

## 2014 SEC 3 BIO IP EOY ANSWERS

- 1a The marble : nucleus; [3]  
The beads : chloroplasts; (accept: mitochondrion)  
The tubing : cell/plasma membrane;
- 1b Vacuole; ribosomes; starch grains; mitochondria; tonoplast; endoplasmic [2]  
reticulum; Golgi apparatus (any 2)
- 1c water leaves; by osmosis; ref. water potential (any ref. to differential in [4]  
concentration / less negative water potential to more negative water potential);  
cell / cytoplasm / protoplasm / model shrinks; ref. decreased pressure / turgidity /  
firmness / flaccidity;  
tubing pulls away from permeable membrane OR cytoplasm or cell membrane  
pulls away from (cell) wall; ref. plasmolysis;  
no sugar leaves cell / enters space between tubing and permeable membrane OR  
between cell membrane and wall; (any 4)
- 1d **Compare:** [2]  
Osmosis will still observed in the plant cell as compared to model plant cell;  
**Contrast:**  
The plant cell wall will still maintain its original shape because plant cell wall is  
rigid/firm unlike the flexible permeable membrane of the model cell which will also  
shrink together with inner tubing; (max 2 marks)
- 2a As temperature of the environment is increased from 2 to 45°C, kinetic energy [3]  
increases and enzyme and substrate molecules move faster;  
Resulting in more successful collisions per unit time and E-S complex is formed at  
a higher rate until the rate of formation of E-S complex is at its maximum at  
optimum temperature;  
At temperatures beyond 45°C (optimal temp), thermal agitation of enzyme disrupts  
the weaker bonds and distorts the specific three-dimensional conformation of  
enzyme/ bonds holding enzyme in 3D form are broken;  
Active site is distorted and no longer complementary to substrate and enzyme is  
said to be denatured;
- 2b Enzymes would be exposed to a higher temperature for a longer period of time; [1]
- 2c At low substrate concentration, increase in substrate concentration increases the [2]  
number of successful collisions between enzyme and substrate molecules;  
Thus, there is increase in number of enzyme-substrate complex being formed,  
hence proportional increase in rate of formation of products;  
Not all active sites of the enzymes are occupied, but at high substrate  
concentration, all active sites of enzymes are occupied and enzyme concentration  
becomes limiting;  
Max 2 marks
- 2d Increase enzyme concentration / increase temperature; [1]  
A: Adjust pH to optimum pH  
R: Change temperature, High temperature, warmer environment, high enzyme  
concentration (two words answer)

- 3a      L                                      M                                      N                                      [1]  
Outer: brown                      Outer: brown                      Outer: brown  
Inner: blue-black                      Inner: brown                      Inner: brown

- 3b      (L) photosynthesis/carbohydrate (or named) production;                      [6]  
uses up carbon dioxide;

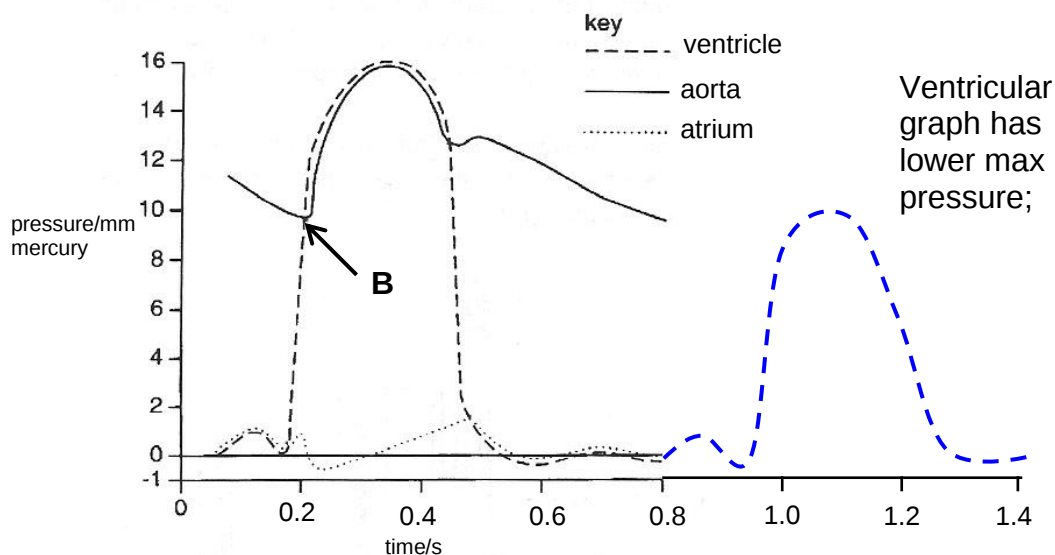
(M) Carbon dioxide released via respiration by the plant;  
Absorbed (by substance);

(N) respiration/no photosynthesis;  
Carbon dioxide released;

- 4a      Carbohydrate metabolism – description of storage of glycogen ;                      [4]  
Fat metabolism – production of bile will be affected;  
Storage of iron from broken down red blood cells ;  
Metabolism of amino acids and formation of urea ;  
Breakdown of alcohol or other harmful substances into harmless substances ;  
(Any reference to the above functions ) ;

- 4b      Excessive intake of either fatty food/high carbohydrate food ;                      [1]  
Excessive & prolonged intake of alcohol;

- 5a      Semilunar/aortic valve opens;                      [1]  
5bi                                      [1]



- 5bii      Bicuspid valve prevents backflow of blood / faulty valve cannot prevent backflow;                      [2]  
From ventricle to atrium;  
Overall less volume of blood in ventricle / ventricle cannot fill to max, thus lower pressure;

- 6a      1 – correctly labeled body part ON diagram;                      [3]  
1 – correctly named chemical related to body part;  
1 – correctly described effect must be linked to chemical;  
(eg. tar paralyses cilia in trachea)

- [Turn over

- 8c     Digestion only reaches completion in the small intestine, where the necessary enzymes are available to break down fats, proteins and carbohydrates into their smallest sub-units; [2]  
Only when the food substances are at their simplest form will they be able to be absorbed efficiently;
- 9Ea     Pulmonary artery (PA) contains less oxygen than Hepatic artery (HA); [2]  
PA contains more carbon dioxide than HA;  
PA contains more glucose than HA;  
PA pressure is lower than HA;  
PA contains more urea than HA;     (any 2)
- 9Eb     FAINTING [8]  
Due to low red blood cell count of  $2.9 \times 10^{12}$  cells per litre ;  
As less oxygen is transported during hike/ bound to haemoglobin for transport;  
(Brain) receives less oxygen for respiration (leading to fainting);
- PROLONGED BLEEDING  
Due to low platelet count of  $77 \times 10^9$  cells per litre;  
Less platelets to produce thrombokinese, which converts prothrombin to thrombin;  
In presence of calcium ions;  
Thus less thrombin converts fibrinogen to fibrin;  
Thus cannot form fibrin mesh which traps blood components to form a clot (as quickly as normal person);
- INFECTION  
Due to slow clotting which allowed bacteria entry;  
Due to low white blood cell count of  $3.6 \times 10^9$  cells per litre;  
Less phagocytes means less engulfing of bacteria that have entered blood;  
Less lymphocytes means less production of antibodies to fight bacteria;
- 9Oa     Right ventricle (RV) (wall) is thinner/less muscular than Left ventricle (LV); [2]  
RV is at lower pressure than LV;  
RV contains blood with less oxygen than LV;  
RV contains blood with more carbon dioxide than LV;     (any 2)
- 9Obi     Ang; Due to high stress + no exercise + family history; [2]  
Bok; Medium stress, Smoker + little exercise;  
Chew; Overweight + smoker + family history;
- 9Oii     Diet rich in fat / sugars / cholesterol\*\*;  
Presence of high blood pressure as pre-existing condition; [1]  
Age of person; Gender of person; Having (Type II) diabetes;  
Pre-existing high cholesterol levels; drug abuse; exposure to 2<sup>nd</sup>-hand smoke;  
EXCESS alcohol intake; (any 1)

- 9Oc Perform a (balloon) ANGIOPLASTY; [5]  
 Insert catheter/thin tube/guide wire (via groin) and feed towards the heart / aorta;  
 Release dye to detect where the blockage sites are;  
 Inflate and deflate balloon at all points A, B, C to widen lumen;  
Stent may be left in place to keep lumen open;
- Perform a heart BYPASS / Coronary Artery Bypass Graft (CABG);  
 Section of a blood vessel is taken from leg (thigh, calf) / arm / chest wall;  
 Attach blood vessels from aorta to point after A, B, C;  
 Use heart-lung machine to keep patient alive during procedure;
- Perform heart TRANSPLANT;

Paper 1 Answers

|     |     |     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Q1  | Q2  | Q3  | Q4  | Q5  | Q6  | Q7  | Q8  | Q9  | Q10   |
| B   | B   | C   | C   | D   | C   | A   | A   | D   | D     |
| Q11 | Q12 | Q13 | Q14 | Q15 | Q16 | Q17 | Q18 | Q19 | Q20   |
| B   | D   | D   | A   | D   | C   | C   | A   | A   | A/B/D |
| Q21 | Q22 | Q23 | Q24 | Q25 | Q26 | Q27 | Q28 | Q29 | Q30   |
| A   | B   | A   | A   | C   | B   | D   | B   | C   | C     |