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Grade 12 2019
Life Science Prelim Paper 1 Memo

Section A

Question 1

1.1 (10)

Answer
B
A
D
G
H
I
F
J
K
L

1.2

(8)

Question	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5
Answer	A	B	C	C	D

1.3.1.

1. None
2. A Only
3. B Only
4. B Only
5. A Only

(5)

1.3.2.

Parental care: □ by carrying the babies on her back she protects them. □

Courtship/mating dance: □ ensures that the fittest individuals are selected for mating. □

Internal fertilisation: □ female takes sperm into her body which increases the chances of fertilisation □/ protects gametes and embryos from dangers of predation/dehydration□.

Ovoviviparity: □ the eggs are held inside the female body until they hatch inside the body thus protecting eggs from predation □/dehydration/ eggs are nourished by own yolk/ offspring well developed when born so less likely to be eaten by predators□.

Altricial: □ the young crawl onto the mothers back until they are big enough to leave the burrow/ fend for themselves □ **(any 2 X 2)** (4)

1.4

1.4.1 Aloe (learners must underline) □ (1)

1.4.2 isolated) group of individual plants, □ of, one / the same species□, living in the same area□ , at the same time. □ (3)

1.4.3 climate change / global warming□ change in land use / described □desertification□ pollution □ plant hunters □ increase in (new / invasive), grazers / predators□ competition with, introduced species / alien species □ (new) disease / pests□ lack of pollinators□ (Any 3) (3)

1.4.4 high risk of extinction □less chance of, reproduction / pollination□ high risk of genetic diseases□ less / little / no, (genetic) variation □ (small population so) more vulnerable to, pests / disease / catastrophe□ reduced number of alleles □ less likely to, adapt to / evolve to / cope with, (named) change in environment□ (3)

1.4.5 $9-5 \div 9 \times 100$
= 44 %□ (3)

1.4.6 (3)

decrease in population (at all sites) □

D has highest mortality / **B** has the lowest mortality □ site **A** has lost the most number of trees / site **D** has lost the lowest number of trees □

use of data from last column to illustrate - minimum of two □

or

loss of trees from at least two sites or one site between two years □ comparative data quote **A** 12 to 4 / **B** 9 to 5 / **C** 5 to 3 / **D** 6 to 5 (in whole population) there is no (net) increase in number of trees □

difficult to compare changes over time as numbers are for different sites □ site **A** has most trees in original photograph / site **C** has the least □ trees in the original photo ; in 2004, **B** and **D** had the most trees / site **C** had the least trees □

1.5

1.5.1 Endocrine disruptors: chemicals that can interfere with endocrine (or hormone) systems at certain doses. □ (1)

1.5.2 Tag not to interfere with the cat's behaviour/daily activities □, no other smells were transferred onto the tag □. (Any one) (1)

1.5.3 Yes □, article published in a scientific journal □ or peer reviewed by different scientists □ (2)

1.5.4 Thyroid location: each side of trachea □ and below the larynx □ (2)

1.5.5 increase in Metabolism □ – cells using of CHO, lipids □ etc body burns more energy at rest □ – leads to unintentional weight loss. (2)

1.5.6 Antithyroid Medications □, use of Radioactive Iodine □, surgery □ (1)

1.5.7 Negative feedback mechanism □ (1)

1.5.8 1: Thyroid stimulating hormone (TSH) □
2: Thyroxin (T4) □ (2)

1.5.9 Gland B: Pituitary gland □ - it is the main endocrine gland that produces hormones that control other glands and many body functions □ / regulates activity of the endocrine glands □ (2)

1.5.10

The anterior pituitary cells are stimulated to secrete thyroid-stimulating hormone (TSH). TSH binds to receptors on epithelial cells in the thyroid gland, stimulating synthesis and secretion of thyroid hormones, which affect probably all cells in the body. If thyroid hormones increase above a certain threshold, Inhibition of TRH secretion leads to shut-off of TSH secretion from the pituitary, which leads to shut-off of thyroid hormone secretion. As thyroid hormone levels decay below the threshold, negative feedback is relieved, TRH secretion starts again, leading to TSH secretion. (Any 4) (4)

1.6

1.6.1 Carbohydrate/or a food item (1)

1.6.2 Liver (1)

1.6.3 Glycogen (1)

1.6.4.1 glucagon (1)

1.6.4.2 insulin (1)

1.6.4.3 insulin (1)

1.6.5 Diabetes /type 1 diabetes

Any 2 symptoms: thirst, frequent urination, dry mouth/nausea, visual impairment, weight loss (3)

1.7

1.7.1 Adrenal medulla (2)

1.7.2 more alert to protect lamb from predators

muscle tone higher to help defend lamb (2)

1.7.3 increased muscle tone to help deliver the lamb

more blood glucose to give mother energy during birthing.

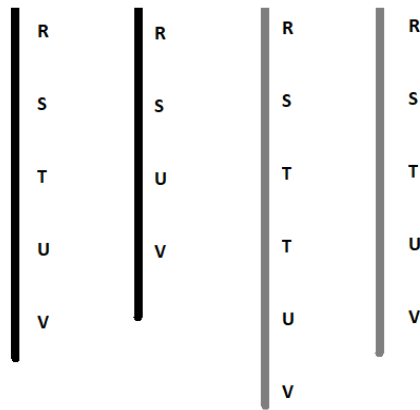
(any two well described) (4)

Section B

Question 2 (46)

- 2.1. Anaphase 2 □ The chromatids/daughter chromosomes are moving towards the opposite poles. □ (2)
- 1
- 2.1. A – spindle fibre □ (2)
- 2 B – cell membrane □
- 2.1. 8 □ (1)
- 3
- 2.1. Humans have 23 pairs of chromosomes, this cell has 4 pairs. □ (1)
- 4
- 2.1. Reduction/halving of chromosome number. □ (2)
- 5 Keep chromosome number constant from generation to generation. □
- Contributes to genetic variation. □ (Any two)
- 2.1. Transcription □ (1)
- 6
- 2.1. Cell nucleus □ (1)
- 7
- 2.1. Codons: UAG CGC UGU ACC
- 8 Amino acids: Stop Arg Cys Thr □□□□ (4)
- 2.1.9 Protein/poly peptide □ (1)
- 2.2.1 Prophase 1 □ (1)
- 2.2.2 Crossing over □ (1)
- 2.2.3 Introduce genetic variation into gametes, ensuring that offspring show variation □, increasing chance of the species surviving □ in times of environmental resistance. (2)

2.2.4



one mark each for length and genes

✓✓✓✓

(4)

2.2.5 Double helix unwinds and unzips.□

The weak hydrogen bonds break (Helicase), allowing the two strands to separate.□

Free nucleotides in the nucleoplasm become attached to their complementary, exposed base partners.□

T bonds with A and C bonds with G.□

The phosphates and sugars of the newly formed strands link together.□

DNA polymerase facilitates this process.□

The two daughter DNA strands twist to form a double helix which wraps itself around histone proteins to form chromatin.□

(5)

(Any five)

2.3.1 Both are transgenic organisms□ as transgenic organisms have genes from a different species. □

Bt cotton has genes from *Bacillus thuringiensis*, while GM rice has genes from *Erwinia uredovora* and *Narcissus pseudonarcissus*. □

(3)

2.3.2 Reducing insect damage means that the cotton plants will grow more and produce more cotton, therefore increasing crop yield. □

(1)

2.3.3 □□ Bt social and biological □□ Golden rice – social and biological

	Social implication	Biological implication
Bt cotton	- farmers cannot use saved seeds; therefore it is expensive as they need to buy new seeds each year - may cause skin disease, reducing quality of life for farmers - less money available as need to buy seed, which impacts on other areas of life, such as food, education, etc. - could increase yield, resulting in more money and potential increases in standard of living	- might contribute to skin diseases in farmers - reduces the environmental impacts of pesticides - genes might get into weed crops and reduce the number of predators for insects that feed on Bt cotton
Golden rice	- farmers can save rice to be used in the next year's harvest, which can lead to increased profits - golden rice improves socioeconomic levels because of a reduction in death and disease - reduced deaths may lead to decreased birth rates - proven safe	- improved nutrition through increased intake of vitamin A - saves lives as avoids vitamin A deficiency - increased intake of vitamin A improves health, leading to benefits to the community

(4)

2.4.1

Yes

- they have had FDA approval so are safe to eat.
- they don't brown so will be more appetising for longer when cut.
- they don't brown so will lead to less wastage. □□

OR**No**

- they have not been on the market long enough to see if there are side effects.
- not right to tamper with nature, should only eat things in their natural form.

(Or any other reasonable answer.) □□

(2)

2.5.1

P1 BW x BW (OR $C^B C^W$) □

Gametes B W x B W □

	B	W
B	BB	BW
W	BW	WW

F1

□ Parental genotype

□□ Method

Ratio Genotypes BB:BW:WW

1: 2: 1 □

Ratio Phenotypes

Black: White: Erminette

1: 1: 2 □ (7)

2.5.2 codominance □ (1)

Question 3 (39)

3.1.1 It was expected that (relationship between variables □□) Increased exposure to Wifi /electromagnetic waves decreased sperm motion/increased sperm death rate. Could be positive or negative statement. (2)

3.1.2.1 Time □exposed to electromagnetic waves /exposure or not to electromagnetic waves (1)

3.1.2.2 sperm motility/motion rate□ and sperm death rate□ (2)

3.1.3 control group: not exposed to electromagnetic waves □
Ensure all variables are fixed and results are due to the independent variable only□/
Ensure a comparison can be made between exposure to waves or not. □ (2)

3.1.4 sperm inactivity – electromagnetic waves inactivate/denature proteins/hormones shapes/function etc. (1)

3.1.5 Combination of reasons such as exposure to chemicals□, pollution□, stress □ and unhealthy diet. □ Any one (1)

- 3.1.6 No – experiment not repeated, too few people used in study. . □ □ (2)
- 3.1.7 To swim to/reach/move to egg□ quickly / whilst egg/sperm are viable□ (2)
- 3.2.1 Transverse/cross □ (1)
- 3.2.2 Testes □ (1)
- 3.2.3 A or C□ (1)
- 3.2.4 developing sperm need nutrients to grow □ (1)
- 3.2.5
- Actual = (4)
- =
- =
- =
- 3.3.1 Menstruation is a cyclic shedding of endometrium□ and the discharge of a bloody fluid from the uterus / out of vagina □ (2)
- 3.3.2 Days 19 to 23 (with 1 point leeway on either side) □ □ (2)
- 3.3.3 **A** Graafian follicle/Secondary oocyte□
- B** corpus luteum□ (2)
- 3.3.4 **C** umbilical cord □
- D** vagina wall / cervix □
- E** placenta□
- E: which functions to provide nutrients and oxygen to the foetus/ remove waste products/ provides immunity□ (4)
- 3.3.5 A single large cell (larger than the sperm) □ large nucleus□ 23 chromosomes□ cytoplasm contains yolk□ surrounded by a jelly coat□ cell membrane has many microvilli □ has more cytoplasm than sperm □ surrounded by follicle cells
- round cell□ (any 2) (2)
- 3.3.6 Change in hormones oestrogen levels are very high which causes oxytocin □ / prostaglandins to be released □/ pressure of the head on the cervix that stimulate the uterus wall contraction □ (any 1 + 1) (2)

3.3.7 200 /4 □ = 50 minutes □ (2)

3.3.8 (2)

Female Condom	Contraceptive Pill
Barrier method	Hormonal contraceptive (oestrogen and progesterone)
Effective against STIs	Ineffective against STIs

Question 4 (37)

4.1.1i A $(34/6) = 5.7$ □

B $(41/6) = 6.8$ □ (2)

4.1.1ii A $(5.7 \times 250) = 1425$ □

B $(6.8 \times 375) = 2550$ □ (2)

4.1.2 Number of bugleweed reduced in B **and** numbers of plantain increased in B □ (2)

/ Bugleweed more affected by trampling (than plantain) □

Relevant reference to table of results/loss of bugleweed relatively much greater than increase in plantain □

(1)

4.1.3 **Any 2 (x1) from diagram:**

- In **A** greater shading □/lower light intensity because of trees □
- Availability of water □ – e.g. one field is further from stream □
- Less nutrient available in field A □ as it is taken by tree roots □
- Less wind in field A □, protected by trees □

(4)

4.1.4 Reference to a random method by name or apparatus □

Description of method to generate random coordinates, dice and tapes/or equivalent

□ Place quadrats (where coordinates meet), {identify/count/record} plants □ (2)

4.1.5 (To have sufficient data) for valid {results/conclusions} □ (1)

- 4.1.6 Number of species reduced C (one lost B) □/Species B has been lost □
Numbers of two species changed □/C has reduced □/ A has increased □ (2)

4.1.7 **Any two (x1) from**

- Provides food □ Industrial material □ Medicines □ Amenity value/leisure pursuits □
Allows food chains to remain stable □ (2)

4.2

- 4.2.1 number of organisms □ an ecosystem can support □ (2)

- 4.2.2 human population has increased □ so much that earth cannot support numbers □
(accept other suitable wording) (2)

- 4.2.3 improved methods of agriculture □ to increase amount of food produced □
improved life span □ by better medical technology □
more people can live in same area □ due to high rise building □
[name explain] × 2 (accept other correct explanations) (4)

- 4.3.1 MUST relate to social organisation only
NEED 2 similarities each; and 2 differences each = 6 (6)

Social organisation	BEES	WILD DOGS
Similarity 1	- All have social organisation where work divided amongst different individuals. - All cooperatively care for the young. □ - Have dominant breeding female and male/s – own reproduction foregone etc any 2 similarities	
Similarity 2		
Difference 1	Dominant queen mates with many males on nuptial flight – polygamous □	Alpha male and female – monogamous □

Difference 2	Different workers do different jobs in the hive eg clean, fetch nectar/pollen – set roles. □	All others in pack share in duties , all participate in hunt, looking after young eg aunts if alpha female hunts. □
etc	Male drones die after mating with queen on nuptial flight. □ etc	Alpha male and female mate for life. Male does not die after mating. □ etc

- 4.3.2
- The wild dogs work together to hunt and kill the prey □ which greatly improves the chance of a successful hunt.
□ *NB must refer to hunting/hunting tactics only!*
 - Singling out the prey so separated from rest of herd□
 - Flank prey from side, then ambushed by rest of pack. □
 - Tire out the prey. □
 - Dogs take turns leading the hunt to ensure that the lead dog is fresh since the leader uses some energy in the chase □
 - Once prey is down a few dogs attack together making it more difficult for prey to escape and decreasing the chance of a dog being injured□
 - Vocal communication during the hunt improves the kill rate□ Any 3 (3)

4.3.3 **wild dogs** □

- Low mortality in the young □ - other adults feed the pups / parental care is high □
- Smaller number of pups (than insects) □ and much protection so more survive□. etc.

Any 2 points relating to shape of graph (3)