Christian Alliance S. C. Chan Memorial College
Mock exam 2020-21
Biology Paper 1 Suggested Answer

Name: _____ Class: _____ No: _____

Section A (36 marks)

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

Section B (84 marks)

1. light-sensitive cells / photoreceptors → sensory neurone → interneurone in brain → motor neurone → eyelid muscle
   (½ mark for each term) (3)
   Deduct ½ mark if there is no arrow sign

2. (a) A (1)
   (b) (i) *synovial membrane (1)

   (ii) It serves as a lubricant to reduce friction between bones during movement. (1) / It supplies oxygen and nutrients to the cartilage (structure Q).

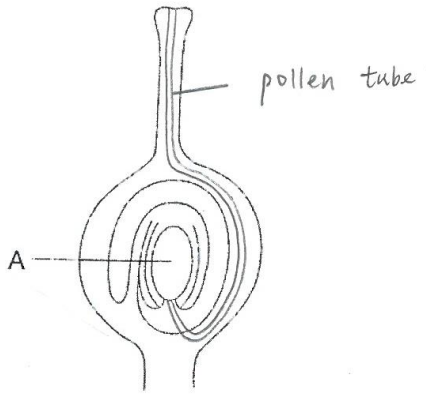
   (iii) Movement at the joint will become difficult / painful (1)
   due to increased friction / pieces of uneven cartilage rubbing against each other. (1)

3. (a) The pollen grains are rough, spiky and sticky (1)
   so that they can be attached to the body of insect pollinators easily (1)

   (b) Energy is not spent on nectar production (1)

   (c) Plant species Y is more likely to survive (1)
   This is because plant species Y can still depend on other species of insect pollinators for pollination even when some have become extinct (1)

(d) through stigma, style, micropyle (1)



(e) The desired quality of the plant can be maintained (1)
because the daughter plants produced from the tubers are genetically identical to the parent (1)

OR

The daughter plants can develop faster/they have a greater chance to develop (1)
as more food is available in the tuber for the development / the development is more independent of environmental conditions (1)

4. (a) (i) P, Q and S (1)

(ii) Both Q and S contacted the COVID-19 virus before (1)
but Q cannot / has not yet produced antibodies against the virus,
while S can form antibodies to destroy the virus / has recovered from an infection.(1)

Markers' comment:
× S received antibody injection before
× S received antibody vaccination before
✓ vaccination is the injection of antigen, not antibody

(iii) No. The antigen of the COVID-19 virus is different from that of the MERS virus (1)
because his immunity is specific to the <u>antigen</u> / <u>pathogen</u> (OR because antibodies are specific in action) (1)

Markers' comment:
× antigen are specific
✓ immunity is specific to the <u>antigen</u> / antibodies are specific in action/ production of antibodies by plasma cell is specific.

(b) When the bellows are moved out, the volume of the metal chamber increases and the air pressure in the metal chamber decreases (1)
The lungs of the patient expand and air pressure in the lung decreases. (1)
so air moves into his lungs (1)

5. (a) *mutualism (1)

(b) (Thick walls exclude oxygen (1) produced by photosynthetic cells (of fern and Anabaena) (1)
Contain no chlorophyll so do not photosynthesise (1) and hence do not produce oxygen (1). Oxygen would inhibit nitrogen fixation process (1)

max. 4

Markers' comment:
- A heterocyst is a differentiated cell of Anabaena that carries out nitrogen fixation. The heterocysts function as the sites for nitrogen fixation under aerobic conditions. They are formed in response to a lack of fixed nitrogen. The morphological differentiation is accompanied by biochemical alterations.
- Prokaryotes are unicellular. The filament of Anabaena consists of many Anabaena.

(c) Anabaena convert nitrogen gas into nitrogenous compounds,(1)
which are used by the fern to synthesis protein (1)
After ploughing the fern plants into the soil, decomposers convert protein / organic nitrogen (in cells of fern)/ dead bodies of ferns into ammonium ions (1)
Nitrifying bacteria convert ammonium ions (ammonia) converted to nitrite, then converted to nitrate (1)
Nitrate used to form protein / amino acids in rice (1) max. 4

Markers' comment:
× nitrogen fixation convert nitrogen gas into nitrate ions

6. (a) Carbon dioxide diffused into the air space in the leaves through the stomata. (1)
It dissolved in the layer of water on the mesophyll cells and diffused into the cells. (1)
The cells used the carbon dioxide in photosynthesis and produced carbohydrates. (1)

(b) (i) Radioactivity can be detected in phloem but not in xylem in plant Q (1)

(ii) Radioactivity can be detected in both xylem and phloem in plant P (1)
Radioactivity in phloem at position 2, where xylem and phloem are separated by the waxed paper, is much lower than the radioactivity at positions 1 and 3. (1)

7. (a) (i) When the concentration of alcohol increase, the concentration of NAD decreases. (1)

Markers' comment:

× The concentration of NAD is inversely proportional to the concentration of alcohol.

∵ the graph does not show inversely proportional relationship. (Information from graph usually can't provide enough information to deduce whether it is inversely proportional or not.)

× The higher the NAD concentration, the lower the alcohol concentration.

✓ The higher the alcohol concentration (因), the lower the NAD concentration (果).

✓ The concentration of NAD decreases with an increase in the concentration of alcohol.(因)

(ii) *Glycolysis / link reaction / Krebs cycle / oxidative phosphorylation (any 2) (1) x 2

Markers' comment:

- Note the correct spelling is Krebs cycle

(b) In glycolysis, glucose is converted to pyruvate (1)
with the production of NADH and ATP (1)
Then pyruvate is converted to lactic acid (1)
using the NADH formed (1)

Markers' comment:

× ATP is formed when pyruvate is converted to lactic acid

✓ ATP is formed during glycolysis, not when pyruvate is converted to lactic acid

(c)
- both involve an electron transport system (1)/a series of electron carriers for the transfer of electrons which are found on the membranes of specific organelles (1) (grana of chloroplasts and cristae of mitochondria)
- during the electron transport, energy of the electrons is stepped down and released(1), this is coupled to synthesis of ATP from ADP and Pi (1)
- ATP synthesis in both photosynthesis and respiration involves a series of redox (reduction-oxidation) reactions (1) max. 4

8. (a) concentration of sucrose solution (1)

(b) (i) The water potential of the distilled water is higher than that of potato cell (1)
Water enter the cells by osmosis (1)
potato cells become turgid / extend (1)

(ii) water potential of potato cell and sucrose solution become the same /equilibrium (1)
no net movement of water/no further osmosis (1)

(c) Increase the temperature of the sucrose solution to a suitable level to increase the rate of osmosis but avoid damage to the cell membrane. /
Cut the potato strips into smaller pieces. (1)

Markers' comment:
× use smaller potato strips

(d) (i) water moved into the sucrose solution from the potato (1) by osmosis during immersion
solution diluted/becomes less concentrated (1) and becomes lower in density

(ii) stay at same position (1)
(Explanation: no net movement of water (in or out) the sucrose solution, density remains the same after immersion of potato tissue)

Markers' comment:
× the blue drop will mix with the sucrose solution
∵ Q ask for the movement

9. (a) Cabbage contained mainly dietary fibre (and other carbohydrates) (1)
The gastric juice in the stomach did not contain enzymes for the digestion of these food substances. (1)

(b) To keep the same temperature as that of the stomach. (1)

(c) In experiment II, the churning of the stomach broke down the chunk of corned beef into smaller pieces. (1)
There is a <u>large surface area</u> for enzymes to act upon (1)
The <u>continuous enzyme production</u> speeds up the digestion (1)
and hence digestion was completed in a shorter time. (1)

} Any 2

10. (a) (i) *ribosomes /rough endoplasmic reticulum (1)

(ii) because genes vary in length /proteins vary in sizes (1) and thus the messengers should be of different sizes

(b) (i)
- the minimum number of bases required for each codon is 3 as there will not be sufficient codons for specifying all the amino acids if each codon is a combination of any 2 bases (1)
- it is logical to believe that a combination of 3 bases is sufficient for specifying the amino acids as there are already more than enough codons for all amino acids (1)

Markers' comment:
× triplet code can form amino acid
✓triplet code <u>to code for</u> the amino acid sequence in protein

(ii)
- by synthesising specific mRNA strands containing a specific codon (e.g. UACUACUACUACUAC), all amino acids in the resulting polypeptide made after translation should be identical (e.g. -tyr-tyr-tyr-) (1)
- this shows the amino acid that the specific codon in the synthetic mRNA specifies for. By repeating this for each of the possible triplets, a codon table can then be produced for all the amino acids (l)

(iii) it helps ensure the production of the required proteins /amino acids even when there are minor mutations (1)

Markers' comment:
× this feature is called universal
✓ this feature is called degenerate

11. <u>Difference in the process of gaseous exchange (A)</u>

	Adult	**Foetus**	
Exchange surface	lung / air sacs	placenta / embryonic villi formed by maternal and foetal tissues	1, 1
Exchange media	Gaseous and liquid	Both sides liquid	1, 1
Exchange direction	Oxygen from air to blood ; reverse for carbon dioxide	Oxygen from maternal blood to foetal blood ; reverse for carbon dioxide	1, 1

(max. 4)

<u>Adaptations of lung and placenta to gas exchange (B)</u>

- Numerous air sacs in the lungs and the large number of finger-like embryonic villi in the placenta (1)
  provide a large surface area for diffusion of gases. (1)
- The epithelia making up the walls of the air sacs are only one-celled thick. The walls of the embryo's capillaries and the embryonic villi are also very thin. (1)
  These features provide a short distance for the diffusion of gases. (1)
- There are numerous capillaries surrounding the air sacs. In the placenta, there are a lot of blood vessels. (1)
  The blood in these blood vessels transports the gases away readily. A steep concentration gradient can be maintained for efficient diffusion of gases. (1)

(max. 4)

Marks award for communication:

Mark	Clarity of expression and relevance to the question	Logical and systematic presentation
3	• Answers are easy to understand, fluent, good command of language • no or little irrelevant material	• Answers are well structured showing coherence of thought and organization of ideas
2	• Langue used is understandable, but there is some inappropriate use of words. • A little irrelevant material is included, but does not mar the overall answer.	• Answers are organized, but there is some repetition of ideas.
1	• Markers have to spend more time and effort to understand the answer(s). • Irrelevant materials obscure some minor ideas	• Answers are a bit disorganized, but paragraphing is evident. Repetition is noticeable.
0	• Language used is incomprehensible • Irrelevant material buries the major ideas required by the question	• Ideas are not coherent and systematic, showing no attempt to organize thoughts

Markers' comment:

× site of gas exchange in foetus is umbilical cord

✓ site of gas exchange in foetus is placenta

- don't put process of gaseous exchange of adult and foetus into separate paragraph. Compare the differences in pairs.

- inhalation and exhalation is irrelevant

End of paper