**KOLEJ MATRIKULASI JOHOR**

**UNIT BIOLOGI**

**PROGRAM BIO-AWESOME BIO-XCELL**

**SB025**

NAME: _____ PRACTICUM; _____

**TOPIC 5: CELLULAR RESPIRATION**

**1. Explain the glycolysis process. [10 marks]**

hexokinase

phosphofructokinase

isomerisation

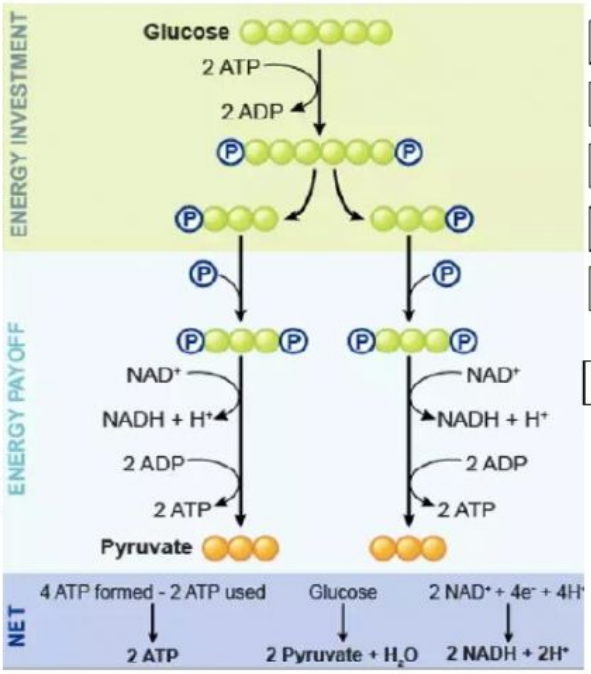
NADH + $H^+$

inorganic

ADP

water

Substrate Level Phosphorylation




Glucose-6-phosphate

Fructose-6-phosphate

Fructose-1,6-bisphosphate

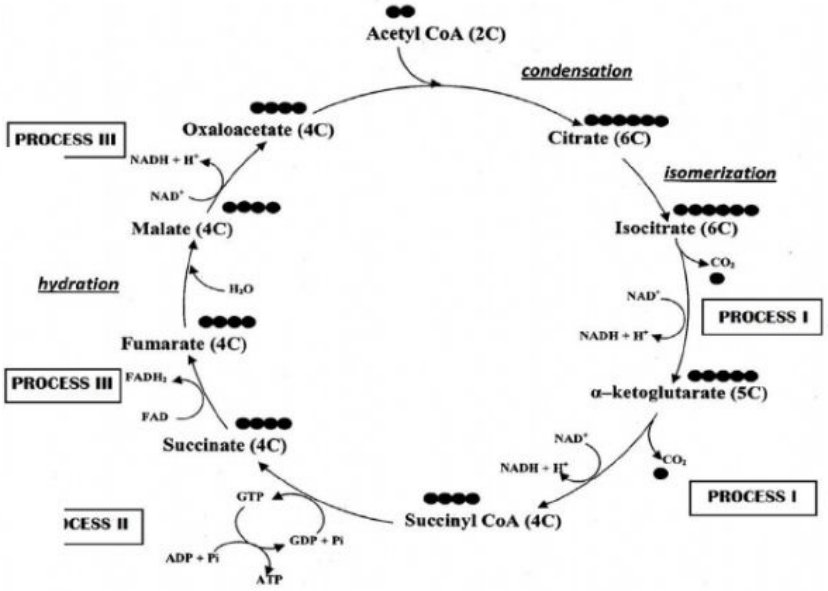
1,3-bisphosphoglycerate

2-phosphoglycerate

Phosphoenolpyruvate

- Glucose is phosphorylated to form _____ catalyze by _____
- Glucose-6-phosphate undergo _____to form _____
- Fructose-6-phosphate is phosphorylated to form _____ catalyze by _____
- Fructose-1,6-bisphosphate splits into 2 glyceraldehyde-3-phosphate
- Each G3P transfers 2H atom to $NAD^+$ to form _____
- Each G3P combines with _____ phosphate to form _____
- 1,3-bisphosphoglycerate transfer phosphate group to _____
- 2 ATP are formed by substrate level phosphorylation
- 3-phosphoglycerate rearranges to form _____
- 2-phosphoglycerate removes a _____molecule & converted to _____
- Each PEP transfers a phosphate group to ADP to formed 2ATP by _____

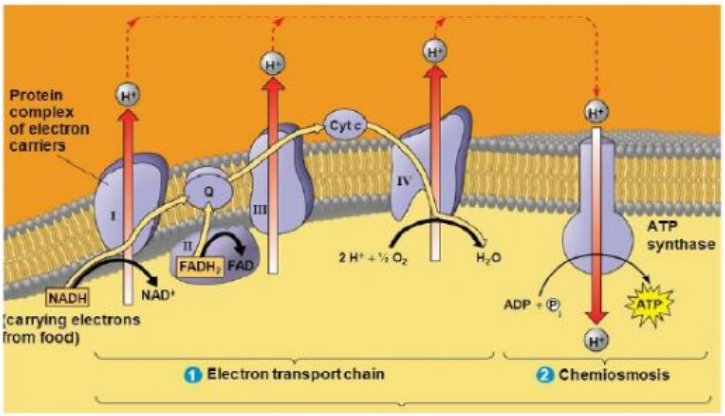
**2. Explain the steps in Krebs cycle that produce high energy molecules. [ 10marks]**




- NADH is produced during oxidation of isocitrate into _____
- Then, NADH is produced during _____ of α-ketoglutarate into _____
- $FADH_2$ is produced during oxidation of _____ into fumarate
- After that, NADH is produced during oxidation of _____ into oxaloacetate
- NADH and $FADH_2$ enter the electron transport chain by oxidative _____
- ATP is produced during conversion of succinyl co-A into succinate by _____ phosphorylation
- One NADH produced _____molecule of ATP and one $FADH_2$ produced _____ ATP

| | | | | |
|---|---|---|---|---|
| α-ketoglutarate | succinyl | succinate | malate | |
| oxidation | phosphorylation | Substrate level | 3 | 2 |

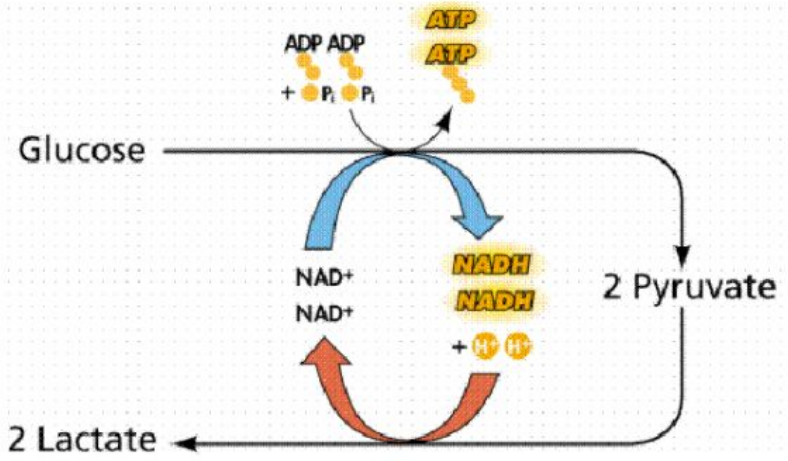
**3. Describe the synthesis of ATP during oxidative phosphorylation [10 marks]**




| | | | | | |
|---|---|---|---|---|---|
| Inner membrane | matrix | Inter membrane space | | | |
| electron | release | pump | proton | | |
| hydrogen | redox | Inorganic phosphate | ATP | | |
| water | oxygen | $FADH_2$ | Electron transport chain | ATP synthase | |

- Occurs at _____ of mitochondria
- NADH and _____ are oxidized and transfer _____ to _____
- By _____ reaction
- Transfer of electron will _____ energy
- The energy is used to _____ hydrogen from matrix to _____
- Creates _____ gradient
- _____ flows back to the _____ through _____
- ADP and _____ bind to form _____
- The final electron acceptor is _____ and produced _____

**4. Explain the production of lactic acid. [ 6 marks]**

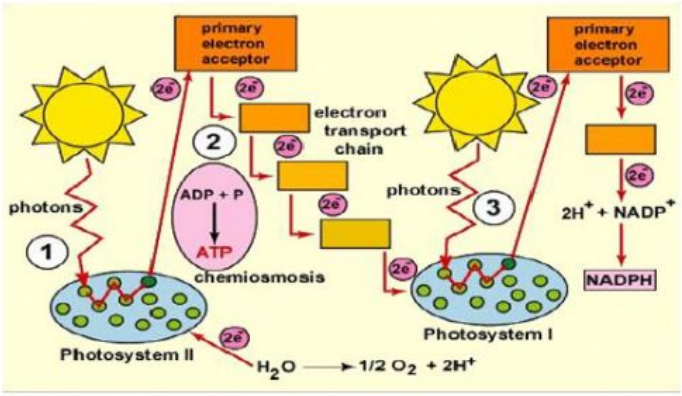



| | | | | |
|---|---|---|---|---|
| Muscle cramp | animal | pyruvate | NADH | |
| $NAD^+$ | Muscle | increase | lactate | oxygen |

- Lactate fermentation occurs in _____ cell
- When _____ is insufficient to support aerobic respiration
- Glycolysis occurs to oxidise glucose into _____
- Pyruvate receives electrons from _____
- Causing it to reduce to form _____
- NADH is oxidised to regenerate _____to sustain glycolysis process
- Lactate accumulates in _____ cells
- Hydrogen ion concentration _____
- Causing fatigue, _____ and soreness

**TOPIC 6: PHOTOSYNTHESIS**

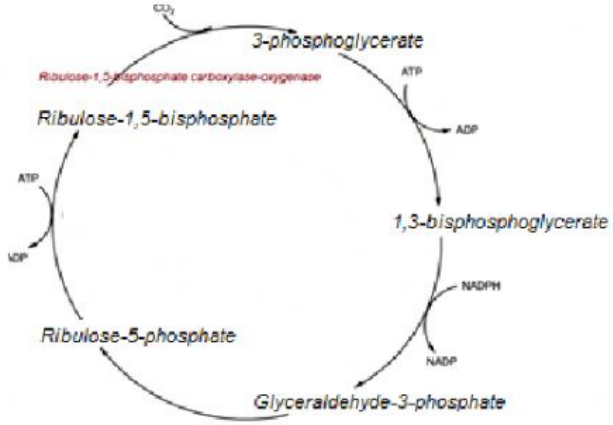
**1. Describe the electron flow through Photosystem II in plants. [10 marks]**




| | | | |
|---|---|---|---|
| PSII | NADPH | $NADP^+$ reductase | $NADP^+$ |
| Ferrodoxin | Plastoquinone | Plastocyanin | Cytochrome complex |
| excited | oxygen | water | Primary electron acceptor |
| photolysis | 2e | light | Reaction centre |

- _____ is absorbed by accessory antenna pigments of PSII
- Then transferred to the _____ Electron becomes _____
- The electrons released from PSII are accepted by _____
- Then pass along ETC starting from _____, _____, _____and then to PSI
- Photoactivated electron from PSI are released and accepted by primary electron acceptor and pass to _____ in ETC.
- Finally the electron pass to _____ and receives $2H^+$ from photolysis of water to form _____ catalyze by enzyme _____
- PSII is strong oxidizing agent which cause water molecule split into $2H^+$ ,_____ and ½ _____ by process photolysis of _____
- Electron from _____ of water neutralize reaction center _____

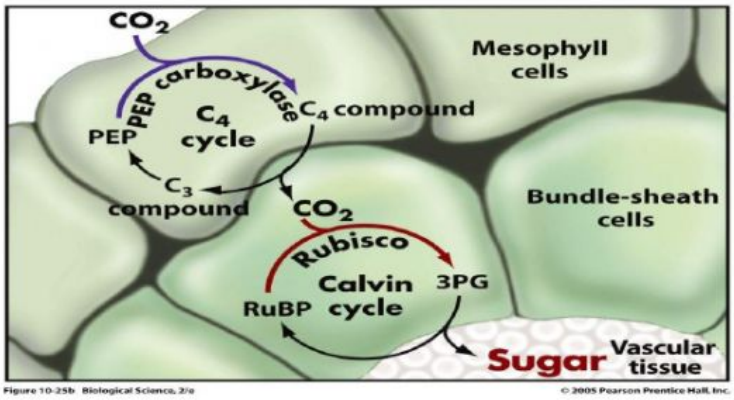
**2. Describe carbon fixation in Calvin cycle for $C_3$ plant. [10 marks]**




| | | | |
|---|---|---|---|
| 3-phosphoglycerate | 6 | stroma | sugar |
| 1,3-bisphosphoglycerate | inorganic phosphate | ATP | |
| Ribulose-1,5-bisphosphate | Glyceraldehyde-3-phosphate | | |
| Ribulose-1,5-bisphosphate carboxylase oxygenase | | | |

- $C_3$ plant fixes carbon dioxide from the atmosphere ccurs in _____ of chloroplast
- $CO_2$ reacts with _____catalyzed by _____
- Produce intermediate six-carbon compound which is unstable and break down into _____
- Phosphate group from ____ is added to 3-phosphoglycerate to form _____
- NADPH reduced 1,3-bisphosphoglycerate followed by removal of _____ group to produce _____
- Some molecule of G3P is used to synthesize _____ molecule and some G3P is used regenerate Ribulose-1,5-bisphosphate
- _____ $CO_2$ are needed to synthesize one molecule of glucose.

**3. Describe carbon fixation in C4 plant. [10 marks]**

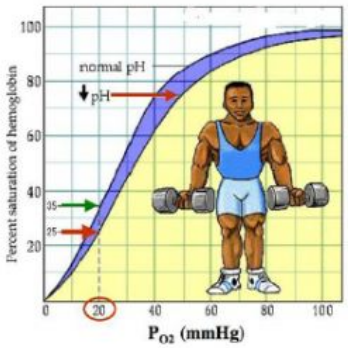



| | | | |
|---|---|---|---|
| phosphorylation | phosphate | Phosphoenolpyruvate | |
| plasmodesmata | Malate | PEP carboxylase | |
| Bundle sheath | Hatch-Slack | Oxidative decarboxylation | |
| oxaloacetate | pyruvate | Ribulose-1,5-bisphosphate | $C0_2$ |
| Ribulose-1,5-bisphosphate carboxylase oxygenase | | mesophyll | Calvin |

- $C_4$ pathway is also called _____ pathway
- $CO_2$ reacts with _____ to form _____
- Catalyses by _____ in mesophyll cell
- Oxaloacetate is reduced into _____ (4C)
- Malate is transported to _____ via _____
- Malate undergo _____ to form _____ and $CO_2$
- $CO_2$ reacts with _____ to 3-phosphoglycerate
- Catalysed by _____ in _____ cycle
- Pyruvate returns to _____ cell
- And undergo _____ using _____ from ATP and become PEP
- $C_4$ plants have adaptation to fix _____ efficiently.

**TOPIC 7: GASEOUS EXCHANGE**

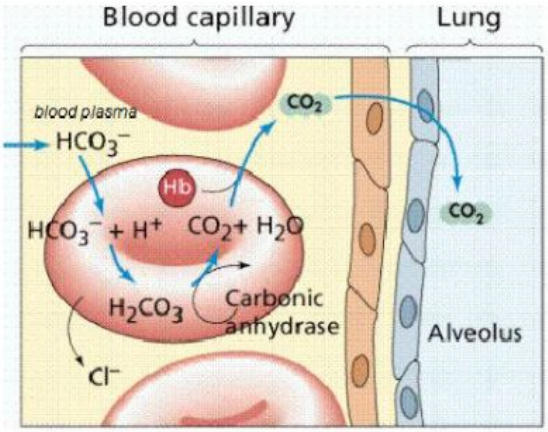
**1. Explain Bohr effect in active tissue [ 8 marks]**




| | | | |
|---|---|---|---|
| affinity | pH | right | dissociate |
| increase | decrease | tissue | Bicarbonate ion |
| Carbon dioxide | oxygen | Carbonic acid | Carbonic anhydrase |

- In active tissue respiration rate _____
- More _____ is released and reacts with water.
- To form _____ catalysed by enzyme _____
- Carbonic acid dissociate to form hydrogen and _____
- Causing _____ in blood _____
- Thus, the _____of haemoglobin for oxygen decrease
- Oxygen dissociation curve shift to the _____
- More oxyhaemoglobin _____ to release _____
- Thus more oxygen can be loaded to active _____ efficiently.

2. **Explain how bicarbonate ion is converted back to $CO_2$ to remove from the bloodstream to the lung. [10 marks]**




| | | | |
|---|---|---|---|
| tissue | Carbon dioxide | Red blood cell | |
| Chloride ion | haemoglobin | haemoglobin | |
| lower | alveoli | Chloride shift | Blood plasma |
| electroneutrality | Carbonic anhydrase | | Carbonic acid |

- $HCO_3^-$ is carried by blood plasma from _____ to the lung
- In the lungs, bicarbonates ion diffuses from plasma into the _____
- Causing_____ ions to move out of red blood cell by process _____
- to maintain the _____
- In the red blood cell, _____ acid dissociate into hydrogen and _____
- $HCO_3^-$ combine with hydrogen forming _____
- $H_2CO_3$ dissociate into water and _____ catalysed by _____
- Since $CO_2$ concentration in alveolar space is_____ than _____
- $CO_2$ diffuses from plasma into the _____