✓ (1)
- 4.2.3 $14/185 \times 100 \checkmark = 7 - 8\%$ (2)
- 4.2.4 Any 4 of Reduce HIV infection ✓ cheap ✓ don't need a manual! ✓ need no medical intervention ✓ easy to procure ✓ no side effects ✓ no hygiene issues ✓ (3)

4.3

- 4.3.1 code ✓ for a protein/polypeptide ✓
OR
unit ✓ of inheritance ✓ (2)
- 4.3.2 genotype/alleles/gene pair/zygote ✓ (1)
- 4.3.3 heterozygous ✓ (1)
- 4.3.4 merely a prediction ✓ does not determine the outcome/reality can be different ✓ sample size too small to be sure ✓/needed to be done more times to be reliable ✓ (2)
- 4.3.5 (a) **any 2**, e.g. size, texture, mass ✓✓ (2)
 (b) if difference can be felt ✓ could affect the randomness/chances ✓ (2)

30 marks

QUESTION 5

Answer	Explanation
Possible in 2009 (D)... Methodology was sound in 1978 but not yet possible (AV).... - Phenotype is result of genetics and environment (E). Environment plays big role in phenotype (E) therefore scientists wise to keep env of surrogate family and major events as similar to Hitler's (SB) therefore killing dad at age 9 (SA). But even though tried to control env factors, impossible to recreate all conditions that may have influenced Hitler to be what he was (E/AV). - Scientists had Hitler's DNA preserved (SA) but preserving might damage the DNA (AV/E). - Insufficient info to comment on feasibility of method.(SA). - Cloning very dissimilar to test tube baby (SC) or IVF (SD) as involves genetic engineering (E). - Scientists had Hitler's DNA preserved and inserted a full set into the female (SA). Theoretically OK – plants have been cloned for yrs (E). Normal clone in a surrogate (E) like Futhi). However still primitive – way before first cloned animal was Dolly in 1997 (SC). Even today procedure like IVF which is not the same (E) and much more natural (E) has a less than 80% success rate (SD). Cloning animals now common (E) and to point where pets, i.e. trivial things are cloned (SC). Many clinics (SD) now doing <i>in vitro</i> treatments with 'high' success rates. - Good that they did lots of couples – greater chance of success (E). - Main obstacle to cloning is now ethical considerations (SE) but differences in opinion over the matter mean it goes ahead in even developed countries (SE). That was 2003 – where are we now? Also UN only voted against it – didn't ban it, and anyway how to enforce that? (SE). Differences in opinion over cloning mean it goes ahead in even developed countries (SE) so higher chance of success. - Technology now improved (SC) to the point where info sharing leads to rapid progress (E). - With cellphone technology/net (E) easier to control 95 couples in secret. - Quest for fame, and increase in organised crime, fanaticism, trafficking of individuals is fertile ground for this to happen illicitly (E). vs Still not possible in 2009 (D) ... - Phenotype is result of genetics and environment. (E). - Environment plays big role in phenotype (E). But even though tried to control env factors, impossible to recreate all conditions that may have influenced him to be what he was (E/AV) – still a problem in 2009. - This would amount to a clone in a surrogate (E). Plants have been cloned for yrs (E) but animals still difficult (E). - With so many boys too hard to monitor 95 couples in secret in 2009 – too much risk of disclosure (E). - Education expected/a right (E) so schools might ask why no education going on (SB). STILL not ethical (E) to murder to recreate father's death (SB). More ethical sensitivity awareness in 2009 (E) so harder to murder to recreate father's death (SB). - Scientists subjected to strong ethical scrutiny and could not do this (E). - Cellphone/net everyday (SC) so easier to get away with doing this in secret (E) but TV and media increase public scrutiny. - Cloning animals is common in 2009 (E), incl. pets (SC), but that does not mean to say human. - Clinics only have high success rates after 4 treatments in IVF which is simple by comparison. (SD). - Anecdotal evidence of clients (SD/E) is unscientific and does not impact average success rate. Strong opposition to cloning on global level (US + catholic nations) and only a few countries (UK) trying to get their way (SE) so little chance of policies supporting it.	SB = Source# E = extra material D = decision AV =alternate view Bullets indicate possible evidence and context-argument. Not exhaustive.

(20)

20 marks

QUESTION 5 RUBRIC

	4	3	2	1
Content: Thoroughness	- All main topics covered. - Source detail very close to full potential. - At least (x) significant instances of information beyond the sources.	- All main topics covered. - About $\frac{3}{4}$ of potential detail cited. - One instance of significant information beyond the sources.	About half of potential detail cited.	Up to 1/3 of potential detail cited.
Content: Relevance	- Isolated incidences of minor repetition. - No digression.	- Repetition mostly avoided. - Some minor digression.	Around half is digression and/or repetition.	Mostly digression and/or repetition.
Supporting Argument, i.e. <u>for</u>	- Strongly supports a clear position. - Reasoning is very clear and succinct. - Flow is logical, showing evidence of clear planning (no after-thoughts). - Compelling with regular use of linking language. - No new information in conclusion. - Refer to at least one incidence of bias, anecdote, false argument, emotive language, etc. where relevant.	- Supports the position. - Reasoning is clear but bit lengthy. - Minor errors in flow. - Solid but not compelling; linkage sometimes missed. - No new information in conclusion.	- Max if no decision to support. - Reasoning correct hard to follow and lengthy. - One paragraph placed illogically. - Ordinary; some linkage is evident.	- Writing consists of facts with little linkage or reasoning. - Reasoning incorrect.
Fairness, i.e. Argument against		- Counter opinions regularly given (x). - A few instances (x) of merit to counter opinions.	- Counter opinions often given (x). - One instance of merit to counter opinion in order to get a 4.	Few counter opinions given. Merit to counter opinion not given.
Position				Clear decision made.
Presentation	- Tone highly mature and suited to scientific argument. - Excellent and appropriate language. - Good use of terminology. - Correct paragraphing with good transitions. - Interesting introduce, satisfying conclude. - No sweeping generalisation.	- Tone is consistent and suited to scientific argument. - Good and appropriate language. - Some good use of terminology. - Introduce and conclude have merit. - Some generalisation but not exaggerated.	- Tone is inconsistent and/or in places inappropriate. - Language is weak but appropriate. - No terminology. - Introduce and conclude present, no matter how weak.	- Writing is almost unintelligible. - Language exceptionally weak. - Inappropriate language.

(20)

20 marks**Total: 150 marks**