



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2015

**LIFE SCIENCES: PAPER II**

**MARKING GUIDELINES**

Time: 2 hours

100 marks

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**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.**

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**SECTION A**

**QUESTION 1**

1.1 1.1.1 Give the scientific term for the following descriptions:

- (a) explant
- (b) vegetative
- (c) transgenic (3)

1.1.2 (a) I = somatic/ordinary/meristematic plant cells removed from parent /original/stock /desired plant separated into single cells (2)

(b) II = single explants grown in culture medium / sterile / nutrient medium until explants strong enough – develop into bigger plants to be planted/ grown on their own/ grown in a field, etc. (2)

1.1.3 A gene / viral DNA/ DNA from potato leaf virus placed in potato plant cells gives plant an immunity to the potato leaf roll virus even if infected does not get the disease disease grows very slowly plant unaffected by virus (2)

1.1.4 (a) sexual (reproduction) (1)

(b) take pollen / gametes from one variety place on stigma of another variety / select plants with desirable features allow to cross pollinate / prevent self pollination collect plant seeds and plant seeds of varieties showing desirable characteristics repeat cross breeding till the desired variety is achieved (4)

(c) a number of subspecies of potato plants will not cross breed / those that will cross-breed may produce sterile varieties / sterile varieties cannot produce offspring - time consuming, it takes about 10 to 15 years to produce a stable new variety requires repeated genetic crossings  
*Any ONE well explained fact from text* (2)

1.1.5 List THREE advantages and THREE disadvantages of micropropagation of potato plants. (not comparative points – just listed on table)

<b>Advantages</b>	<b>Disadvantages</b>
1. ensures rapid multiplication of desired varieties	1. labour intensive
2. plant development is closely controlled and guarantees product uniformity for customers	2. requires skilled workers
3. can be carried out independently of seasonal changes in climate	3. very costly
4. tissue culture of the potato plantlets takes up little space	4. sterile conditions have to be maintained

5. ensures genetic uniformity/ same characteristics	5. some plants undergo spontaneous and undesirable genetic changes
6. can produce disease free plants	6. identical plants are also more susceptible to new diseases or changing environmental conditions
7. plants require same conditions, grow at same rate and ready to harvest at the same time	7. loss of diversity with species
	8. Virus diseases can be passed from parent to offspring

*Any 3 points* × 2 = 6

(6)

1.2 1.2.1 O

(1)

1.2.2 (a) (i) Q = anthers  
(ii) M = stigma

(2)

(2)

(b) insects/birds / pollinator / specific named organism pick up / transfer pollen from one flower and transfer to another (or other suitable pollinating agent) / by pollination by a bird

(1)

1.2.3 preserve **DNA/genes** of original plants – if disease/climate change wipes out cultivated varieties can use original seeds to regrow crops / 4<sup>th</sup> crop in the world for agricultural production / provide food for a growing population / less likely than clones to transmit disease to the next years crops / maintain genetic diversity / can use the genes from the wild varieties to engineer future crops.

*NB – link to food security*

(2)

**[30]**

**QUESTION 2**

- 2.1 2.1.1 (a) TRUE  
(b) FALSE  
(c) TRUE (3)
- 2.1.2 (a) H  
(b) J  
(c) I (3)
- 2.1.3 (a) in the neck region/behind the head/behind the nucleus/before the tail / midsection / middle piece (1)
- (b) the blood tissue barrier is between the germinal epithelium and the developing sperm cells. ARVs cannot get past germinal epithelium/ further into seminiferous tubules. (3)
- (c) ARV drugs are mitochondrial toxins the toxins reduce the amount of mitochondrial DNA in the sperm by inhibiting the action of their enzymes, such as DNA polymerase which aids in the replication of DNA/synthesis of mitochondria/damages mitochondria / they affect/ disrupt / destroy sperm mitochondria release energy for meiosis low energy interferes with sperm production / spermatozoa require numerous mitochondria for energy and motility to reach/fertilise ova in fallopian tubes  
(Any 4 good points) 2 marks for how ARVs affect mitochondria, 2 marks for how it contributes to infertility (4)
- 2.1.4 (a) B/combination of three or more ARVs – as levels of testosterone, FSH and LH not significantly altered sperm production not affected/ is normal
- OR**
- D/Drug 5 and Drug 4 – Higher percentage of motile sperm cells/ increased vitality of sperm. Sperm will be able to fertilise/swim to egg cell.
- OR**
- F/Drug 7 and Drug 8 – higher testosterone levels sperm production will still be able to take place  
must give drug / treatment, one fact from the table, reason (3)
- (b) NO: it takes 72 days for sperm to fully mature – samples for investigation taken only after 21 days /drugs tested on animals might be different maturation time for sperm/ react differently to drugs compared to human tissues  
YES: although takes 72 days to fully mature there will be sperm at different stages/times of development changes will be evident (2)

- (c) X-axis: label – type of ARV treatment  
Y-axis: duration of investigation  
Scale: bar heights in correct proportion for time duration  
Accuracy:  
Heading: Bar graph showing/comparing duration of investigation of  
TWO types of drug therapies/treatments/drug combinations (5)

2.2 2.2.1 Pituitary gland / Hypophysis (1)

- 2.2.2 (a) LH stimulates synthesis/release of testosterone in testis testosterone stimulates the development of sperm/spermatogenesis FSH stimulates Sertoli cells to complete maturation/development of sperm cells (high) levels of testosterone result in declining levels of LH and FSH / levels of testosterone detected by the pituitary gland (4)

- (b) Growth of facial/underarm/chest/pubis hair  
Muscle development / angular features / less body fat / broadening of shoulders  
Enlarging larynx/deepening of voice  
Enlargement/development of testes and penis  
(Any one) (1)

[30]

**60 marks**

**SECTION B**

**QUESTION 3 Expanded memo for factual content**

<b>PILL HAS HAD POSITIVE IMPACT</b>	<b>PILL HAS NOT HAD POSITIVE IMPACT</b>
<p>A Most popular form of birth control – It is an instant hit; 100% effective</p> <ul style="list-style-type: none"> <li>– <b>1965</b> Five years after the FDA approval, 6,5 million American women are on pill, making it the most popular form of birth control in the U.S.A.</li> <li>– Not just a contraceptive any more – pill treatment for acne.</li> <li>– cost effective</li> <li>– health benefits</li> <li>– prevent premature deaths from complications of multiple pregnancies</li> <li>– health insurance</li> </ul>	<p>A</p> <ul style="list-style-type: none"> <li>– Religious opposition to the pill as an unnatural form of contraception.</li> <li>– 2010 Health problems – Fifty years after the FDA approval, problems remain: there are currently 1,100 lawsuits pending regarding blood clots, heart attacks and strokes allegedly caused by the popular pills Yaz, Yazmin and the generic Ocella. (max2)</li> </ul>
<p>B Cultural shifts began well before the advent of the Pill</p> <ul style="list-style-type: none"> <li>– long term contraception</li> <li>– sexual revolution</li> </ul>	<p>B Pill blamed for — a rise in single motherhood, unmarried couples living together or in communes, open marriage and wife swapping, women's liberation, and increased visibility of sex in the media.</p>
<p>C</p>	<p>C still many abortions</p> <ul style="list-style-type: none"> <li>– stigma leads to abortions</li> </ul>
<p>D women can still have a career</p>	<p>D Home-making neglected</p> <ul style="list-style-type: none"> <li>– sociological issues around child rearing, etc.</li> </ul>
<p>E</p> <ul style="list-style-type: none"> <li>– Large numbers of college women could embark on careers that involved long-term, up-front time commitments</li> <li>– in education and training as physicians, lawyers, veterinarians, managers, and academics, among others.</li> <li>– Women could still get married after professional training.</li> <li>– Contribute to economy</li> </ul>	<p>E Many harmful side effects:</p> <ul style="list-style-type: none"> <li>– the divorce rate still soars</li> <li>– does not prevent the transmission of sexually transmitted diseases; accordingly,</li> <li>– the STD rate is epidemic.</li> <li>– runoff of the oestrogen into local waters and disruption of fish populations.</li> <li>– carcinogenic</li> </ul>
<p>F more educated women have fewer children later in life,</p> <ul style="list-style-type: none"> <li>– can provide better for family</li> </ul>	
<p>G</p>	<p>G The powerful hormones could upset the reproductive system for months – or even years – after women stop taking it.</p> <p>Lead to increase in infertility</p>

<p><b>OWN INFO:</b></p> <ul style="list-style-type: none"> <li>– demographic changes; increased healthcare, etc. (F)</li> <li>– quality of life improved</li> <li>– leads to educated work force; therefore increase in economic success of a country</li> <li>– women can control fertility instead of being left with consequences</li> </ul>	<p><b>OWN INFO:</b></p> <ul style="list-style-type: none"> <li>– increased oestrogen – male infertility (E)</li> <li>– 'latch-key' children, increase in problems with children as less parental guidance; also fast food epidemic and obesity</li> <li>– false security; need condoms to prevent STIs</li> <li>– prevent unwanted families</li> <li>– many women incapable of raising children of unplanned pregnancies</li> </ul>
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**KEY FOR ESSAY MARKING GRID 2015**

Symbols for marking	section	total	Sym
D + or D - decision	Planning	6	PL
✓ <sup>1</sup> knowledge from sources			
O <sup>1</sup> – own knowledge	Decision	2	D
S – where fact is synthesised/ integrated/ linked	Knowledge from source ( 4 x 2)	8	K
SR – source reference			
C – satisfying conclusion	Own Knowledge		O
I – Interesting introduction	Relevance	2	R
Rel – relevance			
CE – conceptual error	Support ( 4 x 2)	8	S
F - fairness			
<b>Plan:</b>	Fairness	4	F
1 – key point present			
1 – key point developed	Presentation	4	P
1 – decision identified			
1 - sources	Merit	2	Me
1 – own information			
1 – counter argument	Total	40	T

**40 marks**

	<b>1 mark</b>	<b>2 marks</b>	<b>3 marks</b>	<b>4 marks</b>	<b>Possible mark (40)</b>
<b>Planning</b> ×2	<ul style="list-style-type: none"> <li>Key points present</li> </ul>	<ul style="list-style-type: none"> <li>Key points developed</li> </ul>	<ul style="list-style-type: none"> <li>Key points developed</li> <li>Source references identified (e.g. Source A/ own information)</li> </ul>		6
<b>Decision</b>	<ul style="list-style-type: none"> <li>Vague</li> <li>Changed position within essay</li> </ul>	<ul style="list-style-type: none"> <li>Clear decision made</li> </ul>			2
<b>Use of knowledge from sources</b> ×2	<ul style="list-style-type: none"> <li>Up to 1/3 of potential detail in sources used</li> </ul>	<ul style="list-style-type: none"> <li>Up to 1/2 of potential detail in sources used</li> </ul>	<ul style="list-style-type: none"> <li>Up to 3/4 of potential detail in sources used</li> </ul>	<ul style="list-style-type: none"> <li>Source detail very close to full potential used</li> </ul>	8
<b>Use of own knowledge</b>	<ul style="list-style-type: none"> <li>Some facts given beyond the source</li> </ul>	<ul style="list-style-type: none"> <li>Many facts given beyond the source</li> </ul>	<ul style="list-style-type: none"> <li>Some facts given beyond the source</li> <li>Facts integrated into the argument</li> </ul>	<ul style="list-style-type: none"> <li>Many facts given beyond the source</li> <li>Facts integrated into the argument</li> </ul>	4
<b>Content Relevance</b>	<ul style="list-style-type: none"> <li>Repetition mostly avoided</li> <li>Some minor digression</li> <li>Argument relevant</li> </ul>	<ul style="list-style-type: none"> <li>Repetition mostly avoided</li> <li>Some minor digression</li> <li>Argument relevant</li> <li>Quality of source extracts acknowledged</li> </ul>			2
<b>Quality of argument supporting decision</b> ×2	<ul style="list-style-type: none"> <li>Writing consists of facts with little linkage or reasoning</li> <li>Reasoning incorrect</li> </ul>	<ul style="list-style-type: none"> <li><b>Maximum if no clear decision in support</b></li> <li>Reasoning correct, but hard to follow</li> <li>Ordinary: some linkage evident</li> </ul>	<ul style="list-style-type: none"> <li>Supports the position</li> <li>Reasoning is clear</li> <li>Minor errors in flow</li> <li>Linkage sometimes missed</li> </ul>	<ul style="list-style-type: none"> <li>Strongly supports a clear position</li> <li>Reasoning is very clear and succinct</li> <li>Flow is logical</li> <li>Compelling with regular linkage</li> <li>Well integrated argument</li> </ul>	8
<b>Fairness-counter opinions to decision</b>	<ul style="list-style-type: none"> <li>One – two counter opinion given</li> </ul>	<ul style="list-style-type: none"> <li>Three - four counter opinions given</li> </ul>	<ul style="list-style-type: none"> <li>Integration of one to two counter opinions into argument</li> </ul>	<ul style="list-style-type: none"> <li>Integration of three - four counter opinions into argument</li> </ul>	4
<b>Presentation</b>	<ul style="list-style-type: none"> <li>Writing is almost unintelligible</li> <li>Tone, language, terminology unscientific and very weak</li> <li>Introduction <del>or</del> conclusion <b>not</b> present</li> </ul>	<ul style="list-style-type: none"> <li>Tone, language, terminology weak</li> <li>Introduction <b>and</b> or conclusion present</li> </ul>	<ul style="list-style-type: none"> <li>Tone is consistent and suited to scientific language</li> <li>Good and appropriate language and terminology</li> <li>Mostly appropriate paragraphing</li> <li>Introduction and conclusion have merit</li> </ul>	<ul style="list-style-type: none"> <li>Tone is mature and suited to scientific language</li> <li>Excellent and appropriate language and terminology</li> <li>Correct paragraphing with good transitions</li> <li>Interesting introduction, satisfying conclusion</li> </ul>	4
<b>Scientific merit</b>	Essay shows academic rigour, accurate reasoning, insight and cohesiveness.				2