Form Five Final Exam 2020-21 Biology – Suggested Answers

Section A

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

Section B

1.(a) Repeat the experiment with smaller pH intervals (1)

(b) Enzymes in the liver tissue have already been denatured / active sites of the enzymes have already changed shape (1)
Substrates can no longer bind to the active sites of the enzyme (1)

2. (a) X: blood (1) Y: muscle layer (1)
(b) According to the scale bar, 2cm = 200 µm
Magnification = 20 000 µm / 200 µm [correct method (1)]
= 100 X [correct answer (1)]

(c)The lumen would be larger or be compressed/ tissue Y or the vessel wall would be thinner (1)
(d) The presence of elastic fibres in the walls of the arteries allows the walls to stretch when the heart contracts to pump blood into the artery (1) and
Recoil to keep the blood to flow forward when the heart relaxes (1)
This helps maintain a continuous blood flow.

3. (a) stem (1)
Because the vascular bundles are arranged in a circle near the periphery. (1)
(b) correct label (1)
(c) Transpiration pull (1)
(d) xylem vessels with <u>lignified cell walls</u> (1), provide support to <u>prevent the collapse</u> of the xylem vessels (1)
OR
Xylem vessel consist of dead cells joined end to end to form <u>continuous hollow</u> tubes (1)
Allows a free flow of water with <u>little resistance</u> (1)

4. (a)

Triglyceride/lipid + (3) water $\xrightarrow{\text{lipase}}$ (1) glycerol + (3) fatty acids (1)

Fatty acid produced lower the pH. (1)

(b) From the graph, the rate of pH fall in flask A is faster than that in flask B. (1)

Flask A contains bile salts but flask B does not. This shows that bile salts helps in lipid digestion. (1)

Bile salts <u>emulsify</u> the lipid, <u>increase the surface area for lipase</u> to act on, thus increase the rate of lipid digestion. (1)

(c) The initial pH should be lower and pH level drops with a more gentle slope/pH level remains more or less the same. (1)

5. (a) A foetus obtains nutrients from its mother through the placenta (1)

In the placenta, nutrients diffuse from the maternal blood into the foetal blood (1)

The umbilical vein then carries the nutrient-rich blood from the placenta to the foetus. (1)

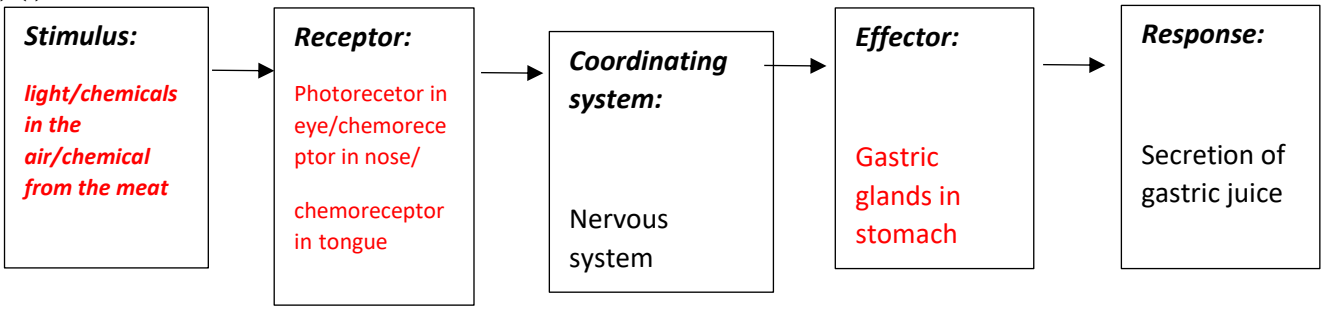
(b) The presence of numerous villi (1) provide a large surface area for exchange of materials (1)

The foetal blood is close to the maternal blood (1), this reduces the distance for diffusion of materials (1)

The rich supply of blood capillaries allows an efficient transport of materials away from the placenta (1), this maintains a steep concentration gradient of materials between the foetal blood and material blood. (1)
(any 2, 4 m)

(c) Muscle of X contract strongly, pushing the foetus out (1) through the cervix and vagina.

6. (a) (i)



(ii) The response is quick and automatic. (1)

Shortly upon the taste of the meat is detected by the taste buds (receptors), nerve impulses are sent to stimulate the gastric glands to secrete gastric juice. (1)

The response is short-lived. (1)

When the stimulus (taste of food) is removed, the secretion of gastric juice stopped quickly. (1)

Any 1 set

(b) To ensure/test whether the secretion of gastric juice is brought about by nervous control. (1)

(c) The secretion of gastric juice occurs over several hours. (1)

It is a long-lasting response. (1)

The secretion of gastric juice still occurs (1)

even after the nerves to the stomach are cut. (1)

Any 1 set

7. (a) The cell wall becomes more able to be stretched (1)

(c) Under the effect of unilateral light, auxins at the coleoptile tip diffuses/moves from the illuminated side to the shaded side (1)

More auxins diffuse into block P than block Q (1)

The side of the decapitated root below P receives a higher concentration of auxins (1)

High auxins concentration inhibit root growth (1)

The side of the decapitated root below block P grows slower / below block Q grows faster (1)
Resulting in the curvature of the root

(d) Put a coleoptile tip on two agar blocks same as set-up I and put the whole set-up in complete darkness or evenly illuminated (1)

This can show that different amounts of auxins collected in the agar blocks are due to unilateral light / auxins move from illuminated side to the shaded side due to unilateral light (1)

OR

Place 2 plain agar blocks on a decapitated root in set-up II (1)

This can show that agar blocks do not contain auxins / bending of roots is not caused by the agar blocks / bending of root is not related to damage to the root / damage to the root does not cause bending (1)

8. (a)

Group	**Organism X**	**Organism Y**
Domain	Bacteria	Archaea
Kingdom	Eubacteria	Archaebacteria

(b) Both X and Y are unicellular / lack true nucleus / lack membrane-bound organelles (1)

Their cell membranes/walls have different composition / chlorophyll is present in some bacteria but not in archaea (1)

(c) (i) Scientists classify organisms based on their phylogenetic (evolutionary) relationships / genetic similarities and differences (1)

(ii) Science is tentative and subject to change/ science relies on the technology available at the time (1)

9. (a) -31

(b) less competition from shorebird B

their eggs are too large/ camouflaged / inaccessible to hedgehogs / unpalatable /they defend their nests/eggs (any1)

increase reproductive rate / birth rate is higher than death rate (1)

(c)

- Idea of geographical isolation e.g. separated by the sea
- no interbreeding between populations
- genetic variation exists in the original population
- different environmental conditions or selection pressure
- accumulation of (genetic) changes /after many generation, eventually lead to reproduction isolation

(d) They may feed on other local organisms/ disturb local food chains /have no natural predators /upset the existing ecological equilibrium

They may carry parasites /disease

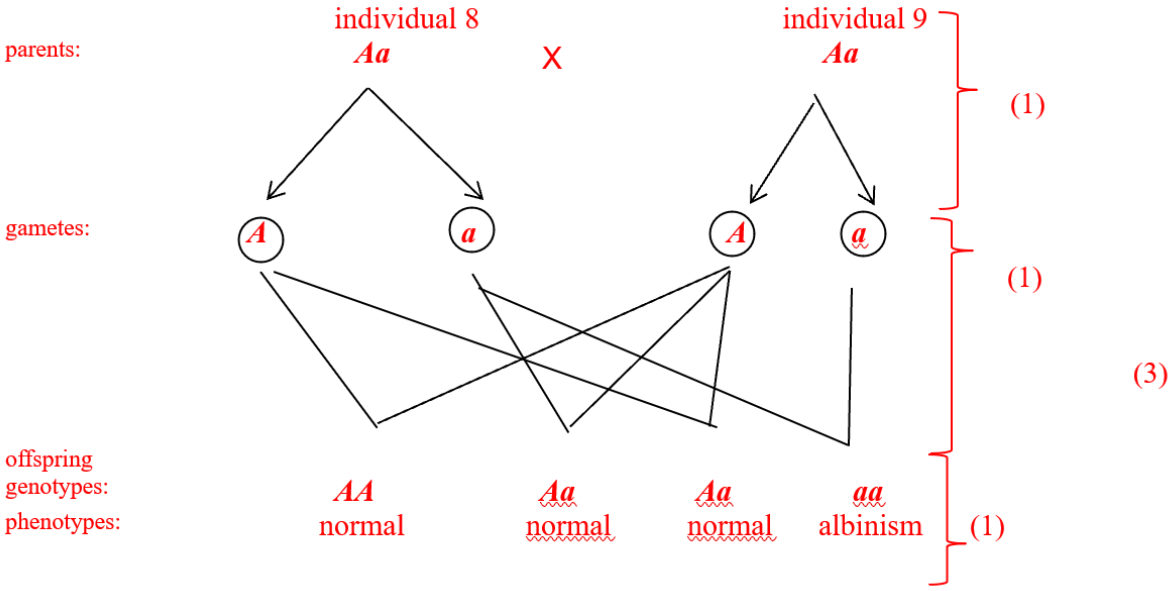
10. (a) Individuals 13/14/16 are albino, so they must have at least 1 allele for albinism inherited from individual 8 or 9 (1)

Individual 8 and 9 are normal, so they must have at least 1 allele for normal condition (1)

(At least one of individual 8 or 9 is heterozygous) In heterozygous condition, only the dominant allele is expressed / the recessive allele is masked (1)

Therefore, the allele for albinism is recessive (1)

(b)



(3)

(c) (i) recessive (1) (ii) ocular albinism ✓

(iii) In pedigree I:

If albinism is X-linked, individual 9 should be an affected male (1)

As he can only receive X chromosome with the allele causing albinism from individual 4 (1)

OR

Individual 4 is affected and homozygous recessive, so she must pass 1 allele causing albinism to individual 9 (1)

However, individual 9 is unaffected, so the recessive allele has been masked. Thus, it cannot be sex-linked as males have 1 X chromosome and 1 Y chromosome (1)

11.

Atmospheric nitrogen into organic nitrogen in plants (max 4 marks)

- Nitrogen fixation – nitrogen into ammonia by free living bacteria in soil (1)
- Nitrification – ammonium compounds oxidized/converted into nitrite then to nitrate by nitrifying bacteria (1)*
- Lightning causes formation of nitrogen oxides (1) which dissolve in rain and form nitrates (1)
- Absorption of nitrates into root (root hairs cells) by diffusion and/or active transport (1)
- Transport of nitrates to different parts of the plant via xylem (1)
- Assimilation of inorganic nitrogen into organic substances e.g. proteins, nucleic acids (DNA, RNA, ATP), chlorophyll etc. (1)*

Uptake of organic nitrogen by cow from plants (max 4 marks)

- By grazing, plant proteins enter the alimentary canal of cow (1)
- Proteins being broken down into amino acids by protease (1)
- Amino acids being absorbed in small intestine into blood by active transport/diffusion (1)
- Assimilation of amino acids as proteins, nucleic acids (DNA, RNA, ATP) etc. (1)*
- Deamination of excess amino acids in liver – amino/nitrogen-containing group being converted into urea (1) and is excreted in urine (via kidney) (1)

Return of organic nitrogen to environment (max 3 marks)

- Dead bodies / excreta / organic waste containing nitrogenous molecules are decomposed into ammonium compounds by decomposer / putrefying bacteria / fungi / saprophytes (1)
- Nitrification – ammonium compounds oxidized/converted into nitrite then to nitrate by nitrifying bacteria (1)*
- Denitrification of nitrates into nitrogen gas by denitrifying bacteria in anaerobic conditions (1)

*mark awarded once only

Question max 8 marks + communication 3 marks

No return of organic nitrogen to environment, question max 7 marks