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ST BENEDICT'S COLLEGE

SUBJECT	LIFE SCIENCES P1	DATE	5 JULY 2023
GRADE	12	MARKS	200
EXAMINER	MRS S. STEGMANN	MODERATOR	MRS B. ZAJAC
		DURATION	3 HOURS

MARKING GUIDELINES

LIFE SCIENCES

Question 1:

- 1.1. G ✓
E ✓
C ✓
I ✓
L ✓
J ✓
F ✓
D ✓
B ✓
H ✓

[10]

1.2.

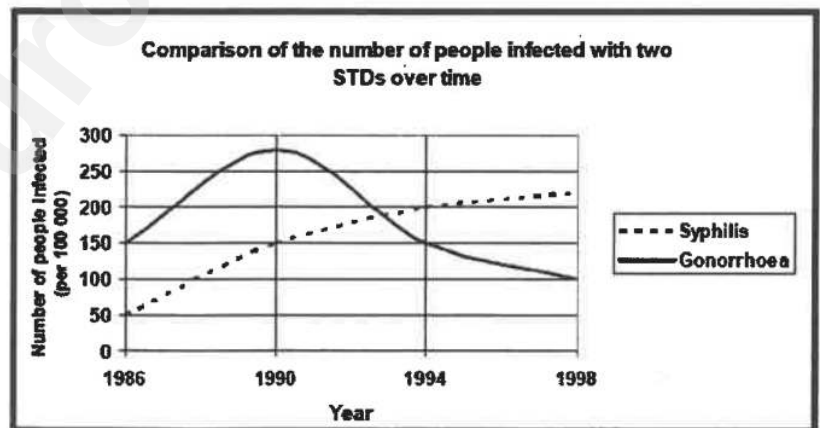
1.2.1.	1.2.2.	1.2.3.	1.2.4.	1.2.5.	1.2.6.	1.2.7.	1.2.8.	1.2.9.
D ✓	B ✓	D ✓	D ✓	C ✓	C ✓	B ✓	C ✓	A ✓✓

[10]

1.3.

1.3.1.

- Heading (H) ✓
X axis title and scale (X) ✓✓
Y axis title and scale (Y) ✓✓
Key (K) ✓
Syphilis correctly plotted (S) ✓
Gonorrhoea correctly plotted (G) ✓



(8)

1.3.2. Syphilis- the number of infections has continued to increase ✓ from 1986 to 1998. ✓

Gonorrhoea- the number of infections increased from 1986 to 1990 ✓ and then decrease from 1990 to 1998. ✓ (4)

1.3.3. From 1986 to 1993 ✓✓

If read from the table: 1986-1990 (one mark only) ✓ (2)

1.3.4. $150/100\ 000 \times 100 = 0,15\%$ ✓ (2)

1.3.5.

- a. Awareness of status would enable partners to be protected if necessary.

Planning by the government and other agencies for medical care, budget, ARVs

Help infected people and prevent further infection.

Increase faithfulness of partners to each other

Job creation related to HIV testing

More accurate statistics become available for research.

Any other relevant answer

(any 1✓)

- b. Takes away an individuals rights to make their medical conditions public.

Information can be misused e.g. by employers to exclude HIV positive people

Can be stigmatized/ discriminated against

Cost of testing could become unaffordable to the government

Increased suicide rate

Logistical issues relating to the implementation and frequency of testing

Any other relevant answer

(any 1✓)

[18]

1.4.

1.4.1. Female sterilization ✓

(1)

1.4.2. $34\% + 25\% + 4\% \checkmark = 63\% \checkmark$ (accept without 25%)

(2)

1.4.3. Natural family planning

Withdrawal method

Ovulation prediction kits

Rhythm method

✓

(any 1)

1.4.4. Condom ✓

(1)

[5]

1.5.

1.5.1. A group of organisms of the same species ✓ that occupy the same are and can breed ✓ (2)

1.5.2. Time/weeks ✓ OR species A and B ✓ (1)

1.5.3. $100-20 \checkmark = 80$ more of Species A ✓ (2)

1.5.4. Competitive exclusion ✓ (1)

1.5.5. Separated: numbers increase greatly due to their being no competitor ✓

Together: both species grow in the first week ✓ as there is sufficient food but thereafter species A increases greatly while species B drastically decreases ✓ due to being outcompeted by A when food is limited ✓ (4)

1.5.6.

1.5.6.1. Predator: organism that hunts and kills its food ✓
Prey: organism eaten by another (predator) ✓ (2)

1.5.6.2. Heading (H) ✓
Axes headings (time on X-axis, species number on Y-axis) (A) ✓
Prey numbers always higher than predator (N) ✓
Cyclic change in predator always slightly after prey (C) ✓
Key (K) ✓ (5)

[17]

1.6.
1.6.1. Normal pigmentation ✓ (1)

1.6.2.

Individual	Genotype	Phenotype
1	Dd ✓	Female with normal pigmentation ✓
3		Female with albinism ✓
6	Dd ✓	
12	dd ✓	Male with albinism ✓

(6)

[7]

1.7.
1.7.1.
A- DNA ✓
B- mRNA ✓
C- anticodon ✓
D- tRNA ✓
E- amino acid ✓
F- polypeptide ✓
G- ribosome ✓
H- nuclear membrane ✓ (8)

1.7.2. P: transcription ✓ Where it occurs: nucleus ✓
Q: translation ✓ Where it occurs: cytoplasm ✓ (4)

1.7.3. Protein synthesis ✓ (1)

[13]

Total Question 1: 80 marks

LIFE SCIENCES

Question 2

2.1.

2.1.1.

A- Lag phase ✓

B- Log phase / exponential growth ✓

(2)

2.1.2. No shortage of food/ sufficient food supply/ resources

Environmental resistance has not built up/ increased

Individuals all very healthy and can reproduce ✓✓

(any 2)

2.1.3. 240000- 50000 ✓ = 190 000 ✓

(2)

2.1.4. F- carrying capacity ✓

The game reserve's limit/ resistance ✓ for impala is 200 000 ✓

(3)

2.1.5. Limited/ competition for food

Competition for water

Competition for shelter

Spread of disease ✓✓

(any 2)

2.1.6. The number of impala fluctuate around the carrying capacity (decrease when it is exceeded and increase when the numbers fall below) ✓

This indicates a stable population with little risk of becoming extinct ✓

(2)

[13]

2.2.

2.2.1. No immigration ✓ or emigration ✓ occurs.

(2)

2.2.2. Marking must not harm the tortoise

Must not interfere with behaviour or locomotion

Must remain on the animal for the duration of the investigation ✓✓

(any 2)

2.2.3.

$$\frac{37 * 24}{11} \checkmark$$

$$11 \checkmark$$

$$= 80 \text{ tortoises } \checkmark$$

(3)

2.2.4. Indirect ✓

(1)

2.2.5. Completing more sample sessions ✓ and getting an average ✓

(2)

2.2.6.

- a. When animals are in fixed positions or are very slow moving ✓

When the area to survey is very large ✓

(2)

- b. Eliminates bias and improves reliability ✓

Every member of the population has an equal chance of being selected ✓

(2)

[14]

2.3.

2.3.1.

2.3.1.1. False/ F ✓

2.3.1.2. True/ T ✓

2.3.1.3. True/ T ✓

2.3.1.4. True/ T ✓

2.3.1.5. False/ F ✓

(5)

2.3.2. E.g. between Giraffe and kudu (accept other appropriate examples)

Giraffes eat the upper leaves of trees while kudu eat from lower branches

OR

Between browsers and grazers (e.g. kudu and zebra; black and white rhino)

Kudu feed off lower branches of trees while zebra eat the grass

(one named example ✓ + description of strategy ✓✓)

(3)

[8]

2.4.

2.4.1.

(a) 1,5 billion ✓ (accept 1.25-1.75 billion)

(1)

(b) 10,5 billion ✓ (accept 10.25-10.75 billion)

(1)

2.4.2. Food production and therefore food security have increased substantially.

More land has been cultivated for food production

Methods of treating diseases have improved greatly ✓

(any 1)

2.4.3. If the population continues to grow at such a rapid rate the earth's resources will run out

Food security will continue to decrease

Too much pressure is being put on the earth's resources

Any other acceptable answer

✓✓

(any 2)

[5]

Total Question 2: 40 marks

LIFE SCIENCES

Question 3

- 3.1.
- 3.1.1. A DNA test is a medical procedure done to analyse genetic information/ chromosome analysis. ✓
DNA sample amplified using PCR. A DNA sample is subjected to gel electrophoresis OR description of process. ✓
It separates into different band widths according to mass. Gives us a picture known as a DNA profile. ✓ (3)
- 3.1.2. FOR: it was not their fault; their baby belongs to them so should be returned to them OR any other suitable point ✓✓
AGAINST: already bonded with the other baby; too traumatic to separate OR any other suitable point. ✓✓ (4)
- 3.1.3. Child 1 ✓
Their DNA bands match one of the parents' bands ✓ (or child 2 is not as their DNA bands do not match either of the parents' bands) (2)
- 3.1.4. Identifying dead bodies; linking criminals to crime; identifying source of poached plants and animals; any other relevant answer. (NOT paternity) ✓✓ (any 2)
[11]
- 3.2.
- 3.2.1. Consists of two strands/ double stranded
helix/spiral shape
circles show the position of sugar molecules in backbone of strands ✓✓ (any 2)
- 3.2.2. Cytosine ✓ and guanine ✓ (2)
- 3.2.3. Rosalind Franklin ✓ (1)
- 3.2.4.
(a) Sample 1 ✓ (1)
- (b) A and T bases (or C and G) are equal percentages ✓ therefore it is double stranded/ complementary ✓
Thymine is present✓/ there is no uracil ✓ (any 2)

(c) DNA has thymine and RNA has uracil/ DNA doesn't have uracil and RNA doesn't have thymine

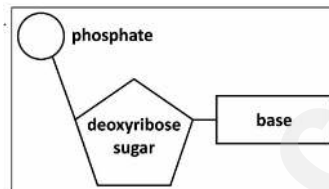
RNA is single stranded and DNA is double stranded

RNA is a shorter molecule and DNA is a longer molecule

RNA has a ribose sugar and DNA has deoxyribose sugar ✓✓

(any 2)

(d) phosphate joined to sugar ✓
sugar joined to base ✓
correctly labelled ✓✓



(4)

[14]

3.3. (1)

3.3.1. Number of mosquitoes ✓ (1)

3.3.2. 1968 ✓ (1)

3.3.3. 20 ✓ (1)

3.3.4. (a) AUG ✓ AGC ✓ GUA ✓ (3)

(b) Substitution ✓ (1)

(c) It will change the amino acid ✓ coded for and therefore the function of the protein ✓ (2)

3.3.5.

	L	I ✓
L	LL	LI
I ✓	LI	II

✓✓ correct F1 genotypes

F1 genotype ratio: 1LL: 2 LI: 1 II ✓

F1 phenotypic ratio: 3 long wings: 1 short wing ✓

(6)

[15]

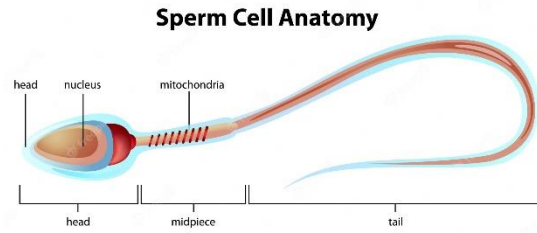
Total Question 3: 40 Marks

LIFE SCIENCES

Question 4

- 4.1.
- 4.1.1.
- (a) Day 14 and Day 28 correctly shown ✓✓ (2)
 - (b) X marked at Day 14 ✓ (1)
 - (c) LH marked at Day 13/14 ✓ (1)
 - (d) FSH marked at Day 5/6/7 ✓ (1)
 - (e) C indicated just after Day 14 ✓ (1)
- 4.1.2. A surge in LH ✓ causes the Graafian follicle to rupture and release a mature egg/ causes ovulation ✓ which occurs on day 14. (2)
- 4.1.3. Secrete progesterone during the first trimester of pregnancy ✓
This maintains the endometrium ✓
And stops FSH from being secreted/ stops new follicles from developing ✓ (3)
- 4.1.4. When FSH levels are high progesterone is inhibited ✓
When progesterone levels increase/ are high then FSH is inhibited ✓
They function on a negative feedback loop/ principle ✓ (3)
- [14]
- 4.2.
- 4.2.1.
- 1- Graafian follicle ✓
 - 3- Corpus luteum ✓
 - 9- Blastocyst ✓
 - 10-Endometrium ✓ (4)
- 4.2.2. The end forms the infundibulum (funnel shape) to widen the receptive area ✓
The infundibulum is comprised of fimbriae which “pull” the ovum into the fallopian tube ✓
Ciliated epithelium in fallopian tube- cilia sweep ovum along to the uterus ✓ (any 2)
- 4.2.3. 2- Ovulation ✓
8- Differentiation/ mitosis ✓ (2)
- 4.2.4. 46 ✓ (1)
- 4.2.5. The haploid nucleus of the sperm and the haploid nucleus of the egg ✓ are present/ fused ✓ (2)

- 4.2.6. Heading ✓
Accuracy ✓
3 correct labels ✓✓✓



(5)

4.2.7.

- (a) Stage where sexual organs mature ✓ for reproduction ✓

(2)

- (b) Testosterone ✓

(1)

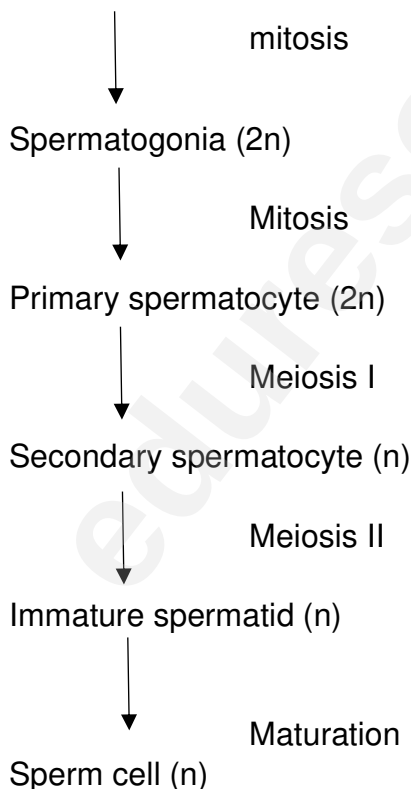
- (c) Shoulders broaden
Pubic hair develops
Facial hair develops
Armpit hair develops
Become more muscular
Skin gets oilier and acne may develop
Penis enlarges
Vocal cords stretch and voice deepens ✓✓

(any 2)

- (d) Spermatogenesis ✓

(1)

- (e) Germ cell (2n)



Correct process ✓
Correct ploidy ✓✓
Flow diagram ✓

(4)

[26]

Total Question 4: 40 marks