



INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2024

BIOLOGY: PAPER II

MARKING GUIDELINES

Time: 2 hours

100 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 1

1.1

Flower part	Number/s
Male	3
Female	2 4 5

1.2 1.2.1 5

1.2.4 4

1.3

1.3.1 Self-Pollination		1.3.2 Cross-Pollination	
Advantages <i>Any one</i>	Beneficial genes passed on to offspring / Pure lines are produced.	Disadvantages <i>Any one</i>	Detrimental genes may be enhanced / Beneficial genes not necessarily passed on / Traits from original plants may be lost.
	More successful reproduction method.		
	Rapid / Occurs more easily.		Longer production time.
			Specific pollinators needed.
Disadvantages <i>Any one</i>	Variation not promoted / Less genetic variation	Advantages <i>Any one</i>	Variation promoted.
			Harmful traits may be eliminated
			New traits can be produced
	Does not support adaptation.		May improve adaptability.

- 1.4 No,
- Sketches are shaded.
 - Sketch-lines are not of the same shade (some are darker/lighter).
 - Not all lines connect.
- Any two

1.5 1.5.1 B

1.5.2 The flowers are high above the ground, flying organisms can access this, rather than the ground dwelling organisms.

The flowers are too small for bats, but the bees are small enough to wriggle into the flowers.

The flowers are brightly coloured – yellow, which would attract bees.

1.5.3 K-strategy

1.5.4

TWO reasons for honeybee as K-strategist	TWO reasons why the honeybee could be mistaken as an r-strategist
- Queen bee has long life span. - Larvae is fed by worker bees with royal jelly, pollen and honey. - Bees are highly (socially) organised animals / Organised into castes. (ANY TWO)	- Lays many eggs / more eggs than necessary. - Bees are seen as prey, thus die off easily / Does not survive easily. - Care for larvae is not from parents. (ANY TWO)

1.6 Field mouse: Gives birth to live young, thus parenting is very high. Increased amount of parenting means the chances of survival of the field mouse increases.

Honeybee: Lays many eggs. This method of mass egg-laying ensures a high probability of survival of the bee.

1.7 1.7.1 Sexual production methods

1.7.2 The pea plant has flowers / uses seeds / pods.

1.7.3 Polyploidy: Larger/more fruit/seeds / Smaller/absent fruits/seeds.

Hybridisation: Plants have greater genetic variation to withstand environmental changes.

1.7.4 - Favourable traits could be passed on to offspring without fear of loss of traits.
 - Yield is produced more rapidly.
 - All the individuals will be able to produce offspring.
 - Asexual reproduction is the most successful method for mass food production.

Any two

QUESTION 2

2.1 Diabetes

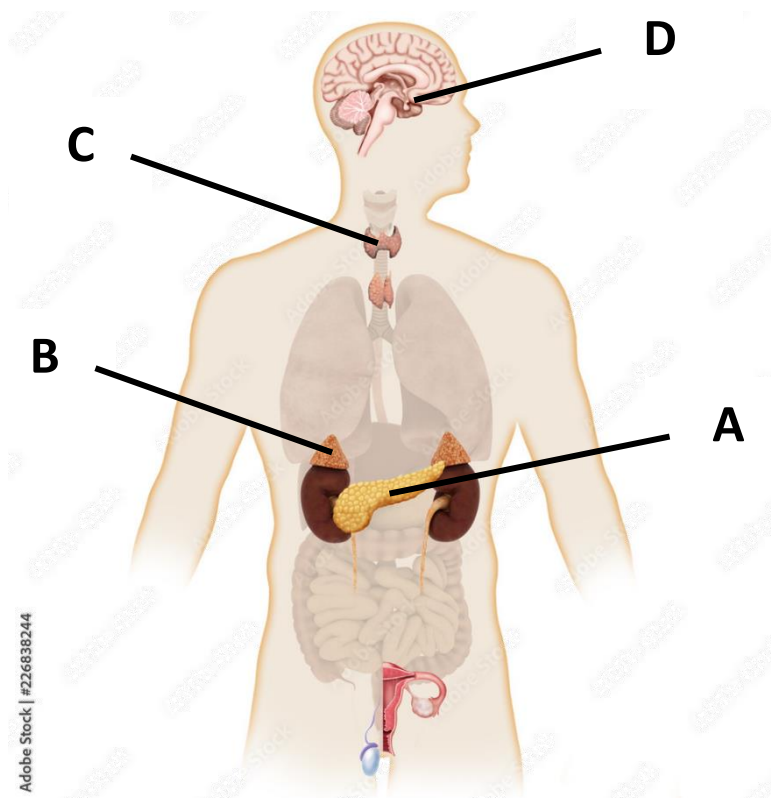
2.2 2.2.1 B

2.2.2 A

2.2.3 C

2.2.4 C

2.3



2.4 Hyperglycaemia

2.5 One mark for arrows (No mark if a cycle is drawn – must be drawn from top to bottom)
Four facts in logical order (see below as an example)

Rise in blood glucose levels (given) → Increase detected by pancreas → Pancreas / Beta-cells / Islets of Langerhans secretes insulin → Insulin causes glucose to be taken up faster/more easily into liver and stored as glycogen → taken up into body cells to be used for energy → Blood glucose levels drop back to normal → Drop in blood glucose inhibits secretion of insulin.

- 2.6 Type 1: Body/Pancreas cannot produce insulin. Not enough insulin in the body to lower the blood glucose levels. (NOT IN CAMS: Autoimmune disease / Treated with artificial insulin / Develops at younger age)
Type 2: Body/Pancreas produces enough insulin. Body cells are insensitive to insulin / Body does not respond to insulin. (NOT IN CAMS: Lifestyle disease / Treated with drugs such as metformin / Develops at older age)
- 2.7 Iodine is needed for the production of thyroxine.
- 2.8 Not a good decision. The population's hypothyroidism was so low, that a sudden increase in iodine could increase the risk of some people to suffer from hyperthyroidism.
- 2.9 2.9.1 Number of thyroid cases.
- 2.9.2 Percentage increase = $\left(\frac{630-202}{202}\right) \times 100$
= $\left(\frac{428}{202}\right) \times 100$
= 211,88%
- 2.9.3 200–300 (Trend showed high and low numbers every 2 years, thus the number has to be higher than 200 and lower than 300.)
- 2.9.4 The trend of the graph shows that the numbers fluctuate every two years at an increasing rate.
- 2.10 2.10.1 Declining testosterone and an increase in temperature both cause infertility among men.
- 2.10.2 Excess blood in scrotum increased temperature / Less oxygenated blood because scrotal arteries were compressed / Compressed arteries have no compressive effects of the vas deferens itself. (Answer should focus on effect on arteries, not compression of vas deferens)

SECTION B**QUESTION 3**

Consider the following statement:

Will Artificial Reproductive Technology (ARTs) be the preferred method of producing children in the future?	
<i>Yes – ARTs will be the preferred method</i>	<i>No – people will still choose alternative natural birthing over ARTs (not choose ARTs)</i>
Source A - Many different forms of ARTs – not only one choice. - Several benefits to IVF: - Can be used by anyone. - Increases chances of fertilization - Increases chances of having a baby - Decreases chances of miscarriage - Outstanding success rates (Any two)	Source A
Source B - AWT mimics internal environment. - Foetus mortality is reduced. - Successful on lamb, so why not humans?	Source B - AWTs have only been tested on animals – unreliable. - An artificial womb can cost anything above R1,8 million – only the rich will be able to afford it. - AWTs are technology, and technology is still more unreliable than human bodies. - Artificial womb facility looks like a farm. - False news about AWT's can be spread – cause mass-hysteria.
Source C - Adoption can be lengthy process. - Adoption is very expensive / Not all people can afford adoption.	Source C - Benefits of adoption: - Stable environment for child to grow up in. - Higher quality of life for adoptive child. - Parents who infertile can have their dream of parenthood fulfilled. - Same-sex couples can have children. (Any two) - Many options for adoptions: Agency, Independent, Domestic, International, Open, Closed (Not all have to be named).

Source D - Many disadvantages to surrogacy: - Lack of professional support. - No emotional support. - Responsible for finding a surrogate. - Hiring and paying all professionals separately can add up. (Any two)	Source D - Advantages of surrogacy: - Potentially lower cost. - More control and responsibility for intended parents and prospective surrogates. - Stronger bond through your direct communication and shared responsibilities. - Option for traditional surrogacy. (Any two)
Source E - Scientists handle IVF procedure with utmost care. - FSH and LH levels controlled to ensure more successful IVF.	Source E - Scientists are tampering with human biology. - IVF is an invasive procedure.
Source F	Source F - Can give rise to unwanted technology, like cloning and abortions – not found naturally in any mammals. - Can have effect on human evolution – we are creating a world as we see fit. - Disposing of unwanted or unused embryos can be seen as murder. - Frozen embryos: who is responsible for these embryos? / Who is paying for their storage?
Source G	Source G - ART's can help to give rise to additional health impacts/disorders through genetic modifications. - Examples of neurological disorders: Autism Spectrum Disorder / Intellectual Disability / Attention Deficit Hyperactive Disability / Cerebral Palsy / Specific Learning Disorder.
Source H - Opinion A agrees that, if the sperm and ovum originate from the original parents, then ART's are acceptable. - Opinion C agree that ARTs are acceptable, but only performed for the husband and wife.	Source H Opinion B believes that an embryo has a moral status as human being, so ART's should only be considered in extreme cases.

OWN KNOWLEDGE • Women are more autonomous – have an informed choice about their bodies. • Artificial womb supplies growing foetus with the same nutrients as placenta would. • ARTs can be used as contraceptive to control unwanted pregnancies. • IVF can control injection of mutated sperm, thus minimizing babies born with genetic disorders.	OWN KNOWLEDGE • IVF is an invasive procedure – all invasive surgeries are dangerous. • ARTs are unnatural and goes against nature. External womb eliminates mother to baby bond • May eliminate dual parenting. • Changes in hormone levels can have dire effects – weight gain, mood changes, facial hair growth etc. – on the body.
SOURCE QUALITY • Source A – Park Avenue Fertility, Bridge Clinic: very reliable → educational website OR not reliable → outdated source (2011) • Source A – Instagram: Not reliable → Social media • Source B – News Medical: reliable → medical news • Source B – Tohoku University: reliable → researched information • Source B – Reuters: reliable → trusted news website • Source C – Considering adoption: very reliable → website specially designed for adoptive services. • Source C – SheCares: reliable → resource website. • Source D – MySurrogateMom.com: reliable → correct information for prospective parents. • Source E – European Society of Human Reproduction and Embryology: reliable → Educational website. • Source F – The Scientist: Very reliable → Scientific articles and journals. • Source F – The Conversation: Not reliable → Opinions from scientists • Source G – IMR Press: reliable → Collection of scientific journals • Source H – ScienceDirect: reliable → Scientific journals OR not reliable → outdated (2005)	

Total marks: 100