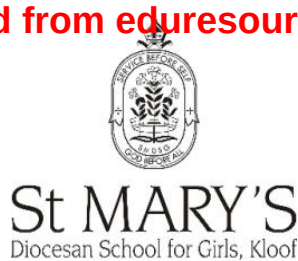
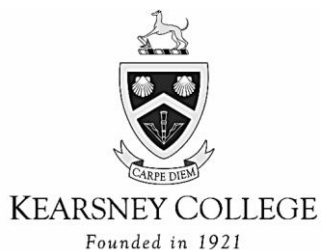




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LIFE SCIENCES : PAPER 2

TRIAL EXAMINATION – SEPTEMBER 2024

MEMORANDUM

QUESTION 1

- 1.1.1 hyperandrogenism ✓ (1)
- 1.1.2 acromegaly ✓ (1)
- 1.1.3 puberty ✓ (1)
- 1.2.1 4.8 nmol/l ✓ (1)
- 1.2.2 No – the Court of Arbitration in Sport (CAS) has set a limit of 5.0 nmol/l as the upper limit for eligibility ✓ (1)
- 1.2.3 Deeper voice ✓, increased sweating ✓, facial hair, more body hair, oily skin, mood changes (any TWO) (2)
- 1.3.1 The prefix “inter” means between and individuals with this condition are have characteristics shared between both sexes ✓ – genetically XY, physically not completely male – some female characteristics ✓ (reference to inter / between because of male and female characteristics) (2)
- 1.3.2 No – these individuals do not have a uterus ✓ therefore would be unable to carry a foetus ✓ (2)
- 1.4.1 ICSH (interstitial-cell-stimulating hormone) ✓ (1)
- 1.4.2 FSH (follicle stimulating hormone) ✓ (1)
- 1.5.1 C ✓ – sperm cell ✓ (2)
- 1.5.2 A ✓ - Sertoli cells ✓ (2)
- 1.6 Pituitary gland secretes ICSH and FSH → ICSH stimulates the testes to produce testosterone → FSH and testosterone stimulate spermatogenesis / production of sperm → high levels of testosterone in the blood inhibit secretion of ICSH and FSH (any 3 sequential points – 1 must refer to negative feedback ✓✓✓ heading ✓ arrows ✓) (5)

- 1.7.1 Women receiving the testosterone cream over 10 weeks will have increased endurance and lean muscle gain than those not receiving the testosterone cream / receiving the placebo (any logical hypothesis ✓✓ statement ✓) (3)
- 1.7.2 Yes – study shows increased testosterone results in better athletic performance and allows for increase in lean muscle, both which offer athletes an unfair advantage
 No – study sample used was very small, cream is an incorrect format for this hormone – not realistic to how much hormone would be present in the blood, increased testosterone could be due to other conditions like PCOS and not intersex, therefore individuals with increased testosterone are still female, no indication of how much cream increased testosterone levels
 Any TWO logical points to support opinion ✓✓ (2)
- 1.8 No – no control over these conditions / sometimes not even aware of them, therefore unfair to penalize them, all genetic conditions should be treated the same if they offer an advantage in terms of sport – e.g. Michael Phelps has a genetic condition which gives him an advantage over other participants, therefore it is unfair not to ban / penalize him but to penalize women with hyperandrogenism / unfair to disadvantage individuals by forcing them to take treatments to suppress androgens that will have negative side effects on their performance and wellbeing, but not expect individuals who produce less lactic acid to compensate for this so that performance is fair, etc. There is still a lot that is not understood about these conditions, therefore more research is needed before denying individuals opportunities / ruining dreams of athletes
 Yes – gender is based on the sex chromosomes and therefore if individuals do not have the XX genotype they should not be able to compete as women, the presence of the Y chromosome will cause elevated testosterone levels which studies have shown increase muscle mass and athletic performance, therefore it is not fair for these individuals to compete against women, unfair for these individuals to receive awards / medals and break records against women who do not have a Y chromosome and would be penalized for taking androgen steroids
 Opinion stated and explained with 1 well developed point ✓✓ and 1 listed ✓ or 3 points listed) ✓✓✓ (3)

QUESTION 2

- 2.1.1 The bats pollinate the plants✓, disperse the seeds, guano fertilizes the soil and the plants provide the bats with food✓ (2)
- 2.1.2 Pollination is the transfer of pollen from the anthers to the stigma ✓ whereas fertilization is the fusion of gametes / sperm and ovum ✓ (2)
- 2.1.3 Pale, nocturnal flowers – bats are nocturnal ✓, large, bell-shaped to accommodate the size of the bat's head✓, produce nectar / scent to attract bats, nectar is found deep in the flower so the bat has to reach its muzzle deep into the flower to reach it and in doing so its head is covered with pollen (any TWO) (2)
- 2.2.1 A genetically identical copy of another organism ✓ / organism with identical DNA sequence to another organism (1)
- 2.2.2 Asexual ✓ (1)
- 2.2.3 Advantage – replicate / make exact copies of desirable genotypes / individuals ✓, fast, less energy is expended in reproduction
- Disadvantage – reduces variation✓, less chance of adaptation to changes in environment (any ONE of each) (2)
- 2.3.1 A and B ✓ (1)
- 2.3.2 A – Stigma ✓ B – Style ✓ (2)
- 2.3.3 Producing pollen ✓ (1)
- 2.3.4 Cross-pollination ✓ – stigma is longer / extends beyond the stamens ✓ / stamens are below the stigma (2)
- 2.4.1 Genetically determined behaviours ✓ to ensure maximum reproductive success✓ / species to breed successfully / species survival (2)
- 2.4.2 Viviparous ✓ (1)
- 2.4.3 Parental care ✓ – lactation✓, amniotic egg – gestation (2)
- 2.5 Oviduct ✓ (1)
- 2.6 K – strategist ✓ – parental care✓, only a few offspring at a time (2)
- 2.7 Convex curve ✓ x-axis – time ✓ y-axis – number of individuals surviving ✓ (3)
- 2.8 Less conservation / more people killing bats, therefore population numbers decreased / reduction in mammal biodiversity – affected plants relying on these animals for pollination, seed dispersal, increased pests – more pesticide usage by farmers, less natural fertilizer from guano – affects soil quality (3 points discussed ✓✓✓) (3)

QUESTION 3

We should be using Assisted Reproductive Technology to extend the reproductive lifespan of woman.

Source Knowledge Facts:

9 – 12 = 4 x 2

6 – 8 = 3 x 2

3 – 5 = 2 x 2

1 – 2 = 1 x 2

Own knowledge and Counter Argument:

1 – 2 – no linkage = 1 mark

1 – 2 – linkage = 3 marks

3 – 4 – no linkage = 2 marks

3 – 4 – linkage = 4 marks

SOURCE	SHOULD use ART	SHOULDN'T USE ART
A	Laboratory process, non-invasive, using the egg and sperm of the individuals involved and implanting their own embryos	Unnatural process, creating embryo's – playing God, some embryo's not implanted
B	Fertility declines in a women's 20s, atresia causes eggs to diminish in quality and quantity, finite number of eggs; career driven – freeze eggs when they are still a good quality, cancer – allows for eggs to be saved from the damaging effects of cancer therapy, religion / culture may prevent freezing of embryo's therefore in infertility cases may need to freeze eggs (not living)	Chance of conception for a woman older than 43 is very low – but this is an old age.
C	Alleviate heartache of infertility, hone embryos to be free of disease and defects, mitochondrial defects, prevent diseases like muscular dystrophy, infertility is random and crosses all economic lines – caused by Mother Nature	Dangers of crossing ethical and moral lines, postpone childbirth till it fits their schedule, expensive, IVF and PGD open the door to people manipulating genetic material, women without resources lose out twice – infertile and can't afford treatment, unequal access, legal structures and how to guarantee

		anonymity for donors- era of increasing transparency, not being able to become a mother at 65 is not a medical condition
D	Chance of pregnancy decreases by 10% from 22 – 35 (less than 15% chance to fall pregnant each month)	Percentage of miscarriages increases with maternal age
E	1970 avg woman had first baby at 21 – in 2022 birth rate is higher in early thirties than late 20s – foundation laid in 1960s – birth control pill – control over their fertility, common due to finance concerns, child care, later marriage, finding a partner, prioritizing education, career, leisure time, delayed parenthood sign of progress – empowerment, financially stable, mature as a person, studies shown kids born to older parents grow up to be healthier, better educated, better behaved than peers with younger parents, women report bigger happiness boosts around and after birth when they are older compared to younger mothers, childcare is expensive, paid parental leave isn't guaranteed, high living costs, structural barriers create necessity for postponing having children	Social expectations, class and racial hierarchies
F	Freezing of eggs – easier, misinformed individuals – prevent the hurt	Unsuccessful rounds of IVF – success rates low – 25.1% for ages 38 – 40 and 12.7% for ages 41 – 42 (society for assisted reproductive technology) – “bump watch” – pressure, accusations – just cared about career, etc
G	Ovulation disorders, conditions of uterus, fallopian tube blockage, endometriosis, primary ovarian insufficiency, pelvic adhesions, cancer – not the woman's fault	
H		70 year old / 73 years old twins – how much longer will they live – old

		Twins born prematurely – 31 weeks - incubators
I	Most people unaware / uneducated about fertility until it is too late, medical technology – IVF offered by state and private facilities – available at much cheaper prices at state facilities	Expensive – few medical aids cover. Only the rich can afford it. Private facilities taking advantage of desperate couples – using state laboratories but charging much higher prices than state facilities for the process

Own Knowledge – Should

- Men produce sperm throughout lifetime, risk of mutations also increases with age, why shouldn't women be given the same choice / chance because of age
- Human right – to become a mother, have control over eggs, uterus, reproductive timeline
- Medical advancements allow people to be healthier and bodies to be in better condition till later ages / live longer, therefore, why shouldn't reproductive age also be extended

Own Knowledge – Shouldn't

- Natural selection at play? Women with these conditions may not have the "fittest" genes – is it correct to artificially manipulate and go against Nature
- Is it fair to the child to have older parents – mocked at school, less energy to engage with children, higher chance of dying before children are adult, higher chance of leaving children without parents – strain on govt – orphanages, etc
- Not only eggs that age – woman's body ages too – pregnancy could be detrimental to woman's health as well as risk baby's development and chances of being born early, with defects higher
- What happens to embryo's not used – "living" – research, ethical implications
- Menopause and hormone levels change with age – effects of this on gestation, etc

	Possible mark (40)			
Planning	- Decision given - Key points present (important facts from sources listed in plan/grouped into key areas of importance) - Key points developed (short phrases/sentences to support the key points) - Sources referenced (e.g. source A) - Counter arguments provided - Own information provided and indicated (must support argument)			
Decision	1 mark	2 marks	3 marks	4 marks
Use of knowledge from sources x 2	- Vague. - Changed position within essay. - Up to of potential detail in sources used to support argument.	- Clear decision made. - Up to ½ of potential detail in sources used to support argument. - Many facts given beyond the source to support argument.	- Up to ¾ of potential detail in sources used to support argument. - Some facts given beyond the source to support argument. - Facts integrated into the argument.	- Source detail very close to full potential used to support argument. - Many facts given beyond the source to support argument. - Facts integrated into the argument.
Use of own knowledge	Some facts given beyond the source to support argument.	Many facts given beyond the source to support argument.	- Some facts given beyond the source to support argument. - Facts integrated into the argument.	- Many facts given beyond the source to support argument. - Facts integrated into the argument.
Content Relevance	- Repetition mostly avoided. - Some minor digression. - Supporting argument relevant.	- Repetition mostly avoided. - Some minor digression. - Supporting argument relevant. - Quality of source extracts.		
Quality of argument Supporting decision x 2	- Writing consists of facts with little linkage or reasoning. - Reasoning incorrect.	- Reasoning mostly avoided. - Some minor digression. - Supporting argument relevant. - Quality of source extracts. - Maximum if no clear decision in support. - Reasoning correct, but hard to follow. - Ordinary: some linkage evident.	- Supports the position. - Reasoning is clear. - Minor errors in flow. - Linkage sometimes missed.	- Strongly supports a clear position. - Reasoning is very clear and succinct. - Flow is logical. - Compelling with regular linkage. - Well integrated argument.
Fairness-counter opinions to decision	One - two counter opinion given from the sources.	Three - four counter opinions given from the sources.	Integration of one to two counter opinions from the sources into argument.	Integration of three - four counter opinions from the sources into argument.
Presentation	- Writing is almost unintelligible. - Tone, language, terminology. Unscientific and very weak. - Introduction and/or conclusion not present.	- Tone, language, terminology weak. - Introduction and conclusion present.	- Tone is consistent and suited to scientific language. - Good and appropriate language and terminology. - Mostly appropriate paragraphing. - Introduction and conclusion have merit.	- Tone is mature and suited to scientific language. - Excellent and appropriate language and terminology. - Correct paragraphing with good transitions. - Interesting introduction, satisfying conclusion.
Scientific merit	Essay shows academic rigour, accurate reasoning, insight and cohesiveness			

[40 marks]