Neap

Trial Examination 2021

VCE Biology Units 1&2

Written Examination

Suggested Solutions

SECTION A – MULTIPLE-CHOICE QUESTIONS

1	A	**B**	C	D
2	**A**	B	C	D
3	A	**B**	C	D
4	A	B	C	**D**
5	A	**B**	C	D
6	**A**	B	C	D
7	A	**B**	C	D
8	A	B	**C**	D
9	**A**	B	C	D
10	A	B	C	**D**
11	**A**	B	C	D
12	A	B	**C**	D
13	A	B	C	**D**
14	A	B	**C**	D
15	A	**B**	C	D
16	A	**B**	C	D
17	A	B	**C**	D
18	A	B	C	**D**
19	A	**B**	C	D
20	**A**	B	C	D
21	A	B	C	**D**
22	A	**B**	C	D
23	A	B	**C**	D
24	A	B	**C**	D
25	A	**B**	C	D
26	**A**	B	C	D
27	A	B	C	**D**
28	A	B	**C**	D
29	A	**B**	C	D
30	A	B	C	**D**
31	A	B	**C**	D
32	**A**	B	C	D
33	A	B	C	**D**
34	A	B	C	**D**
35	A	**B**	C	D
36	**A**	B	C	D
37	**A**	B	C	D
38	A	**B**	C	D
39	A	**B**	C	D
40	A	B	**C**	D

Question 1 D

D is correct. Prokaryotes have no membrane-bound nucleus or organelles. **A** is incorrect. Plant eukaryotes have a cell wall. **B** and **C** are incorrect. All prokaryotes and eukaryotes have a plasma membrane and many ribosomes.

Question 2 A

A is correct. Chloroplasts have a double outer-membrane, whereas mitochondria have a smooth outer-membrane and a folded inner membrane. **B** is incorrect. There are no pigments in mitochondria; enzymes are attached to the inner folded membrane. **C** is incorrect. Both organelles have membranes made of phospholipid and protein. **D** is incorrect. Both organelles contain ribosomes.

Question 3 B

B is correct. Vesicles are surrounded by a membrane and carry out a range of activities. **A** is incorrect. Cytoplasm is the fluid containing the organelles inside the cell membrane. **C** is incorrect. Lysosomes are a specific type of vesicle with the role of digesting engulfed material. **D** is incorrect. The nucleolus is an organelle with a specific function that is not surrounded by a membrane.

Question 4 D

D is correct. By having several different membrane-bound intracellular environments, the cell can function efficiently to carry out all activities optimally. **A**, **B** and **C** are incorrect. None of these are an advantage of membrane-bound compartmentalisation in the cytosol.

Question 5 B

B is correct. Lipid-soluble molecules can dissolve in the phospholipid bilayer and readily pass through. **A** is incorrect. Protein molecules are too large to pass through protein channels in the plasma membrane. **C** is incorrect. Although ions are small, they cannot pass through the bilayer directly, as they are water soluble, and so must pass through the protein channels. **D** is incorrect. The presence of cholesterol helps to maintain membrane stability, but it does not aid in the membrane acting as a semi-permeable boundary.

Question 6 A

A is correct. In photosynthesis, carbon from the input of carbon dioxide joins with the hydrogen ions from water, using energy to produce the carbohydrate glucose. **B** is incorrect. Oxygen is not a waste product; plant cells will use it in cellular respiration. **C** is incorrect. Solar energy is already light energy, so no conversion is needed. **D** is incorrect. Absorbed light energy is converted into chemical energy (glucose).

Question 7 B

B is correct. Carbon dioxide is an input and oxygen is an output in photosynthesis; in cellular respiration, ADP and P_i are converted into ATP using the energy given off in glucose breakdown. **A**, **B** and **C** are incorrect. These options incorrectly identify the chemicals.

Question 8 C

C is correct. A mesophyll leaf cell contains chloroplasts and is the main type of cell in which photosynthesis occurs. **A** and **D** are incorrect. Root hair cells and inner stem storage cells are located in the dark, so no photosynthesis occurs. **B** is incorrect. Xylem vessel cells are dead.

Question 9 A

A is correct. Once blood glucose concentration begins to rise above the optimum, insulin will be released and reach a peak before glucose peaks. As the glucose concentration decreases back to normal, the insulin will then decrease rapidly back to a low concentration, as it has fulfilled its purpose. **B**, **C** and **D** are incorrect. These options do not show this relationship between mean blood glucose and insulin concentration.

Question 10 D

D is correct. The beta cells in the pancreas are the sites of insulin synthesis. If they are broken down, the person will make little or no insulin and suffer from type 1 diabetes. **A** and **C** are incorrect. The kidney and liver play no direct role in glucose regulation. **B** is incorrect. The pancreas is a ductless endocrine gland, so there could be no effect from a duct blockage.

Question 11 A

A is correct. With broken-down beta cells in a malfunctioning pancreas, there will be little or no insulin produced. **B** is incorrect. The opposing hormone, glucagon, is produced by alpha cells in the pancreas. **C** is incorrect. A person with type 1 diabetes will consistently produce little to no insulin. **D** is incorrect. ADH hormone is involved with the regulation of blood solute concentration.

Question 12 C

C is correct. The symptoms displayed with type 1 diabetes show that the systems of the human body are interconnected and interdependent, and a malfunction in one system will have consequences in the others. **A**, **B** and **D** are incorrect. The symptoms given do not show any of these to be true.

Question 13 D

D is correct. A living community needs to have an energy source, either light energy, energy from chemical reactions or a source of food/complex organic molecules containing stored chemical energy. **A** and **C** are incorrect. As it is completely dark in the cave, there can be no photosynthesis or healthy green plants. **B** is incorrect. There must be animals, such as bats, crickets or spiders, visiting the cave and depositing organic matter for energy to be provided to the community of organisms in the pond.

Question 14 C

C is correct. The organisms in the pond will rely on organic matter brought into the cave for their energy source. **A** is incorrect. No light or energy from chemical reactions is available for autotrophic nutrition. **B** is incorrect. There is no light in the cave for photosynthesis. **D** is incorrect. The organisms cannot make their own food, so they must be consumers (heterotrophs), not decomposers.

Question 15 B

B is correct. An ecosystem consists of a community of interacting living organisms, such as barnacles, oysters, sea anemones and sea urchins, together with their non-living surroundings (water, rocks, sand) in a particular place at a particular time. **A** and **C** are incorrect. Community and population refer only to the living organisms. **D** is incorrect. Biosphere is a term used for the global ecosystem.

Question 16 B

B is correct. The diagram shows an intertidal zone, which will be exposed to the air between high and low tide. Therefore, the organisms that live in this area are well-adapted by having hard outer-coverings and clinging firmly to the rock surface to prevent water loss (dehydration). **A** is incorrect. The organisms are not mobile. **C** is incorrect. The organisms are only open to the air when the tide is out, and so would not be mainly adapted to absorb oxygen from the air. **D** is incorrect. Being exposed to the sun does not necessarily make the organisms producers.

Question 17 C

C is correct. The red and brown algae are in the sub-tidal zone, not the intertidal zone where the barnacles and oysters live, so they could not provide them with food. **A** is incorrect. Red and brown algae can carry out photosynthesis using different coloured pigments for light absorption. **B** is incorrect. Some algae do float in the water, while others are fixed. **D** is incorrect. The algae are never available at low tide as they are in the sub-tidal zone.

Question 18 D

D is correct. Buds beneath the surface of the bark are protected from the fire but are ready to grow vigorously even though the outer bark is burnt. **A**, **B** and **C** are incorrect. Smooth shiny bark, cylindrical leaves and horizontal surface stems would all be destroyed by the heat and intensity of the fire.

Question 19 B

B is correct. Wombats live on the ground and in burrows, whereas koalas are tree-dwelling, so wombat competition would not threaten the species density and diversity of the koalas. **A**, **C** and **D** are incorrect. Habitat loss, motor vehicle accidents and bacterial diseases are all major threats to koalas.

Question 20 A

A is correct. Transferring some of these unaffected, disease-free koalas to the mainland and breeding them in captivity will increase the population numbers of the disease-free koalas. This will hopefully maintain the koala species at levels above vulnerable when they are put back into their natural environments. **B**, **C** and **D** are incorrect. None of these strategies would result in a better outcome than breeding the disease-free koalas in captivity.

Question 21 D

D is correct. Due to processes that occur during meiosis, sexual reproduction results in greater variation in the gametes produced, and therefore greater variation in the offspring. **A** is incorrect. Offspring produced by sexual reproduction are genetically different to the parents. **B** is incorrect. As offspring produced by sexual reproduction are different to the parents, they may not be suited to the same environment as the parents, or may be better suited to other environments. **C** is incorrect. Offspring produced by sexual reproduction are not necessarily more easily dispersed.

Question 22 B

B is correct. Two new cells are not produced until after cytokinesis, which is stage U. **A**, **C** and **D** are incorrect. Although the DNA in the cell replicates in stage Y and the cell grows in stage W, it is not until after stage P is completed and stage Y occurs that the two cells are produced.

Question 23 C

C is correct. Interphase is the longest stage of the cell cycle and continues from the end of cytokinesis to the beginning of mitosis. It includes stage X (G1: growth), stage Y (S: DNA synthesis) and stage W (G2: growth and organelle duplication). **A**, **B** and **D** are incorrect. Interphase does not include stage P (mitosis) or stage U (cytokinesis).

Question 24 C

A is correct. Stage R is the metaphase stage of mitosis in which the chromosomes line up along the equator, but the amount of DNA remains constant at four picograms, as is shown in section II in the graph. **B** is incorrect. In stage S, the chromatids separate to the poles in anaphase of mitosis, and the amount of DNA remains constant; it does not halve as shown in stage V. **C** is incorrect. In stage X, the amount of DNA stays constant and does not double. **D** is incorrect. In stage Y, the amount of DNA doubles and does not remain constant.

Question 25 B

B is correct. The inner cell mass of the blastula consists of cells that are the developing embryo, which are pluripotent at this early stage as they can develop into most cell types in the three germ layers of the embryo. **A** is incorrect. Totipotent cells can develop into all cell types, including the outer cell layer that forms the placenta. **C** is incorrect. Multipotent cells can only develop into a limited number of cell types. **D** is incorrect. Unipotent is not a type of potency in stem cells.

Question 26 A

A is correct. The cells are already 'tagged' to produce specific cell types. **B**, **C** and **D** are incorrect. The cells can still undergo mitosis as they are not yet fully specialised, but they cannot differentiate into all cell types.

Question 27 D

D is correct. 'Ecto' means outside; ectoderm layers form skin and pigment layers, nail, hair, eye lens and other outer parts of organs. **A** is incorrect. Ectoderm cells will not form interior cells such as cardiac or skeletal muscle cells. **B** is incorrect. The heart and blood vessels are formed by the mesoderm. **C** is incorrect. The inner layers of the digestive and respiratory systems will be formed by endoderm cells.

Question 28 C

C is correct. The G1 checkpoint is near the end of the first growth phase, so it is important that cell size and adequate nutrient availability is determined. **A** is incorrect. At the G2 checkpoint, the amount of DNA is checked to ensure that it has doubled, not halved. **B** is incorrect. Since the cell cycle involves mitosis, not meiosis, there will be no homologous pairing of chromosomes or attachment to spindle fibres. **D** is incorrect. The structures checked at the G2 checkpoint are made up of two chromatids, not two chromosomes.

Question 29 B

B is correct. If there is a mutation in a tumour-suppressor gene, it will not trigger apoptosis of cells with damaged DNA, so they will not be removed and will develop into cancer cells. **A**, **C** and **D** are incorrect. Rapid cell division, unchecked cell proliferation and small amounts of repair to cells with damaged DNA will still occur if a mutation appears in a tumour-suppressor gene.

Question 30 D

D is correct. The measured quantities of chlorine added to the water of swimming pools does not induce or increase the rate of mutations, so is not a mutagen. **A**, **B** and **C** are incorrect. Mutagens do include X-rays, nuclear radiation, some wavelengths in sunlight (such as ultraviolet rays) and some viruses (such as the human papillomavirus).

Question 31 C

C is correct. A genetic predisposition is an increased likelihood of developing the disease based on a person's genetic makeup, which they inherit from their parents. **A** is incorrect. A genetic predisposition does not mean the individual will definitely get the disease. **B** is incorrect. Lifestyle factors may increase the likelihood of developing the disease, but do not cause the disease. **D** is incorrect. A genetic predisposition increases the likelihood that an individual will develop cancers.

Question 32 A

A is correct. The decrease in methylation will change the structure of the DNA that makes up the chromatin. **B** is incorrect. The decrease in methylation will not alter the nucleotide sequence of the DNA. **C** and **D** are incorrect. The decrease in methylation could result in decreased expression of tumour-suppressor genes and consequently increase the chance of bowel cancer occurring.

Question 33 D

D is correct. Factors such as methylation are called epigenetic factors, which alter gene expression by switching genes on and off, thereby altering the phenotype of the organism. **A**, **B** and **C** are incorrect. The research is not related to factors that alter the nucleotide sequence in the genes and therefore genotype is unrelated.

Question 34 D

D is correct. This genetic disorder affects far more men than women, which indicates it is caused by the ichthyosis gene being located on the X chromosome. **A** is incorrect. Females would have two copies of the gene as they have two X chromosomes. **B** is incorrect. Moisturising creams applied to the skin will not alter genetic makeup. **C** is incorrect. If the trait were Y-linked, it would not appear in females at all, as they have no Y chromosome.

Question 35 B

B is correct. If the alleles are H = polled and h = horned, then Hh × Hh would result in a $\frac{3}{4}$ chance of an offspring being polled. As the polled offspring would be HH or Hh, there is a $\frac{2}{3}$ chance of the offspring being heterozygous. **A**, **B** and **D** are incorrect. These options do not show the correct probability.

Question 36 A

A is correct. A polled bull could be HH or Hh. A test cross of the bull with a recessive horned cow, hh, could be used to determine the genotype of the bull. **B** and **D** are incorrect. Reciprocal and back crosses are used for other purposes. **C** is incorrect. A polled cow would not be used for a test cross as it could have the genotype HH or Hh.

Question 37 A

A is correct. Short bristles are inherited as a recessive trait with the allele symbol bobbed = bb, so a fly with short bristles would be bbbb. Wrinkled wings are inherited as a dominant trait, so a fly with wrinkled wings could be WW or Ww. Of the alternatives, the only correct possibility is Wwbbbb. **B**, **C** and **D** are incorrect. These genotypes do not represent a male with wrinkled wings and short bristles.

Question 38 B

B is correct. The gene for wrinkled wings is on chromosome 3 and the gene for vermillion eyes is on chromosome 1. Since they are not linked, a cross between WwRr × wwrr (test cross) would have a phenotypic predicted ratio of 1 : 1 : 1 : 1 of the four possible phenotypes in the offspring. **A**, **C** and **D** are incorrect. The other ratios in these options are for linked genes (1 : 1 : few : few) or heterozygous crosses.

Question 39 B

B is correct. The two gene loci of the traits bobbed bristles and vermillion eye colour are on the same chromosome, number 1, and the distance between the two gene loci is much further apart (33 units) than the loci of any other pair of traits. This means there is a greater chance for crossing-over to occur during meiosis I for the alleles of these two traits. **A**, **C** and **D** are incorrect. These traits would have lower percentages of crossing-over than bobbed bristles and vermillion eye colour.

Question 40 C

C is correct. In the process of crossing-over, one chromatid of each homologous chromosome crosses over with the other, breaks, and then rejoins with the other chromatid, thereby exchanging segments of alleles. This results in the production of gametes with many different combinations of alleles; that is, greater variation in the gametes. **A** is incorrect. Crossing-over increases the likelihood of gametes containing different genetic material. **B** and **D** are incorrect. The alleles are not changed during the process, nor is there a loss or gain of alleles unless an error occurs.

SECTION B

Question 1 (7 marks)

a. **i.** structural adaptation 1 mark

ii. Microvilli provide a greater surface area for reabsorption of sodium ions and water. 1 mark

b. **i.** active transport 1 mark

ii. Movement of sodium ions is from a lower concentration in the tubule to a higher concentration in the blood. 1 mark

The cells are densely packed with mitochondria, which provide the energy needed for active transport. 1 mark

c. **i.** osmosis 1 mark

ii. passive, as no added cell energy is needed for the water to move along the concentration gradient 1 mark

Question 2 (6 marks)

a. **i.** cellular respiration 1 mark

ii. *For example:*

If there is no carbon dioxide in the air surrounding the leaf, then the plant will not carry out photosynthesis. 1 mark

b. **i.** Lee was correct, as it is essential to have a control experiment for comparison in order to show that the lack of carbon dioxide (the independent variable) was the factor that caused the results, and not some other factor. 1 mark

ii. The dependent variable is the presence of starch (indicated by the change in colour of the iodine). 1 mark

c. **i.** $6CO_2 + 12H_2O \xrightarrow{\text{light, chlorophyll}} C_6H_{12}O_6 + 6CO_2 + 6H_2O$ 1 mark

ii. No. Cellular respiration takes place day and night, so it would be occurring at the same time as photosynthesis when the leaf was in bright sunlight. 1 mark

Question 3 (8 marks)

a. Jess was correct. The contents of the digestive tract are still external, whereas the fluids bathing the cells are internal. 1 mark

b. the hypothalamus 1 mark

Note: 'The brain' is not a specific answer and should not be awarded a mark.

c. **i.** *For example, any one of:*

- Vasodilation/expansion of the blood vessels in the skin could occur, thereby bringing more warm blood from the core to the surface in order to increase heat loss.
- Increased sweating could occur, as evaporation of the liquid sweat uses heat energy to convert it into gaseous water vapour, thereby cooling down the body.
- Ingesting cold food or drink, having a cold bath or swimming in cold water would reduce heat in the body as it is absorbed into the cold medium.

2 marks

1 mark for stating the corrective mechanism.
1 mark for describing the corrective mechanism.

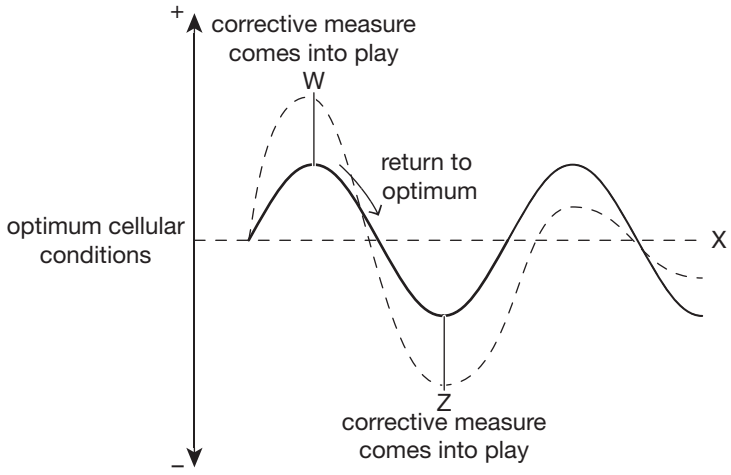
ii. *For example, any one of:*

- Shivering would increase body temperature as the skeletal muscle cells increase the rate of cellular respiration.
- Standing in front of a heater or fire, or having a warm bath will increase body temperature, as heat will be absorbed by radiation and conduction.

2 marks

1 mark for stating the corrective mechanism.
1 mark for describing the corrective mechanism.

d. *For example:*



1 mark

Any one of:

- The upward curve is higher, as a greater amount of heat has been produced than lost, resulting in a higher increase in body temperature.
- The downward curve is lower, as there is less heat lost to the environment; maybe the person is wearing a jumper for insulation.

1 mark

Note: An alternative graph may be drawn that shows less variation. Accept a supporting reason identifying that as body temperature fluctuates around the optimum, there is less difference in body temperature over time.

Question 4 (8 marks)

a. **i.** Water evaporates from the moist cell walls of the leaf cells into the intercellular leaf spaces, then travels from this higher concentration out through the open stomata into the surrounding air. 1 mark

ii. The rate of water loss slows down because the concentration difference of the water vapour inside and outside the leaf has decreased. 1 mark

iii. Species 2 was the *Pelargonium*, as it has a lower percentage mass decrease over the four-hour period. 1 mark

It is better adapted to reducing water loss due to the presence of the thicker cuticle and hairy leaves. 1 mark

b. **i.** *For example, any one of:*

- The percentage of water lost in exhaled air and sweat would increase.
- The percentage of water lost in urine would decrease.

1 mark

ii. Their kidney would reabsorb more water, so that they produced a smaller volume of concentrated urine. 1 mark

c. Nearly half of the kangaroo rat's water loss is evaporated water vapour, mainly in their breath, with much less lost in their urine and faeces. 1 mark

The kangaroo rat is well-adapted to desert conditions and produces very concentrated urine (uric acid paste) and very dry faeces to retain water when compared to the urine and faeces of a human. 1 mark

Question 5 (11 marks)

a. **i.** the direction of energy flow 1 mark

ii. An arrow between the musky rat kangaroo and the common taipan would place the common taipan at the fourth tropic level. 1 mark

b. **i.** mutualism 1 mark

ii. The seeds of the fruit trees are excreted in the dung of the cassowary and are then dispersed some distance from the parent plant, reducing competition for light, water and other resources. 1 mark

c. **i.** A keystone species is one that has a disproportionately large impact on an ecosystem relative to its abundance. 1 mark

ii. Due to their role in the distribution of seeds, cassowaries are a specific species that aid in the balance of the Daintree Rainforest. 1 mark

d. **i.** Reduced suitable habitats due to farming and subdividing the land will result in reduced numbers of cassowaries. 1 mark

ii. As cassowaries are a keystone species, this could affect the dispersal of fruit trees and other plant species, potentially even resulting in the breakdown of the ecosystem. 1 mark

e. **i.** The second name is the descriptive name in the species name, such as *camaldulensis* in the name of the red gum. 1 mark

ii. The two types of gum trees have different morphological/structural features and are not in the same species. They have different first genus names as they are also in different genera. 1 mark

iii. *For example:*

- The binomial system of nomenclature provides a universal system of naming that is used internationally and aids in communication between scientists in different countries.
- any other reasonable answer

1 mark

Question 6 (6 marks)

a.

	Diagram 1	**Diagram 2**
Type of reproduction	asexual reproduction	sexual reproduction
Name of reproduction	binary fusion	**budding**
Type of organism	eukaryote, such as bacteria	eukaryote, such as Hydra
Genetics of parent organism compared to offspring and each other	genetically identical to each other and parent	genetically different to the parent and each other
One advantage of this type of reproduction	**Only involves one parent, so no need to spend time and energy looking for a mate.** **OR** **All the offspring are genetically identical and may be well-adapted for survival in the same environment as the parent.** **OR** **A large number of offspring can be reproduced rapidly and efficiently, enabling quicker spread and colonisation of a favourable area.**	The species can adapt to new environments due to variation, which gives them a survival advantage.

2 marks

1 mark for each cell correctly completed.

b. *Any four of:*

- The type of reproduction shown in diagram 2 is a type of asexual reproduction, as it does not involve the fusion of gametes.
- The name of the reproduction shown in diagram 1 is binary fission as it involves the splitting of one individual into two, not fusion (which means joining).
- The type of organism in which the reproduction shown in diagram 1 takes place would be within a prokaryotic bacterium, not a eukaryotic cell.
- For the type of reproduction shown in diagram 2, the offspring would be genetically identical to the parent as it was formed by repeated mitotic cell divisions.
- The type of reproduction in diagram 2 is asexual, which does not lead to increased variation in the species, as all offspring are usually identical; therefore, the species does not readily adapt in changing environments.

4 marks

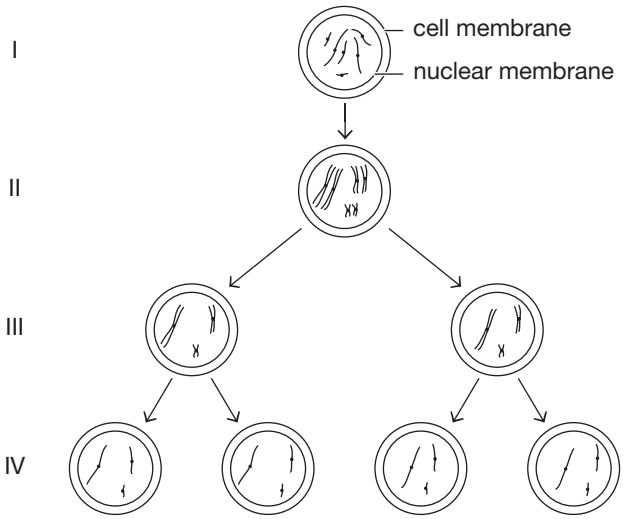
1 mark for each error identified and justified.

Question 7 (11 marks)

a. **i.** There are two divisions, which indicates meiosis and not mitosis. 1 mark

There is pairing of homologous chromosomes in cell II, which only occurs in meiosis and not in mitosis. 1 mark

ii.



2 marks

1 mark for drawing the correct chromosomes in the cells at stage III.
1 mark for drawing the correct chromosomes in the cells at stage IV.

b. **i.** $2n = 6$ 1 mark

ii. Susie was correct, as the cell of the ovary (gonad) in which meiosis takes place is diploid; therefore, it is a somatic or non-sex cell. 1 mark

A sex cell is produced as a result of meiosis and it is haploid; therefore, it cannot be the initial ovary cell that divides. 1 mark

c. **i.** **Name:** crossing-over 1 mark

Stage: prophase I 1 mark

ii. RQ, Rq, rQ, rq 1 mark

iii. Crossing-over is important to the survival of the species as it produces greater diversity by producing new combinations of genes (in the gametes and, subsequently, in the offspring). 1 mark

Question 8 (6 marks)

a. **i.** In cloning, the offspring produced in each generation are genetically identical to the parents of the previous generation. 1 mark

ii. *For example, any one of:*

- rice
- wheat
- corn
- sorghum

1 mark

iii. Plant cloning in nature will result in no variation and all the offspring may be susceptible to disease or other environmental factors (including drought, higher soil salt concentrations or waterlogged soil). 1 mark

b. **i.** Clones occur naturally in humans and other mammals (when a fertilised egg splits in two and results in two offspring). Animal cloning can be carried out in the same way using embryo splitting (technology that separates the fertilised egg into two cells). 1 mark

ii. totipotent 1 mark

c. Totipotent cells used for human cloning are harvested from the very early stages of human embryonic development, which is a controversial issue when it comes to considerations of the destruction of human life. 1 mark

*Note: Consequential on answer to **part b.ii.***

Question 9 (8 marks)

a. The trait is autosomal recessive. 1 mark

Two hairy dogs (I1 and I2) have two hairless offspring (male II3 and female II5). 1 mark

b. **i.** Diana had deduced that the gene for the hairless trait was located on a non-sex chromosome (autosomal), as both hairy and hairless male and female offspring were produced in the breeding experiments. 1 mark

The hairless characteristic was dominant to hairy, as when the hairless parents were mated, they produced both hairless and hairy offspring. 1 mark

ii. H = hairless, h = hairy

Parents: hairless × hairy

	H	**h**
H	HH	Hh
h	Hh	hh

1 mark

The offspring would be in a 3 hairless : 1 hairy ratio. 1 mark

c. **i.** Pure breeding means that parents with a particular phenotype will produce offspring with the same phenotype (as parents are homozygous for the trait). 1 mark

ii. *For example, any one of:*

- The homozygous genotype (HH) was lethal.
- All carriers of this genotype died.
- All carriers of this genotype were never born.

1 mark

Question 10 (9 marks)

a. polygenic inheritance 1 mark

b. two 1 mark

c. **i.** Parents: Bbyy × Bbyy 1 mark

	H	**h**
H	HH	Hh
h	Hh	hh

1 mark

50% chance of genotype the same as the parents 1 mark

ii. 75% chance of same phenotype as parents 1 mark

d. **i.** bbyy; a white budgerigar 1 mark

ii. If all the offspring from the breeding crosses were green, Jimmy would know his three budgerigars were BBYY. 1 mark

However, if there were any that were white, yellow, or blue, he would know his budgerigars were not homozygous at both gene loci. 1 mark

