

insight™
YEAR 12 *Trial Exam Paper*

2014
BIOLOGY

Written examination

Sample answers

This book presents:

- high-level sample answers
- explanatory notes
- mark allocations
- tips on how to approach the exam

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SECTION A – Multiple-choice questions

Question 1

Answer is D

Explanatory notes

A is incorrect – E is the Golgi apparatus, F is the nucleus, G is a secretory vesicle.
 B is incorrect – D is a lysosome, F is the nucleus, G is a secretory vesicle.
 C is incorrect – F is the nucleus, H is the endoplasmic reticulum, D is a lysosome.
 D is correct – H is the endoplasmic reticulum, E is the Golgi apparatus, G is a secretory vesicle. An amino acid found in trypsin can only follow this pathway.

Question 2

Answer is A

Explanatory notes

A is correct – glucose is actively transported into cells for the purpose of cellular respiration.
 B is incorrect – trypsin would not be actively transported out of the cell, it would diffuse down the concentration gradient.
 C is incorrect – intestinal cells do not photosynthesise.
 D is incorrect – intestinal cells do not require mitochondria to perform anaerobic respiration.

Question 3

Answer is D

Explanatory notes

A is incorrect – ribosomes are structures that are not membrane bound and are therefore not organelles.
 B is incorrect – chloroplasts are organelles that perform photosynthesis. They are not present in animal cells.
 C is incorrect – microfilaments are cytoskeletal structures, they are not membrane bound and are not organelles.
 D is correct – lysosomes are membrane bound and they are organelles.

Question 4

Answer is B

Explanatory notes

A is incorrect – exergonic
 B is correct – endergonic
 C is incorrect – exergonic
 D is incorrect – exergonic

Question 5**Answer is C****Explanatory notes**

A is incorrect – as dehydrogenase becomes saturated, the reaction rate will decrease, not increase.

B is incorrect – the rate of product formation will not increase with increasing substrate concentration.

C is correct – the amount of substrate will increase as the reaction proceeds.

D is incorrect – as the reaction proceeds the amount of product should increase, not decrease.

Question 6**Answer is D****Explanatory notes**

A is incorrect – malonate is not broken down by dehydrogenase, succinate is.

B is incorrect – malonate is not broken down by dehydrogenase, succinate is.

C is incorrect – does not show the action of a competitive inhibitor, rate of reaction is enhanced.

D is correct – shows the action of a competitive inhibitor, rate of reaction is reduced.

Question 7**Answer is A****Explanatory notes**

A is correct – whether a competitive inhibitor is present or not, there will be a maximum rate of reaction.

B is incorrect – whether a competitive inhibitor is present or not, there will **not** be an exponential increase in the rate of reaction.

C is incorrect – whether a competitive inhibitor is present or not, there will **not** be a decline in the rate of reaction.

D is incorrect – there will be a change in the rate of reaction if the substrate concentration is increased.

Question 8

Answer is C

Explanatory notes

A is incorrect – apoptosis is programmed cell death, not a failure in the translation/transcription mechanism.

B is incorrect – an accumulation of genetic errors can lead to apoptosis but it is not apoptosis.

C is correct – apoptosis is the process of programmed cell death that occurs in multicellular organisms.

D is incorrect – apoptosis generally confers advantages during an organism's lifecycle.

Question 9

Answer is B

Explanatory notes

A is incorrect – acetyl CoA links glycolysis and the Krebs cycle not the Krebs cycle and oxidative phosphorylation.

B is correct – acetyl CoA links glycolysis and the Krebs cycle.

C is incorrect – acetyl CoA links glycolysis and the Krebs cycle not glycolysis and the Calvin cycle.

D is incorrect – acetyl CoA links glycolysis and the Krebs cycle not the Calvin cycle to oxidative phosphorylation.

Question 10**Answer is D****Explanatory notes**

A is incorrect – fermentation is a process that occurs in the absence of oxygen and cannot be aerobic.

B is incorrect – alcoholic fermentation produces ethanol, not lactic acid.

C is incorrect – aerobic respiration does not produce lactic acid, it produces energy, carbon dioxide and water.

D is correct – the diagram shows anaerobic respiration.

Question 11**Answer is A****Explanatory notes**

A is correct – glycolysis occurs in the cytosol in both aerobic and anaerobic respiration.

B is incorrect – glycolysis does not occur in the matrix of the mitochondria.

C is incorrect – glycolysis does not occur in the chloroplasts.

D is incorrect – glycolysis occurs within the cytosol of the cell, not in the extracellular fluid.

Question 12**Answer is B****Explanatory notes**

A is incorrect – Person G has diabetes, her blood glucose level does not return to its original level within the duration of the test.

B is correct – Person H does not have diabetes

C is incorrect – Person G has diabetes, Person H does not.

D is incorrect – Person G has diabetes, Person H does not.

Question 13**Answer is D****Explanatory notes**

A is incorrect – Person H produces insulin reducing blood glucose levels; Person G doesn't produce insulin.

B is incorrect – only Person H produces insulin, causing the reduction in blood glucose levels.

C is incorrect – Person G does not produce insulin, causing the blood glucose level to remain high.

D is correct – Person H produces insulin reducing blood glucose levels.

Question 14

Answer is A

Explanatory notes

A is correct – neurotransmitters are required in high concentrations and have short-lived effects.

B is incorrect – neurotransmitters are required in high concentrations (not low) and have short-lived effects.

C is incorrect – neurotransmitters are required in high concentrations and are not sustained.

D is incorrect – neurotransmitters are required in high concentrations (not low) and are not sustained.

Question 15

Answer is C

Explanatory notes

A is incorrect – order of terms is incorrect, correct order shown in C.

B is incorrect – order of terms is incorrect, correct order shown in C.

C is correct – presynaptic terminal, membrane, synaptic vesicle, acetylcholine receptor, mitochondrion

D is incorrect – order of terms is incorrect, correct order shown in C.

Question 16

Answer is B

Explanatory notes

A is incorrect – lysozyme is a first line defence chemical.

B is correct – eosinophils are white blood cells, not a first line defence chemical.

C is incorrect – lactoferrin is a first line defence chemical.

D is incorrect – defensin is a first line defence chemical.

Question 17

Answer is C

Explanatory notes

A is incorrect – Anti-B antibodies are found in the plasma of a person with blood group A.

B is incorrect – Anti-A antibodies are found in the plasma of a person with blood group B.

C is correct – Anti-A and Anti-B antibodies are found in the plasma of a person with blood group O.

D is incorrect – There are no blood antibodies found in the plasma of a person with blood group AB.

Question 18

Answer is B

Explanatory notes

A is incorrect – artificially acquired immunity is not passive as antibodies are made in response to virus.

B is correct – artificially acquired immunity is active as antibodies are made in response to virus.

C is incorrect – not naturally acquired because antibodies are introduced via vaccine; not passive as antibodies are made in response to virus.

D is incorrect – even though active because antibodies are made in response to virus, it not naturally acquired because antibodies are introduced via vaccine.

Question 19

Answer is A

Explanatory notes

A is correct – this is the response elicited when encountering the same antigen for a second time.

B is incorrect – this is not the first time the antigen has been encountered, thus not a primary response.

C is incorrect – this is part of the immune response but it is not specific enough compared with A (secondary response).

D is incorrect – this is a response to infection but it is not specific enough compared with A (secondary response).

Question 20**Answer is A****Explanatory notes**

A is correct – flu virus 2014 is structurally similar to flu virus 2013, immune memory is triggered, hence secondary like response.

B is incorrect – if 2014 virus is identical to 2013 virus, it would be expected that there would be a response in 2014 even stronger and faster than secondary response in 2013.

C is incorrect – flu virus changes regularly and frequently, immunity to all viruses would not occur.

D is incorrect – flu virus 2014 is structurally similar to flu virus 2013, immune memory is triggered, hence secondary like response, not primary.

Question 21**Answer is C****Explanatory notes**

A is incorrect – B cell activation is associated with the humoral response, not innate immunity.

B is incorrect – B cell activation is associated with the humoral response, not non-specific immunity.

C is correct – B cell activation is associated with the humoral response.

D is incorrect – B cell activation is associated with the humoral response, not the cell-mediated response.

Question 22**Answer is D****Explanatory notes**

A is incorrect because R is a B cell, not a T cell and W is the T cell receptor, not S.

B is incorrect because R is a B cell, not a T cell; Z is the peptide, not X-Z.

C is incorrect because Z is the peptide, not X-Z and W is the T cell receptor, not S.

D is correct because R is the B cell, Z is the peptide and W is the T cell receptor.

Question 23**Answer is A****Explanatory notes**

A is correct – recognition of peptide by T cell receptor leads to proliferation of both B and T cells.

B is incorrect – recognition of peptide by T cell receptor leads to proliferation of both B and T cells, not just B cells.

C is incorrect – recognition of peptide by T cell receptor leads to proliferation of both B and T cells, not just T cells.

D is incorrect – recognition of peptide by T cell receptor leads to proliferation of both B and T cells.

Question 24**Answer is B****Explanatory notes**

A is incorrect because homologous pairs of chromosomes are drawn apart during anaphase I.
 B is correct because homologous pairs of chromosomes are assembled together during metaphase I.

C is incorrect because sister chromatids separate and are drawn apart during anaphase II.
 D is incorrect because sister chromatids assemble together on the spindle of the dividing cell during metaphase I and metaphase II.

Question 25**Answer is A****Explanatory notes**

A is correct – S phase is when DNA replication occurs.

B is incorrect – G₁: increase in proteins, number of organelles, increase in size – not DNA replication.

C is incorrect – G₂: rapid cell growth, protein synthesis, cell prepares for mitosis – not DNA replication.

D is incorrect – M phase is the division of single cell to form daughter cells – not DNA replication.

Question 26**Answer is C****Explanatory notes**

A is incorrect – a checkpoint is not a location but a moment in time.

B is incorrect – checkpoints only take place during G₁ at the end of G₂ and during M phase.

C is correct – checkpoints take place at specific stages during G₁ at the end of G₂ and during M phase.

D is incorrect – checkpoints only occur during G₁ at the end of G₂ and during M phase.

Question 27**Answer is B****Explanatory notes**

A is incorrect – mitochondrial DNA has a rapid mutation rate, not slow.

B is correct – mitochondrial DNA has a rapid mutation rate.

C is incorrect – mitochondrial DNA is inherited matrilineally and is not highly conserved.

D is incorrect – whilst mitochondrial DNA is inherited matrilineally, it is not highly conserved.

Question 28**Answer is D****Explanatory notes**

A, B and C are incorrect – order of processes and structures are not correct.

D is correct – order of processes and structures is correct.

Question 29**Answer is D****Explanatory notes**

A is incorrect – each conception is independent; there is a 25% chance the child will be affected (not 100%).

B is incorrect – each conception is independent; there is a 25% chance the child will be affected (not 75%).

C is incorrect – each conception is independent; there is a 25% chance the child will be affected (not 50%).

D is correct – each conception is independent; there is a 25% chance the child will be affected.

Question 30**Answer is B****Explanatory notes**

A is incorrect – if they were recessive they would not be expressed when bred with plants that are true breeding for normal leaves and few fruit spines.

B is correct – they are dominant because they are expressed when bred with plants that are true breeding for normal leaves and few fruit spines.

C is incorrect – if they were co-dominant they would express a phenotype that showed characteristics of heart and normal shaped leaves and few and numerous fruit spines when bred with plants that are true breeding for normal leaves and few fruit spines.

D is incorrect – if they were multiple alleles they would express more than two phenotypes when bred with plants that are true breeding for normal leaves and few fruit spines.

Question 31**Answer is A****Explanatory notes**

A is correct because recombinants are shown in the lowest similar proportion.

B is incorrect because these are the parental genotypes.

C is incorrect because this is a combination of a parental and a recombinant.

D is incorrect because this is a combination of a parental and a recombinant.

Question 32**Answer is A****Explanatory notes**

A is correct – even though there are problems using DNA sequences in the determination phylogeny, it is the best of the four methods listed in the question.

B is incorrect – natural selection is best defined as the reproductive success of the members of a population best adapted to the environment, not the struggle for existence.

C is incorrect – the fossil record is an incomplete and less accurate source of data for determining phylogeny when compared with DNA sequences.

D is incorrect – quantitative analysis of morphological similarities and differences is not as accurate as a source of data for determining phylogeny when compared with DNA sequences.

Question 33**Answer is C****Explanatory notes**

A is incorrect – allopatric speciation occurs as a result of geographical isolation, this is not one such representation.

B is incorrect – extinction has not occurred, these mammals are extant.

C is correct – occurs when organisms not closely related independently evolve similar traits in response to similar selection pressures; these mammals share a similar ability to glide.

D is incorrect – occurs when related species evolve different traits in response to different selection pressures.

Question 34**Answer is B****Explanatory notes**

A is incorrect because a buffer is used in electrophoresis to maintain the pH at a relatively constant level.

B is correct because ligase is an enzyme that catalyses the joining of two large molecules.

C is incorrect because DNA polymerase is an enzyme that synthesises DNA molecules from nucleotides.

D is incorrect because an endonuclease is an enzyme that catalyses the cutting of a phosphodiester bond.

Question 35**Answer is B****Explanatory notes**

A is incorrect because there would be 5 restriction sites present in the circular DNA.

B is correct because there are 5 restriction sites in the circular piece of DNA.

C is incorrect because there are 5 not 7 restriction sites present in the circular DNA.

D is incorrect because there are 5 not 10 restriction sites present in the circular DNA.

Question 36**Answer is A****Explanatory notes**

A is correct because selective breeding removes genes that code for less desirable traits.

B is incorrect because selective breeding does not favour genes that code for less desirable traits.

C is incorrect because selective breeding does not retain genes that code for less desirable traits.

D is incorrect because selective breeding does not remove genes that code for desirable traits.

Question 37**Answer is A****Explanatory notes**

A is correct – a GMO is an organism whose genome has been artificially changed (and also includes TGOs).

B is incorrect – recombination through meiosis occurs naturally and will therefore not produce a GMO.

C is incorrect – a clone is an organism that is genetically identical to another; it is not necessarily a GMO.

D is incorrect – exposure to mutagens does not produce a GMO.

Question 38**Answer is C****Explanatory notes**

A is incorrect – both parent and daughter isotopes are required to measure radioactive decay.

B is incorrect – both parent and daughter isotopes are required to measure radioactive decay.

C is correct – radiometric dating is based on a comparison between the abundance of a naturally occurring radioactive isotope (parent) and its decay products (daughter).

D is incorrect – both parent and daughter isotopes (not either) are required to measure radioactive decay.

Question 39**Answer is B****Explanatory notes**

A is incorrect – Neanderthal DNA originated in Neanderthals, not in Eurasians.

B is correct – there were beneficial genes in the genome and these were kept during evolution.

C is incorrect – Neanderthal DNA will have undergone change since interbreeding with modern humans.

D is incorrect – Neanderthal DNA cannot accumulate any further in the Eurasian genome as there are no more extant Neanderthals to contribute their DNA.

Question 40**Answer is B****Explanatory notes**

A is incorrect – it is not possible to know for certain if the *BNC2* gene was present in modern humans.

B is correct – presence of *BNC2* in present day populations indicates it has been positively selected for.

C is incorrect – Eurasians only partly owe paler skin to Neanderthals.

D is incorrect – Eurasians partly owe skin colour to Neanderthals.

**General tips for Section A**

- Do NOT mark or score the exam booklet in ANY way during reading time – this constitutes a breach of exam protocol and has serious consequences.
- Allocate an approximate amount of time for the multiple-choice section and then the short-answer section of the paper.
- Make an attempt to answer EVERY question. If you are uncertain of the correct answer in the multiple-choice section, make an informed and educated guess – you have a 25% chance of getting it right!
- Use a pencil for answering the multiple-choice section.

SECTION B – Short-answer questions

Question 1a.

Sample answer

A neuron OR nerve cell

Mark allocation

- 1 mark for correct type of brain cell

Question 1b.

Sample answer

Sodium ions are charged atoms and cannot dissolve through and cross the phospholipid bilayer, instead they move through ion channels.

Mark allocation

- 1 mark for correct reason

Question 1c.

Sample answer

When a critical portion of a community is immunised against a contagious disease, most members of the community are protected against that disease because there is little opportunity for an outbreak. Even those who cannot have certain vaccines – such as infants, pregnant women, or immunocompromised individuals – get some protection because the spread of contagious disease is contained.

Mark allocation: 2 marks

- 1 mark if stating that if a critical proportion of people are immunised, most people are protected
- 1 mark those ineligible for vaccines get protection, as spread is contained

Question 2a.i.**Sample answer**

RNA

Mark allocation

- 1 mark for RNA

Question 2a.ii.**Sample answer**

RNA is a nucleic acid that is a polymer built from nucleotides. Nucleotides have high levels of phosphate, which correlates with the student's results.

Mark allocation

- 1 mark for stating that nucleotides have high levels of phosphate

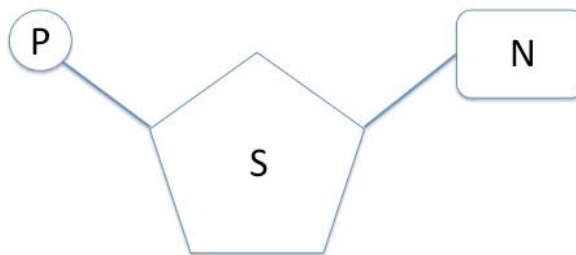
Question 2a.iii.**Sample answer**

Diagram will show a nucleotide P – ribose sugar – N base

Mark allocation

- 1 mark for correct diagram

Question 2b.i.**Sample answer**

Insulin

Mark allocation

- 1 mark for insulin

Question 2b.ii.**Sample answer**

Insulin is a protein hormone, sulfur is found in some amino acid side chains. Sulfur is not found in arginine, isomaltose or RNA.

Mark allocation

- 1 mark for a correct explanation that links to the idea of the presence of sulfur

Question 2c.i.**Sample answer**

In the presence of water, the polymer would have been broken down due to the cleavage of chemical bonds that joined its constituent monomers.

Mark allocation: 2 marks

- 1 mark for mentioning that in the presence of water, the polymer would have been broken down
- 1 mark for stating it is due to the cleavage of chemical bonds that joined its constituent monomers

Question 2c.ii.**Sample answer**

Test tube 3 contained the amino acid arginine, which is not a polymer formed by condensation reactions.

Mark allocation: 1 mark

- 1 mark for identifying that arginine is not a polymer (it is a monomer)

**Tips**

- *Key words need to be identified and understood. Recognise and understand the requirements associated with words such as – ‘explain’, ‘identify’, ‘name’, ‘describe’, ‘outline’, ‘compare’, ‘state’, ‘justify’, ‘define’, ‘label’, ‘show working’ and ‘suggest’.*
- *Also look out for negatives and exceptions.*

Question 3a.i.**Sample answer**

Pan troglodytes

Mark allocation

- 1 mark for correct answer

Question 3a.ii.**Sample answer**

They are upright walking OR bipedal.

Mark allocation

- 1 mark for principal physical characteristic

Question 3b.**Sample answer**

Characteristic	Difference	Significance of difference
pelvic structure	<i>Pan troglodytes</i> has an elongated pelvic structure. <i>Homo sapiens</i> has a shorter, wider bowl-shaped pelvic structure.	The elongated pelvis is better suited to quadrupedal movement whereas the shorter, wider bowl-shaped pelvis is more stable for weight support when standing upright or moving bipedally.
foot structure	<i>Pan troglodytes</i> has a foot with a diverging/separated big toe. <i>Homo sapiens</i> has a foot with a big toe in alignment with all other toes.	Divergent toes enable grasping ability in their toes and feet, which is better suited to quadrupedal tree-climbing activity. Having a big toe in alignment or the same size as other toes is energetically efficient for bipedalism.

Mark allocation: 4 marks

- 1 mark for each box filled in correctly

Question 3c.i.**Sample answer**

Use of fire for cooking

Mark allocation

- 1 mark for correct answer

Question 3c.ii.**Sample answer**

Cooking food makes it softer and easier to break down for digestion. If it is softer, individuals in a population with smaller teeth can eat it and obtain the energy and nutrients they need to survive. They survive to reproduce and pass on their alleles that code for the production of smaller teeth. Making smaller teeth is more energy efficient, placing smaller toothed individuals at a selective advantage.

Mark allocation: 3 marks

- 1 mark for explaining that cooking food makes the energy more easily accessible to populations with smaller teeth
- 1 mark for explaining that small toothed individuals survive to reproduce, passing on their small tooth alleles
- 1 mark for explaining that making small teeth takes less energy than making big teeth, so smaller-toothed individuals are at a selective advantage

**Tip**

- *The number of lines allocated to a question is indicative of the length of the response expected by the Assessor. Try to use the space provided and avoid writing any more than what has been provided. The exam will be electronically scanned for assessment purposes so you must make sure you write ONLY in the designated areas for the response (a boxed in space).*

Question 4a.i.**Sample answer**

To obtain oxygen required for egg maturation.

OR

To enable easier transmission.

Mark allocation

- 1 mark for an appropriate suggestion

Question 4a.ii.**Sample answer**

The host scratches the area most likely getting eggs caught in their fingernails, which can then be transferred to the mouth leading to reinfection OR ruptures the body of the female worm, which releases eggs that can then reinfect host, OR similar.

Mark allocation

- 1 mark for an appropriate explanation

Question 4b.**Sample answer**

The pinworm has evolved with the human host over hundreds of thousands of years (and is good at evading attack by the immune system).

Mark allocation

- 1 mark for explanation of expression

Question 4c.i.**Sample answer**

Macrophages OR macrophagocytes OR phagocytes

Mark allocation

- 1 mark for identifying a correct answer

Question 4c.ii.**Sample answer**

Threadworms are large organisms (much larger than viruses or bacteria) and any immune attack powerful enough to kill threadworms would cause significant damage to host tissues, possibly killing the host.

Mark allocation

- 1 mark for an appropriate explanation

Question 5a.**Sample answer**

The immune system has previously been exposed to the protein in peanuts that causes the allergic response. Antigen presenting cells internalise, process and then express these allergens on their cell surface. The allergens are then presented to other cells, particularly T-lymphocytes. This results in B-lymphocytes being transformed into antibody secretory cells (plasma cells), which produce high numbers of antibodies (IgEs), which attach to mast cells and basophils. When mast cells (and basophils) encounter the allergen on a subsequent occasion, the IgEs bind to the allergen, which triggers the release of histamine.

Mark allocation: 3 marks

- 1 mark for explaining that an allergen is encountered by the antigen presenting cell (APC); APCs internalise, process and then express allergens on the cell surface
- 1 mark for explaining that B cells (triggered by T cells) produce high volumes of antibodies (IgE), which bind to mast cells and basophils
- 1 mark for explaining that on encountering the allergen on a subsequent occasion, the IgEs bind to the allergen, which triggers the release of histamine

Question 5b.**Sample answer**

desensitisation

Mark allocation

- 1 mark for correct answer

Question 5c.**Sample answer**

That OIT is a successful treatment for peanut allergy

OR

Children who are treated with OIT for peanut allergy have a high chance of responding to treatment

OR

similar

Mark allocation

- 1 mark for an appropriate conclusion

Question 6a.**Sample answer**

0.1M

Mark allocation

- 1 mark for correct answer

Question 6b.i.**Sample answer**

There has been a 27.18% loss of mass in the potato slices over the duration of the experiment. This decrease in mass is due to water moving out from the cells of the potato and into the surrounding sucrose solution.

Mark allocation: 2 marks

- 1 mark for identifying there will be a loss of mass (27.18%)
- 1 mark for explaining that this is due to water moving out from the cells of the potato and into the surrounding sucrose solution

Question 6b.ii.**Sample answer**

Hypertonic

Mark allocation

- 1 mark for correct term

Question 6c.i.**Sample answer**

Any of – same room temperature, same type of potato, same duration of experiment

Mark allocation

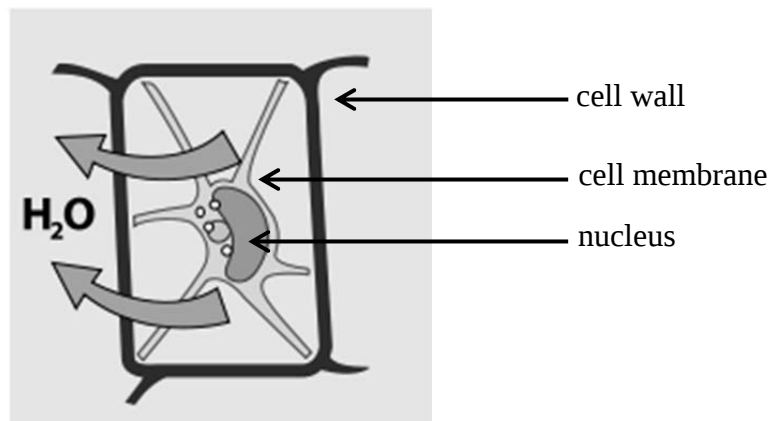
- 1 mark for a correct controlled variable

Question 6c.ii.**Sample answer**

An exact molarity reading is required here – a figure equal to somewhere between 0.36M or 0.37M. There is no mass change because the concentration of the solute is exactly the same in the sucrose solution and in potato cells.

Mark allocation: 2 marks

- 1 mark for the exact molar concentration of sucrose
- 1 mark for stating the concentration of the solute concentration is exactly the same in sucrose solution and in potato cells

Question 6d.**Sample answer**

Source: http://en.wikipedia.org/wiki/File:Turgor_pressure_on_plant_cells_diagram.svg

Mark allocation: 2 marks

- 1 mark for a correct diagram
- 1 mark for correct labels for H_2O and two of cell wall, cell membrane, nucleus or any other relevant

Question 7a.i.**Sample answer**

Enzyme

Mark allocation

- 1 mark for the correct answer

Question 7a.ii.**Sample answer**

When the temperature rises above 15°C.

Mark allocation

- 1 mark for an appropriate event

Question 7b.**Sample answer**

Autoclaving/heating the mackerel that has been spiked with biogenic amines to 121°C has very little effect on the level of biogenic amines in the tissue OR heat (121°C) does not significantly change the level of biogenic amine in mackerel tissue.

Mark allocation

- 1 mark for a reasonable conclusion

Question 7c.**Sample answer**

Bacterium OR virus OR protist

Mark allocation

- 1 mark for an appropriate common agent

Question 7d.i.**Sample answer**

The pair ate fish that had not been handled properly and had been exposed to temperatures that increased above 15°C, which triggered the conversion of histidine to histamine. The cooking process did not affect the histamine present which, when ingested by the pair in their meal, triggered a severe allergic reaction leading to their death.

Mark allocation: 2 marks

- 1 mark for explaining that if fish was kept in temperatures above 15°C, histidine would have converted to histamine
- 1 mark for explaining that histamine remained after cooking, and when ingested would have caused the severe allergic reaction and death

Question 7d.ii.**Sample answer**

Administration of antihistamines OR use of an EpiPen

Mark allocation

- 1 mark for an appropriate medical intervention

Question 7d.iii.**Sample answer**

Fish should be iced/cooled immediately after catching and thawed only just before cooking. It should not be allowed to reach temperatures close to or above 15°C.

Mark allocation

- 1 mark for a reasonable recommendation

Question 8a.i.**Sample answer**

Aerobic respiration

Mark allocation

- 1 mark for the correct metabolic process

Question 8a.ii.**Sample answer**

Mitochondria

Mark allocation

- 1 mark for the correct answer

Question 8b.**Sample answer**

G T C C A C C T G A T A C C T G T G

Mark allocation

- 1 mark for the correct sequence

Question 8c.**Sample answer**

Gln – Val – Asp – Tyr – Gly – His

Mark allocation

- 1 mark for the correct answer

Question 9a.**Sample answer**

Red and blue light

Mark allocation

- 1 mark for the correct answer

**Tip**

- *Students should be able to apply knowledge to new and potentially unfamiliar scenarios. Instead of being asked to define the light-independent reaction of photosynthesis, a question may require students to consider some information and determine whether acceptor molecules are being loaded.*

Question 9b.**Sample answer**

In the light dependent stage.

Mark allocation

- 1 mark for the correct stage

**Tip**

- *Know how to apply the terms correctly. It is acceptable to use conventionally acceptable acronyms and abbreviations (e.g. RNA, ATP, NADH and chemical symbols such as CO₂). If you are uncertain if something is an acceptable convention, write it out in full first and then include the abbreviation in brackets e.g. photosynthesis (PHS).*

Question 9c.i.**Sample answer**

Halobacteria and early microbes appeared first in geological time. They used green light to photosynthesise, so plants that could use other visible light (i.e. blue and red) had greater survival rates.

Mark allocation

- 1 mark for an appropriate explanation

Question 9c.ii.**Sample answer**

It is more efficient, makes better use of the light that it absorbs which is why the Earth is green and not purple.

Mark allocation

- 1 mark for an appropriate inference

Question 10a.**Sample answer**

Mode of inheritance is X-linked dominant – all daughters of an affected father but not his sons (unless the mother is affected) will show the trait OR the condition appears in every generation of the affected lineage OR the son of an affected mother will show the trait but not necessarily her daughters.

Mark allocation: 2 marks

- 1 mark for identifying the mode is X-linked dominant
- 1 mark for a suitable explanation of this mode

Question 10b.**Sample answer**

Primer 1	5'-GTCATACGT-3'
Primer 2	5'-ATTACGCAT-3'
Primer 3	5'-ATGCGTAAT-3'
Primer 4	5'-CAGTATGCA-3'
Primer 5	5'-TGCATACTG-3'

Mark allocation

- 1 mark for selecting Primer 2 and Primer 4

Question 10c.**Sample answer**

Individual 3: X^mY

Individual 7: X^MX^m

Mark allocation: 2 marks

- 1 mark for each correct genotype

Question 11a.**Sample answer**

Glycosidic bond

Mark allocation

- 1 mark for the correct bond

Question 11b.**Sample answer**

Geographic isolation

Mark allocation

- 1 mark for correct cause of speciation

Question 11c.**Sample answer**

A difference in food selection preference

Mark allocation

- 1 mark for correct answer

Question 11d.**Sample answer**

That geographic isolation in a population leads to reproductive isolation

Mark allocation

- 1 mark for an appropriate conclusion

Question 11e.**Sample answer**

It is difficult to get an eyewitness account of a natural speciation event because most of these events happened in the distant past and it is difficult to figure out *how* they happened.

Mark allocation

- 1 mark for a reasonable suggestion

Question 12a.**Sample answer**

D – dwarfed legs and wings; d – normal legs and wings

$Dd \times dd$

$Dd \ Dd \ dd \ dd$

1 dwarfed legs/wings : 1 normal legs/wings

Mark allocation: 2 marks

- 1 mark for appropriate and correctly assigned alleles
- 1 mark for showing cross and correct outcome/ratio

Question 12b.**Sample answer**

Dwarfed leg/wing in chickens is a condition that results in the death before hatching of chickens that have a homozygous genotype (DD) for dwarfed leg/wing; it is a lethal dominant allele.

Mark allocation

- 1 mark for a reasonable explanation of the outcome

**General tips for Section B**

- *Success in the Unit 3 and 4 Biology exam requires both knowledge and problem-solving skills. In addition to the Key Knowledge, the Study Design for Biology describes a range of Key Skills. These will be assessed. You will need to be able to design a controlled experiment, write a hypothesis, analyse, interpret and transpose data and information.*
- *Clear, accurate and concise responses are vital and must relate directly to the specific contexts given in examination questions.*
- *Make sure that you try to use correct spelling at all times, particularly when it comes to key words – e.g. mitosis/meiosis, glucagon/glycogen.*
- *Use a blue or black ballpoint pen for the short-answer section.*

END OF SAMPLE ANSWERS