



HSC Biology

Exams & Marking Criteria

Student name: _____



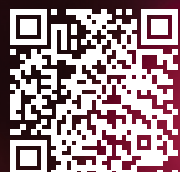


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- B Music
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- B Music
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YOU LOVE STUDIES OF RELIGION? *WHY NOT STUDY:*

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YOU LOVE VISUAL ARTS? *WHY NOT STUDY:*

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- B of Design and Technology
- B of Industrial Design (Honours)

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- B Business
- B Accounting
- B Education (Primary)
- B Education (Secondary)
- B Tourism and Event Management
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- B Criminology
- B Criminal and Community Justice
- B Cyber Security and Behaviour
- B Policing
- B Laws
- B Social Science
- B Humanitarian and Development Studies
- B Education (Primary)
- B Education (Secondary)
- B Construction Management (Honours)
- B Social Work
- B Youth Work

YOU LOVE COMMUNITY AND FAMILY STUDIES STUDIES? *WHY NOT STUDY:*

- B Arts
- B Criminology
- B Nursing
- B Midwifery
- B Psychology (Honours)
- B Psychological and Social Sciences
- B Social Science
- B Youth Work
- B Social Work
- B Humanitarian and Development Studies
- B Education (Early Childhood)
- B Education (Primary)
- B Education (Secondary)

YOU LOVE PHYSICS? *WHY NOT STUDY:*

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- B Education (Primary)
- B Education (Secondary)
- B Engineering
- B Architectural Design
- B Industrial Design (Honours)
- B Design and Technology

YOU LOVE CHEMISTRY? *WHY NOT STUDY:*

- B Science
- B Medical Science
- B Education (Primary)
- B Education (Secondary)

YOU LOVE HEALTH AND MOVEMENT SCIENCE? *WHY NOT STUDY:*

- B Health Science
- B Health, Physical Education and Sport
- B Exercise Physiology
- B Exercise Science
- B Sport and Performance Science
- B Occupational Therapy
- B Paramedicine
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- B Podiatric Medicine
- B Speech Pathology
- B Traditional Chinese Medicine
- B Nursing
- B Midwifery
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YOU LOVE MATHEMATICS? *WHY NOT STUDY:*

- B Computer Science
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- B Engineering
- B Education (Primary)
- B Education (Secondary)
- B Planning (Pathway to M Urban Management and Planning)
- B Accounting

YOU LOVE BIOLOGY? *WHY NOT STUDY:*

- B Health Science
- B Health, Physical Education and Sport
- B Occupational Therapy
- B Paramedicine
- B Physiotherapy
- B Podiatric Medicine
- B Speech Pathology
- B Sport and Performance Science
- B Traditional Chinese Medicine
- B Science
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Biology

Module 5

General Instructions:

- Reading time – 5 minutes
- Working time – 1 hour 10 minutes
- Write using a black pen
- Draw diagrams using pencil
- For questions in Section II, show all relevant working in questions involving calculations
- NESA approved calculators may be used

Total Marks:
40

Section I - 20 Marks

- Attempt questions 1-20
- Allow about 35 mins for this section

Section II - 20 Marks

- Attempt questions 21-26
- Allow about 35 mins for this section

Section I

20 marks

Attempt Questions 1-20

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1-20

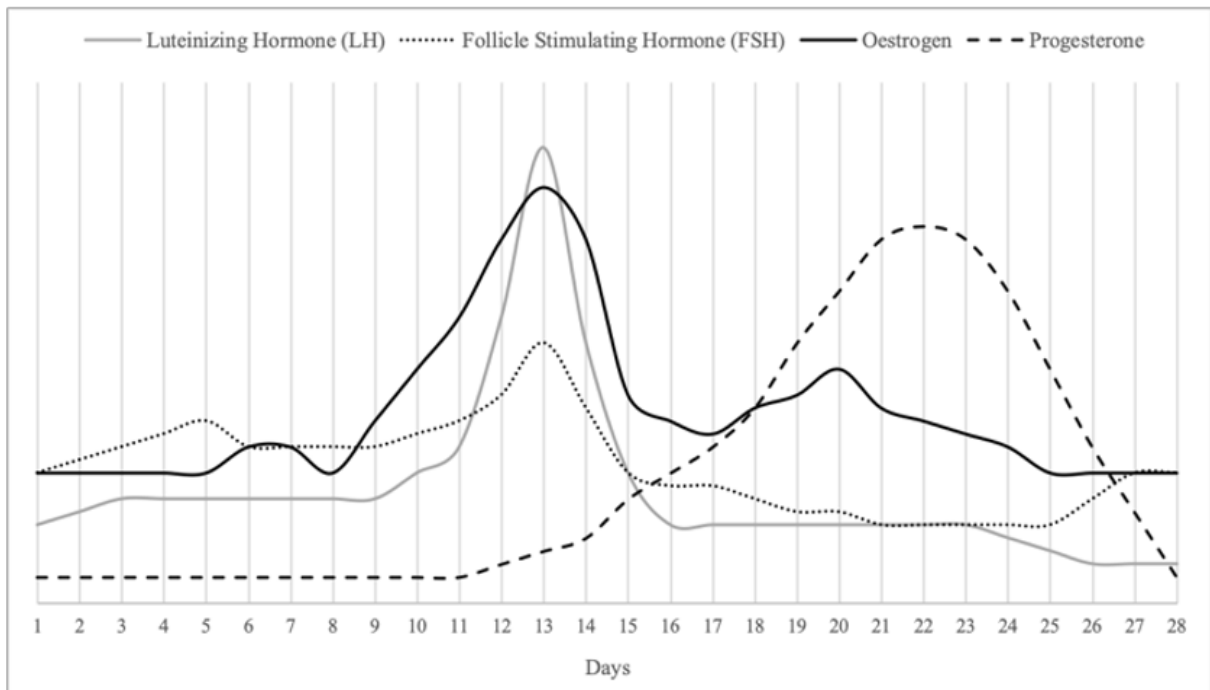
1. Which row of the table is correct with respect to the location and shape of DNA in prokaryotes and eukaryotes?

	Prokaryotes	Eukaryotes
A.	Looped DNA found in the nucleus	Looped DNA found in the nucleus
B.	Looped DNA found in the nucleoid region	Non-looped DNA found in the nucleus
C.	Looped DNA found in the nucleus	Looped DNA found in nucleoid region
D.	Non-Looped DNA found in the nucleus	Non-Looped DNA found in the nucleus

2. Which of the following hormones are produced by the blastocyst as it implants into the endometrium?

- A. ADH
- B. FSH
- C. LH
- D. HCG

3. The following graph shows hormone changes that occur across the menstrual cycle.



What is the hormone that is released after ovulation?

- A. Estrogen
 - B. Progesterone
 - C. Luteinizing Hormone (LH)
 - D. Follicle Stimulating Hormone (FSH)
4. Select the row below which correctly contrasts the characteristics of internal and external fertilisation.

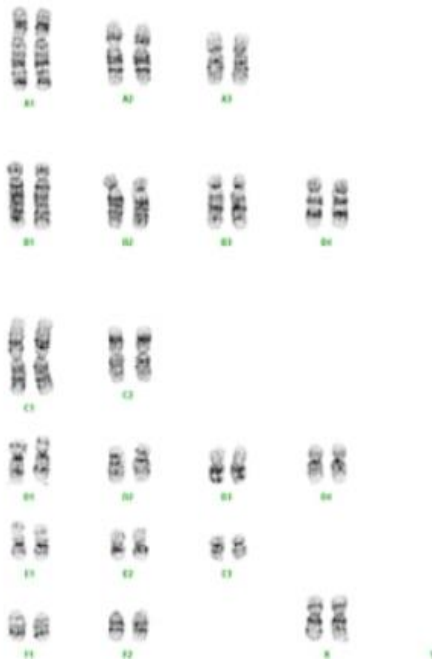
	External fertilisation	Internal fertilisation
A.	Many eggs produced Little parental care of young	Few eggs produced Significant parental care of young
B.	Many eggs produced Significant parental care of young	Few eggs produced Little parental care of young

C.	Few eggs produced	Many eggs produced
	Significant parental care of young	Little parental care of young
D.	Few eggs produced	Many eggs produced
	Little parental care of young	Significant parental care of young

5. In pea plants, round seeds (R) are dominant to wrinkled (r). A pure-breeding pea plant with round seeds was crossed with a pure-breeding plant with wrinkled seeds. The seeds from this F1 cross were collected and grown and allowed to self-pollinate to form the F2 generation. The expected offspring genotypes for this cross would be

- A. 100% Rr
- B. 50% RR, 50% rr
- C. 25% Rr, 25% rr, 50% RR
- D. 25% RR, 25% rr, 50% Rr

6. The image below shows the genotype of a domestic cat. Which row of the table is correct?



	Haploid chromosome number	Diploid chromosome number
A.	38	19
B.	19	38
C.	38	38
D.	19	19

7. Which of the following processes would lead to variations in the offspring of an organism that reproduces asexually?

- A. Fertilisation
- B. Independent assortment
- C. Crossing over
- D. Mutation

8. The karyotype below shows the chromosomes present in the nucleus of a human cell.



The cell must be a:

- A. sperm cell
- B. egg cell
- C. adult female cell
- D. adult male cell

9. Which of the following best describes the role of mRNA in polypeptide synthesis?

- A. Translate codons
- B. Transports information out of the nucleus
- C. Reads genetic code in the cytoplasm
- D. Transports amino acids to ribosomes

Refer to the following diagram which compares the germination rates of pollen stored in different ways for some commercially important plant species to answer question 10

Plant species	% of pollen which germinate		
	Fresh	Dry	Stored in liquid nitrogen
Date	54	59	29
Pine	82	88	84
Pear	50	47	41
Apple	58	17	27
Maize	45	49	39

10. For which of the species listed is it most important to use fresh pollen?

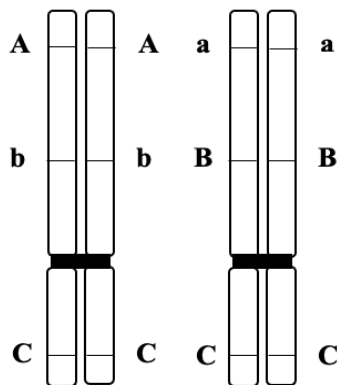
- A. Date
- B. Pine
- C. Pear
- D. Apple

11. Occasionally a sheep and a goat will mate and produce a baby called a geep. Sheep have a chromosome number of 54, goats 60.

What would the chromosome number of the geep be?

- A. 54
- B. 57
- C. 60
- D. 114

12. The diagram below shows a homologous pair of chromosomes paired up early in meiosis. The letters represent the alleles of three genes.



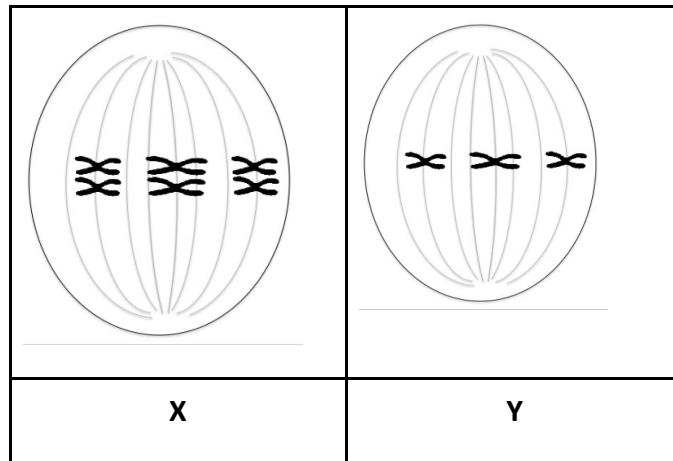
Which process would need to occur for a gamete of genotype ABC to be produced?

- A. Crossing over
- B. Random segregation
- C. Fertilisation
- D. Dominance assertion

13. Which of the following hormones are correctly matched with its function?

A.	oxytocin	stimulates contractions of the uterus to promote birth
B.	glucagon	stimulates storage of glucose in the liver
C.	progesterone	relaxes the pelvis and joints to allow for birth
D.	estrogen/estradiol	prevents contractions of the uterus to maintain pregnancy

14. The following diagrams illustrate two cells from different preparations that are in particular stages of nuclear division. Identify the phases labeled X and Y.

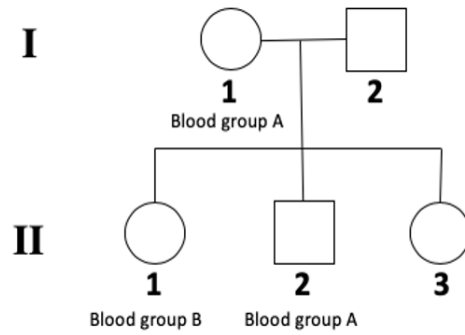


- A.** X - Metaphase I of mitosis; Y - Metaphase II of mitosis
- B.** X - Metaphase I of meiosis; Y - Metaphase II of meiosis
- C.** X - Metaphase I of meiosis; Y - Metaphase II of mitosis
- D.** X - Metaphase II of meiosis; Y - Metaphase I of meiosis

15. In fruit flies, curly wings are dominant (T) over straight winged (t). Two curly winged fruit flies produce 51 offspring with straight wings and 149 with curly wings. What are the probable genotypes of the parent flies?

- A.** TT and Tt
- B.** TT and tt
- C.** Tt and tt
- D.** Tt and Tt

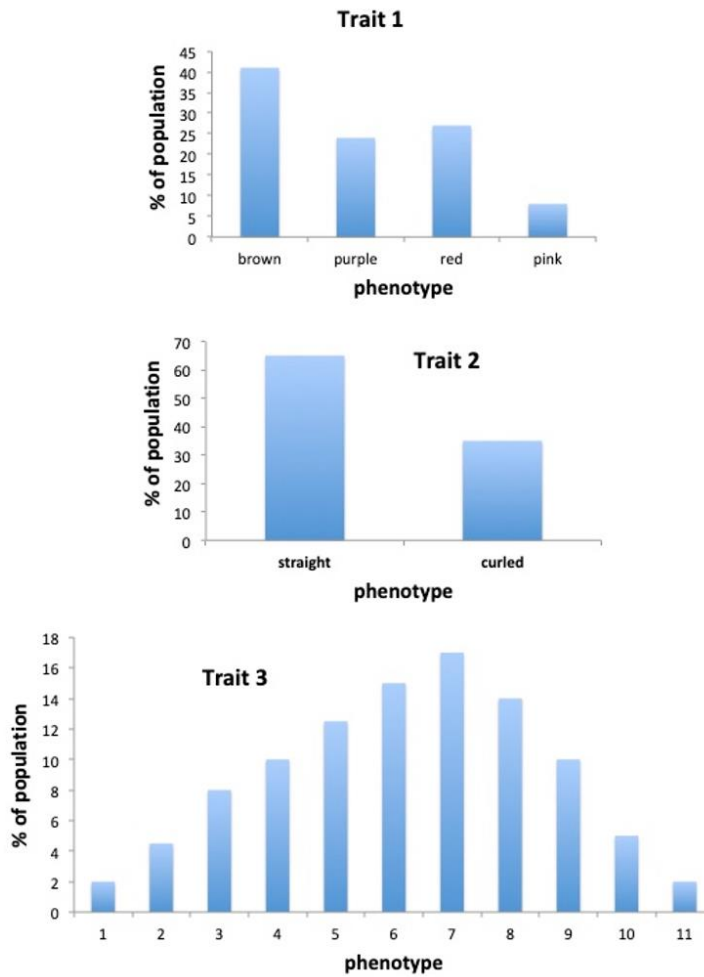
16. The following diagram shows the inheritance of blood type in a family and indicates the blood type phenotype of several members. The phenotype of one individual in each generation is missing.



Which of the following gives the possible blood types of individuals I, 2 and II, 3?

	Generation I, Individual 2	Generation II, Individual 3
A.	A	AB
B.	AB	O
C.	AB	B
D.	O	B

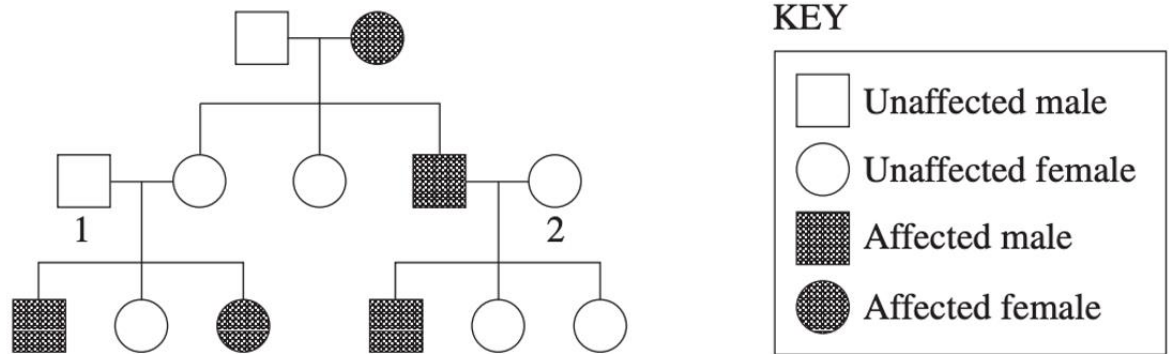
17. The following graphs show the frequency distribution of phenotypes in a population for three different traits.



The types of inheritance responsible for the three traits are most likely to be:

	Trait 1	Trait 2	Trait 3
A.	one gene - two alleles	polygenic	one gene - multiple alleles
B.	polygenic	one gene - multiple alleles	polygenic
C.	two linked genes	one gene - multiple alleles	one gene - multiple alleles
D.	one gene - multiple alleles	one gene - two alleles	polygenic

18. The following pedigree shows the inheritance of a disorder



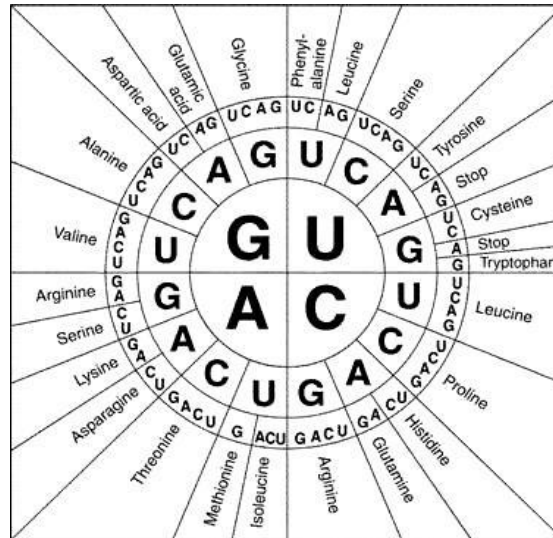
Which row of the table shows the genotypes of individuals 1 and 2?

	Individual 1	Individual 2
A.	Aa	Aa
B.	AA	Aa
C.	$X^A Y$	$X^A X^a$
D.	$X^a Y$	$X^A X^a$

19. The sequence of bases on a section of mRNA is given below.

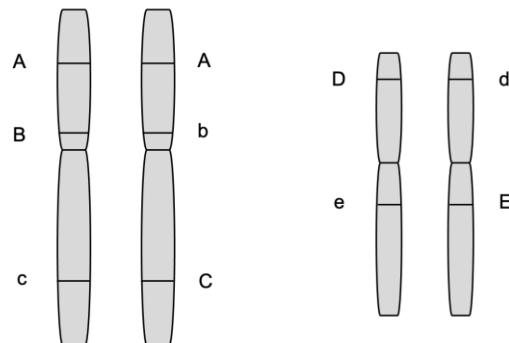
UAUGCUAAG

Use the mRNA wheel to identify the amino acid coded for by the second codon.



- A. Tyrosine
- B. Methionine
- C. Serine
- D. Alanine

20. The diagram below shows two pairs of homologous chromosomes and the arrangement of the alleles of 5 genes on them.



Assuming that crossing over doesn't occur, which row below shows possible genotypes of alleles produced by this organism.

- A. ABcDE, ABcdE, AbCDe, AbDdE
- B. AbCdE, ABCdE, AbCDE, AbCdE
- C. AbcDE, ABcdE, AbCDe, ABcdE
- D. ABcDe, ABcdE, AbCDe, AbCdE

Section II

20 marks

Attempt Questions 21-26

Allow about 35 minutes for this section

Question 21 (2 marks)

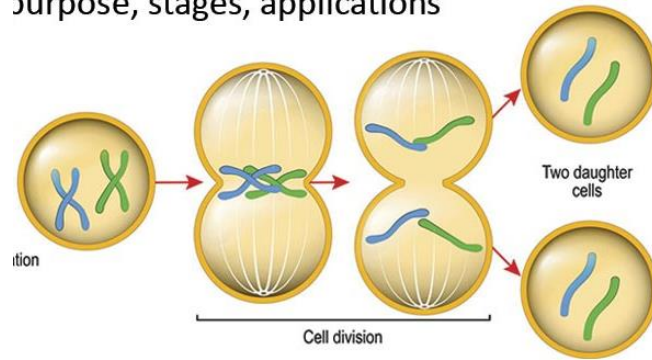
Mitosis is the process in which a somatic cell produces two identical daughter cells for growth and repair of an organism.

The table below outlines the key activities that happens during each distinct stage of mitosis.

Phase	Outline
Prophase	Chromosomes consist of two individual sister chromatids.
Metaphase	Chromosomes line up along the equator.
Anaphase	Sister chromatids of chromosome are pulled apart by spindle fibres.
Telophase	Nucleus begins to reform around each set of chromosomes. Cell begins to pinch.

Using the diagram below, sketch an appropriate graph that shows the distance between the sister chromatids during mitosis.

purpose, stages, applications



Question 22 (3 marks)

An autosomal gene found in cane toads determines colour. The dominant allele causes the cane toads to be brown, whilst the cane toads with the recessive trait are yellow.

A female cane toad reproduces with the same male and can produce 8000 offspring throughout their lifetime. Below are the numbers and phenotypes of the offspring produced below.

Colour	Total Offspring
Brown	6187
Yellow	1813

Justify the genotypes of each of the parents. Use a Punnett square in your response.

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Question 23 (3 marks)

Tay-Sachs disease is a genetically inherited condition in which the mutated HEXA gene stops the cells of the human nervous system from producing an enzyme vital to the function of the brain and spinal cord.

Using Tay-Sachs disease as an example, outline the relationship between genes and enzymes.

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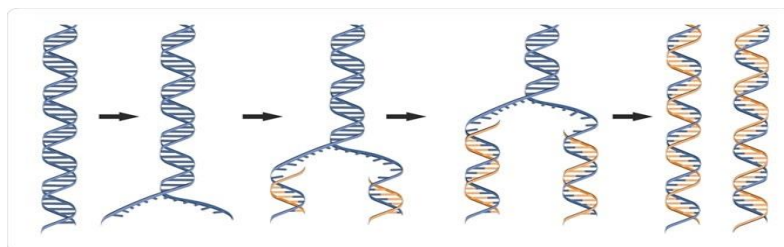
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Question 24 (4 marks)

The following diagram depicts a process in our nucleus



(a) Identify the following process

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(b) Outline why the following model is often called **semi-conservative**.

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(c) If the total amount of adenine in a chromosome is 20%, what is the total amount of guanine present?

1

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Question 25 (3 marks)

Outline a method of asexual reproduction used by a pathogen that may assist its transmission.

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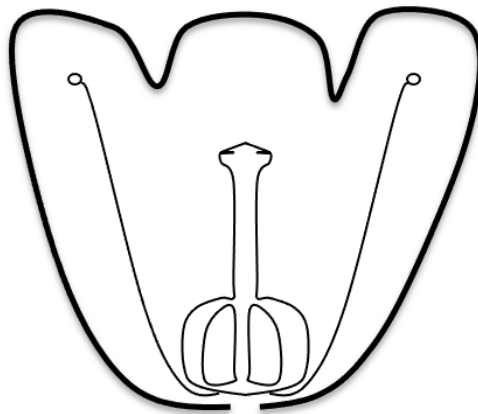
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Question 26 (5 marks)

The drawing below shows the sexual reproductive structures of a flowering plant.



- a) Identify 2 structures in the diagram above that are used in reproduction and outline their function in reproduction.

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b) Most plants can also reproduce asexually. Outline the relative advantages and disadvantages to flowering plants of sexual and asexual reproduction.

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END OF EXAM

Biology

Module 6

General Instructions:

- Reading time – 5 minutes
- Working time – 1 hour 10 minutes
- Write using a black pen
- Draw diagrams using pencil
- For questions in Section II, show all relevant working in questions involving calculations
- NESA approved calculators may be used

Total Marks:
40

Section I - 20 Marks

- Attempt questions 1-20
- Allow about 35 mins for this section

Section II - 20 Marks

- Attempt questions 21-26
- Allow about 35 mins for this section

Section I

20 marks

Attempt Questions 1-20

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1-20

1. Which of the following statements about 'non-coding' DNA segments is correct?
 - A. They are less common than 'coding' DNA segments
 - B. They have some functions
 - C. They are structural mirror images of 'coding' DNA
 - D. They only occur in the DNA of humans

2. Changes to the gene pool can result from several processes such as the movement of alleles in and out of a population as a result of organisms' migration and emigration. This is an example of:
 - A. Natural selection
 - B. Gene flow
 - C. Genetic drift
 - D. Genesis

3. Which statement about germ-line mutations is correct?
 - A. They are always harmful
 - B. They occur in somatic cells
 - C. They are not carried into the offspring of the affected organism
 - D. They are incorporated into the DNA of the offspring of the affected organism

4. A team of scientists have developed a new drug, but it requires testing on mice in a lab. They are discussing whether the benefits of this process outweigh the harmful consequences for the mice.

Which of the following does the discussion address?

- A. Ethical implications
 - B. Social implications
 - C. Economic implications
 - D. Cultural influences
5. Environmental factors can affect the DNA base sequences in a chromosome. Which of the following is an example of this process?
- A. Drugs of addiction result in human brain malfunctions
 - B. Exposure to carcinogenic chemicals results in birth defects
 - C. Improved nutrition results in fewer skin problems in a developing country
 - D. Extra coaching improves a runner's race results
6. The production of insulin is performed using Recombinant DNA technology. Which other form of Biotechnology could this be considered as?
- A. Gene Cloning
 - B. Cloning
 - C. Artificial Insemination
 - D. PCR

7. Scientists moved 20 healthy young mating pairs of *Ground-dwelling Parrots* to a very remote island to save the population from over-predation and forecast extinction.

As the parrot population on the island grows, it is likely that

- A. Over several decades, macroevolution will occur
- B. It will be subjected to a higher level of genetic drift because the population will be as genetically diverse as the original population
- C. It will be subjected to a higher level of genetic drift because the population won't be as genetically diverse as the original population
- D. It will be subjected to a lower level of genetic drift because the population won't be as genetically diverse as the original population

8. Which of the following best describes the outcomes of artificial insemination of cattle?

- A. Artificial insemination produces genetically modified calves that may not be safe for human consumption.
- B. Artificial insemination produces genetically identical offspring
- C. Artificial insemination increases genetic diversity by passing on genes through different populations on different farms.
- D. Artificial insemination enables a large number of cows to be inseminated with sperm from a bull that has optimal characteristics.

9. Sickle cell anaemia is caused by the single substitution of an amino acid in haemoglobin. This change is the result of a:

- A. point mutation
- B. chromosomal inversion
- C. frameshift mutation
- D. polyploidy

10. Canola is an oilseed crop grown for its edible oil and seed meal (the fiber left after the oil pressing process). It is often used as stock feed. Glyphosate is a herbicide that kills 'normal' canola/ A type of canola has been developed to be resistant to this herbicide. This was done by an agrochemical company introducing genetic material from two types of bacterium into the canola's genome.

This is an example of:

- A.** Selective breeding
- B.** Genetic modification
- C.** Natural genetic change
- D.** Replicating an extended DNA sequence that occurs in nature

11. Which of the following lists only potential mutagens?

- A.** tobacco, base analogues, UV radiation
- B.** UV radiation, retroviruses, non-ionising radiation
- C.** UV radiation, transposable genetic elements, microwaves
- D.** ionising radiation, base analogues, exons

12. Which of the following best describes a mutagen?

- A.** A mutagen is a strand of DNA that has a mutation.
- B.** A mutagen is a peptide chain with an incorrect amino acid.
- C.** A mutagen is anything that causes a mutation.
- D.** A mutagen is a tRNA molecule that has misread an mRNA strand.

13. Artificial pollination is a very important reproductive technology in agriculture.

Which one of the following is its chief advantage?

- A.** It reduces genetic diversity.
- B.** It makes it possible to self-pollinate plants.
- C.** It increases the frequency of favourable alleles.
- D.** It increases biodiversity.

14. Introns are:

- A.** Non-coding sequences in DNA.
- B.** Regions of DNA that are expressed in a polypeptide.
- C.** Likely to cause phenotypic change if they undergo mutation.
- D.** Random repeated sequences that code for promoter proteins.

15. Which of the following has been achieved by gene cloning?

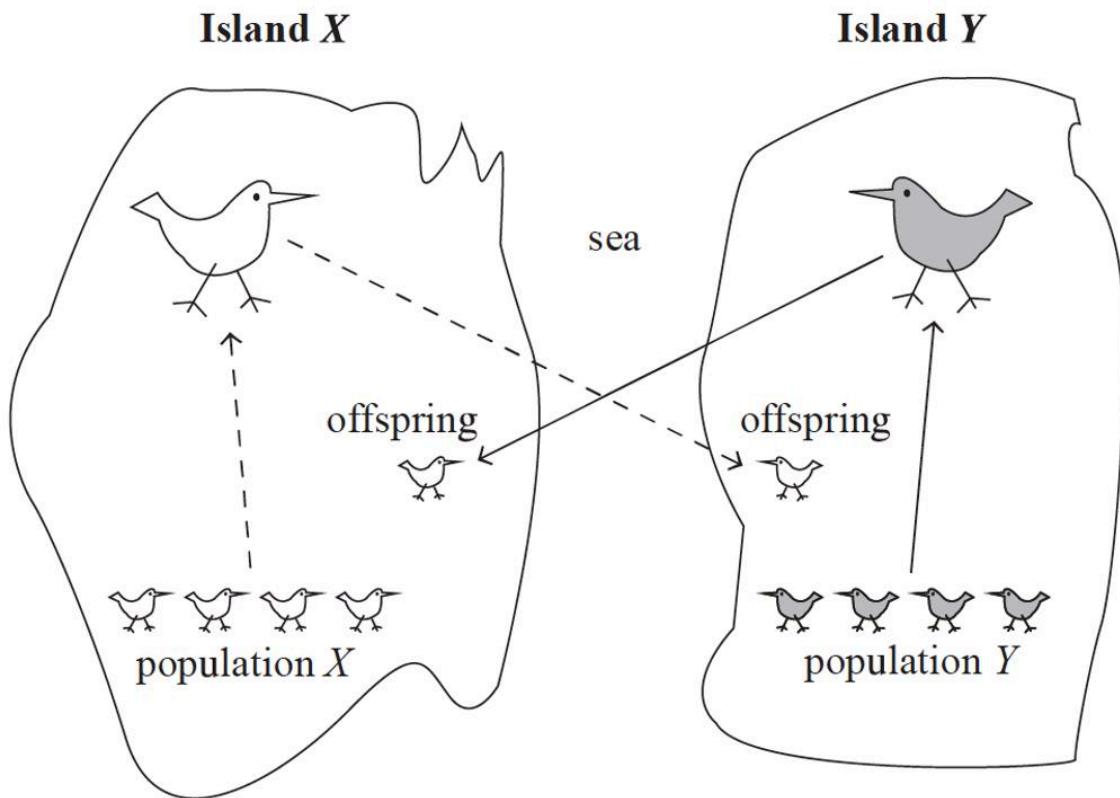
- A.** Production of the first cloned mammal, Dolly the sheep
- B.** Copying of chromosomes to form polyploid plants
- C.** Development of hybrid vegetables such as broccolini
- D.** Economical production of insulin for diabetics

16. A gene from a tomato is inserted into a salmon to make its flesh a brighter red colour.

What is this an example of?

- A.** Cloning
- B.** Transgenics
- C.** In vitro fertilisation
- D.** Artificial insemination

17. The diagram shows the populations of birds of the same species on two islands (X and Y) that have become geographically separated.



Population X has homozygous alleles for a particular characteristic and population Y has different homozygous alleles for the same characteristic. Heterozygous offspring arose when there was some movements of birds between the two islands.

The occurrence of these offspring is an example of:

- A. Gene flow
- B. Gene drift
- C. Asexual reproduction
- D. evolution

18. The grapefruit originated from a cross between an orange and a pumelo.

The new plant has since undergone natural mutations to form a pink/ruby red grapefruit. Farmers now predominantly grow the ruby red grapefruit from offspring of the original mutation.

What is this an example of?

- A.** Cloning
- B.** Transgenics
- C.** Selective breeding
- D.** Artificial pollination

19. The polymerase chain reaction is often used in genetic technologies because

- A.** It produces insulin in bacteria
- B.** It makes clones of some bacteria
- C.** It can be used to denature a segment of DNA
- D.** It can produce multiple copies of a DNA segment

20. The following events occur after DNA is subjected to radiation. The events are listed in no specific order.

P: Mutation

Q: Change in cell activity

R: Change in protein structure

S: Change in polypeptide sequence

What is the correct sequence of steps

- A.** P,Q,R,S
- B.** S,Q,P,R
- C.** S,R,Q,P
- D.** P,S,R,Q

END OF SECTION I

Section II

20 marks

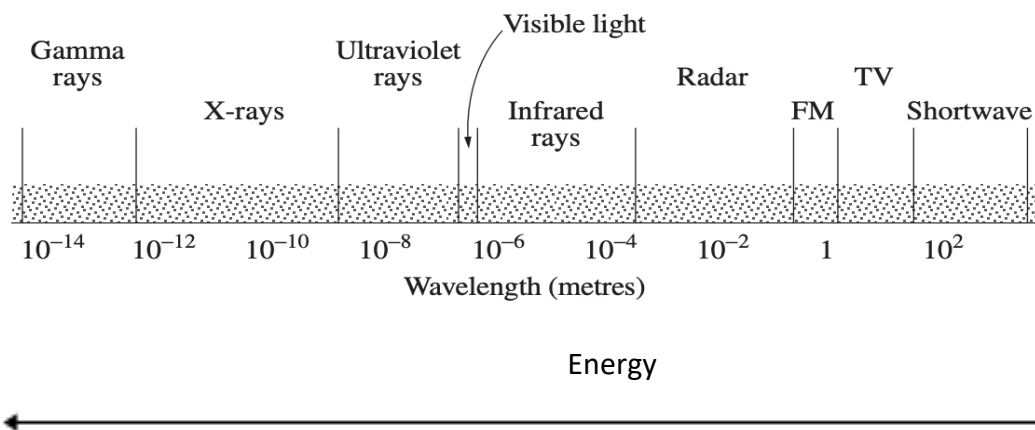
Attempt Questions 21-25

Allow about 35 minutes for this section

Question 21 (4 marks)

The diagram shows various forms of radiation that are part of the electromagnetic spectrum.

A decrease in wavelength causes an increase in mutation rate.



a) Identify ONE form of radiation that is considered to be a mutagen.

1

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b) Explain how this type of mutagen effects DNA.

2

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c) Describe the relationship between energy and the mutagenic nature of radiation 1

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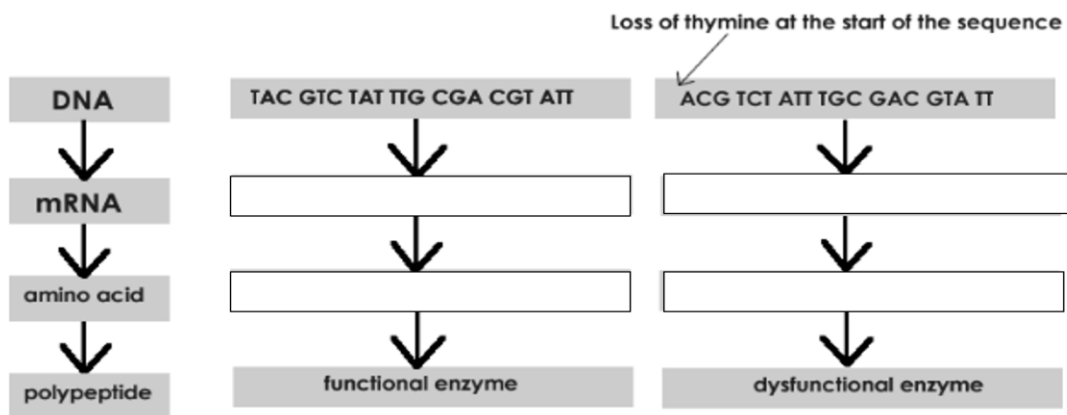
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Question 22 (5 marks)

Below is a flowchart that shows the effect of a mutagen on DNA.

a) Fill in the blanks in the flow chart.

2



		Second Base				
		U	C	A	G	
First Base	U	Phe Phe Leu Leu	Ser Ser Ser Ser	Tyr Tyr Stop Stop	Cys Cys Stop Trp	U C A G
	C	Leu Leu Leu Leu	Pro Pro Pro Pro	His His Gln Gln	Arg Arg Arg Arg	U C A G
	A	Ile Ile Ile Met	Thr Thr Thr Thr	Asn Asn Lys Lys	Ser Ser Arg Arg	U C A G
	G	Val Val Val Val	Ala Ala Ala Ala	Asp Asp Glu Glu	Gly Gly Gly Gly	U C A G
						Third Base

- b) identify the type of mutation that has occurred and explain the potential impact on the code after the change has occurred. 3

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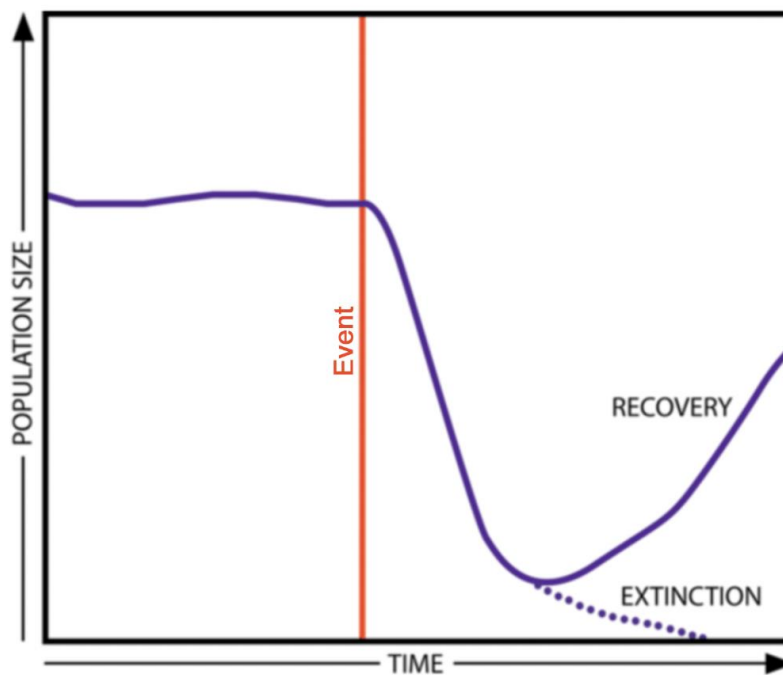
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Question 23 (4 marks)

Refer to the graph below to answer the questions.



- a) Identify a random event that could have caused the rapid decline. 1

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b) Identify the biological term that explains this concept.

1

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c) Explain how this could affect a particular species.

2

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Question 24 (2 marks)

Outline why the phenotype of a cloned organism might not be identical to that of its parent.

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Question 25 (5 marks)

Evaluate the ethical considerations that must be taken into account when modifying the genes of an organism, make specific reference to the stimulus below.



Fluorescent fish go on sale

Despite objections from food safety and conservation groups, zebra fish genetically modified to fluoresce red went on sale in several pet stores in Florida last week. ‘They’re selling really well,’ says Steven Feinberg of the Pet Supermarket chain. Each GloFish costs \$4.99, ten times as much as a normal zebra fish, he says.

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END OF EXAM

HSC SIMULATED EXAM

Biology

Module 7

General Instructions:

- Reading time – 5 minutes
- Working time – 1 hour and 10 minutes
- Write using a black pen
- Draw diagrams using pencil
- Calculators approved by NESA may be used
- For questions in Section II, show all relevant working in questions involving calculations

Total Marks:
40

Section I - 20 Marks

- Attempt Questions 1-20
- Allow about 35 mins for this section

Section II - 20 Marks

- Attempt Questions 21-26
- Allow about 35 mins for this section

Section I

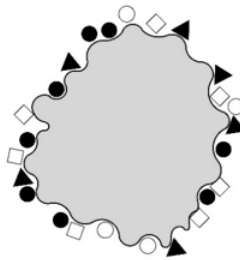
20 marks

Attempt Questions 1-20

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1-20

1. The drawing below represents a human cell with a variety of surface proteins on its cell membrane.



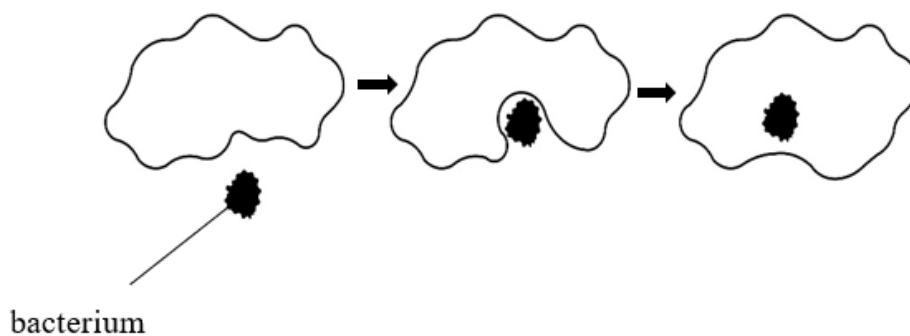
These surface proteins allow the body to:

- A. trap foreign cells in mucus.
 - B. form blood clots to stem bleeding.
 - C. recognise cells as self or non-self.
 - D. activate the sneezing reflex.
2. A possible pathogen is found to be eukaryotic, heterotrophic and have no cell wall. How would it be classified?
- A. Protozoan
 - B. Fungus
 - C. Bacterium
 - D. Virus
3. Koch contributed to an understanding of a disease by developing:
- A. A method to link a particular pathogen to the cause of a disease
 - B. An experiment that disproved the theory of spontaneous generation
 - C. A method of killing microbes by heating and thus preventing decay
 - D. An immunisation program based on a knowledge of immune responses

4. If a media is inoculated with a single bacterium, how many bacteria will be present after one hour, if reproduction occurs every 20 minutes?
- A. 3
 - B. 4
 - C. 8
 - D. 16
5. Cells which are damaged by trauma or bacterial infection release histamines and other chemical messengers. This leads to an increase of circulation to the area, and a movement of fluid from capillaries into the tissue fluid. This is often associated with pain.

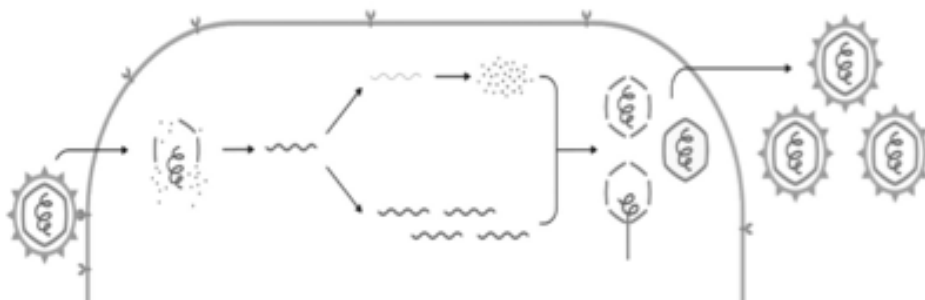
This response to infection is called:

- A. Inflammation
 - B. The immune Response
 - C. The fever response
 - D. Cell-mediated immunity
6. The diagram below represents a response of the human body to bacterial infection. The process represented here is:



- A. Cell mediated immunity
- B. Antibody mediated immunity
- C. Anaphylaxis
- D. Phagocytosis

7. Which of the following is not correct in terms of the chemical changes that occurs during the body's immune response.
- A. Release of cytokines by helper T cells
 - B. Release of histamine to decrease blood flow and permeability of blood vessels
 - C. Release of pyrogen to increase body temperature
 - D. Production of compliment proteins to inhibit pathogen functions
8. Which of the following is not part of the innate immune system?
- A. Stomach acid
 - B. Inflammation
 - C. Cilia
 - D. Production of antibodies
9. The following diagram models the infection of a host by a parasite.



The parasite is most likely to be a:

- A. Bacterium
 - B. Virus
 - C. Protozoan
 - D. Prion
10. What is the name given to cells which make antibodies?
- 1. plasma cells
 - 2. memory B cells
 - 3. killer T cells

4. helper T cells

The next two questions refer to the information about the Ebola outbreak below.

Ebola virus disease was first described from the Sudan and the Congo in 1976.

Since then it has recurred regularly in Central and Western Africa. The most recent outbreak is in the Democratic Republic of the Congo.

The mortality rate is 90%.

The virus is transmitted in human body fluids, particularly blood, vomit and faeces, placing health workers who care for sufferers, or the people who dispose of the bodies, at particular risk.

Infection rates of health workers in remote, poorly equipped locations are much higher than those in well equipped, modern hospitals.

From the World Health Organisation website.

11. From the information above, how would you classify the most recent Ebola outbreak?

- A. an epidemic
- B. a pandemic
- C. a plague
- D. an endemic disease

12. Health workers in modern, well-equipped hospitals have much lower Ebola infection rates than those in remote, poorly equipped ones.

This is most likely due to:

- A. greater availability of antibiotic and antiviral drugs in modern hospitals.
- B. understaffing and poor training in remote hospitals.
- C. poorer diagnostic services in remote hospitals.
- D. better use of sterile procedures and personal protection equipment in modern hospitals.

13. Which of the following is a feature of the adaptive immune response?

- A. Rapid
- B. Specific
- C. Fixed Responses

D. No immunological memory

- 14.** Some farmers have noticed that their sheep are becoming sick and are losing condition. They engage a microbiologist to find the pathogen.

The microbiologist discovers that all the sick animals have a particular bacterium present in their blood. This bacterium cannot be found in healthy sheep.

The microbiologist isolates some of the bacteria and grows them in a pure culture.

What is the next step that the microbiologist needs to take?

- A.** Find out whether an antibiotic which kills the bacteria also cures the sheep.
 - B.** Inoculate healthy sheep with different bacteria to see whether they develop similar symptoms.
 - C.** Inoculate healthy sheep with the cultured bacteria to see whether they develop similar symptoms.
 - D.** Culture bacteria from sheep with similar, but different, diseases.
- 15.** Influenza (also known as the flu) is an infectious disease that is transmitted from person to person. People are most contagious within the first 3-4 days of feeling unwell and during winter, the flu is more prevalent.

The government has rolled out an initiative and materials that workplaces can access. These materials include posters and pamphlets that outline the signs of the flu, what to do if you feel unwell, good hygiene practices and the promotion of being vaccinated against the flu.

What type of disease prevention procedure is being described?

- A.** Vaccination
 - B.** Quarantine
 - C.** Use of pesticides
 - D.** Public health campaigns
- 16.** The scientist that developed the first vaccine for cholera.
- A.** Maurice Wilkins
 - B.** Rosalind Franklin
 - C.** Robert Koch
 - D.** Louis Pasteur

17. The Anopheles mosquito transmits the malaria parasite from one infected person to another.

What is the best classification of this mode of transmission?

- A. Direct contact
- B. Indirect contact
- C. Host transmission
- D. Vector transmission

18. Which of the following statements about Tuberculosis (TB) is correct about data below.

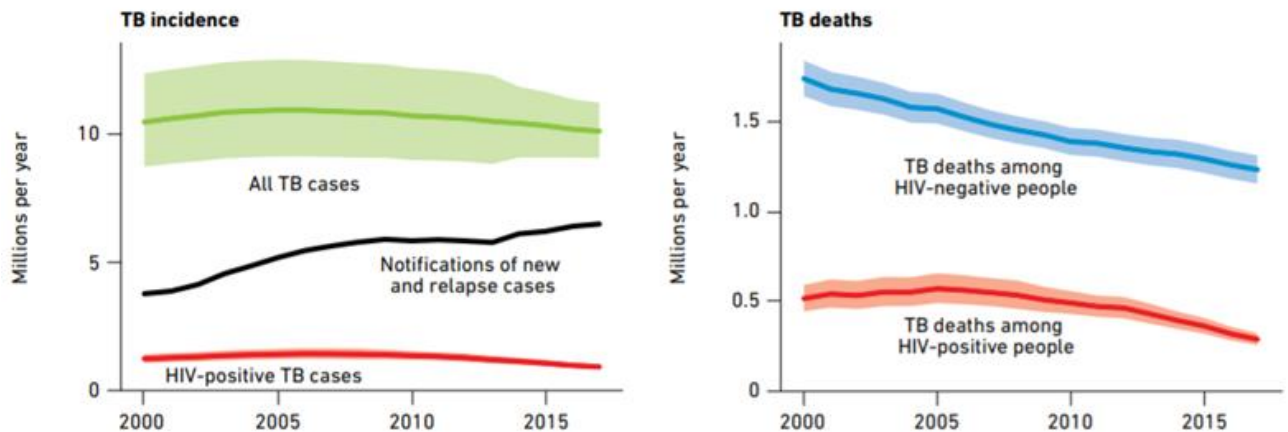
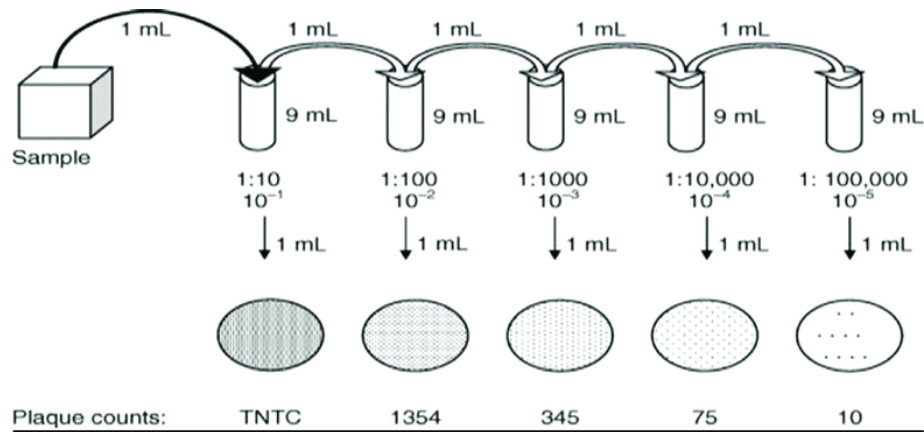


Image from World Health Organisation

- 1. Prevalence of TB has decreased
 - 2. Mortality has decreased
 - 3. Incidence has decreased
 - 4. Having HIV increases your chance of getting TB
19. The term incidence can be best described as:
- 1. The rate of occurrence of new cases of a disease
 - 2. The total number of cases in a given time frame
 - 3. The frequency and distribution of the disease events in a population
 - 4. the risk factors that influence the occurrence of disease.

20. A student conducted an experiment to investigate the microbial growth of a water sample.



Identify the independent variable of the experiment.

- A. Amount of microbial growth (plaque counts)
- B. Type of water sample
- C. Concentration of water sample
- D. Amount of added water

END OF MULTIPLE CHOICE

Section II

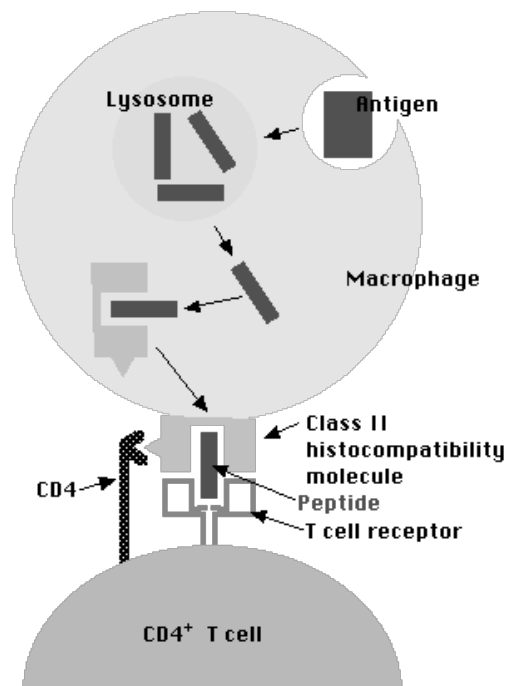
20 marks

Attempt Questions 21-26

Allow about 35 minutes for this section

Question 21 (3 marks)

The drawing below models how macrophages deal with foreign pathogens in the body.



Describe the process represented by the macrophage model.

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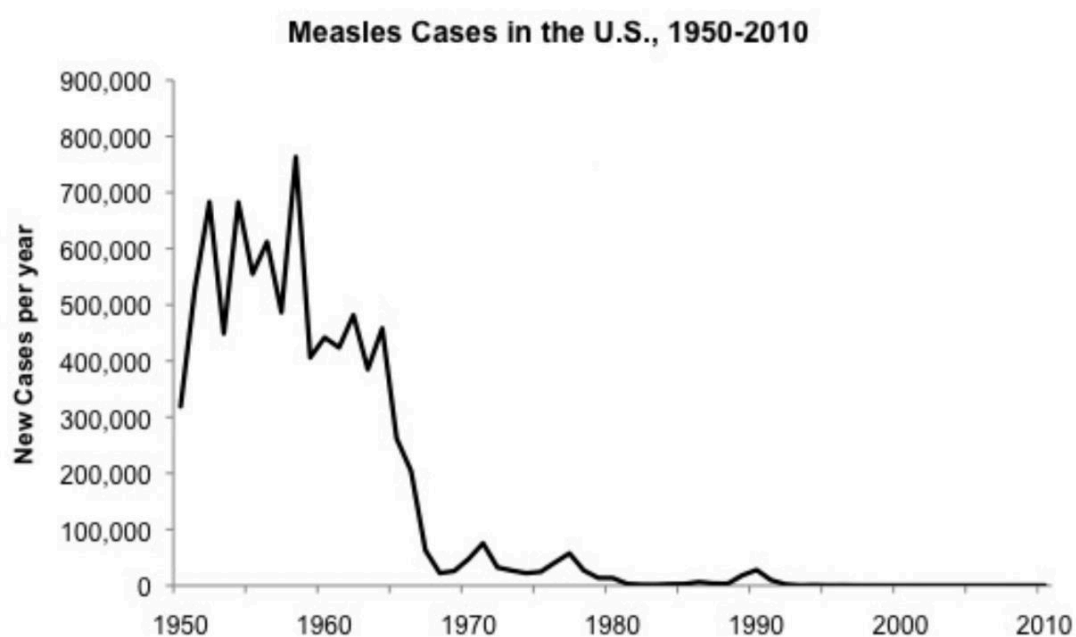
Question 22 (2 marks)

Complete the table below for a pathogen which you have studied.

2

Name of pathogen	
Way in which pathogen is adapted to allow entry into host.	
Way in which pathogen is adapted to facilitate transmission.	

Question 23 (4 marks)



(a) Outline the trend observed in the graph.

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(b) Suggest a possible reason for this trend.

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Question 24 (2 marks)

Natalie went to the doctor after having a headache, sore throat and a cough for a few days. The doctor recommends rest and drinking plenty of fluids. Natalie asks the doctor to prescribe her with antibiotics, but the doctor says that it is most likely a Viral infection.

When Natalie gets home she decides to take some left over anti-biotics she had from a previous illness to help alleviate her symptoms.

Explain why Natalie should not be taking the antibiotics to help her recover from her symptoms.

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Question 25 (3 marks)

Tabulate the function of 2 B or T cells used in the 3rd line of defence in the space below.

Question 26 (6 marks)

Read the article below to answer the questions that follow.

Dieback – An epidemic in Native Australian Plant Species

Phytophthora ‘dieback’ is a plant pathogen that can spread easily, causing disease, death and potential extinction in susceptible plants, and loss of habitat for animals. In Australia, the disease causes damage of epidemic proportions to native vegetation in many regions, particularly in the south-eastern and south-western regions of the country. The disease was first associated with the death of a large number of native plants in the jarrah forests in Western Australia in 1921 and in 1952 in Gippsland (in the south-east of Victoria).

By the 1990’s, the disease had destroyed large areas of native vegetation in Western Australia, Tasmania, Queensland and Victoria, causing local susceptible species to disappear. Today, the area of land infected in Western Australia by Phytophthora dieback is equivalent to 500 times the size of Rottnest Island or over one million hectares. Twenty percent of the states jarrah forest and up to 80% of the Stirling Range National Park is infected.

The disease is caused mainly by *Phytophthora cinnamomi*, which causes root and crown rots, resulting in shoot dieback, chlorotic foliage and defoliation. When rot has girdled the collar region, plants invariably wilt and die. Young eucalypt seedlings tend to show greater sensitivity to phytophthora dieback than older plants. The spread and severity of disease depends very much on the prevailing weather conditions. Being a water mould, *P.cinnamomi* thrives in warm and wet conditions, when the pathogen sporulates and releases motile zoospores which are attracted to and infect the roots. Infected plants may die during hot, dry spells following wet weather, as plants with rotted roots are unable to take up sufficient water to compensate for increased water loss. This pattern is common in the Mediterranean-type environments of the south-western and south-eastern parts of Australia where a warm and wet spring is followed by a hot and dry summer.

Phytophthora cinnamomi affects a large number of species in Australia’s diverse and unique flora, from large trees to prostrate shrubs found that 36 of 47 species native to Tasmania tested were susceptible. An assessment of the susceptibility of 749 native plant species from 253 genera in Western Australia estimated 40% of the 5710 described plant species in the South-West Botanical Province to be susceptible to this pathogen. Of these, about 800 species were ranked as highly susceptible. A field evaluation of susceptibility showed that up to 75% of the native flora in an infested native vegetation site in Brisbane Ranges National Park, Victoria, was susceptible. The disease caused not only local extinction of susceptible species and endangered the continued survival of rare species but also changed the species composition of the plant communities.

(a) Describe how this fungal infection leads to plant death.

2

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(b) Explain why the spread of dieback could be considered an epidemic. **2**

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(c) Describe how a named Australian plant responds to a pathogen. **2**

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END OF EXAM

HSC SIMULATED EXAM

Biology

Module 8

General Instructions:

- Reading time – 5 minutes
- Working time – 1 hour and 10 minutes
- Write using a black pen
- Draw diagrams using pencil
- Calculators approved by NESA may be used
- For questions in Section II, show all relevant working in questions involving calculations

Total Marks:
40

Section I - 20 Marks

- Attempt Questions 1-20
- Allow about 35 mins for this section

Section II - 20 Marks

- Attempt Questions 21-25
- Allow about 35 mins for this section

Section I

20 marks

Attempt Questions 1-20

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1-20

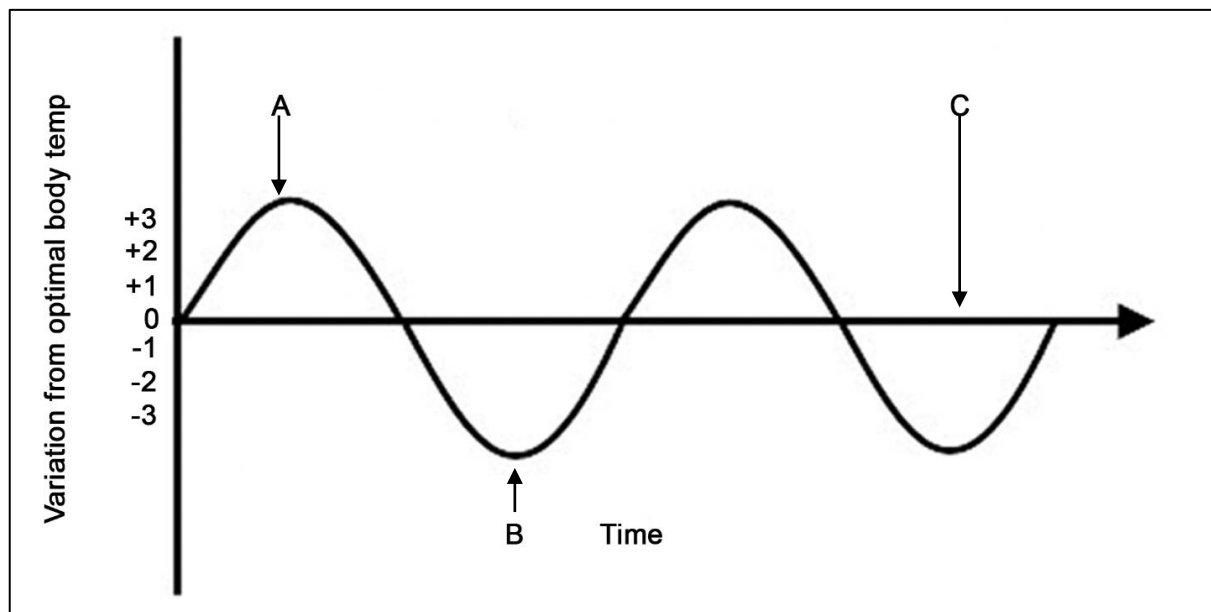
1. Consider the following definition.

A chemical produced by an organ in the body that is transported to another part of the body where it causes a change in other cells, tissues or organs.

This best describes

- A. a gland
 - B. a hormone
 - C. an effector
 - D. a receptor
2. Dialysis is a technology which can be used to help address a disorder in the function of which organ in the body?
- A. Nephron
 - B. Ear
 - C. Kidney
 - D. Eye
3. Which of the following is an example of physiological adaptation in an endotherm that assists in maintaining homeostasis?
- A. a dog moving into the shade to keep cool on a hot day
 - B. lizards moving into sunlight to raise body temperature
 - C. surface blood vessels in a human constricting on a cold day
 - D. animals in cold climates having thick fur coats

4. Identify the body response that would occur at point B in the graph?



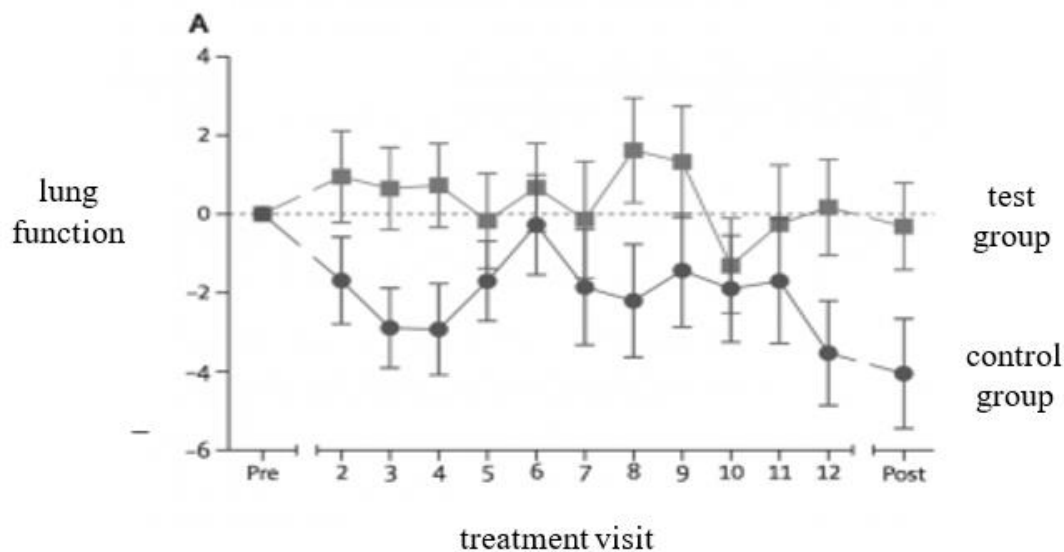
- A. Increased heart rate
 - B. Sweating
 - C. Vasodilation
 - D. Vasoconstriction
5. Which of the following is not a form of epidemiology study?
- A. Clinical
 - B. Analytical
 - C. Descriptive
 - D. Intervention
6. A patient is diagnosed with a disorder in which the pituitary gland overproduces anti-diuretic hormone (ADH). Which of the following combinations of symptoms would you expect to be associated with this disorder?
- A. Reduced urine volume and high blood pressure
 - B. Increased urine volume and high blood pressure
 - C. Reduced urine volume and low blood pressure
 - D. Increased urine volume and low blood pressure

Refer to the following information to answer Question 7 and 8.

For many years, health professionals have been concerned about the increase in new cases of childhood obesity. Recent policies to educate pre-school children about nutrition and exercise have had some impact and the rate of new cases diagnosed each year has stabilised.

7. The data above relates to the
- A. Incidence of childhood obesity
 - B. Prevalence of childhood obesity
 - C. Mortality of childhood obesity
 - D. Frequency of childhood obesity
8. The strategy to address childhood obesity was
- A. Public policies in hospitals
 - B. Genetic engineering
 - C. Drug trial
 - D. Education program
9. Homeostasis, In plants, is best explained as:
- A. a response to an increase or decrease in ambient temperature
 - B. detection of temperature change in the internal environment
 - C. allowing for evolution of plant adaptations
 - D. allowing internal water levels to remain at the same level

Questions 10 and 11 refer to the graph below.



Adapted from Alton et al. 2015. The Lancet.

The graph shows the results of a study on the effectiveness of a type of gene therapy on sufferers of cystic fibrosis, an inherited disease which impairs lung function.

150 sufferers were separated into two groups, a test group and a control group. Patients did not know which group they were in. The test group received the treatment and the control group were treated with a placebo (a treatment which doesn't contain the gene)

Changes in the average lung function of each group are shown in the graph below. Zero on the Y axis represents the lung function at the start of the study and the points on the graph show how lung function (expressed as a %) then varied from this initial level as the study proceeded.

10. Which one of the following is a valid inference from this graph?

- A. The treatment did not produce a lasting improvement in lung function.
- B. The placebo was more effective than the treatment.
- C. There was no difference in the effectiveness of the two treatments.
- D. The treatment produced a lasting improvement in lung function.

11. Which is the independent variable in this investigation?

- A. The number of the treatment visit.
- B. The type of treatment
- C. Lung function
- D. The demographic composition of both groups

12. Hormonal and neural control of animal responses differ in which of the following ways?

- A.** Hormonal controls involve electrical signals and neural responses involve chemical response.
- B.** Hormonal control acts slower for longer periods of time while neural signals act rapidly.
- C.** Hormonal signals are more rapid than neural signals.
- D.** Hormonal control systems use negative feedback while neural control systems do not.

13. Technology can be used to assist people with either hearing or visual disorders. A person with short-sightedness (myopia) can be prescribed spectacles to correct their vision. Which of the following correctly links the problem with the technological solution?

	Problem causing short-sightedness	Correction with spectacles
A.	Eyeball is too long and images fall in front of the retina, causing blurred vision.	Concave lenses in spectacles focus the images onto the retina.
B.	Eyeball is too long and images fall in front of the retina, causing blurred vision.	Convex lenses in spectacles focus the images onto the retina.
C.	Eyeball is too short and images fall behind the retina, causing blurred vision.	Concave lenses in spectacles focus the images onto the retina.
D.	Eyeball is too short and images fall behind the retina, causing blurred vision.	Convex lenses in spectacles focus the images onto the retina.

- 14.** Australia has the highest prevalence of melanoma in the world. Melanoma is caused by exposure to ultraviolet radiation (UV). Due to Australia's proximity to the hole in the Ozone layer, we are exposed to greater quantities of UV radiation than any other population.

Under what category of disease is melanoma classified?

- A.** Genetic
 - B.** Bacterial
 - C.** Nutritional
 - D.** Environmental
- 15.** The process of renal dialysis has been developed to remove metabolic waste from the blood. To maximise the removal from the blood by diffusion,
- A.** the haemodialysis is warmed to body temperature
 - B.** the haemodialysis concentration is the same as the blood plasma without the metabolic waste
 - C.** the dialysate concentration is the same as the blood plasma without the metabolic waste
 - D.** the dialysate concentration is the same as the blood plasma with the metabolic waste

- 16.** Which of the following hormones is correctly matched with its function?

A.	Oestrogen	prevents contractions of the uterus to maintain pregnancy
B.	Glucagon	stimulates break down of glycogen in the liver to increase blood glucose levels
C.	Insulin	Increases blood glucose levels
D.	ADH	Leads to the production of more dilute urine

- 17.** Blood oxygen levels fall and carbon dioxide levels increase when a person exercises. The increase in carbon dioxide causes the blood to become more acidic. This change in pH is detected and the response is to contract and relax the diaphragm at a faster rate, causing more oxygen to be inhaled and carbon dioxide to be exhaled.

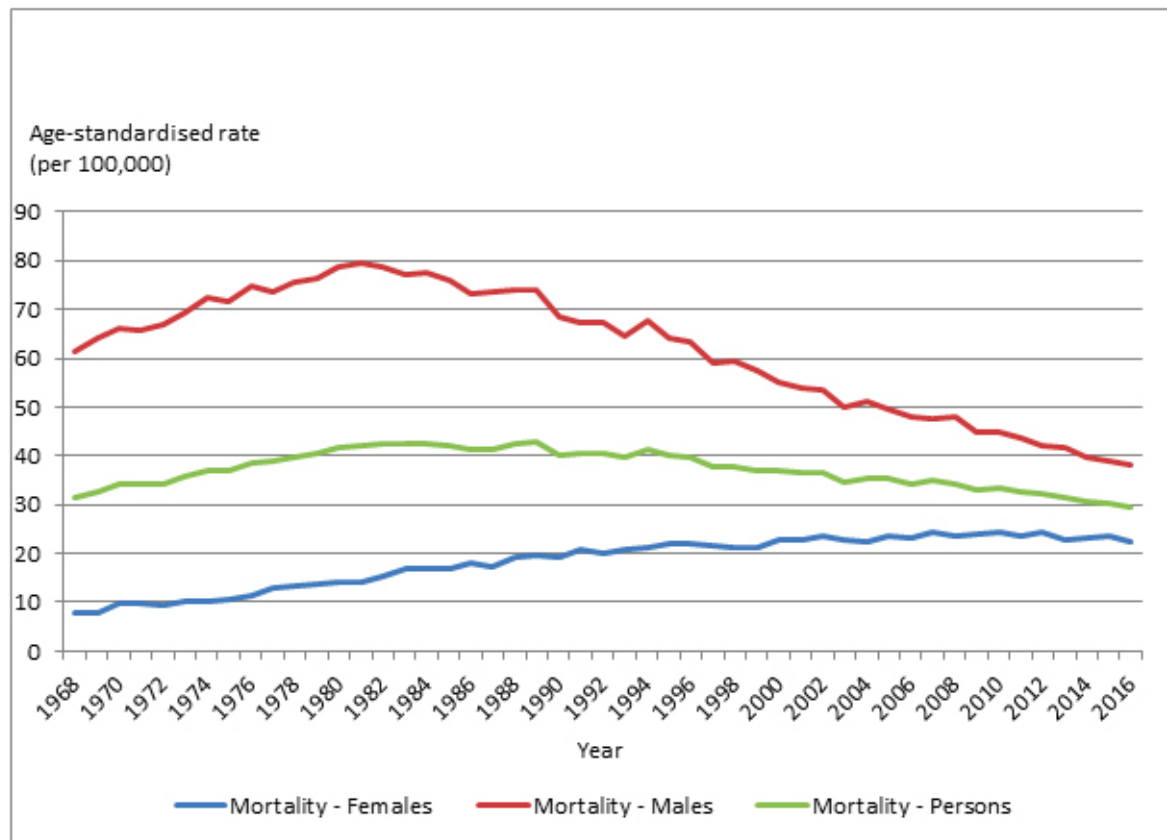
Which of the following is the correct description of the above situation?

- A.** Chemoreceptors detect the change in pH and the diaphragm is the effector that responds.
 - B.** Mechanoreceptors cause the diaphragm to contract, resulting in a decrease in pH.
 - C.** Photoreceptors detect the change in oxygen and the diaphragm is the effector that releases hormones.
 - D.** Thermoreceptors detect the change in the body temperature and glands release hormone to increase sweating.
- 18.** Which of the following is correct about the homeostatic balance of blood glucose.
- A.** During times of low blood glucose, the pancreas will release insulin to decrease the amount of glycogen in the blood
 - B.** During times of low blood glucose, the liver will break down glycogen to increase blood glucose levels.
 - C.** During times of high blood glucose, the liver will uptake glycogen to increase blood glucose levels.
 - D.** During times of high blood glucose, the pancreas will release will release insulin to increase levels of glycogen in the blood.

- 19.** A nervous impulse travels along a sensory neurone in the direction:

- A.** Dendrite - sensory receptor - cell body -axon
- B.** Sensory receptor - dendrite - cell body - axon
- C.** Sensory receptor - axon - cell body - dendrite
- D.** Axon - cell body - sensory receptor - dendrite

20. Refer to the following graph to answer the question



Age-standardised mortality rates for lung cancer, 1968 to 2016, by sex

The mortality rate data for Australians with lung cancer shows that, since the late 1980s,

- A. The mortality rate for males has changed very little
- B. The mortality rate for females has been steadily increasing whilst steadily decreasing for males
- C. The combined effect of the male and female mortality rates is an increase in deaths in the general population as a whole
- D. The trend in mortality rates for both males and the general population as a whole shows a decrease

Section II

20 marks

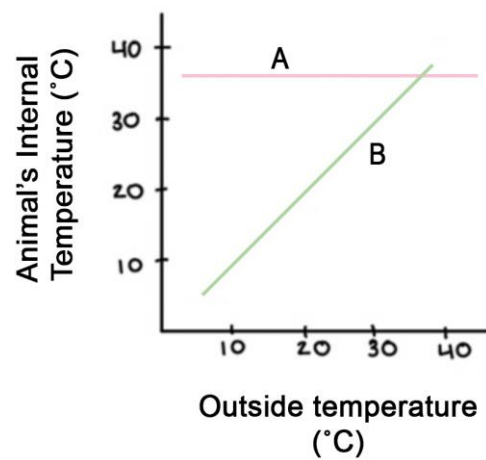
Attempt Questions 21-25

Allow about 35 minutes for this section

Question 21

3

Identify whether line A or B in the graph below is likely to represent an ectotherm and which is likely to be an endotherm. Justify your answer.



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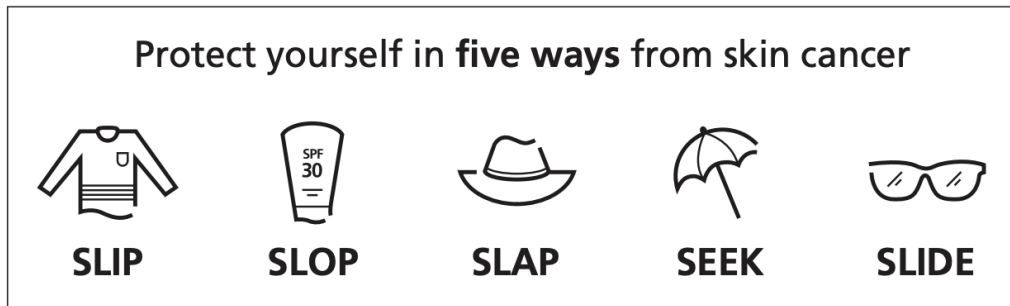
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Question 22

A public education campaign was developed with the aim of lowering the incidence of skin cancer in the population. The campaign was adopted Australia wide and is illustrated in the poster.



How could you measure the effectiveness of this campaign?

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Outline one other public health campaign that has been used to minimise the impact of a named disease or disorder.

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Question 23 (3 marks)

Organisms must maintaining a stable internal temperature for optimal cell functioning and survival.

Construct a flow chart that demonstrates how the internal temperature of organisms is maintained through homeostasis.

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Question 24 (5 marks)

Medical disorders are defined as a disruption to, or abnormality in the regular functioning of body parts and/or systems.

- a)** Name and describe the organ disorder and its cause(s). **2**

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- b)** Explain how a named technology is used to manage the effects of the disorder you described in part (a) **3**

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Question 25 (4 marks)

Refer to the following data to answer the questions below.

Characteristic**	Number with Current Asthma (in thousands)	Percent with Current Asthma
Total	26,515	8.3
Child (Age < 18 years)	6,132	8.3
Adult (Age 18+ years)	20,383	8.3
All Age Groups		
0-4 years	767	3.8
5-14 years	4,141	10.1
15-19 years	2,085	10.0
20-24 years	1,993	9.5
25-34 years	3,087	7.1
35-64 years	10,914	8.8
65+ years	3,529	7.4

- a) Outline whether the following data is displaying incidence, prevalence or mortality. **2**

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- b) Using the data from the table, outline which of all the age groups is the second most likely to have asthma **2**

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END OF EXAM



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Marking Criteria

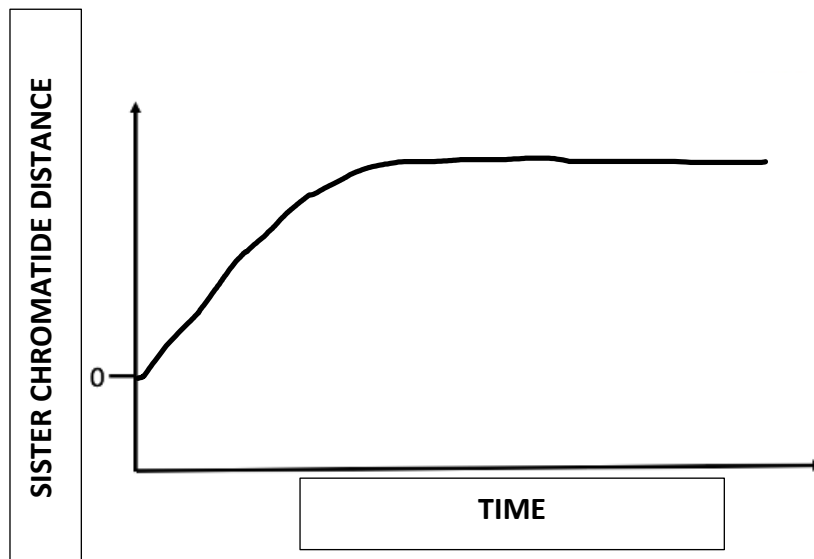
Biology - Module 5

Module 5 Marking Criteria
Multiple Choice

<i>Question</i>	<i>Answer</i>
1	B
2	D
3	B
4	A
5	D
6	B
7	D
8	C
9	B
10	D
11	B
12	A
13	A
14	B
15	D
16	C
17	D
18	A
19	D
20	D

Question 21

a)



Criteria	Marks
- Correctly identifies the change in the distance of sister chromatids over time - X and Y axis labelled	2
One of the above	1

Question 22

	B	b
B	BB	Bb
b	Bb	bb

The parents must have both been heterozygous for the colour gene. When the two parents produced offspring, there was a 75% chance of the offspring being brown, whilst there is a 25% being yellow. These percentages are very close to the proportions of brown to yellow.

Criteria	Marks
- Includes punnet square - Crosses correct parents - Provides a justification of answer	3
2 of the above	2
1 of the above	1

Question 23

Genes are segments of DNA that code for proteins, whilst enzyme are proteins. In Tay-Sachs disease, the HEXA gene which usually codes for the enzyme responsible for brain function is mutated, meaning the DNA sequence is incorrect which would lead to the incorrect protein produced. Since enzyme function is highly reliant upon enzyme structure, the mutation would lead to a non-functional enzyme.

Criteria	Marks
- Describe the terms 'gene' & enzyme - Outlines how 'genes' relate to 'enzyme' function - Link relationship to Tay-Sach's disease	3
2 of the above	2
1 of the above	1

Question 24

a) DNA replication

Criteria	Marks
Correctly identifies the diagram as DNA replication	1

- b) DNA replication is often referred to as semi-conservative as when the single length of double stranded DNA is copied to form 2 lengths of double stranded DNA, each of the new lengths of DNA contains one old length and DNA and a newly created complimentary length of DNA. Hence the term semi-conservative, as half of the DNA strand is conserved.

Criteria	Marks
Clearly outlines how DNA is considered semi-conservative	2
Briefly outlines how DNA is considered semi-conservative	1

- c) Guanine = 30%

Criteria	Marks
Identifies the correct amount of Guanine in a DNA strand as 30%	1

Question 25

Fungi reproduce asexually through the production of spores. Spores travel long distances and are able to grow threads back to the parent fungi. The adaptations of spores being light, in large numbers as well as having the ability to reconnect to the parent fungi means it can successfully be transmitted over a long distance.

Criteria	Marks
- Identifies a type of pathogen - Describes the adaptation the pathogen has - Explains how this adaptation assists in transmission	3
- Identifies a type of pathogen - Describes the adaptation the pathogen has	2
Identifies a pathogen	1

Question 26

- a) Anther – creates and stores the pollen (male gamete) used in sexual reproduction.
Stigma – the female part of the flower that traps pollen. The pollen will grow down the stigma to fertilise the egg.

Criteria	Marks
Structure and function identified for 2 of the structures.	2
2 structures identified	1

- b)** Asexual reproduction produces genetically identical plants. An advantage is that there is no requirement for pollen or sexual reproduction to pass on genetic information. Another advantage is the relative success of asexual reproduction as it can be done much faster. Disadvantages include the lack of variation in the new plants and also the increase in susceptibility to diseases.

Criteria	Marks
• Define the term 'asexual reproduction' • Outline 2 or more advantages of sexual reproduction • Outline 2 or more disadvantages of sexual reproduction	3
•	2
•	1



Marking Criteria

Biology - Module 6



HSC SIMULATED EXAM

Marking Criteria

Biology - Module 7

Module 7 Marking Criteria
Multiple Choice

Question	Answer
1	C
2	A
3	A
4	C
5	A
6	D
7	B
8	D
9	B
10	A
11	A
12	D
13	B
14	C
15	D
16	D
17	D
18	B
19	A
20	C

Part B

Question 21 (a)

Criteria	Mark
• Identifies and describes the process of the macrophage model	3
• Identifies and outlines the process of the model	2
• Provides some relevant information	1

Sample answer

The process shows a macrophage phagocytosing a pathogen/antigen. The lysosomes then break down the pathogen/antigen into parts and one of those parts is used to display on the MHC2 molecule on the macrophage. The antigen is presented to a T-helper cell which will initiate an immune response making specific cells to overcome the pathogen/antigen.

Question 22

Criteria	Marks
• Completes all aspects of the table	2
• One error present in table or missing	1

Sample answer

Name of pathogen	Influenza Virus
Way in which pathogen is adapted to allow entry into host.	Virus is small and light and can travel in water particles in the air which can be ingested. Has protein spikes that trick the cell into allowing the virus entry.
Way in which pathogen is adapted to facilitate transmission.	The influenza virus stimulates the body to cough and sneeze which allows the pathogen to move from one host to another.

Question 23

Criteria	Marks
• Outlines the trend correctly	2
• Outlines a part of the trend	1

Sample answer

The incidence of Measles increases significantly with some fluctuations from 1950-1959. The rate then decreases significantly until 1960's and then plateaus. In 1965 there is a significant decrease in the number of new cases until around 1969 where it plateaus once again with some small fluctuations.

b)

Criteria	Marks
• Suggests a logical reason for the trend	2
• Suggests a reason for the trend	1

Sample answer

The decreasing rate may be due to the introduction of a vaccine. The vaccine would allow a large number of people to be vaccinated thus decreasing the overall incidence.

Question 24

Criteria	Marks
• Explains the impact of using antibiotics to treat a virus. Outlines the potential for antibiotic resistant bacteria.	2
• Outlines the function of antibiotics. Unclear explanation of why it should not be used for a virus. No mention or little mention of antibiotic resistance.	1

Sample answer

Antibiotics will not be effective against a virus as they only work on bacteria. Natalie should not be using them as this may also increase the likelihood of creating antibiotic resistant bacteria.

Question 25

Criteria	Marks
• Tabulates the function of two T OR B cells	3
• Tabulates the function of a T OR B cell	2
• Some detail given	1

Sample answer

	Helper T-Cell	Cytotoxic T-Cell
Function	Receives antigen from macrophage, dendritic cell or B-cell. Releases cytokines to stimulate an immune response	Part of cell mediated immunity. Finds markers that have the antigen attached and release chemicals to destroy infected cells

Question 26

a)

Criteria	Marks
• Describes how the fungal infection affects the plant	2
• Identifies some parts of how the fungal infection affects the plant	1

Sample answer

It causes root and crown rots, resulting in shoot dieback, chlorotic foliage and defoliation. When rot has girdled the collar region, plants invariably wilt and die

b)

Criteria	Marks
• Defines epidemic.	2
• Mentions large amount of infected individuals, localised to the Australian continent OR discusses the ability of the pathogen to spread rapidly (for plants)	
• Mentions one of the above factors.	1

Sample answer

The spread of dieback could be considered an epidemic because it affects a large percentage of individuals and has been found all across Australia. It also appears to be fast moving in that it has infected a large area over a short period of time for a plant disease.

c)

Criteria	Marks
• Names an Australian plant and outlines a response to a pathogen	2
• Names an Australian plant and gives some detail about a response.	1

Sample answer

Myrtle rust is a disease which is caused by a fungus that affects the Eucalyptus plant. The eucalyptus plant defends itself by releasing special chemicals like eucalyptus oil which inhibit the ability of the pathogen to function by either trapping it or killing it.

Module 6 Marking Criteria
Multiple Choice

Question	Answer
1	B
2	B
3	D
4	A
5	B
6	A
7	C
8	D
9	A
10	B
11	A
12	C
13	C
14	A
15	D
16	B
17	A
18	C
19	D
20	D

Question 21

- a) Ultraviolet light, X-Rays of Gamma Rays

Criteria	Marks
Correctly identifies a mutation from the electromagnetic spectrum	1

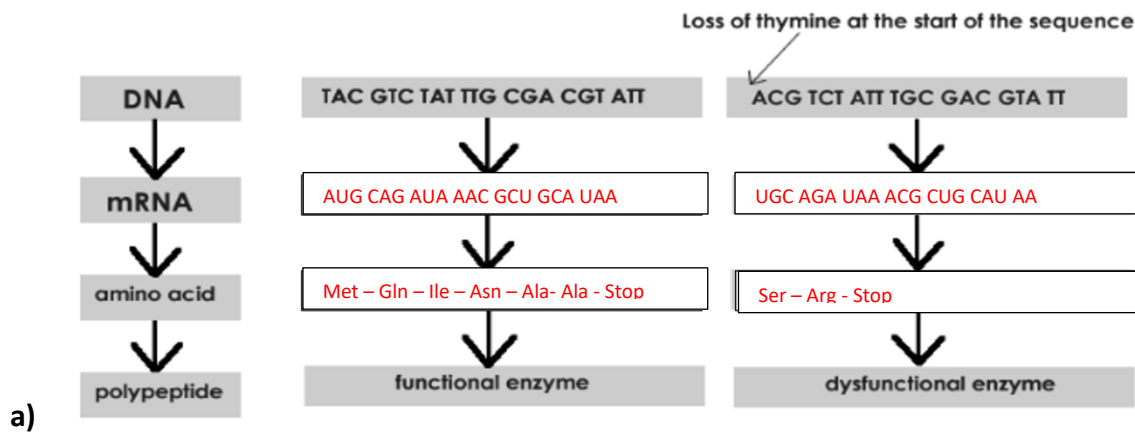
- b) Electromagnetic mutagens like UV rays will cause pyrimidine dimers. These will lead to the incorrect pairing of base pairs. For example T will bind with another T instead of T binding to A.

Criteria	Marks
• Outlines the effect on DNA. • Identifies production of pyrimidine dimers.	2
• Identifies the impact of electromagnetic radiation on DNA.	1

- c) As the amount of energy increases, the mutagenic effect increases.

Criteria	Marks
• Identifies the relationship between energy and mutagenic effect of radiation.	1

Question 22



Criteria	Marks
- Correctly transcribes both DNA strands into mRNA - Correctly Translates both mRNA strands into amino acid	2
Correctly translates and transcribes one of the DNA strands into an amino acid chain.	1

- b) A deletion mutation has occurred which has led to a frameshift, causing all the subsequent mRNA base pairs to be shifted one place to the left. This causes every amino acid after the mutation to be incorrect.

Criteria	Marks
- Outlines how the mutation can alter the final amino acid chain. - Outlines the impact of this mutation on the mRNA code. - Correctly identifies the type of mutation	3
- Outlines the impact of this mutation on the DNA code. - Correctly identifies the type of mutation	2
Correctly identifies the type of mutation	1

Question 23

- a) Any natural even that may significant decrease population size. Volcano, drought, fire etc

Criteria	Marks
Identifies a random event that could cause a rapid decline in the population.	1

- b) Genetic drift

Criteria	Marks
Correctly identifies the term that is explained in the graph.	1

- c) The genetic diversity could decrease after the random event and alleles could be wiped out of the population. The remaining population would now have a smaller amount of variation and the new populations genetic makeup would be based off the remaining few individuals.

Criteria	Marks
Clearly outlines how the population could be affected by the random event.	2
Briefly outlines how the population could be affected.	1

Question 24

Although cloned organisms have identical genetics, the environment can have a significant impact upon the phenotype. Some environmental conditions can lead to a change expression of certain genes. For example, an increased amount of UV light can lead to an increased amount of the skin pigment melanin, which can make the organism appear darker.

Criteria	Marks
- Outlines how clones may have different phenotypes. - Identifies an example of how phenotype may not be identical in clones.	2
- Identify an example of how phenotype may not be identical in clones. OR - Outlines how clones may have different phenotypes.	1

Question 25

Genetically modified organism like the zebra fish are a type of transgenic organism. That is, they have the genes from more than one animal in their DNA. Many ethical considerations need to be taken into account when modifying any organism.

Risk of disease or mutation. The unknown factor of modifying genes may cause random mutations to occur. These mutations may lead to diseases which spread through a community or species wiping them out. Furthermore it could have detrimental effects on the organisms around the modified species.

Animal rights. The animals that are being modified have no ability to give consent and therefore the introduction of these genes could cause suffering or pain in an individual that otherwise might not have been there.

Playing God. Some religious groups may be against the idea of modifying genes as it tampers with the aspects of organism that may be sacred or important.

The zebra fish modification seems to be for pure vanity traits and to sell them for a higher price. When profits are being made from the technology it may be used in a way that is not beneficial for the organism or the ecosystem. If a fish was to escape in the wild they may pass on these traits to others in the community leading to some of the issues mentioned above.

Overall the use of transgenic species needs to be researched and more assurances are needed to ensure the technology is considered safe and will not have a significant impact on the organism or any other organism in the wild.

Criteria	Marks
• Defines transgenic species and how they are made • Explains several ethical considerations • Clearly links consideration back to stimulus	4-5
• Outlines transgenic species • Outlines some ethical considerations • Some link made to stimulus	3-4
• One or two of the points mentioned above	1-2



HSC SIMULATED EXAM

Marking Criteria

Biology - Module 8

Module 8 Marking Criteria
Multiple Choice

Question	Answer
1	A
2	C
3	C
4	D
5	A
6	A
7	A
8	D
9	A
10	A
11	B
12	B
13	A
14	D
15	C
16	B
17	A
18	B
19	B
20	D

Part B

Question 21 (a)

Criteria	Mark
• Correctly identifies endotherm and ectotherm. Accurate justification that discusses the ambient temperature impact on body temperature.	3
• Correct identification of letters with an attempt at justifying	2
• Correct identification of A and B. OR Justification given	1

Sample answer

A is an endotherm and B is an ectotherm. This is because the ectotherm would have a body temperature that would be similar to the outside temperature and as such it would change with any change in temperature. A is an endotherm as they are able to maintain a relatively stable internal temperature regardless of environmental changes.

Question 22

(a)

Criteria	Mark
• References an epidemiological survey including some relevant data that could be collected	2
• Suggests a valid way to collect data on effectiveness	1

Sample answer

The researchers could use an epidemiological survey to determine what percentage of the population have seen this message using a questionnaire which asked questions around the content of the campaign. They could follow this up by doing an analytical study of data related to the development of skin cancer although this may take several years to show as melanoma takes some time to develop.

(b)

Criteria	Mark
• Named health campaign. Named disease or disorder. • Outlines several key features of the campaign	3
• Two of the above mention	2
• One of the above mentioned	1

Sample answer

QUIT is a public health campaign aimed at reducing the impacts of lung cancer on the population. The program uses many different techniques to minimize the impact of the diseases. An example would be the use of plain packaging and the use of graphic images to deter individuals from smoking as social status is often linked with smoking. Also increasing the cost of cigarettes over time becomes a significant financial burden for individuals further decreasing the rate of smoking in the population.

Question 23

Criteria	Mark
• Accurate flow chart that includes stimulus, receptor, control centre, effector, response.	3
• Missing one component mentioned above	2
• Some components missing	1

Sample answer

An increase in temperature → body's thermoreceptors detect change → sends signal to the hypothalamus in brain → brain tells sweat glands to start producing sweat → evaporative cooling occurs bringing the body temperature back to a normal level.

Question 24

(a)

Criteria	Mark
• Names disorder and describes accurately the disorder and cause	2
• Names disorder and accurately describes disorder OR cause	1

Sample answer

Sensorineural hearing loss is a significant condition that impacts the hearing of an individual as the function of their inner ear does not work properly to convert sound into an electrochemical signal. There are many causes of this condition including damage or infections however, it is most likely caused by a genetic defect which is a congenital defect from birth.

(b)

Criteria	Mark
• Names a piece of technology to manage the disorder and explains how it functions	2
• Outlines how a piece of technology functions to overcome the disorder.	1

Sample answer

The cochlear ear implant is a device which is inserted into the inner ear to allow an individual to hear again. The device works by inserting a small electrode into cochlear of an individual. The electrode is connected to a wire that runs to a device that is implanted in the skull which receives information from a transmitter worn on the outside of the ear. The transmitter picks up sounds like a microphone and sends them to the receiver which then converts it to an electrical signal. This is then run down the electrode and stimulates the cochlear at specific frequencies.

Question 25**(a)**

Criteria	Mark
• Outlines prevalence – Gives a reason	2
• Identifies prevalence	1

Sample answer

Prevalence – The data shows the current number with the disease. Incidence is new cases and mortality is death rate.

(b)

Criteria	Mark
• Identifies 15-19 age group. Uses percentage to support answer.	2
• Identifies age group	1

Sample answer

15-19 are the second highest as they have a percentage of 10%. which is second only to 5-14 year old's which have a percentage of 10.1.



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