HELENA COLLEGE

Semester Two Examination 2021
Question/Answer Booklet

BIOLOGY
Year 12

Teacher: Mrs. Reddy

WA student Number: In figures: | | | | | | | | |

In words: _____

_____

Time allowed for this paper
Reading time before commencing work: ten minutes
Working time: three hours

Materials required/recommended for this paper
To be provided by the supervisor
This Question/Answer booklet
Multiple-choice answer sheet

To be provided by the candidate
Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course examination

Important note to candidates
No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	30	30	40	30	30
Section Two Short answer	5	5	90	100	50
Section Three Extended answer Unit 3	2	1	50	20	10
Unit 4	2	1		20	10
				Total	100

Instructions to candidates

1. The rules for the conduct of this exam are as detailed in the 2021 Helena College Exam Information for Students document attached to the exam timetable. This can also be found on Seqta under School Documents. Sitting this exam implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer booklet preferably using a blue/black pen. Do not use erasable or gel pens.
3. Answer the questions according to the following instructions.

   Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

   Section Two: Write your answers in this Question/Answer booklet. Wherever possible, confine your answers to the line spaces provided.

   Section Three: Consists of two parts each with two questions. You must answer one question from each part. Tick the box next to the question you are answering. Write your answers in this Question/Answer booklet.
4. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
5. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

BIOLOGY **YEAR 12**

Section One: Multiple-choice 30% (30 Marks)

This section has **30** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 40 minutes.

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1. Two alleles, *R1* and *R2*, are present for the agouti gene in mice. Mice that are homozygous for the *R1* allele have black fur, mice that have both the *R1* and *R2* alleles (i.e. heterozygotes) have yellow fur, and mice that are homozygous for the *R2* allele die before being born. Two yellow mice were mated repeatedly to produce multiple litters.

The proportion of surviving offspring that have yellow fur is expected to be

(a) 0.25.
(b) 0.33.
(c) 0.50.
(d) 0.67.

2. A virus

(a) does not contain protein.
(b) does not contain nucleic acid.
(c) can synthesize both proteins and nucleic acids.
(d) cannot synthesize either proteins or nucleic acids.

Biologists counted the number of seeds produced by the flowers on five plants infected with a disease. The data are shown in the table. Note that some plants had more flowers than others.

The number of seeds per flower for each of the five plants

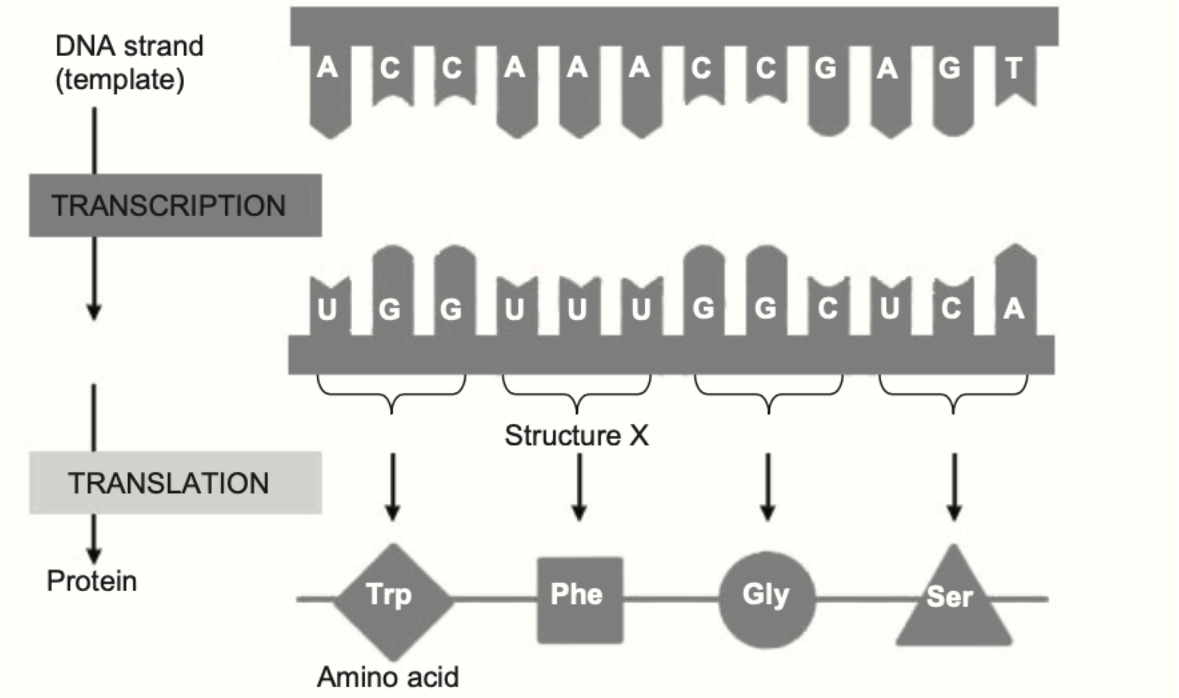
	Flower 1	Flower 2	Flower 3	Flower 4
Plant 1	17	22	18	18
Plant 2	12	2	9	–
Plant 3	40	16	13	14
Plant 4	21	18	–	–
Plant 5	41	–	–	–

3. The range in the number of flowers per plant is

(a) 0–41.
(b) 2–41.
(c) 0–4.
(d) 1–4.

4. During the translation stage, structure X binds with another structure to determine the type of amino acid formed.

See next page



Which of the following names structure X and the structure that binds to it correctly?

	Structure X	Structure that binds to structure X
(a)	anticodon of mRNA	codon of tRNA
(b)	codon of tRNA	anticodon of mRNA
(c)	anticodon of tRNA	codon of mRNA
(d)	codon of mRNA	anticodon of tRNA

5. Which one of the following statements about evidence for evolution is correct?

(a) The wings of insects and birds are homologous.
(b) Organisms produce hundreds of different types of amino acids.
(c) The embryos of both humans and fish have tails.
(d) Soft-bodied organisms are common in the fossil record.

6. A mutation in a DNA sequence results in the substitution of one amino acid for another in a protein product. This mutation has produced a new

(a) allele.
(b) chromosome.
(c) gene.
(d) species.

Questions 7 and 8 refer to the information below.

In the technique of genetic profiling, each DNA profile represents several loci (gene positions) on a pair of homologous chromosomes. If an animal is heterozygous at a particular locus, two bands are seen in the DNA profile. If it is homozygous, only one band is seen.

See next page

DNA profiles for three animals are shown below.

Locus	Allele	Animal 1	Animal 2	Animal 3
A	1	--------		
	2		--------	
	3		--------	
	4	--------		--------
	5			--------
B	1			
	2		--------	
	3	--------		
	4	--------	--------	--------
	5			--------
C	1			--------
	2			--------
	3	--------		
	4		--------	
	5			
D	1	--------		
	2		--------	
	3		--------	
	4			--------
	5	--------		
E	1			
	2	--------	--------	
	3			--------
	4		--------	--------
	5			

7. At how many loci is Animal 2 homozygous?

(a) 4
(b) 3
(c) 2
(d) 1

8. If Animal 1 mated with Animal 3 and produced a single offspring, the offspring

(a) must be homozygous at Locus A
(b) must be heterozygous at Locus E
(c) must be homozygous at Locus D
(d) must be either homozygous or heterozygous at Locus C

9. A gene pool represents

(a) the total number of genes present in a given population.
(b) all the different types of alleles present in a given population.
(c) the phenotypic variation within a given population.
(d) the number of individuals present in a given population.

10. Many seabirds are able to drink sea water because they have glands near the tops of their beaks that excrete salt solution. If sea water contains 35 grams of salt per litre, the concentration of salt excreted from the glands is

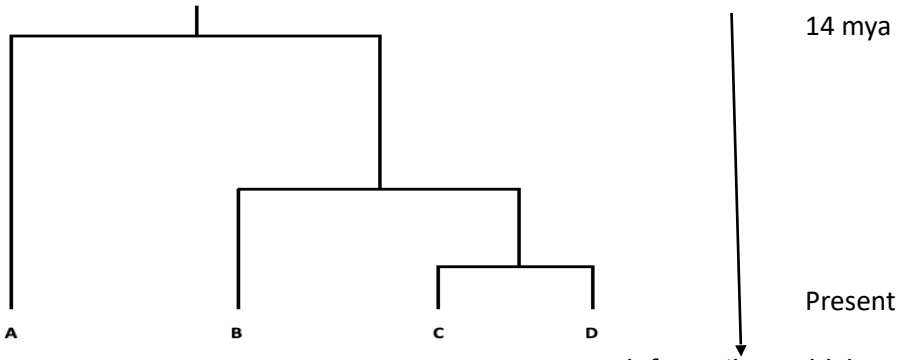
See next page

(a) more than 35 g/L.
(b) less than 35 g/L.
(c) equal to 35 g/L.
(d) dependent on the amount of sea water the bird drinks.

11. Which of the following statements is **true** regarding a genetic disease that is X-linked recessive?

(a) only male offspring are affected
(b) only female offspring are affected
(c) it is inherited from the female parent only
(d) it can be inherited from both male and female parents

A new species of Orangutan has been confirmed using fossils and genomic comparisons. *Pongo tapanuliensis*, or the Tapanuli Orangutan, is found in an isolated pocket of northwest Sumatra, in an area of around 1000 km^2. There are approximately 800 individuals remaining, making the Tapanuli Orangutan the most critically endangered primate on Earth. A more recent phylogenetic investigation has mapped the evolution of the three Orangutan species after their ancestral species split from the other great apes around 14 million years ago. The Tapanuli Orangutan split from its ancestral species approximately 3.4 million years ago, with the Sumatran Orangutan and the Bornean Orangutan diverging around 674,000 years ago.



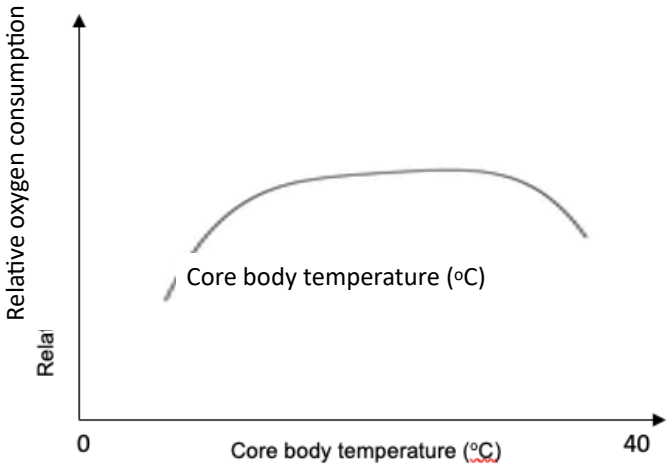
12. Given this information, which position on the phylogenetic tree shown above represents the newly discovered Tapanuli Orangutan?

(a) A.
(b) B.
(c) C.
(d) D.

13. Which one of the following statements about the gene pool is most accurate?

(a) Mutation decreases the size of the gene pool.
(b) Genetic drift increases the size of the gene pool.
(c) The gene pool contributes to biodiversity
(d) Natural selection causes random changes to the gene pool.

Question 14 relates to the information below.



14. The data presented in the graph shown above most likely represents the metabolic activity of a

(a) marsupial.
(b) whale.
(c) fish.
(d) bird.

15. A gradual change in allele frequency of a given population is usually the result of

(a) inbreeding.
(b) an increase in selective pressures.
(c) genetic engineering.
(d) artificial selection.

16. Polygenic inheritance is characterised by

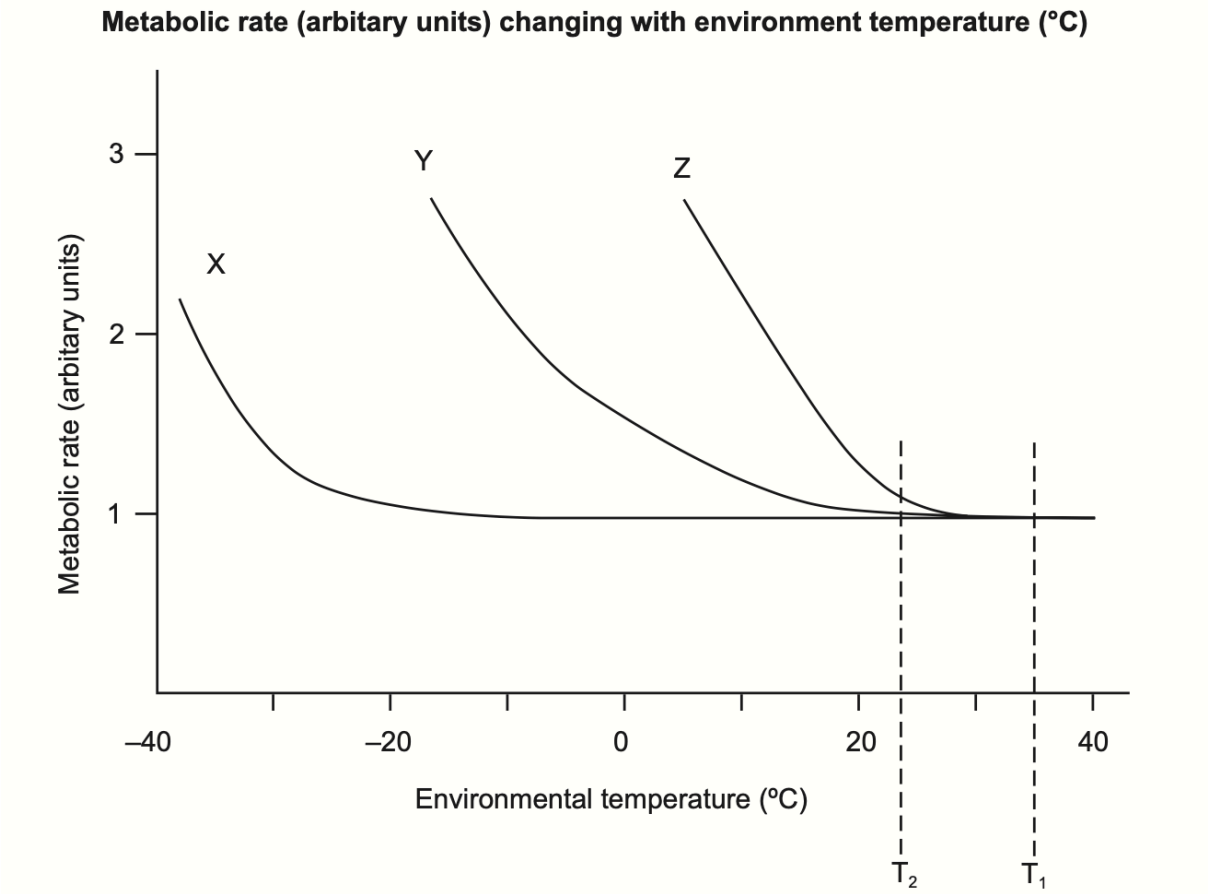
(a) discrete phenotypic variation.
(b) continuous phenotypic variation.
(c) a genotype greater than 2n.
(d) a greater degree of allelic heterogeneity.

17. Fossils provide evidence for evolution because they

(a) show that all living organisms share the same genetic material.
(b) represent the preserved remains of every living organism that has ever lived on Earth.
(c) suggest that life has existed on Earth for billions of years.
(d) reveal the anatomical links between extinct aquatic and terrestrial animals.

Question 18 refers to the graph below.

See next page



18. Use this graph and your knowledge of thermoregulation to determine which one of the following statements is correct.

(a) Animal X has a poorly-developed mechanism for responding to temperature changes.
(b) Animal X would be better adapted to a cold environment than Animal Z.
(c) At temperature T_1 the heat gain of Animal Y is less than its heat loss.
(d) Heat production by Animal Z decreases at temperatures below T_2.

19. Familial hypercholesterolemia is a genetic disorder that results in high levels of cholesterol in the blood and is the main cause of coronary heart disease in people under the age of 55. This disorder is caused by the substitution of a single nucleotide in a gene associated with blood-cholesterol regulation. The mutation does not change length of the gene.

Given this information, the mutation causing familial hypercholesterolemia can be categorized as a

(a) nonsense mutation.
(b) missense mutation.
(c) silent mutation.
(d) frameshift mutation.

See next page

20. Covid-19 is zoonotic and caused by the SARS-CoV-2 virus. Zoonotic viruses can be particularly dangerous because they

(a) have a high mortality rate.
(b) can be transferred between mammal species.
(c) can be transferred between different vertebrate species.
(d) are always highly virulent.

21. Adaptive radiation is a process whereby a species

(a) slowly diversifies into many taxa with similar adaptations
(b) rapidly diversifies into many taxa with differing adaptations
(c) rapidly diversifies into many taxa with similar adaptations
(d) slowly diversifies into many taxa with differing adaptations

22. The stomata of some xerophytic plants are in sunken pits. Which of the following best describes the function of sunken pits?

(a) creating a lower water potential in the leaf to facilitate transpiration
(b) creating a higher water potential in the leaf to facilitate transpiration
(c) creating a higher osmotic pressure in the pit to reduce transpiration
(d) creating a lower osmotic pressure in the pit to reduce transpiration

23. A long loop of Henle may be present in the kidneys of animals to

(a) increase the production of urea
(b) decrease the production of urea
(c) increase the production of water
(d) decrease the production of urine

Question 24 relates to the image below.

See next page

24. The marine iguana (*Amblyrhynchus cristatus*), shown in the image above us an example of an

(a) endothermic poikilotherm
(b endothermic homeotherm
(c) ectothermic poikilotherm
(d) ectothermic homeotherm

25. With age, skin cells produce less collagen, a structural protein, which leads to the appearance of wrinkles. Retinoic acid is a skin treatment that stimulates the skin cells to produce more collagen.

Given this information, which of the following cellular activities is retinoic acid most likely to influence?

(a) mitosis
(b) transcription
(c) cell apoptosis
(d) meiosis

26. In 1959, American horticultural scientists used x-rays and irradiation to produce grapefruit with red flesh and fewer seeds. These changes in grapefruit phenotype are most likely the result of

(a) the suppression of dominant traits.
(b) a decrease in genetic mutations.
(c) an increase in genetic mutations.
(d) stimulating transcription of genes already present in the grapefruit genome.

27. Controlling variables in an experiment is important because it

(a) allows data to be recorded with more precision.
(b) allows the independent variable to be controlled.
(c) improves the validity of the data collected.
(d) improves the reliability of the data collected.

28. Homeostasis can only be maintained if an organism can respond to changes in external or internal stimuli. Which of the following represents a change in internal stimuli of a tropical marine fish?

(a) a reduction in water temperature
(b) an increase in dissolved oxygen in the water
(c) an increase in urine excretion
(d) an increase in ammonia levels

29. Which of the following best describes the defining feature of the negative feedback mechanism of homeostasis?

(a) the outcome is opposite to the input.
(b) the outcome is an amplification of the input.
(c) it is controlled by the nervous system.
(d) a constant internal environment is always maintained.

See next page

30. Malaria is an infectious disease found mostly in tropical climates. Illness in humans is caused by microorganisms from the genus *Plasmodium* which is transmitted from host to host via the following sequence of stage development

(a)	sporozoites	→	gametocytes	→	gametes	→	merozoites
(b)	gametes	→	merozoites	→	sporozoites	→	gametocytes
(c)	gametes	→	sporozoites	→	merozoites	→	gametocytes
(d)	gametes	→	gametocytes	→	sporozoites	→	merozoites

End of Section One

See next page

BIOLOGY **YEAR 12**
Section Two: Short answer **50% (100 Marks)**

This section has **five** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 90 minutes.

Question 31 **(20 marks)**

(a) Use the codon chart below to fill in the table on mutations. (4 marks)

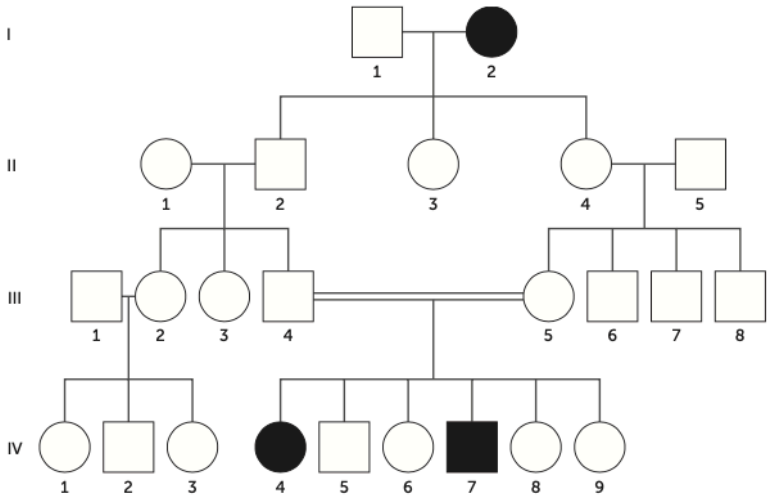
Second Base

First Base	U	C	A	G	Third Base
U	Phenylalanine	Serine	Tyrosine	Cysteine	U
	Phenylalanine	Serine	Tyrosine	Cysteine	C
	Leucine	Serine	STOP	STOP	A
	Leucine	Serine	STOP	Tryptophan	G
C	Leucine	Proline	Histidine	Arginine	U
	Leucine	Proline	Histidine	Arginine	C
	Leucine	Proline	Glutamine	Arginine	A
	Leucine	Proline	Glutamine	Arginine	G
A	Isoleucine	Threonine	Asparagine	Serine	U
	Isoleucine	Threonine	Asparagine	Serine	C
	Isoleucine	Threonine	Lysine	Arginine	A
	Methionine	Threonine	Lysine	Arginine	G
G	Valine	Alanine	Aspartic Acid	Glycine	U
	Valine	Alanine	Aspartic Acid	Glycine	C
	Valine	Alanine	Glutamic Acid	Glycine	A
	Valine	Alanine	Glutamic Acid	Glycine	G

Genetic Mutation	Amino Acids	Effect on Protein
CACGGG ↓ CACGGC	_____ ↓ _____	
CAGACA ↓ CACGACA	_____ ↓ _____	

See next page

(b) The Pedigree below shows that French bulldogs can be affected by an inherited eye disease known as early onset cataracts, otherwise known as juvenile cataracts (JC). An insertion mutation affects a gene known as the HSF4 gene.



(i) Explain why this disease cannot be X-linked dominant. (3 marks)

_____

_____

_____

_____

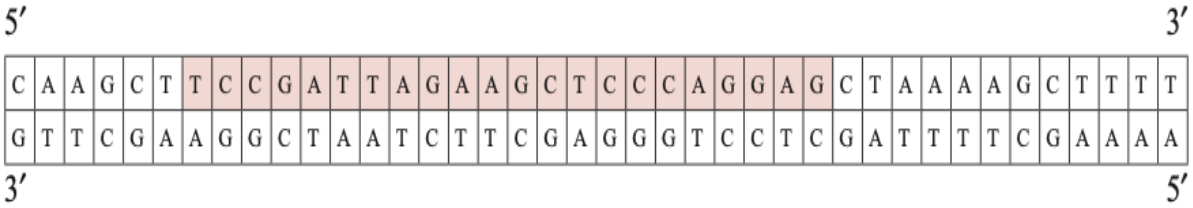
_____

_____

(ii) Use a Punnett square to support your answer in question (i). (3 marks)

Question 31 (continued)

(c) A gene has been marked as potentially beneficial and scientists want to sequence it and test it. The coding strand of the gene of interest is shaded. Below is a table of restriction enzymes used to genes.



Enzyme	Bacterial source	Restriction site	After cutting
*Eco*RI	*Escherichia coli*	5′GAATTC3′ 3′CTTAAG5′	5′G AATTC3′ 3′CTTAA G5′
*Hind*III	*Haemophilus parainfluenzae*	5′AAGCTT3′ 3′TTCGAA5′	5′A AGCTT3′ 3′TTCGA A5′
*Alu*I	*Arthrobacter luteus*	5′AGCT3′ 3′TCGA5′	5′AG CT3′ 3′TC GA5′
*Bam*HI	*Bacillus amyloliquefaciens* (H)	5′GGATCC3′ 3′CCTAGG5′	5′G GATCC3′ 3′CCTAG G5′

(i) Use the table of restriction enzymes to select the enzyme that could best cut the molecule into a fragment containing the helpful gene of interest. (1 mark)

_____

(ii) Give two reasons for selecting the restriction enzyme in question (i) (2 marks)

_____

_____

_____

_____

(iii) There is another restriction site in the DNA sequence. Name the enzyme and describe two reasons why this would not be an appropriate site to cut. (3 marks)

_____

_____

_____

_____

_____

(iv) How many fragments would result from running the selected restriction enzyme along this molecule? (1 mark)

_____

(v) Draw a plasmid, cut with the same restriction enzyme from question (i), into one fragment, ready for ligation. Indicate, by writing the correct nitrogenous bases on the overhanging parts, the complementary bases that the gene of interest could anneal to.
(3 marks)

BIOLOGY **YEAR 12**
Question 32 **(20 marks)**

(a) Explain why seemingly unrelated organisms could have a high percentage of very similar genes. (3 marks)

_____

_____

(b) Provide four (4) reasons as to why comparative genomics provides more reliable evidence for relatedness than comparative anatomy. (4 marks)

_____

_____

_____

_____

_____

_____

(c) Compare the types of mutation in a population that result from mutation and crossing over. (2 marks)

_____

_____

_____

_____

(d) What effects can isolating mechanisms have on a population? (2 marks)

_____

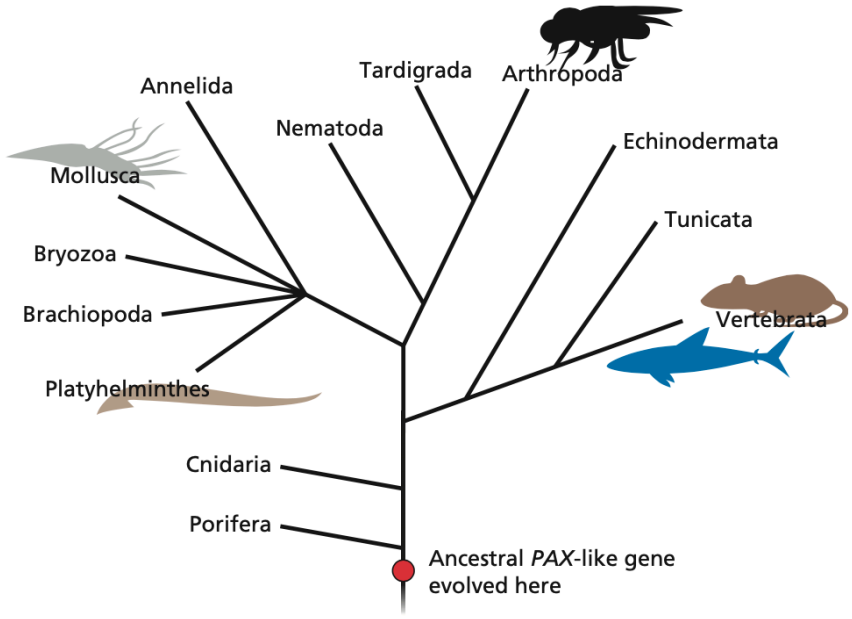
_____

_____

_____

(e) The following diagram shows a phylogenetic tree mapping the 'eye-building' genes across all animals with eyes.

See next page



Explain what this diagram is communicating in relation to the process of evolution. (5 marks)

See next page

Question 31 (continued)

(f) The information below represents the morphological data of different pine trees.

	Morphological characters			
	Number of vascular bundles per needle	Sheath around needle bundle (1 = straight, 2 = curling back)	Number of needles per bundle	Seed wing (0 = absent, 1 = detachable, 2 =permanent)
Japanese black pine	2	1	2	2
Bhutan white pine	1	2	5	1
Chiapas pine	1	2	5	1
Eastern white pine	1	2	5	1
Lacebark pine	1	2	3	2
Red pine	2	1	2	2
Single-leaf pinyon	1	2	1	0

Use the data to construct a phylogenetic tree for the seven pine species (4 marks)

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See next page

BIOLOGY **YEAR 12**

Question 33

(a) When internal factors deviate away from their tolerance ranges, there may be detrimental effects on the organism.

(i) Explain four ways in which an increase in nitrogenous waste may impact the organism. (4 marks)

(ii) Explain four ways in which transpiration supports the physiology of the plant. (4 marks)

(iii) Explain the mechanism of stomata opening and closing. (4 marks)

See next page

(iv) List four benefits of endothermy. (4 marks)

(v) List four benefits of ectothermy. (4 marks)

Question 34

(a) Infectious diseases are on the rise. This is partly due to the pathogens that cause these infections.

(i) State three ways in which a bacterial pathogen can harm its host. (3 marks)

See next page

(ii) Describe the steps that a virus undertakes to replicate itself in a eukaryotic cell. (6 marks)

(iii) Consider the steps outlined in Q (ii) and describe two points at which a virus would be susceptible to antiviral chemical therapies. (2 marks)

See next page

(iv) List 3 features of viruses and bacteria that have contributed to their constant evolution (3 marks)

(v) Viruses affect only specific host cells. Explain how this specificity comes about? (2 marks)

(vi) Explain the different patterns of disease spread. (4 marks)

Question 35

Emperor penguins (*Aptenoytes fosteri*) breed during the Antarctic winters, enduring extreme weather conditions. Male penguins may spend up to four months of the year incubating a single egg while the females hunt for food. During this period, the male penguins do not feed and must keep the egg warm at all times. To withstand the freezing temperatures (-40^{o}C) and damaging winds of up to 200 km/h, the male penguins form tight huddles and routinely rotate their positions from the outside of the huddle to the inside. This behaviour has shown to help maintain an ambient air temperature of up to 24^{o}C at the centre of the huddle.

A biology class was investigating the effect of huddling on temperature regulation. The students wanted to find out whether the size of a penguin huddle has an effect on maintaining a relatively constant

temperature within the huddle. This would be determined by measuring any change in temperature of different sized huddles, over a given period of time.

Three separate 'huddles' were set up using test tubes filled with warm water. Huddle one was represented by a single test tube, while huddles two and three contained 12 and 24 test tubes, respectively. Each test tube contained a thermometer and 10 mL of 40^{o}C water and stoppered with cotton wool. The test tube huddles were held together with a strip of cling film and placed on a wooden stand. The room temperature was recorded at 21^{o}C. All windows and doors were shut, and the lights and air conditioning were turned off. Water temperature of every test tube was recorded intermittently over a 45-minute period and an average calculated.

(a) Identify the independent and dependent variables in this experiment. (2 marks)

Independent _____

Dependent _____

(b) Suggest a suitable hypothesis for this experiment. (2 marks)

_____

_____

_____

_____

The results of the investigation are summarized in the table below.

Table 1: Change in mean water temperature (^{o}C) of the test tube 'huddles' over time.

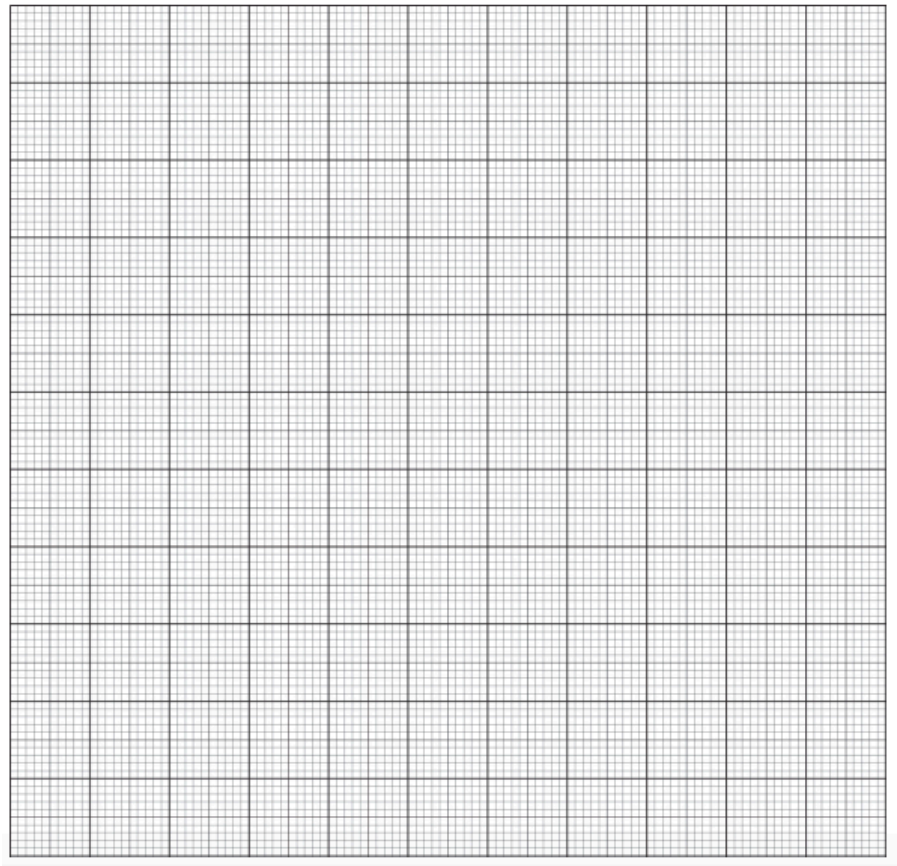
Time (mins)	**Mean water temperature (^{o}C)**		
	Huddle 1	Huddle 2	Huddle 3
0	40	40	40
5	35	38	39
10	32	37	39
15	29	36	38

See next page

20	25	35	37
25	24	35	37
30	23	33	36
35	22	31	35
40	21	29	34
45	21	27	34

(c) Construct a graph of the data from Table 1 in the grid provided below. (6 marks)

There is a spare grid on page 43 of the exam if required



Question 35 (continued)

(d) Using the information presented in the graph, explain the results obtained for each test tube huddle. (6 marks)

_____

_____

_____

_____

(e) State **one** change that could be made to the experimental design and explain how it could better represent penguin behaviour or environment. (2 marks)

(f) State **one** change that could be made to the experimental design and explain how it improves the reliability of the data. (2 marks)

End of Section Two

BIOLOGY **YEAR 12**

Section Three: Extended answer **20% (40 Marks)**

Section Three consists of **four** questions.

Questions 36 and 37 are from Unit 3. Questions 38 and 39 are from Unit 4. Answer **one** question from Unit 3 and **one** question from Unit 4.

Use black or blue pen for this section. Do not use erasable or gel pens. Only graphs and diagrams may be drawn in pencil. Responses can include; labelled diagrams with explanatory notes; lists of points with linking sentences; labelled tables and/or graphs; and/or annotated flow diagrams with introductory notes.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 50 minutes

Unit 3

Choose **either** Question 36 **or** Question 37.

Indicate the question you will answer by ticking the box next to the question. Write your answer on pages 28 - 32. When you have answered your first question, turn to page 33 and indicate on that page the second question you will answer.

Question 36 **(20 marks)**

(a) Perth Zoo is undertaking the task to determine the genome of some of their species. The process that is currently being used to do this has replaced its predecessor. Discuss the similarities and benefits of this process and how it outweighs the older method. (10 marks)

(b) Discuss microevolution and the different processes that can contribute to this type of evolution. (10 marks)

☐ **Question 37** **(20 marks)**

(a) Compare by providing ten differences between DNA replication and transcription (10 marks)

(b) All species are under selection pressures. In some cases, these may lead to a species becoming extinct. In others, they may lead to the evolution of new species. Explain what is meant by selection pressures and how they can lead to extinction. (10 marks)

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Choose **either** Question 38 **or** Question 39.

Indicate the question you will answer by ticking the box next to the question. Write your answer on the pages provided.

☐ **Question 38** **(20 marks)**

(a) An increase in internal factors beyond the tolerance limit will potentially affect organisms. Outline the potential effects on organisms if homeostatic mechanisms failed to compensate for an increase in body temperature, internal water levels and internal salt levels beyond the ideal range. (10 marks)

(b) Pathogenicity and virulence can be related. Discuss these concepts and using influenza as an example, explain how pathogenicity can affect virulence. (10 marks)

☐ **Question 39** **(20 marks)**

(a) A decline in internal factors outside of the tolerance limits can be detrimental to the animal. Assuming that homeostatic mechanisms were disengaged, outline the effects that a decrease in internal water levels and a decrease in internal body temperature, would have on the animal's bodily functioning. (10 marks)

(b) Australian Bat Lysavirus is fatal but has caused a low number of human deaths. Discuss the three interrelated factors that affect its spread and explain why the spread among humans has so far been low. (10 marks)

End of questions

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Supplementary page

Question number: _____

Supplementary page

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Supplementary page

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Supplementary page

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Spare Grid

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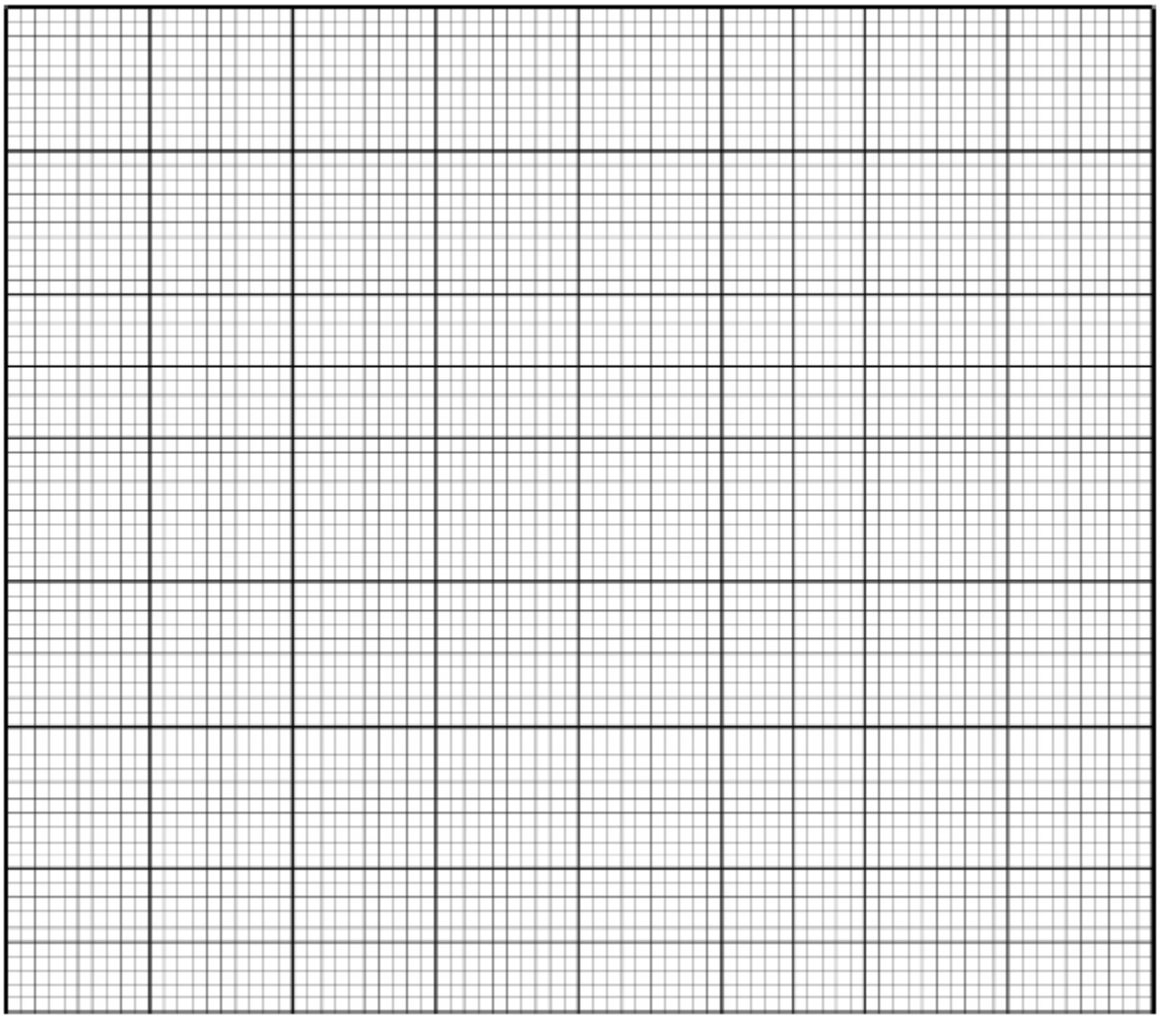

ACKNOWLEDGEMENTS

Question 14
Graph - oxygen consumption vs core body temperature.

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Author constructed

Question 24

Marine Iguana image - Constanza S. Mora
https://www.flickr.com/photos/28788207@N04/47765966752

Question 31

'The Genetic Code', , *Amoeba Sisters* [Online] https://www.amoebasisters.com/uploads/2/1/9/0/21902384/codon_chart_video_companion_by_amoeba_sisters.pdf,

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