BIOLOGY

BOOKS - MTG BIOLOGY (ENGLISH)

RESPIRATION IN PLANTS

Introduction

1. Identify the correct terms for the given statements and select the correct answer.

(i) Sudden increase in the rate of respiration during ripening of fruits.

(ii) Reduction in the consumption of respiratory substrate when mole of respiration is changed from anaerobic to aerobic.

(iii) Respiratory oxidation of carbohydrates and fats.

A. Pasteur effect (i) Floating respiration (ii) Climacteric respiration (iii).

B. Pasteur effect (ii) Floating respiration (iii) Climacteric respiration (i).

C. Pasteur effect (iii) Floating respiration (ii) Climacteric respiration (i).

D. Pasteur effect (ii) Floating respiration (i) Climacteric respiration (iii).

Answer: B

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2. Respiratory substrates are the organic substances which are _____during respiration to liberate energy.

A. oxidised

B. reduced

C. synthesised

D. both (a) and (b)

Answer: A

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3. Instantaneous source of energy is

A. proteins

B. fats

C. nucleic acids

D. glucose

Answer: D

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4. Complete the following biochemical equation of respiration and select the correct answer.

$C_6H_{12}O_6 + 6O_2 \rightarrow$

$C_6H_{12}O_6 + 6O_2 \longrightarrow \square + \square + \square$

A. $6CO_2 + 12H_2O$ Energy

B. $12CO_2 + 4H_2O +$ Energy

C. $12CO_2 + 6H_2O +$ Energy

D. $6CO_2 + 6H_2O +$ Energy

Answer: D

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5. The respiration in germinating seeds produces energy energy which can be detected in the form of

A. water

B. heat

C. oxygen

D. CO_2

Answer: B

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6. Seeds respire in

A. presence of O_2

B. presence of CO_2

C. absence of O_2

D. both (a) and (c)

Answer: D

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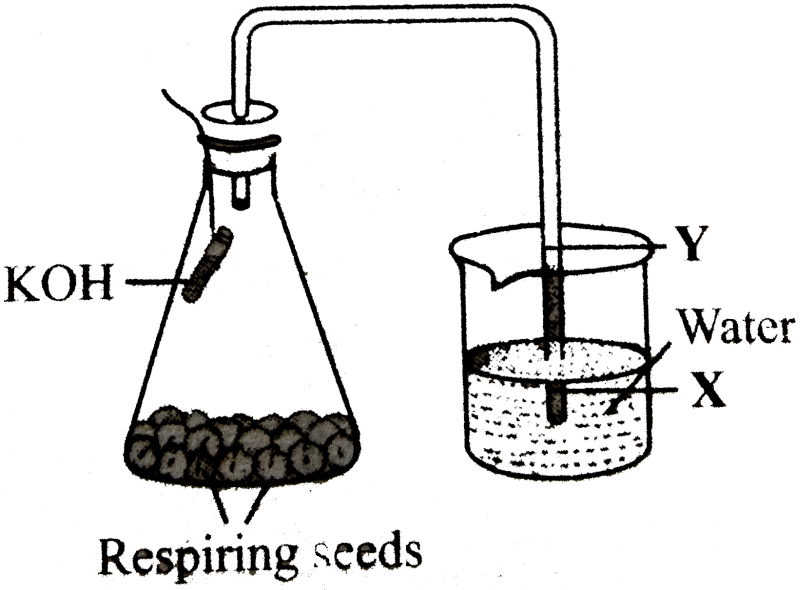
7. Rise in the water level from X to Y in the given experimental set-up demonstrates



A. aerobic respiration

B. anaerobic respiration

C. photosynthesis

D. transpiration pull

Answer: A

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Glycolysis

1. The pathway of respiration common in all living organisms is $\underline{x}$, it occurs in the $\underline{y}$ and the products formed are two molecules of $\underline{Z}$. Identify X,Y and Z in the above paragraph and select the correct answer.

A. X Y Z
EMPpathyway mitochondrion pyruvic acid

B. X Y Z
EMPpathyway cytoplasm pyruvic acid

C. X Y Z
Krebs' cycle cytoplasm acetyl CoA

D. X Y Z
Krebs' cycle mitochondrion acetyl CoA

Answer: B

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2. Select the wrong statements with respect to glycolysis.

A. It occurs outside mitochondria

B. it an anaerobic phase

C. Glucose undergoes partial oxidation to form 2 molecules of pyruvic acid

D. Glucose is phosphorylates to glucose-6-phosphate by isomerase enzyme.

Answer: D

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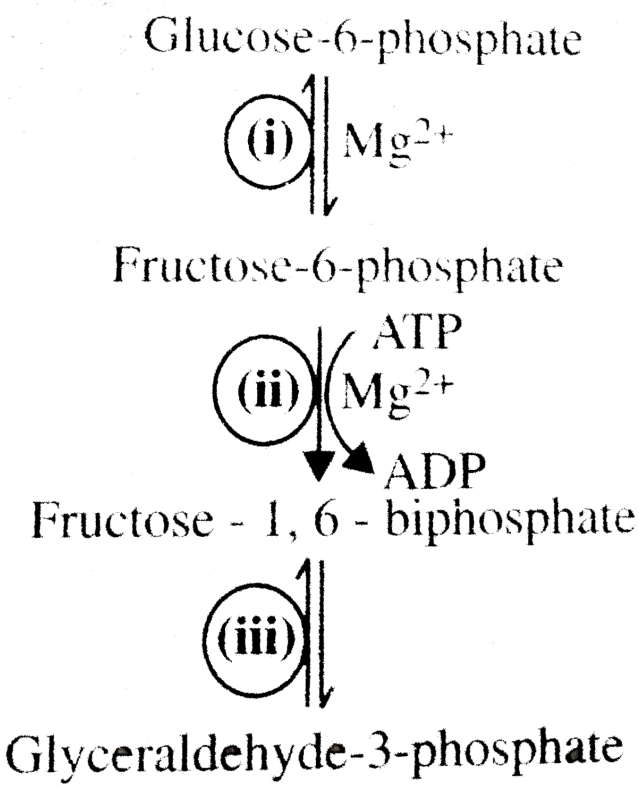
3. Study the given steps of glycolysis and identify the enzymes (i),(ii) and (iii) responsible for carrying out these steps.



A.

(*i*) (*ii*)
Phosphohexose isomerase Phospho-fructokinase-Phospho-fructoki

B. (*i*) (*ii*) (*iii*).
Hexokinase Phospho-fructokinase Aldolase

C. (*i*) (*ii*) (*iii*).
Phosphohexose isomerase Hexokinase Phosphofructo-kinase

D. (*i*) (*ii*) (*iii*).
Aldolase Phospho-fructokinase Phosphohexose isomerase

Answer: A

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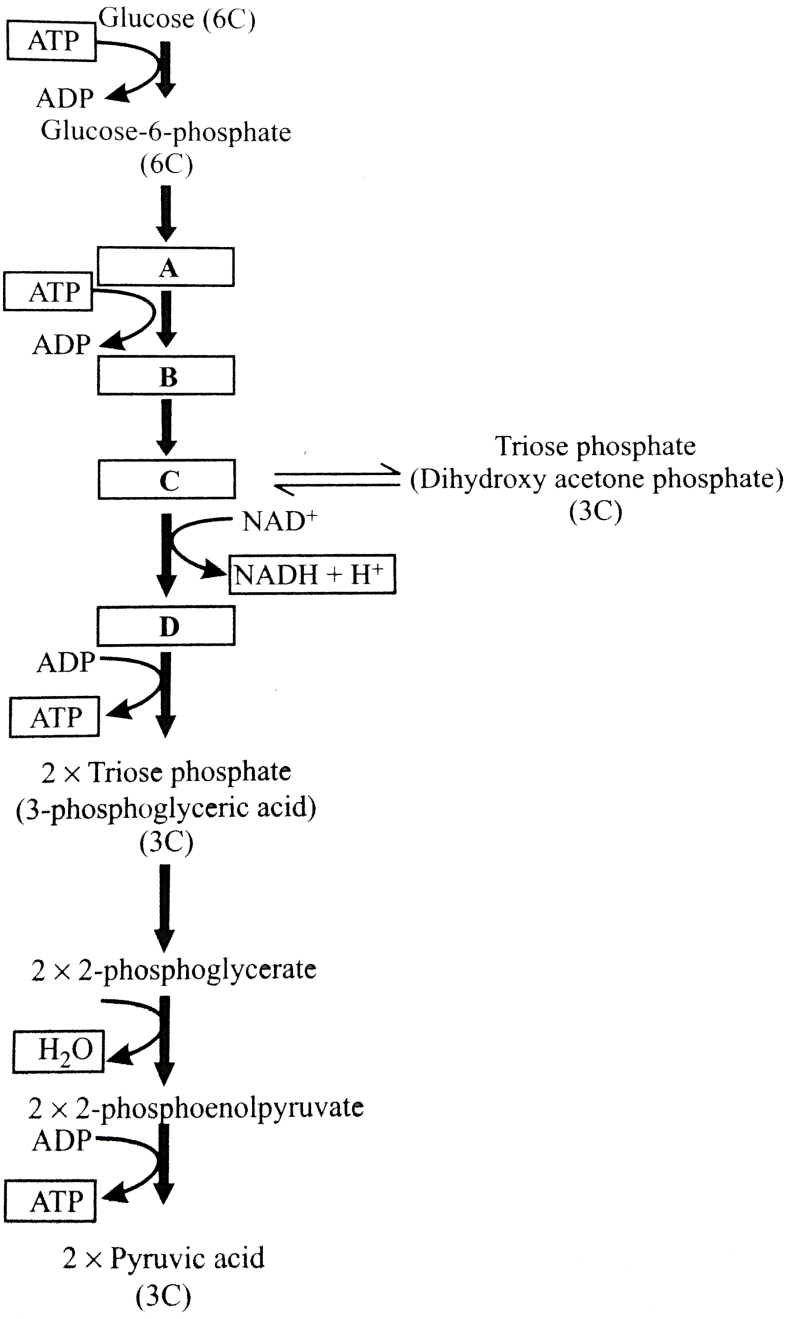
4. The flow chart given below shows the steps in glycolysis. Select the option that correctly fills in the missing steps A,B,C and D.


Glucose (6C)
ATP
ADP
Glucose-6-phosphate
(6C)
A
ATP
ADP
B
C
Triose phosphate
(Dihydroxy acetone phosphate)
(3C)
NAD+
NADH + H+
D
ADP
ATP
2 × Triose phosphate
(3-phosphoglyceric acid)
(3C)
2 × 2-phosphoglycerate
H2O
2 × 2-phosphoenolpyruvate
ADP
ATP
2 × Pyruvic acid
(3C)

A. (a)

A	B	C	D
Fructose-6-phosphate	Fructose-1-6-biphosphate	$3-PGAL$	1.3

B. (b)

A	B	C
Fructose-1,6-biphosphate	3-PGAL	$1.3-$ biphospho-glyceric acid

C.

A	B	C	D
3-PGA	1,3-biphospho-glyceric acid	$3-PGAL$	Fructose-1 ,6-bi

D.

A	B	C	D
Fructose-1,6-biphosphate	Fructose-6-phosphate	$3-PGAL$	1,3-

Answer: A

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5. Which of the following are isomers?

A. 3PGA and 2PGA

B. PGAL and DHAP

C. Glucose and Fructose

D. All of these

Answer: D

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6. Which of the following steps during glycolysis is associated with utilisation of ATP?

A. Glucose $\rightarrow$ Glucose -6-phosphate

B. Fructose-6-phosphate $\rightarrow$ Fructose-1,6-biphosphate

C. PEP $\rightarrow$ Pyruvic acid

D. Both (a) and (b)

Answer: D

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7. Which of the following conversions involve ATP synthesis during glucolysis?

A. Glucose $\rightarrow$ Glucose-6-phosphate

B. Fructose-6-phosphate $\rightarrow$ Fructose-1,6-biphosphate

C. 1,3-bisphonsphoglyceric acid (BPGA) $\rightarrow$ 3-phosphoglyceric acid (PGA)

D. All of these

Answer: C

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8. At the end of glycolysis, X is the net energy gain from one molecule of glycose via Y, but there is also energy stored in the form of Z. Identify X,Y and Z.

A.

X	Y	Z
$1ATP$	Oxidative phosphorylation	$NADH + H^+$

B.

X	Y	Z
$2ATPs$	Oxidative phosphorylation	$NADH + H^+$

C.

X	Y	Z
$1ATP$	Substrate level phosphorylation	$FADH_2$

D.

X	Y	Z
$2ATPs$	Substrate level phosphorylation	$NADH + H^+$

Answer: D

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9. The net gain of ATP molecules in glycolysis during aerobic respiration is

A. 0

B. 2

C. 4

D. 8

Answer: D

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10. The end product of glycolysis is

A. pyruvic acid

B. glucose

C. ethyl alcohol

D. CO_2

Answer: A

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11. What is true about the end products of glycolysis?

A. 2 pyruvic acid $+2ATP + 2NADH_2$

B. 2 pyruvic acid $+2NADH_2$

C. 1 pyruvic acud $+2ATP + 2NADH_2$

D. 2 pyruvic acid $+1ATP + 1NADH_2$

Answer: A

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12. During the process of acerobic respiration $\underline{(i)}$ gets oxidised and its electrons get transferred to the electron transport chain while in photosyntheis, $\underline{(ii)}$ gets oxidised to transfer molecules to the electron transport chain.

A. (i)-glucose, (ii)-xanthophyll

B. (i)-carbon dioxide, (ii)-xanthophyll

C. (i)-carbon dioxide, (ii)-chlorophyll-a

D. (i)-glucose, (ii)-chlorophyll-a

Answer: D

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13. Match column I with column II and select the correct option from the codes given below.

$Column I$	$Column II$
A. Fats made of three fatty acid chains attached to glycerol	(i) Glycogen
B. Glycolysis metabolite made from glycerol	(ii) Glycerald
C. Storage form of glucose	(iii) Triglycer
D. Common respiratory substrate of glycolysis	(iv) Glucose

A. A-(iv),B-(iii),C-(i),D-(iii)

B. A-(iii),B-(ii),C-(i),D-(iv)

C. A-(iv),B-(iii),C-(i),D-(ii)

D. A-(i),B-(ii),C-(iii),D-(iv)

Answer: B

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Fermentation

1. Ethyl alcohol fermetation occurs in

A. Lactobacillus

B. muscles of humans

C. Rhizopus

D. all of these

Answer: C

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2. Anaerobic respiration takes place in

A. mitochondrion

B. nucleus

C. cytoplasm

D. vacuole

Answer: C

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3. Which of the molecule listed below is a product of fermentation of glucose by yeast?

A. $(C_6H_{10}O_5)_n$

B. C_2H_5OH

C. $C_6H_{12}O_6$

D. CH_3OH

Answer: B

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4. A test tube containing molasses solution and yeast is kept in a warm place overnight. The gas collected from this mixture

A. extingusihes the flame

B. bursts into flame when ignited

C. turns lime water milky

D. both (a) and (c)

Answer: D

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5. Which of the following options does not hold good regarding anaerobic respiration or fermentation ?

A. Occurs inside the mitochondria

B. Partial breakdown of glycose occurs

C. Net gain of only 2 ATP molecules

D. None of these

Answer: A

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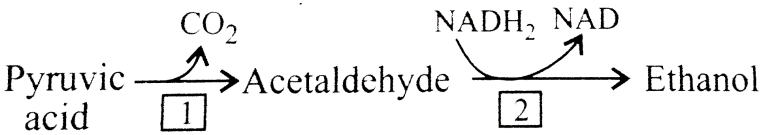
6. Identify the enzymes 1 and 2 in the given reaction and select the correct option.



A. Alcohol dehydrogenase Pyruvate decarboxylase

B. Alcohol decarboxylase Pyruvate dehydrogenase

C. Pyruvate decarboxylase Alcohol dehydrogenase

D. Pyruvate dehydrogenase Alcohol dehydrogenase

Answer: C

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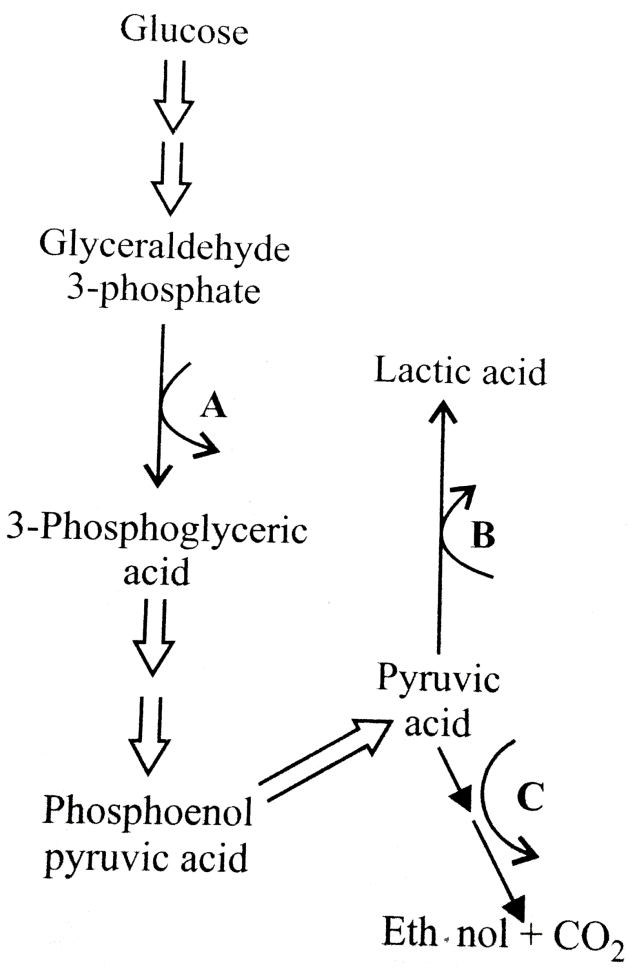
7. What does A,B and C depict in the given pathways of anaerobic respiration ?



A.

A	B	C
$NADH + H^+ \rightarrow NAD^+$	$NAD^+ \rightarrow NADH + H^+$	$NAD^+ \rightarrow$

B.

A	B	C
$NADH + H^+ \rightarrow NAD^+$	$NADH + H^+ \rightarrow NAD^+$	$NAD^+ \rightarrow$

C.

A	B	C
$NAD^+ \rightarrow NADH + H^+$	$NADH + H^+ \rightarrow NAD^+$	$NADH +$

D.

A	B	C
$NAD^+ \rightarrow NADH + H^+$	$NADH + H^+ \rightarrow NAD^+$	$NAD^+ \rightarrow$

Answer: C

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8. Though vertebrates are aerobes, but their $\underline{(i)}$ show anaerobic respiration during $\underline{(iii)}$. During this $\underline{(iii)}$ of skeletal muscle fibres is broken down to release lactic acid and energy. Lactic acid, if accumulates causes muscle fatigue. Fill up the blanks in the above paragraph and select the correct option.

A.

(i)	(ii)	(iii).
skeletal muscles	heavy exercise	glucose

B.

(i)	(ii)	(iii).
skeletal muscles	mild exercise	glycogen

C.

(i)	(ii)	(iii).
skeletal muscles	heavy exercise	glycogen

D. (i) (ii) (iii).
cardiac muscles heavy exercise glycogen

Answer: A

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9. Identify A,B and C in the given reaction of lactic acid fermentation and select the correct option.

Pyruvic acid $+A \xrightleftharpoons[FMN, ZN^{2+}]{\text{Lactate dehydrogenase}} B + C$

A. A B C
$NADH$ Lactic acid $+CO_2$ NAD^+

B. A B C
$NADH$ Lactic acid NAD^+

C. A B C
NAD^+ Lactic acid $NADH$

D. A B C
NAD^+ Lactic acid $+CO_2$ $NADH$

Answer: B

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10. Select the incorrectly matched pair.

A. End products of alcoholic Ethanol fermentation - $+CO_2$

B. End products of lactic acid fermentation - Lactic acid $+CO_2$

C. Glycolysis -Cytoplasm

D. Key product of glycolysis - Pyruvic acid

Answer: B

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11. Fermentation is represented by the equation

A. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 686$ kcal

B. `C_(6)H_(12)O_(6) rarr 2C_(2)H_(5)OH +2CO_(2) + 18 kcal

C. $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2$

D. $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Answer: B

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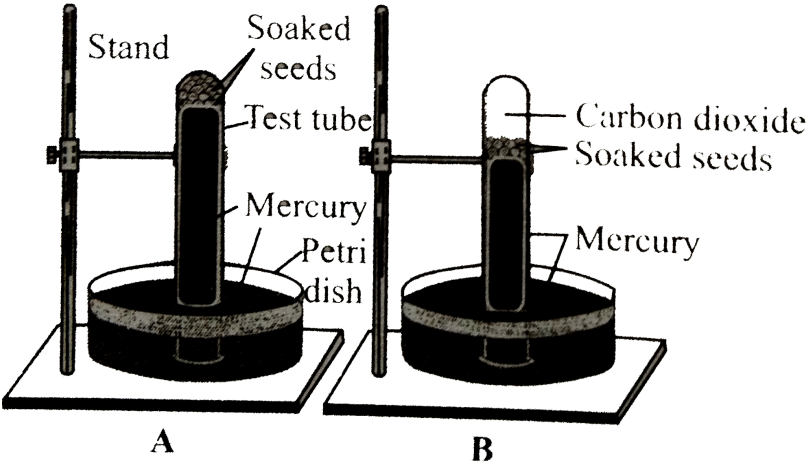
12. The given experimental set-up demonstrates



A. photosynthesis

B. aerobic respiration

C. anaerobic respiration

D. ascent of sap

Answer: C

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13. Mercury (Hg) is generally used in anaerobic respiration experiments because it does not react with____.

A. O_2

B. CO_2

C. H_2O

D. air

Answer: B

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14. Which of the following describes significance of fermentation?

(i)Prodyction of alcohol in brewing industry

(ii) Making of dough in baking industry

(iii) Curing of tea and tobacco

(iv) Production of vinegar by acteic acid bacteria

A. (i),(ii) and (iii)

B. (i),(ii) and (iv)

C. (ii),(iii) and (iv)

D. (i),(ii),(iii) and (iv)

Answer: D

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15. Dough kept overnight in warm weather becomes soft and spongy due to

A. absorption of CO_2 from atmosphere

B. imbibition

C. fermentation

D. all of these

Answer: C

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Afrobic Respiration

1. Site of Krebs' cycle in mitochondria is

A. outer membrane

B. matrix

C. oxysomes

D. inner membrane.

Answer: B

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2. Read the given statements and select the correct option.

Statement 1: Glycolysis occurs in mitochondrial matrix.

Statement 2: Krebs' cycle occurs on cristae of mitochondria.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: D

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3. Fate of pyruvic acid during aerobic respiration is

A. lactic acid fermentation

B. alcoholic fermentation

C. oxidative decarboxylation

D. oxidative phosphorylation

Answer: C

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4. Pyruvate dehydrogenase is used in converting

A. glucose to pyruvate

B. pyruvic acid to lactic acid

C. pyruvate to acetyl CoA

D. pyruvate to glucose

Answer: C

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5. Identify A and B in the given reaction.

Pyruvic acid

$$+CoA + NAD^{+} \xrightarrow[\text{Pyruvate dehydrogenase}]{Mg^{2+}} A + B + NADH + H^{+}$$

A. A B
PEP CO_2

B. A B
$\text{Acetyl}CoA$ CO_2

C. A B
CO_2 H_2O

D. A B
$\text{Acetyl}CoA$ H_2O

Answer: B

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6. Which step is called gateway step/link reaction in aerobic respiration?

A. Glycolysis

B. Formation of acteyl coenzyme A

C. Citric acid formation

D. ETS terminal oxidation

Answer: B

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7. Alternate name of Krebs' cycle is

A. TCA cycle

B. citric acid cycle

C. both (a) and (b)

D. none of these

Answer: C

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8. Krebs' cycle starts with the formation of a six carbon compound by reaction between

A. fumaric acid and pyruvic acid

B. OA A and acetyl CoA

C. malic acid and acetyl CoA

D. succinic acid and pyruvic acid.

Answer: B

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9. In krebs' cycle OA A accepts acteyl CoA to form

A. citric acid

B. oxalosuccinate

C. fumarate

D. succinyl CoA

Answer: A

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10. Which of the following is a 4-carbon compound?

A. Oxaloacetic acid

B. Phosphoglyceric acid

C. Ribulose bisphosphate

D. Phosphoenol pyruvate

Answer: A

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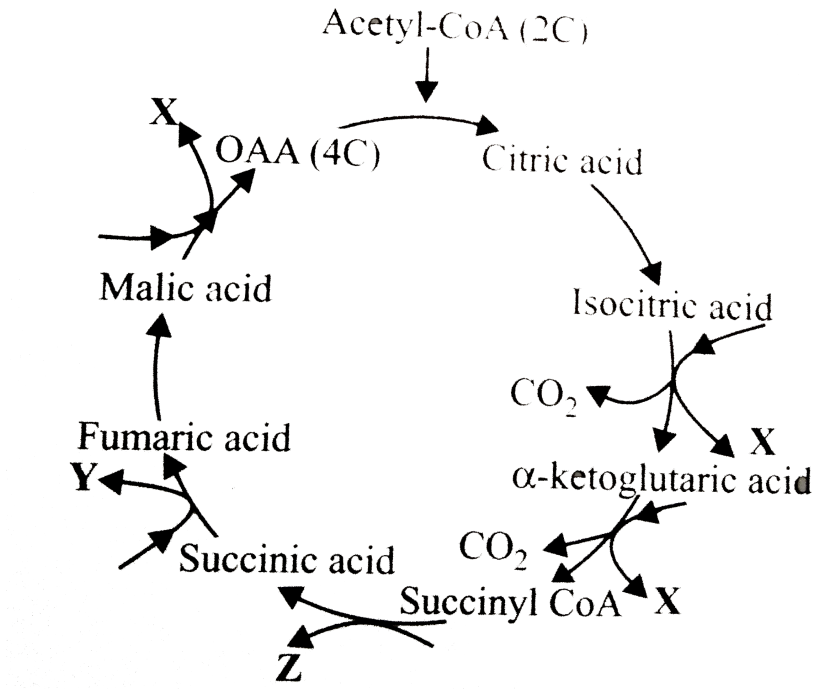
11. Identify X,Y and Z in the given diagram representing steps of citric acid cycle and select the correct option.



A. $\begin{matrix} X & Y & Z \\ GTP & NADH_2 & FADH_2 \end{matrix}$

B. $\begin{matrix} X & Y & Z \\ FADH_2 & NADH_2 & GTP \end{matrix}$

C. $\begin{matrix} X & Y & Z \\ NADH_2 & FADH_2 & GTP \end{matrix}$

D. $\begin{matrix} X & Y & Z \\ CO_2 & NADH_2 & ADP \end{matrix}$

Answer: C

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12. Consider the first reaction of TCA cycle.

Acetyl $CoA + OAA + H_2O \xrightarrow[\text{synthase}]{\text{Citrate}} A + CoA$ What is true about compound A?

A. First product of TCA cycle

B. Tricarboxylic acid and six carbon compound

C. It undergoes reorganisation in the presence of enzyme aconitase to form cis-aconitate

D. All of these

Answer: D

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13. Identify enzyme A in the given reaction of Krebs' cycle

$$\underset{(4C)}{OAA} + \text{Acetyl} - CoA + H_2O \xrightarrow{A} \underset{(6C)}{\text{Citric acid}} + CoA$$

A. Oxaloacetate synthetase

B. Citrate synthase

C. Aconitase

D. Dehydrogenase

Answer: B

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14. Krebs' cycle is also called metabolic sink as it is a common pathway for

A. carbohydrates, fats and proteins (amino acids)

B. carbohydrates and fats only

C. carbohydrates and organic acids only

D. proteins and fats only

Answer: A

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15. The intermediate product between α-ketoglutaric acid and succinic acid in TCA cycle is

A. acetyl CoA

B. succinly CoA

C. fumarate

D. oxalosuccinic acid

Answer: B

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16. Select the correct sequence of formation of given intermediates of Krebs' cycle.

A. succinate $\rightarrow$ Malate $\rightarrow$ Fumarate $\rightarrow OAA$

B. Fumarate $\rightarrow$ Succinate $\rightarrow$ Malate $\rightarrow OAA$

C. Succinate $\rightarrow$ Fumarate $\rightarrow$ Malate $\rightarrow OAA$

D. Malate $\rightarrow$ Fumarate $\rightarrow$ Succinate $\rightarrow OAA$

Answer: C

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17. Substrate level phosphorylation occurs during which step of Krebs' cycle

A. Succinly$CoA \rightarrow$ Succinic acid

B. Isocitric acid $\rightarrow$ Oxalosuccinic acid

C. Oxalosuccinic acid $\rightarrow \alpha -$ ketoglutaric acid

D. Malic acid $\rightarrow OAA$

Answer: A

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18. The first 5C dicarboxylic acid in Krebs' cycle which is used in nitrogen metabolism is

A. OAA

B. citric acid

C. α-ketoglutaric acid

D. acetyl coenzyme A

Answer: C

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19. Which of the following steps is associated with ATP formation (substrate level phosphorylation)?

A. Succinly $CoA \rightarrow$ Succinic acid

B. 1,3 bis $PGA \rightarrow 3PGA$

C. $PEP \rightarrow$ Pyruvate

D. All of these

Answer: D

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20. FAD participates in Krebs' cycle as electron acceptor during conversion of

A. succinly CoA to succinic acid

B. α-ketoglutarate to succinly CoA

C. succinic acid to fumaric acid

D. fumaric acid to malic acid

Answer: C

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21. Select the correct statement.

A. When ATP is synthesised directly from metabolites, it is substrate level phosphorylation.

B. In Krebs' cycle, citrate undergoes 2 decarboxylations and 4 dehydrogenations.

C. Krebs' cycle in an amphibolic process.

D. All of these

Answer: D

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22. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is

A. isocitrate dehydrogenase

B. ketoglutarate dehydrogenase

C. succinate dehydrogenase

D. lactate dehydrogenase.

Answer: C

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23. Categorise the given equations under respective phases and select the correct option.

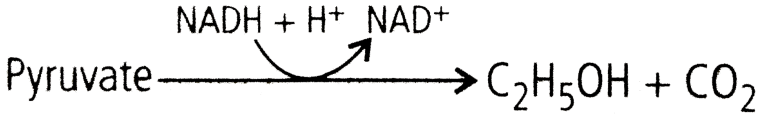
I.

$$C_6H_{12}O_6 + 2NAD^+ + 2ADP + 2\Pi \rightarrow 2C_3H_4O_3 + 2ATP + 2NADH +$$

II. Pyruvic acid

$$+4NAD^+ + FAD^+ + 2H_2O + ADP + \Pi \rightarrow 3CO_2 + 4NADH + 4H^+$$

III.



A.

I	II	III
Glycolysis	Fermentation	Krebs'cycle

B. | I | II | III |
|---|---|---|
| Krebs' cycle | Fermentation | Glycolysis |

C. | I | II | III |
|---|---|---|
| Krebs' cycle | Glycolysis | Fermentation |

D. | I | II | III |
|---|---|---|
| Glycolysis | Krebs's cycle | Fermentation |

Answer: D

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24. Which of the following steps of respiration is amphibolic ?

A. Glycolysis

B. Oxidative decarboxylation of pyruvate

C. TCA cycle

D. Oxidative phosphorylation

Answer: C

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25. When two molecules of acetyl CoA enter the TCA cycle, net gain at the end of the cycle is

A. $2NADH_2 + 2FADH_2 + 1GTP$

B. $3NADH_2 + 2FADH_2 + 2GTP$

C. $6NADH_2 + 2FADH_2 + 2GTP$

D. $3NADH_2 + 1FADH_2 + 4GTP$

Answer: C

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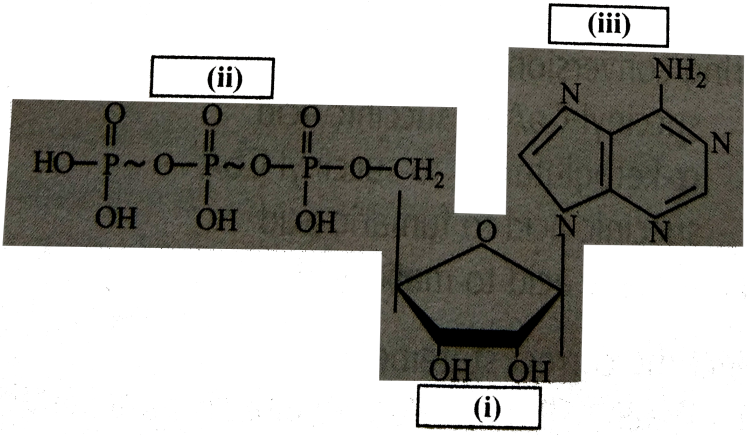
26. Identify the three components [(i),(ii) and (iii)] of ATP molecule shown in the give figure.



A. (i) Ribose (ii) Triphosphate group (iii). Adenine

B. (i) Adenine (ii) Triphosphate group (iii). Ribose

C. (i) Glucose (ii) Triphosphate group (iii). Adenine

D. (i) Ribose (ii) Triphosphate group (iii). Guanine

Answer: A

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27. Amount of energy released during hydrolysis of a high energy bond of ATP is

A. $73 kcal mol^{-1}$

B. $0.73 kcal mol^{-1}$

C. $3.4 kcal mol^{-1}$

D. $7.3 kcal mol^{-1}$

Answer: d

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28. All of the following processes can release CO_2 except

A. alcoholic fermentation

B. oxidative decarboxylation and Krebs' cycle

C. oxidative phosphorylation

D. conversion of α-ketoglutarc acid to succinic acid.

Answer: C

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29. Select the option that correctly fills the blanks in the following statements.

A. Glucose has $\underline{(i)}$ carbon atoms, pyruvic acid has $\underline{(ii)}$ carbon atoms and the acetyl group has $\underline{(iii)}$carbon atoms.

B. Electrons enter the electron transport system as parts of hydrogen atoms attached to $\underline{(i)}$ and $\underline{(ii)}$.

A. $\begin{matrix} A & & B \\ (i)-6 & (ii)-4 & (iii)-3 \end{matrix} \quad \begin{matrix} B \\ (i)-NADH & (ii)-FADH_2 \end{matrix}$

B. $\begin{matrix} A & & B \\ (i)-6 & (ii)-3 & (iii)-2 \end{matrix} \quad \begin{matrix} B \\ (i)-NADH & (ii)-FADH_2 \end{matrix}$

C. $\begin{matrix} A & & B \\ (i)-6 & (ii)-3 & (iii)-2 \end{matrix} \quad \begin{matrix} B \\ (i)-ATP & (ii)-GTP \end{matrix}$

D. $\begin{matrix} A & & B \\ (i)-6 & (ii)-4 & (iii)-3 \end{matrix} \quad \begin{matrix} B \\ (i)-ATP & (ii)-GTP \end{matrix}$

Answer: b

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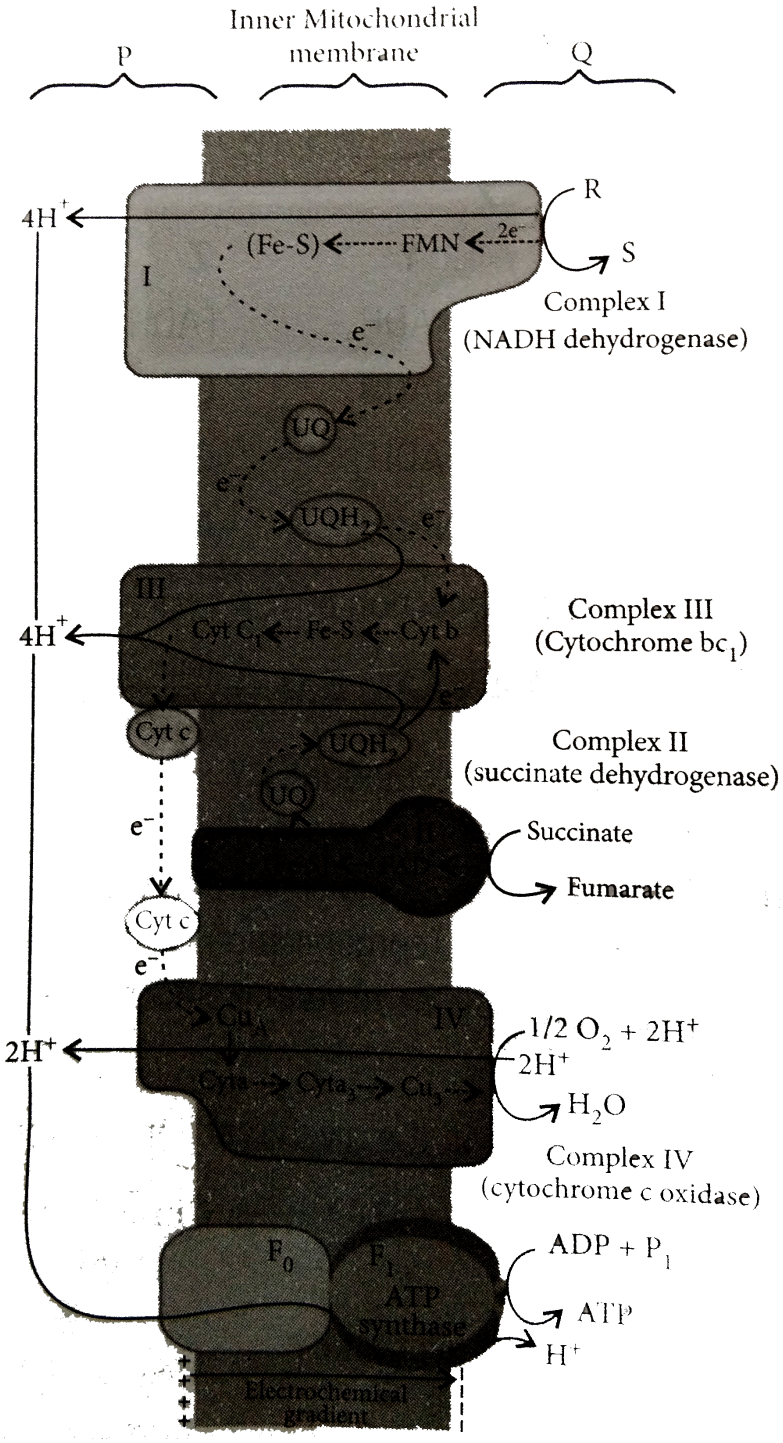
30. Identify P,Q,R and S in the given diagram of electron transport system.



A. $\begin{array}{cccc} P & Q & R & S \\ \text{Matrix} & \text{Outer chamber} & FMNH_2 & NADH_2 \end{array}$

B. $\begin{array}{cccc} P & Q & R & S \\ \text{Inter-membrane space} & \text{Matrix} & NaDH + H^+ & NAD^+ \end{array}$

C. $\begin{array}{cccc} P & Q & R & S \\ \text{Inter-membrane} & \text{Cristae} & NAD^+ & NADH + H^+ \end{array}$

D. $\begin{array}{cccc} P & Q & R & S \\ \text{Cristae} & \text{Outer chamber} & NADH + H^+ & NAD^+ \end{array}$

Answer: b

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31. Match column I with column II and select the correct option from the given codes.

$ColumnI$	$COlumnII$
$A.$ Glycolysis	(i)Inner mitochondrial membrane
$B.\ TCA$cycle	(ii)Mitochondrial matrix
$C.\ ETS$	(iii)Cytoplasm

A. A-(iii),B-(i),C-(ii)

B. A-(iii),B-(ii),C-(i)

C. A-(i),B-(ii),C-(iii)

D. A-(ii),B-(i),C-(iii)

Answer: b

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32. Electron transport chain (ETC) is a set of_____electroncarries present in a specific sequence along_____mitochondrial membrane.

A. seven, inner

B. six,inner

C. seven,outer

D. six,outer

Answer: a

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33. In the electron transport system present in the inner mitochondrial membrane complexes I and IV are respectively

A. NADH dehydrogenase and $FADH_2$

B. $FADH_2$ and $NADH$ dehydrogenase

C. $NADH$ dehydrogenase and cytochrome c oxidase complex

D. NADH dehydrogenase and ATP synthase

Answer: C

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34. Oxidation of one $NADH$ and one $FADH_2$ respectively gives rise to____and ____ATP molecules.

A. 3 and 2

B. 2 and 1

C. 2 and 3

D. 1 and 1

Answer: a

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35. Study the incorrect statement with respect to an overview of the electron transport system (ETS).

A. Ubiquinone receives reducing equivalents via, $FADH_2$ (complex II) that is generated during oxidation of succinate in the TCA cycle.

B. As the electron move down the system, energy is released and used to form ATP

C. $2ATPs$ are formed for every pair of electrons that enters by way of $NADH$ and $3ATPs$ are formed for every pair of electrons that enters by way of $FADH_2$

D. Oxygen, the final e^- acceptor becomes a part of water.

Answer: c

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36. Last e^- acceptor during ETS is

A. O_2

B. cyt a

C. cyt a_2

D. cyt a_3

Answer: A

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37. Which of these are respiratory poisons or inhibitor of ETC?

A. Cyanides

B. Antimycin A

C. Carbon monoxide

D. All of these

Answer: d

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38. During electron transport system (ETS) electron transport proceeds from carriers that have _____redox potential to those having____redox potential. This electront transport down the energy gradient leads to the formation of ATP from ADP and Pi, which is referred to as_____.

A. low, high, oxidative phosphorylation

B. low, high, oxidative decarboxylation

C. high, low, oxidative phosphorylation

D. high, low, oxidative decarboxylation

Answer: a

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39. Read the given statements and select the correct option.

Statement 1: During photophosphorylation (of photosynthesis), light energy is utilised for the production of proton gradient during ATP synthesis.

Statement 2 : In respiration, energy of oxidation-reduction is utilised for the phosphorylation and thus the process is called oxidative phosphorylation.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: a

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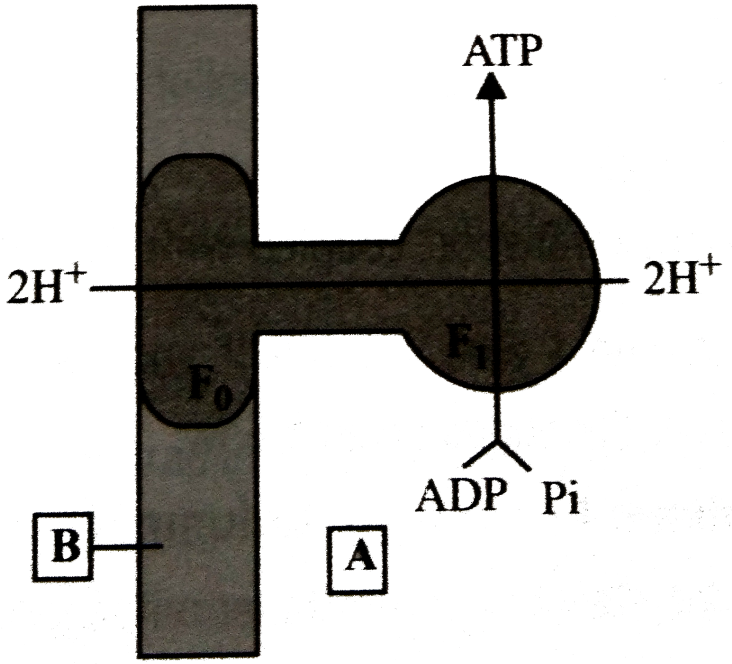
40. Identify A and B in the given diagram showing ATP synthesis in mitochondria.



A. A = Mitochondrial matrix

B = Outer mitochondrial membrane

B. A= Mitochondrial matrix

B = Inner mitochondrial membrane

C. A = Cell cytoplasm

B = Inner mitochondrial membrane

D. A = Cell cytoplasm

B = Outer mitochondrial membrane

Answer: b

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41. As per chemiosmotic coupling hypothesis, in mitochondria, protons accumulate in the

A. outer membrane

B. inner membrane

C. intermembrane space

D. matrix

Answer: c

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42. Study the following statements regarding chemiosmotic hypothesis in mitochondria and select the correct ones.

(i) F_1 headpiece contains the site for the synthesis of ATP from $ADP + \Pi$.

(ii) F_0 par forms the channel through which protons cross the inner membrane.

(iii) For each ATP produced, $2H^+$ pass through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: d

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43. Select the wrong statement.

A. Oxidative decarboxylation of pyruvic acid requires the presence of enzyme pyruvate dehydrogenase.

B. All living cells whether aerobic or anaerobic, perform glycolysis.

C. Cyanide does not stop chemiosmosis

D. Respiratory chain uses O_2 as final hydrogen acceptor.

Answer: c

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44. Which of the following cellular metabolic processes can occur both in the presence or absence of O_2?

A. Glycolysis

B. Fermentation

C. TCA cycle

D. Electron transport coupled with chemiosmosis

Answer: a

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45. Match column I with colum II and select the correct option from the codes given below.

$Column I$	$Column II$
$A.\ TCA$ cycle	(i) Inner mitochondrial membrane
$B.\ F_0 - F_1$ particles	(ii) Hans Krebs
$C.$ End product of glycolysis	(iii) Oxidative decarboxylation
$D.$ Pyruvate dehydrogenase	(iv) Pyruvic acid

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(i),B-(ii),C-(iv),D-(iii)

C. A-(ii),B-(iii),C-(iv),D-(i)

D. A-(iii),B-(ii),C-(i),D-(iv)

Answer: a

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46. Select the correct statements.

(i) Between temperature range $0 - 25^{\circ} C$, rate of respiration doubles for every $10^{\circ} C$ rise in temperature.

(ii) Cytochromes are iron-porphyrin compounds.

(iii) Respiratory rate of wounded or injured plant parts generally decreases.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: a

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47. Which of the following statements is correct with respect to the effect of temperature on rate of respiration ?

A. Rate of respiration increases with an increase in temperature from $0^{\circ}C$ to $30^{\circ}C$

B. Rate of respiration doubles for every $10^{\circ}C$ rise in temperature, thus temperature co-efficient (Q_{10}) for respiration is 2.

C. At very high temperatures such as $50^{\circ}C$ or more, rate of respiration decreases due to enzymatic degradation.

D. All of these

Answer: d

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Respiratory Balance Sheet

1. During complet metabolism of glucose, the number of ATP formed is

A. 2

B. 12

C. 36

D. 44

Answer: c

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2. How many ATP molecules will be generated in a plant system during complet oxidation of 40 molecules of glucose?

A. 180

B. 360

C. 1440

D. 3040

Answer: c

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3. The balance sheet for ATP production in glycolysis has been given below. Select the option which correctly fills up the blanks for P,Q,R and S.

['X' stands for 'nil'].

Steps	ATPUtilisa
1. Glucose rarrGlucose-6-phosphate	P
2. Fructose-6-phosphate $\rightarrow$ Fructose-1,6-bisphosphate	1
3.1.3 $-$ bisphosphoglyceric acid $\rightarrow$ 3 $-$ Phosphoglyceric acid	X
4.2 $-$ Phosphenol pyuvic acid $\rightarrow$ Pyruvic acid	S

A.

P	Q	R	S
1	X	X	2

B.

P	Q	R	S
1	X	2	X

C.

P	Q	R	S
2	1	X	1

D.

P	Q	R	S
X	1	2	X

Answer: b

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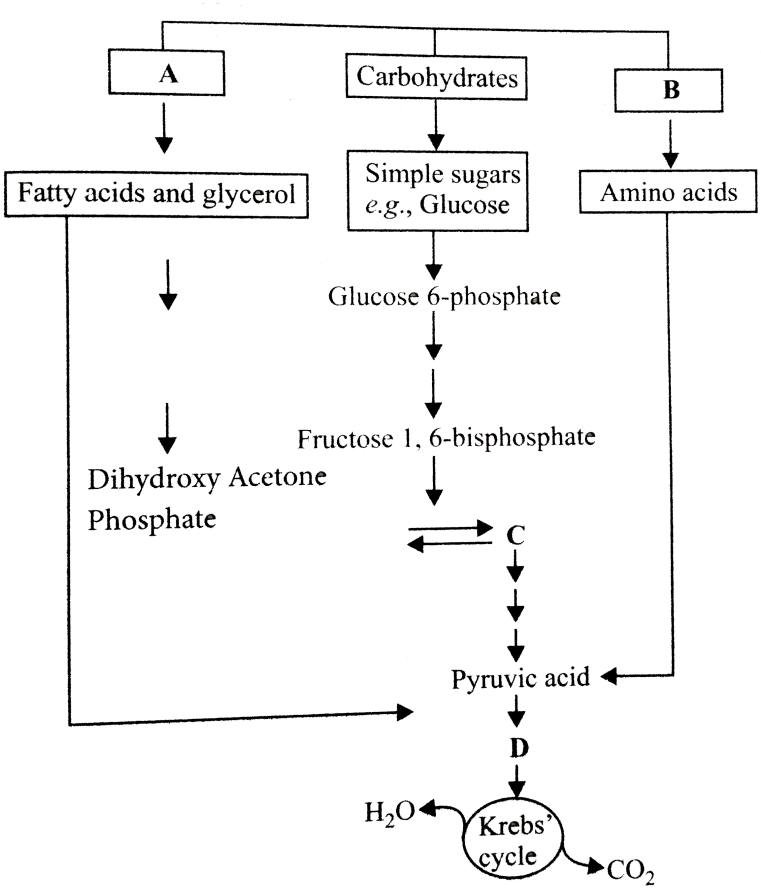
Amphibolic Pathway

1. Refer to the given figure and select the correct option for A,B,C and D.



A.

A	B	C	D
Fats	Proteins	$3-PGAL$	AcetylCoA

B.

A	B	C	D
Fats	Proteins	$3-PGAL$	CO_2

C. $\begin{array}{llll} A & B & C & D \\ \text{Proteins} & \text{Fats} & Acetyl CoA & PEP \end{array}$

D. $\begin{array}{llll} A & B & C & D \\ \text{Proteins} & \text{Fats} & PEP & \text{Acetyl} CoA \end{array}$

Answer: a

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2. Which of the following statements regarding metabolic pathways is incorrect?

A. Many of the steps of glycolysis can run in reverse.

B. Strach, sucrose or glycogen must be hydrolysed before if can enter the glycolysis

C. After fats are digested, glycerol enters glycolysis by forming DHAP

D. After fat digestion, fatty acids can no longer participate in cellular respiration.

Answer: d

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3. Respiratory pathway is

A. catabolic

B. amphibolic

C. anabolic

D. endergonic

Answer: b

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Respiratory Quotient

1. Respiratory quotient may be represented as

A. O_2 taken in $/CO_2$ evolved

B. CO_2 evolved $/O_2$ taken in

C. O_2 taken in

D. CO_2 taken in

Answer: b

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2. which out of the following statements is incorrect ?

A. The breakdown product of glucose which enters into mitochondrion during aerobic respiration is pyruvic acid generated in the cytosol.

B. When the electrons pass from one carrier to another via complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP from ADP and Pi

C. The ratio of volume of O_2 consumed in respiration to the volume of CO_2 evolved is called as the respiratory quotient (RQ).

D. Compensation point is the point reached in a plant when the rate of photosynthesis is equal to the rate of respiration.

Answer: c

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3. Respirometer is an instrument used to measure

A. rate of respiration

B. respiratory quotient

C. both of these

D. none of these

Answer: c

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4. Refer the given equation.

$2(C_{51}H_{98}O_6) + 145O_2 \rightarrow 102CO_2 + 98H_2O +$ Energy The RQ in this case is

A. 1

B. 0.7

C. 1.45

D. 1.62

Answer: b

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5. Consider the following statements with respect to respiration.

(i) Glycolysis occurs in the cytoplasm of the cell.

(ii) Aerobic respiration takes place within the mitochondria.

(iii) Electron transport system is present in the outer mitochondrial

membrane.

(iv) $C_{51}H_{98}O_6$ is the chemical formula of tripalmitin, a fatty acid.

(v) Respiratory quotient $= \frac{\text{Volume of} O_2 \text{evolved}}{\text{Volume of} CO_2 \text{consumed}}$ of the above statements

A. (i),(ii) and (iv) are correct

B. (ii),(iii) and (iv) are correct

C. (iii),(iv) and (v) are correct

D. (ii),(iv) and (v) are correct

Answer: a

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6. Select the wrong statement.

A. When tripalmitin is used as a substrate in respiration the RQ is 0.7

B. The intermediate compound which links glycolysis with Krebs' cycle is malic acid

C. One glycose molecule yields a net gain of 36 ATP molecules during aerobic respiration

D. One glycose molecule yields a net gain of 2 ATP molecules during glycolysis

Answer: b

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7. RQ of proteins, carbohydrates, fats and organic acids are in order

A. $< 1, 1, < 1, > 1$

B. $> 1, < 1, 1, 1$

C. $1, 1, 0, -1$

D. $0, < 1, 1, > 1$

Answer: a

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8. Select the correct combination of the respiratory substrates and their respective RQs.

A. $\begin{matrix}\text{Organic acid} & \text{Fats} & \text{Succulents} \\ 1.3 & 0.7 & Zero\end{matrix}$

B. $\begin{matrix}\text{Organic acid} & \text{Fats} & \text{Succulents} \\ \text{Infinity} & 0.7 & Zero\end{matrix}$

C. $\begin{matrix}\text{Organic acid} & \text{Fats} & \text{Succulents} \\ Zero & 1.3 & 0.7\end{matrix}$

D. $\begin{matrix}\text{Organic acid} & \text{Fats} & \text{Succulents} \\ zero & 0.7 & 1.3\end{matrix}$

Answer: a

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9. Match column I with column II and select the correct option from the codes given below.

$Column I$	$Column II$
$A.\ RQ$	(i) Chemiosmotic ATP syntheis
$B.$ Mitchel	(ii) Muscle fatigue
$C.$ Cytochromes	(iii) Inner mitochondrial membrane
$D.$ Lactic acid	(iv) Alcoholic fermentation
$E.$ Yeast	(v) Respirometer

A. A-(v),B-(i),C-(iii),D-(ii),E-(iv)

B. A-(v),B-(i),C-(iii),D-(iv),E-(ii)

C. A-(i),B-(v),C-(ii),D-(iii),E-(iv)

D. A-(v),B-(ii),C-(iv),D-(iii),E-(i)

Answer: a

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10. If volume of CO_2 liberated during respiration is more than the volume of O_2 used, then the respiratory substrate will be

A. carbohydrate

B. fat

C. protein

D. organic acid

Answer: d

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11. Valume of RQ in succulents is

A. unity

B. infinite

C. less than unity

D. zero

Answer: d

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12. RQ in anaerobic respiration is

A. 0.7

B. 0.9

C. unity

D. infinity

Answer: d

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Hots

1. Study carefully the following statements and select the incorrect ones.

When fats are used in respiration, the RQ is more than unity because fats contain more O_2 and require relatively less amount of O_2 for oxidation.

(ii) The most important energy carrier is ATP. This energy rich compound is mobile and can pass from one cell to another.

(iii) Before pyruvic acid enter Krebs' cycle, one of the two carbon atoms of pyruvic acid is reduced to carbon dioxide in the reaction called reductive carboxylation.

(iv) A special electron carrier system located in the mitochondrial membrane is called shuttle system. It transfers electron from the hydrogens of cytoplasmic NADH to the mitochondrial electron carriers across the mitochondrial membrane.

(v) Zymase is a complex mixture of many enzymes which requires several coenzymes for its action. The enzyme complex-zymase catalyses series of reaction taking place during fermentation leading to the production of ethyl alcohol.

A. (i) and (ii)

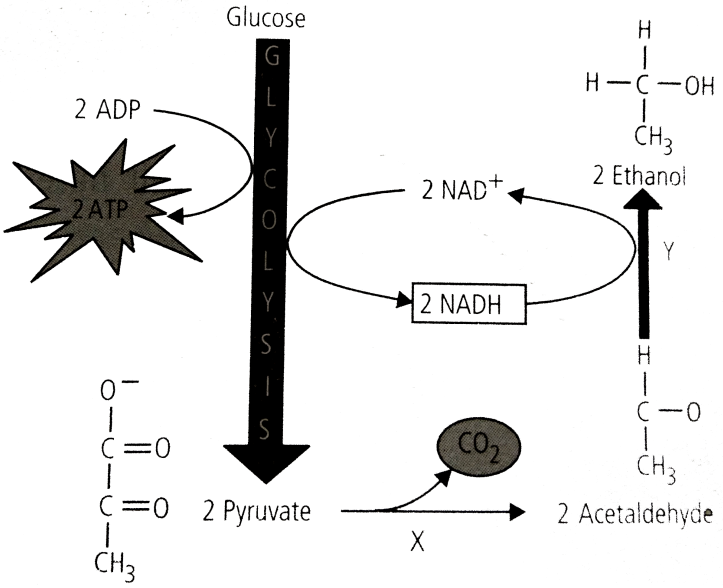
B. (iii) and (iv)

C. (i),(ii) and (iii)

D. (iii),(iv) and (v)

Answer: c

2. Select the incorrect statements with respect to the given representation.



A. X is the enzyme pyruvate dehydrogenase and Y is the enzyme ethanol decarboxylase

B. This process is involved in brewing industry for producing beverages like beer, rum, whisky, etc.

C. Accumulation of the end product (i.e., ethanol) during this process, in a culture of yeast, stops the multiplication of yeast cells and may

even lead to death of cells.

D. None of these

Answer: a

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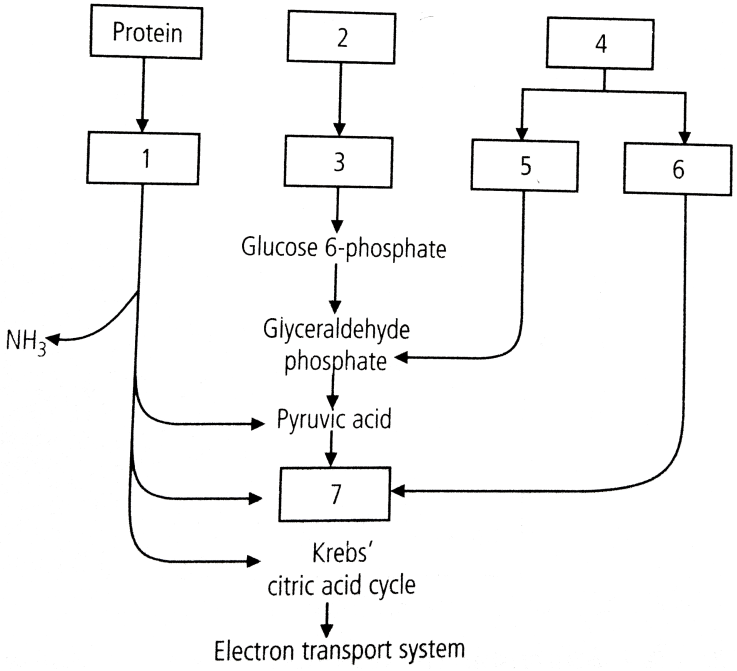
3. Refer to the following flow chart representing the cellular respiration and its fuels. Blanks 1,2,3,4,5,6 and 7 are respectively



A. amino acids, carbohydrate, glucose, fats, glycerol, fatty acid, acetyl Co-A

B. fats, acetyl Co-A amino acid, fatty acid, carbohydrate, glycerol, glucose

C. fatty acid, glucose, acetyl Co-A glycerol, fats, carbohydrate, amino acid

D. carbohydrate, fats, glycerol, fatty acids, amino acid, glycose, acetyl Co-A

Answer: a

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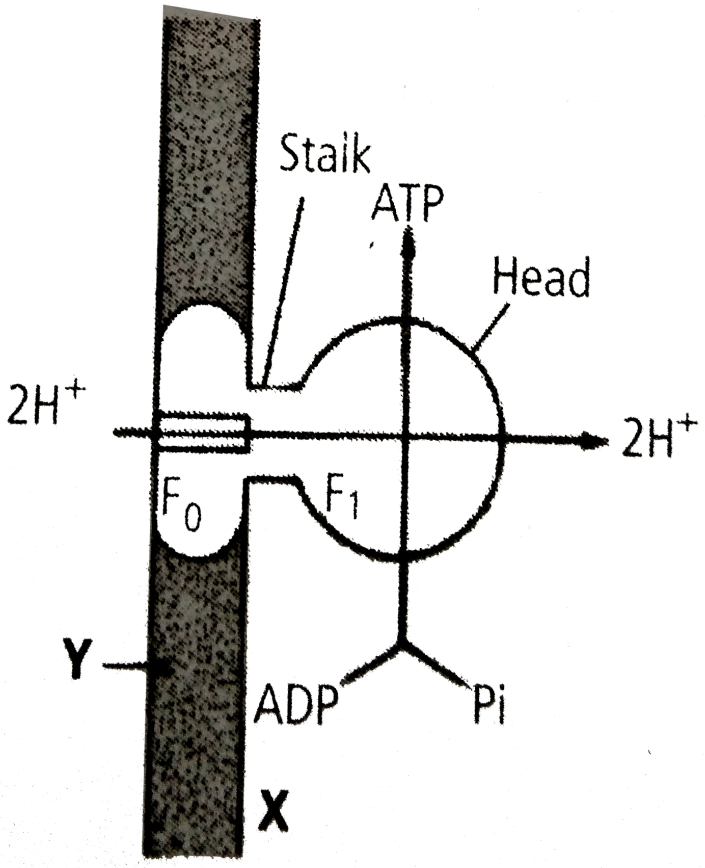
4. Study the given figure and select the incorrect option regarding this.



A. (a) The figure represents chemiosmotic ATP synthesis by oxysomes where X is the mitochondrial matrix and Y is the inner mitochondrial membrane.

B. (b) Enzyme required for ATP synthesis is ATP synthase, considered to be the complex-V of ETS

C. (c) The figure represents oxidative phosphorylation which is the synthesis of energy rich ATP molecules with the help of energy liberated during oxidation of reduced co-enzymes $(NADH - FADH_2)$ produced in respiration

D. (d) ATP synthase becomes active only when there is a proton gradient having higher concentration of protons $\left(H^+\right)$ on the inner side (F_1 side) as compared to the outer side (F_0 side).

Answer: d

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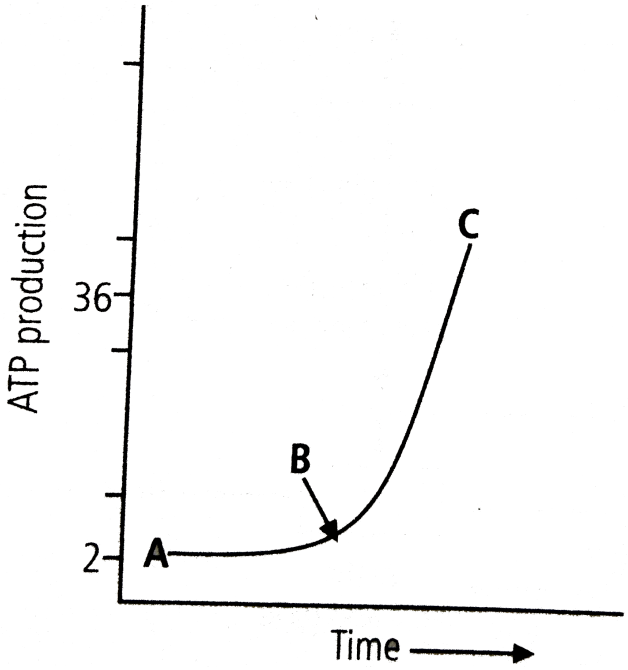
5. Animal cells are suspended in a culture medium that contains excess glucose. The graph below shows glucose utilisation under different

growth conditions (A),(B), and (C) in the graph indicate



A. A-Anaerobic respiration

B-Introduction of O_2 to culture medium

C- Aerobic respiration

B. A-Aerobic respiration

B-Introduction of O_2 to culture medium

C- Anaerobic respiration

C. A-Aerobic respiration

B-Supply of organic triphosphate

C-Aerobic respiration

D. A-Aerobic respiration

B-Introduction of CO_2 to culture medium

C-Anaerobic respiration.

Answer: a

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6. In addition to the normal process of oxidation of carbohydrates through glycolysis and Krebs' cycle, there is another process by which plants could oxidise carbohydrates to obtain energy. In this process, hexose sugars undergo oxidative degradation through 5-C sugar intermediates and hence it is known as pentose phosphate pathway (P P P). Which of the following statements is not true with regard to P P P?

A. It is an alternative to glycolysis and also acts as a safety value or shunt to glycolysis and also acts as a

B. It is common in plants and occurs in certain specialised tissues of animal body, e.g., liver, adipose tissue, testes, ovary, adrenal cortex, lactating mammary gland, eye lens and cornea.

C. It occurs only in cytoplasm but not in any cell organelle.

D. It is also called as hexose monophosphate shunt (HMP pathway).

Answer: c

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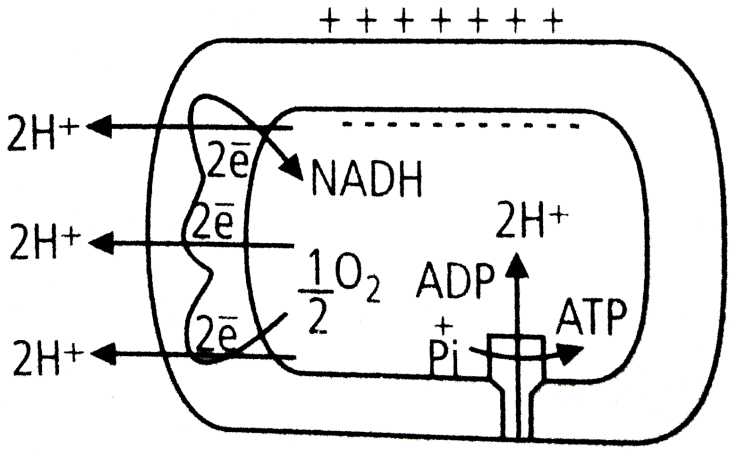
7. Mechanism of phosphorylation is depiected in the diagram below. Study it carefully and mark the correct option.



A. a) The diagram depicts photosynthetic phosphorylation taking place in the chloroplast. The incident light should be shown in the diagram

B. b) The diagram depicts oxidative phoshorylation taking place in mitochondria. However, the flow of electrons should be shown in reverse direction.

C. c) Diagram depicts the basic process of both oxidative as well as photosynthetic phosphorylation. However, the proton concentration should be high inside and low outside.

D. d) The diagram correctly depicts the oxidative phosphorylation occuring in all heterotrophic organisms.

Answer: b

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Ncert

1. The ultimate electron acceptor of respiration in an aerobic organism is

A. cytochrome

B. oxygen

C. hydrogen

D. glucose

Answer: b

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2. Phosphorylation of glucose during glycolysis is catalysed by

A. phosphoglucomutase

B. phosphoglucoisomerase

C. hexokinase

D. phosphorylase

Answer: c

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3. Pyruvic acid, the key product of glycolysis can have many metabolic fates. Under aerobic condition it forms

A. lactic acid

B. $CO_2 + H_2O$

C. acetyl $CoA + CO_2$

D. ethanol $+CO_2$

Answer: c

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4. Electron Transport system (ETS) is located in mitochondrial

A. outer membrane

B. inter membrane space

C. inner membrane

D. matrix

Answer: c

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5. Which of the following exhibits the highest rate of respiration?

A. Growing shoot apex

B. Germinating seed

C. Root tip

D. Leaf bud

Answer: b

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6. Mitochondria are called power house of the cell. Which of the following observations support this statement?

A. (a) Mitochondria synthesizes ATP

B. (b) Mitochondria have a double membrane

C. (c) The enzymes of the Krebs cycle and the cytochromes are found in mitochondria

D. (d) Mitochondria are found in almost all plant and animal cells.

Answer: a

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7. The end product of oxidative phosphorylation is

A. NADH

B. Oxygen

C. ADP

D. $ATP + H_2O$

Answer: d

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8. Match the following and choose the correct option from those given below.

$Column A$	$Column B$
A. Molecular oxygen	i. $\alpha -$ Ketoglutaric acid
B. Electron acceptor	ii. Hydrogen acceptor
C. Pyruvate dehydrogenase	iii. Cytochrome$C$
D. Decarboxylation	iv. AcetylCoA

A. A-ii,B-iii,C-iv,D-i

B. A-iii,B-iv,C-ii,D-i

C. A-ii,B-I,C-iii,D-iv

D. A-iv,B-iii,C-I,D-ii

Answer: a

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Assertion Reason

1. Assertion : Respiration is the breaking of the C-C bonds of complex compounds through oxidation within the cells and release of large amount of energy.

Reason : The compounds that are oxidised during respiration are called respiratory substrates.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: b

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2. Assertion : ATP acts as the energy currency of the cell.

Reason : ATP can be broken down to release energy wherever and whenever energy needs to be utilised.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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3. Assertion : Plants have no specialised respiratory organs.

Reason : There is very little transport of gases from one plant part to another.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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4. Assertion : Glycolysis is also called EMP pathway.

Reason : It is the only process of respiration in aerobic organisms.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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5. Assertion : This conversion of 1,3-bishosphoglycerate (BPGA) to 3-phosphoglyceric acid (PGA) is an energy yielding step.

Reason : This energy is trapped by the formation of ATP

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: b

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6. Assertion : Fermentation is the incomplete oxidation of glucose into lactic acid or ethanol.

Reason : It takes place under anaerobic conditions in prokaryotes only.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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7. Assertion : Anaerobic respiration sometimes occurs in our skeletal muscles during strenous exercise.

Reason : Pyruvic acid is reduced to lactic acid by lactate dehydrogenase in the absence of oxygen.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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8. Assertion : The first step in TCA cycle is the condensation of pyruvate with oxaloacetic acid and water.

Reason : This reaction is catalysed by enzyme pyruvate synthase.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: d

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9. Assertion : The metabolic pathway through which the electron passes from one carrier to another is called the electron transport system (ETS)

Reason : ETS is present in the inner mitochondrial membrane.

A. (a) Both assertion and reason are true and reason is the correct explanation of assertion

B. (b) Both assertion and reason are true but reason is not the correct explanation of assertion

C. (c) Assertion is true but reason is false

D. (d) Both assertion and reason are false

Answer: c

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10. Assertion : Complex II and complex III of ETS are NADH dehydrogease and cytochrome oxidase complex respectively.

Reason : Cytochrome c acts as a mobile carrier for transfer of electrons between complex II and III.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: d

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11. Assertion : Oxidation of one molecule of NADH gives rise to 3 molecules of ATP and that of one molecule of $FADH_2$ produces 2 molecules of ATP

Reason : The number of ATP molecules synthesised depends on the nature of the electron donor.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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12. Assertion : In electron transport system, the electrons are passed on to oxygen resulting in the formation of H_2O

Reason : Oxygen is the ultimate acceptor of electrons.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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13. Assertion : During aerobic respiration, pyruvic acid formed as a result of glycolysis, undergoes phosphorylation reaction to form acetyl CoA.

Reason : There is net gain of 18 ATP molecules during aerobic respiration of one molecule of glucose.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: d

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14. Assertion : Respiratory pathway is an amphibolic pathway.

Reason : In respiration, there is breakdown of many substances (catabolism) and synthesis of many substances (anabolism) by respiratory intermediates.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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15. Assertion : When carbohydrates are used as substrate and are completely oxidised, the RQ is equal to 1.

Reason : When proteins are used in respiration, the RQ is greater than 1.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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Respiration In Plants

1. Identify the correct terms for the given statements and select the correct answer.

(i) Sudden increase in the rate of respiration during ripening of fruits.

(ii) Reduction in the consumption of respiratory substrate when mole of respiration is changed from anaerobic to aerobic.

(iii) Respiratory oxidation of carbohydrates and fats.

A. Pasteur effect (i) Flating respiration (ii) Climacteric respiration (iii).

B. Pasteur effect (i) Flating respiration (iii) Climacteric respiration (i).

C. Pasteur effect (iii) Flating respiration (ii) Climacteric respiration (i).

D. Pasteur effect (ii) Flating respiration (i) Climacteric respiration (iii).

Answer: B

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2. Respiratory substrates are the organic substances which are _____during respiration to liberate energy.

A. oxidised

B. reduced

C. synthesised

D. both (a) and (b)

Answer: A

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3. Instantaneous source of energy is

A. proteins

B. fats

C. nucleic acids

D. glucose

Answer: D

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4. Complete the following biochemical equation of respiration and select the correct answer.

$C_6H_{12}O_6 + 6O_2 \rightarrow$

A. $6CO_2 + 12H_2O$ Energy

B. $12CO_2 + 4H_2O +$ Energy

C. $12CO_2 + 6H_2O +$ Energy

D. $6CO_2 + 6H_2O +$ Energy

Answer: D

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5. The respiration in germinating seeds produces energy energy which can be detected in the form of

A. water

B. heat

C. oxygen

D. CO_2

Answer: B

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6. Seeds respire in

A. presence of O_2

B. presence of CO_2

C. absence of O_2

D. both (a) and (b)

Answer: D

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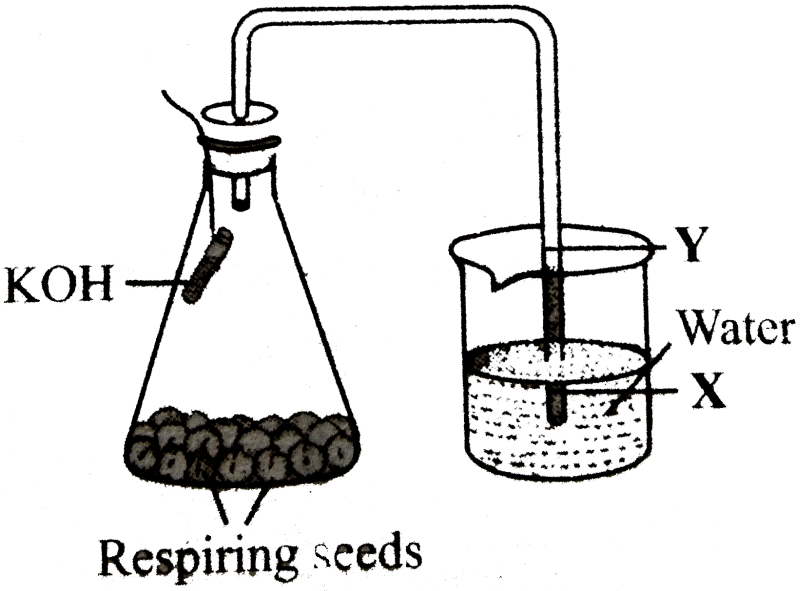
7. Rise in the water level from X to Y in the given experimental set-up demonstrates



A. aerobic respiration

B. anaerobic respiration

C. photosynthesis

D. transpiration pull

Answer: A

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8. The pathway of respiration common in all living organisms is $\underline{x}$, it occurs in the $\underline{y}$ and the products formed are two molecules of $\underline{Z}$. Identify X,Y and Z in the above paragraph and select the correct answer.

A.

X	Y	Z
EMP pathway	mitochondrion	pyruvic acid

B.

X	Y	Z
EMP pathway	cytoplasm	pyruvic acid

C.

X	Y	Z
Krebs' cycle	cytoplasm	acetyl CoA

D.

X	Y	Z
Krebs' cycle	mitochondrion	acetyl CoA

Answer: B

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9. Select the wrong statements with respect to glycolysis.

A. It occurs outside mitochondria

B. it an anaerobic phase

C. Glucose undergoes partial oxidation to form 2 molecules of pyruvic acid

D. Glucose is phosphorylates to glucose-6-phosphate by isomerase enzyme.

Answer: D

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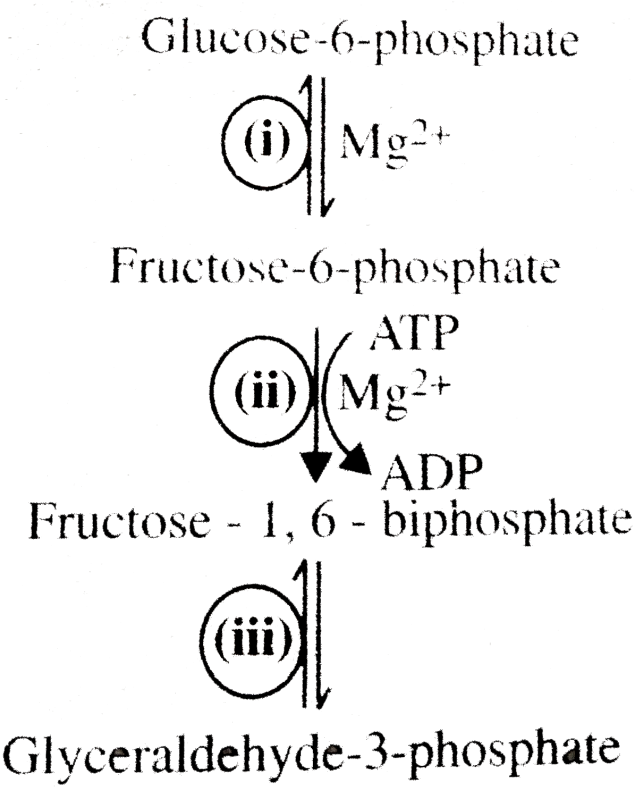
10. Study the given steps of glycolysis and identify the enzymes (i),(ii) and (iii) responsible for carrying out these steps.



A.

(*i*) (*ii*)
Phosphohexose isomerase Phospho-fructokinase-Phospho-fructoki

B. (*i*) (*ii*) (*iii*).
Hexokinase Phospho-fructokinase Aldolase

C. (*i*) (*ii*) (*iii*).
Phosphohexose isomerase Hexokinase Phosphofructo-kinase

D. (*i*) (*ii*) (*iii*).
Aldolase Phospho-fructokinase Phosphohexose isomerase

Answer: A

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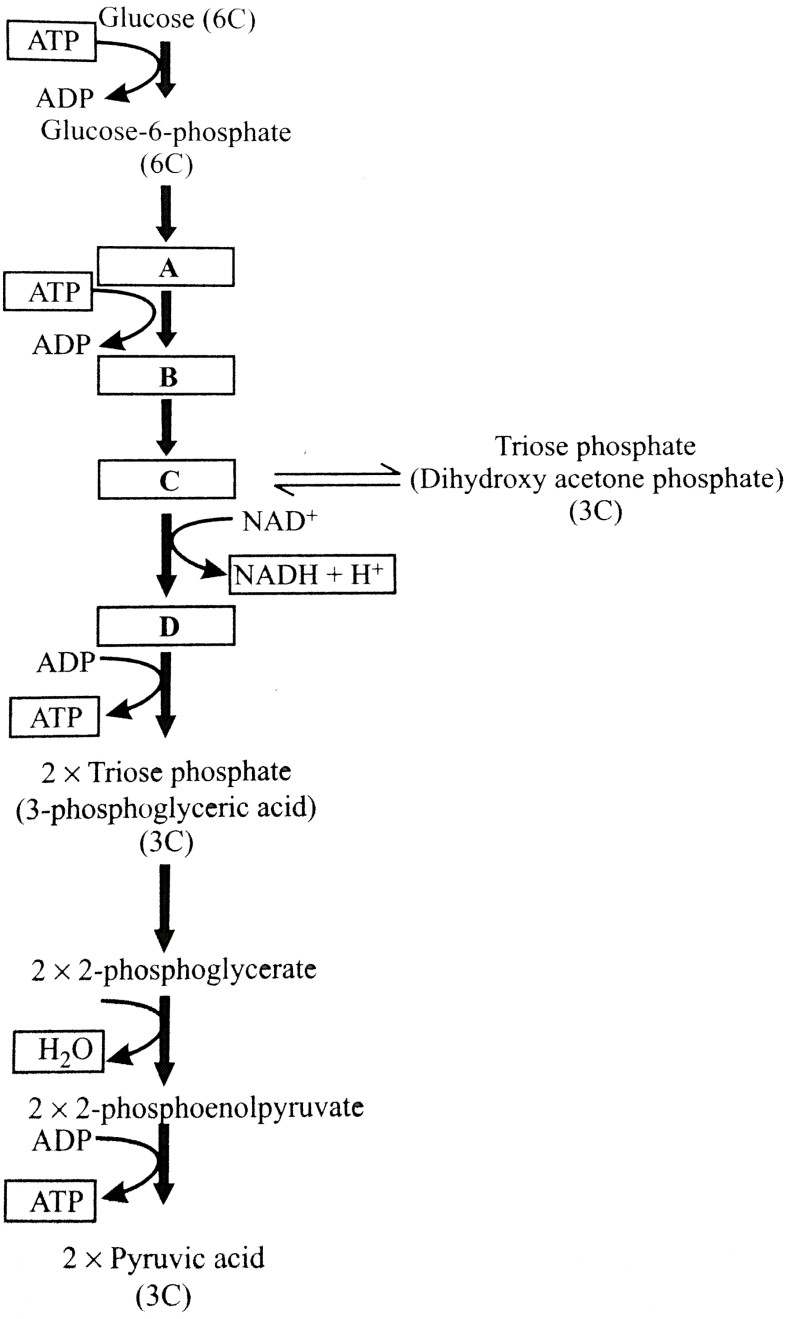
11. The flow chart given below shows the steps in glycolysis. Select the option that correctly fills in the missing steps A,B,C and D.


Glucose (6C)
ATP
ADP
Glucose-6-phosphate
(6C)
A
ATP
ADP
B
C
Triose phosphate
(Dihydroxy acetone phosphate)
(3C)
NAD+
NADH + H+
D
ADP
ATP
2 × Triose phosphate
(3-phosphoglyceric acid)
(3C)
2 × 2-phosphoglycerate
H2O
2 × 2-phosphoenolpyruvate
ADP
ATP
2 × Pyruvic acid
(3C)

A.

A	B	C	D
Fructose-6-phosphate	Fructose-1-6-biphosphate	$3-PGAL$	1.3

B.

A	B	C
Fructose-1,6-biphosphate	3-PGAL	$1.3-$ biphospho-glyceric acid

C.

A	B	C	D
3-PGA	1,3-biphospho-glyceric acid	$3-PGAL$	Fructose-1 ,6-bi

D.

A	B	C	D
Fructose-1,6-biphosphate	Fructose-6-phosphate	$3-PGAL$	1,3-

Answer: A

View Text Solution

12. Which of the following are isomers?

A. 3PGA and 2PGA

B. PGAL and DHAP

C. Glucose and Fructose

D. All of these

Answer: D

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13. Which of the following steps during glycolysis is associated with utilisation of ATP?

A. Glucose $\rightarrow$ Glucose -6-phosphate

B. Fructose-6-phosphate $\rightarrow$ Fructose-1,6-biphosphate

C. PEP $\rightarrow$ Pyruvic acid

D. Both (a) and (b)

Answer: D

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14. Which of the following conversions involve ATP synthesis during glucolysis?

A. Glucose $\rightarrow$ Glucose-6-phosphate

B. Fructose-6-phosphate $\rightarrow$ Fructose-1,6-biphosphate

C. 1,3-bisphonsphoglyceric acid (BPGA) $\rightarrow$ 3-phosphoglyceric acid (PGA)

D. All of these

Answer: C

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15. At the end of glycolysis, X is the net energy gain from one molecule of glycose via Y, but there is also energy stored in the form of Z. Identify X,Y and Z.

A.

X	Y	Z
$1ATP$	Oxidative phosphorylation	$NADH + H^+$

B.

X	Y	Z
$2ATPs$	Oxidative phosphorylation	$NADH + H^+$

C.

X	Y	Z
$1ATP$	Substrate level phosphorylation	$FADH_2$

D.

X	Y	Z
$2ATPs$	Substrate level phosphorylation	$NADH + H^+$

Answer: D

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16. The net gain of ATP molecules in glycolysis during aerobic respiration is

A. 0

B. 2

C. 4

D. 8

Answer: D

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17. The end product of glycolysis is

A. pyruvic acid

B. glycose

C. ethyl alcohol

D. CO_2

Answer: A

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18. What is true about the end products of glycolysis?

A. 2 pyruvic acid $+2ATP + 2NADH_2$

B. 2 pyruvic acid $+2NADH_2$

C. 1 pyruvic acud $+2ATP + 2NADH_2$

D. 2 pyruvic acid $+1ATP + 1NADH_2$

Answer: A

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19. During the process of acerobic respiration (i) gets oxidised and its electrons get transferred to the electron transport chain while in photosyntheis, (ii) gets oxidised to transfer molecules to the electron transport chain.

A. (i)-glucose, (ii)-xanthophyll

B. (i)-carbon dioxide, (ii)-xanthophyll

C. (i)-carbon dioxide, (ii)-chlorophyll-a

D. (i)-glucose, (ii)-chlorophyll-a

Answer: D

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20. Match column I with column II and select the correct option from the codes given below.

$Column I$	$Column II$
A. Fats made of three fatty acid chains attached to glycerol	(i) Glycogen
B. Glycolysis metabolite made from glycerol	(ii) Glycerald
C. Storage form of glucose	(iii) Triglycer
D. Common respiratory substrate of glycolysis	(iv) Glucose

A. A-(iv),B-(iii),C-(i),D-(iii)

B. A-(iii),B-(ii),C-(i),D-(iv)

C. A-(iv),B-(iii),C-(i),D-(ii)

D. A-(i),B-(ii),C-(iii),D-(iv)

Answer: B

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21. Ethyl alcohol fermetation occurs in

A. Lactobacillus

B. muscles of humans

C. Rhizopus

D. all of these

Answer: C

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22. Anaerobic respiration takes place in

A. mitochondrion

B. nucleus

C. cytoplasm

D. vacuole

Answer: C

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23. Which of the molecule listed below is a product of fermentation of glucose by yeast?

A. $(C_6H_{10}O_5)_n$

B. C_2H_5OH

C. $C_6H_{12}O_6$

D. CH_3OH

Answer: B

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24. A test tube containing molasses solution and yeast is kept in a warm place overnight. The gas collected from this mixture

A. extingusihes the flame

B. bursts into flame when ignited

C. turns lime water milky

D. both (a) and (c)

Answer: D

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25. Which of the following options does not hold good regarding anaerobic respiration or fermentation ?

A. Occurs inside the mitochondria

B. Partial breakdown of glycose occurs

C. Net gain of only 2 ATP molecules

D. None of these

Answer: A

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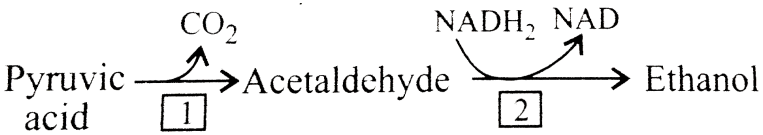
26. Identify the enzymes 1 and 2 in the given reaction and select the correct option.



A. Alcohol dehydrogenase Pyruvare decarboxylase

B. Alcohol decarboxylase Pyruvate dehydrogenase

C. Pyruvate decarboxylase Alcohol dehydrogenase

D. Pyruvate dehydroganase Alcohol dehydroganase

Answer: C

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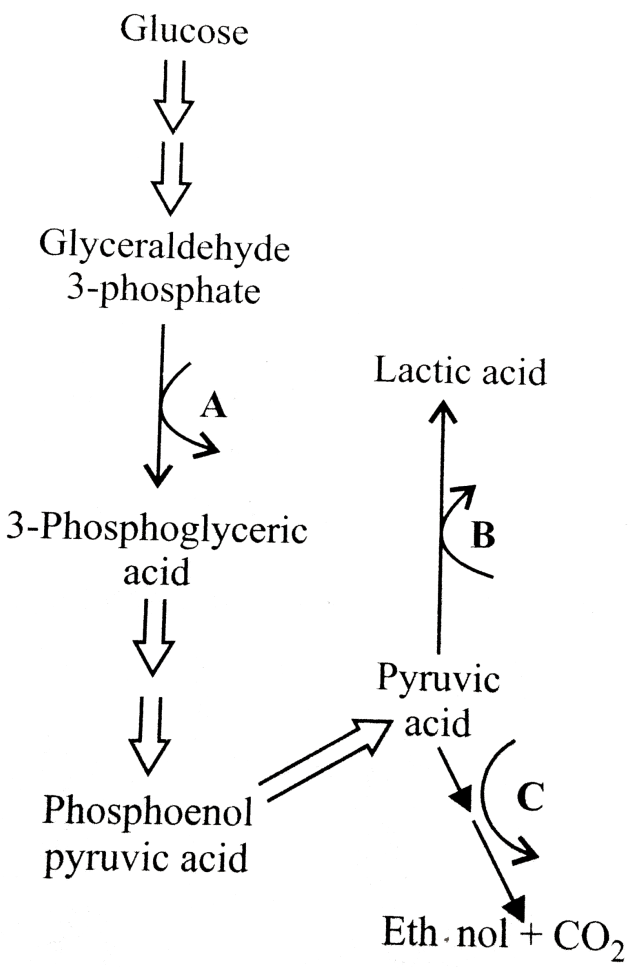
27. What does A,B and C depict in the given pathways of anaerobic respiration ?



A.

A	B	C
$NADH + H^+ \rightarrow NAD^+$	$NAD^+ \rightarrow NADH + H^+$	$NAD^+ \rightarrow$

B.

A	B	C
$NADH + H^+ \rightarrow NAD^+$	$NADH + H^+ \rightarrow NAD^+$	$NAD^+ \rightarrow$

C.

A	B	C
$NAD^+ \rightarrow NADH + H^+$	$NADH + H^+ \rightarrow NAD^+$	$NADH +$

D.

A	B	C
$NAD^+ \rightarrow NADH + H^+$	$NADH + H^+ \rightarrow NAD^+$	$NAD^+ \rightarrow$

Answer: C

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28. Though vertebrates are aerobes, but their $\underline{(i)}$ show anaerobic respiration during $\underline{(iii)}$. During this $\underline{(iii)}$ of skeletal muscle fibres is broken down to release lactic acid and energy. Lactic acid, if accumulates causes muscle fatigue. Fill up the blanks in the above paragraph and select the correct option.

A.

(i)	(ii)	(iii).
skeletal muscles	heavy exercise	glycose

B.

(i)	(ii)	(iii).
skeletal muscles	mild exercise	glycogen

C.

(i)	(ii)	(iii).
skeletal muscles	heavy exercise	glycogen

D. (i) cardiac muscles (ii) heavy exercise (iii). glycogen

Answer: A

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29. Identify A,B and C in the given reaction of lactic acid fermentation and select the correct option.

Pyruvic acid $+A \underset{FMN, ZN^{2+}}{\overset{\text{Lactate dehydrogenase}}{\Longleftrightarrow}} B + C$

A. A $NADH$ B Lactic acid $+CO_2$ C NAD^+

B. A $NADH$ B Lactic acid C NAD^+

C. A NAD^+ B Lactic acid C $NADH$

D. A NAD^+ B Lactic acid $+CO_2$ C $NADH$

Answer: B

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30. Select the incorrectly matched pair.

A. End products of alcoholic Ethanol fermentation - $+CO_2$

B. End products of lactic acid fermentation - Lactic acid $+CO_2$

C. Glycolysis -Cytoplasm

D. Key product of glycolysis - Pyruvic acid

Answer: B

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31. Fermentation is represented by the equation

A. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 686$ kcal

B. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 59$ kcal

C. $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2$

D. $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Answer: B

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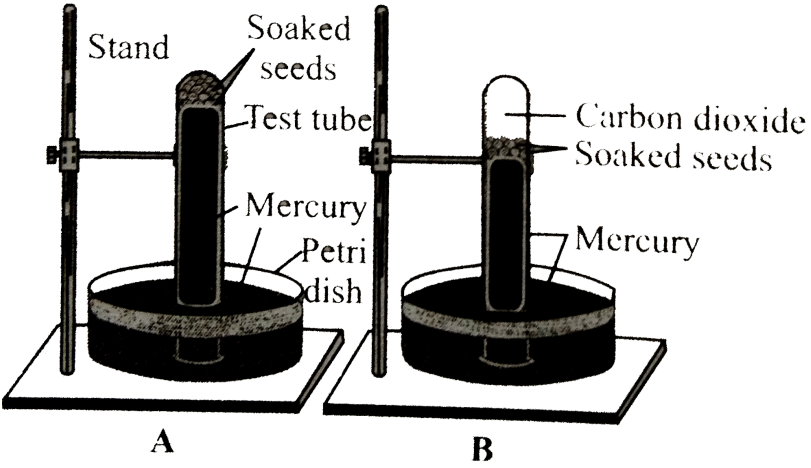
32. The given experimental set-up demonstrates



A. photosynthesis

B. aerobic respiration

C. anaerobic respiration

D. ascent of sap

Answer: C

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33. Mercury (Hg) is generally used in anaerobic respiration experiments because it does not react with____.

A. O_2

B. CO_2

C. H_2O

D. air

Answer: B

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34. Which of the following describes significance of fermentation?

(i)Prodyction of alcohol in brewing industry

(ii) Making of dough in baking industry

(iii) Curing of tea and tobacco

(iv) Production of vinegar by acteic acid bacteria

A. (i),(ii) and (iii)

B. (i),(ii) and (iv)

C. (ii),(iii) and (iv)

D. (i),(ii),(iii) and (iv)

Answer: D

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35. Dough kept overnight in warm weather becomes soft and spongy due to

A. absorption of CO_2 from atmosphere

B. imbibition

C. fermentation

D. all of these

Answer: C

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36. Site of Krebs' cycle in mitochondria is

A. outer membrane

B. matrix

C. oxysomes

D. inner membrane.

Answer: B

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37. Read the given statements and select the correct option.

Statement 1: Glycolysis occurs in mitochondrial matrix.

Statement 2: Krebs' cycle occurs on cristae of mitochondria.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: D

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38. Fate of pyruvic acid during aerobic respiration is

A. lactic acid fermentation

B. alcoholic fermentation

C. oxidative decarboxylation

D. oxidative phosphorylation

Answer: C

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39. Pyruvate dehydrogenase is used in converting

A. glucose to pyruvate

B. pyruvic acid to lactic acid

C. pyruvate to acetyl CoA

D. pyruvate to glucose

Answer: C

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40. Identify A and B in the given reaction.

Pyruvic acid

$$+CoA+NAD^{+}\xrightarrow[\text{Pyruvate dehydrogenase}]{Mg^{2+}}A+B+NADH+H^{+}$$

A. $\begin{matrix}A & B\\ PEP & CO_2\end{matrix}$

B. $\begin{matrix}A & B\\ \text{Acetyl}CoA & CO_2\end{matrix}$

C. $\begin{matrix}A & B\\ CO_2 & H_2O\end{matrix}$

D. $\begin{matrix}A & B\\ \text{Acetyl}CoA & H_2O\end{matrix}$

Answer: B

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41. Which step is called gateway step/link reaction in aerobic respiration?

A. Glycolysis

B. Formation of acteyl coenzyme A

C. Citric acid formation

D. ETS terminal oxidation

Answer: B

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42. Alternate name of Krebs' cycle is

A. TCA cycle

B. citric acid cycle

C. both (a) and (b)

D. none of these

Answer: C

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43. Krebs' cycle starts with the formation of a six carbon compound by reaction between

A. fumaric acid and pyruvic acid

B. OA A and acetyl CoA

C. malic acid and acetyl CoA

D. succinic acid and pyruvic acid.

Answer: B

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44. In krebs' cycle OA A accepts acteyl CoA to form

A. citric acid

B. oxalosuccinate

C. fumarate

D. succinyl CoA

Answer: A

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45. Which of the following is a 4-carbon compound?

A. Oxaloacetic acid

B. Phosphoglyceric acid

C. Ribulose bisphosphate

D. Phosphoenol pyruvate

Answer: A

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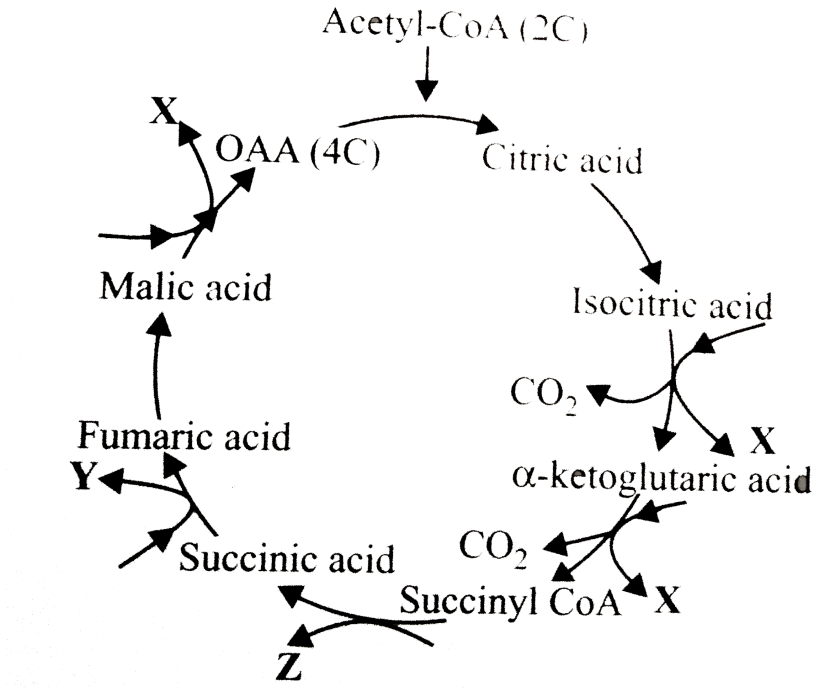
46. Identify X,Y and Z in the given diagram representing steps of citric acid cycle and select the correct option.



A. $\begin{matrix} X & Y & Z \\ GTP & NADH_2 & FADH_2 \end{matrix}$

B. $\begin{matrix} X & Y & Z \\ FADH_2 & NADH_2 & GTP \end{matrix}$

C. $\begin{matrix} X & Y & Z \\ NADH_2 & FADH_2 & GTP \end{matrix}$

D. $\begin{matrix} X & Y & Z \\ CO_2 & NADH_2 & ADP \end{matrix}$

Answer: C

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47. Consider the first reaction of TCA cycle.

Acetyl $CoA + OAA + H_2O \xrightarrow[\text{synthase}]{\text{Citrate}} A + CoA$ What is true about compound A?

A. First product of TCA cycle

B. Tricarboxylic acid and six carbon compound

C. It undergoes reorganisation in the presence of enzyme aconitase to form cis-aconitate

D. All of these

Answer: D

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48. Identify enzyme A in the given reaction of Krebs' cycle

$\underset{(4C)}{OAA} + \text{Acetyl} - CoA + H_2O \xrightarrow{A} \underset{(6C)}{\text{Citric acid}} + CoA$

A. Oxaloacetate synthetase

B. Citrate synthase

C. Aconitase

D. Dehydrogenase

Answer: B

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49. Krebs' cycle is also called metabolic sink as it is a common pathway for

A. carbohydrates, fats and proteins (amino acids)

B. carbohydrates and fats only

C. carbohydrates and organic acids only

D. proteins and fats only

Answer: A

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50. The intermediate product between α-ketoglutaric acid and succinic acid in TCA cycle is

A. acetyl CoA

B. succinly CoA

C. fumarate

D. oxalosuccinic acid

Answer: B

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51. Select the correct sequence of formation of given intermediates of Krebs' cycle.

A. succinate $\rightarrow$ Malate $\rightarrow$ Fumarate $\rightarrow OAA$

B. Fumarate $\rightarrow$ Succinate $\rightarrow$ Malate $\rightarrow OAA$

C. Succinate $\rightarrow$ Fumarate $\rightarrow$ Malate $\rightarrow OAA$

D. Malate $\rightarrow$ Fumarate $\rightarrow$ Succinate $\rightarrow OAA$

Answer: C

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52. Substrate level phosphorylation occurs during which step of Krebs' cycle

A. Succinly$CoA \rightarrow$ Succinic acid

B. Isocitric acid $\rightarrow$ Oxalosuccinic acid

C. Oxalosuccinic acid $\rightarrow \alpha -$ ketoglutaric acid

D. Malic acid $\rightarrow OAA$

Answer: A

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53. The first 5C dicarboxylic acid in Krebs' cycle which is used in nitrogen metabolism is

A. OA A

B. citric acid

C. α-ketoglutaric acid

D. acetyl coenzyme A

Answer: C

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54. Which of the following steps is associated with ATP formation (substrate level phosphorylation)?

A. Succinly $CoA \rightarrow$ Succinic acid

B. 1,3 bis $PGA \rightarrow 3PGA$

C. $PEP \rightarrow$ Pyruvate

D. All of these

Answer: D

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55. FAD participates in Krebs' cycle as electron acceptor during conversion of

A. succinly CoA to succinic acid

B. α-ketoglutarate to succinly CoA

C. succinic acid to fumaric acid

D. fumaric acid to malic acid

Answer: C

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56. Select the correct statement.

A. When ATP is synthesised directly from metabolites, it is substrate level phosphorylation.

B. In Krebs' cycle, citrate undergoes 2 decarboxylations and 4 dehydrogenations.

C. Krebs' cycle in an amphibolic process.

D. All of these

Answer: D

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57. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is

A. isocitrate dehydrogenase

B. ketoglutarate dehydrogenase

C. succinate dehydrogenase

D. lactate dehydrogenase.

Answer: C

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58. Categorise the given equations under respective phases and select the correct option.

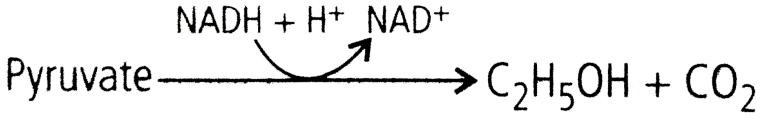
I.

$$C_6H_{12}O_6 + 2NAD^+ + 2ADP + 2\Pi \rightarrow 2C_3H_4O_3 + 2ATP + 2NADH +$$

II. Pyruvic acid

$$+4NAD^+ + FAD^+ + 2H_2O + ADP + \Pi \rightarrow 3CO_2 + 4NADH + 4H^+$$

III.



A.

I	II	III
Glycolysis	Fermentation	Krebs'cycle

B. | I | II | III |
|---|---|---|
| Krebs' cycle | Fermentation | Glycolysis |

C. | I | II | III |
|---|---|---|
| Krebs' cycle | Glycolysis | Fermentation |

D. | I | II | III |
|---|---|---|
| Glycolysis | Krebs's cycle | Fermentation |

Answer: D

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59. Which of the following steps of respiration is amphibolic ?

A. Glycolysis

B. Oxidative decarboxylation of pyruvate

C. TCA cycle

D. Oxidative phosphorylation

Answer: C

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60. When two molecules of acetyl CoA enter the TCA cycle, net gain at the end of the cycle is

A. $2NADH_2 + 2FADH_2 + 1GTP$

B. $3NADH_2 + 2FADH_2 + 2GTP$

C. $6NADH_2 + 2FADH_2 + 2GTP$

D. $3NADH_2 + 1FADH_2 + 4GTP$

Answer: C

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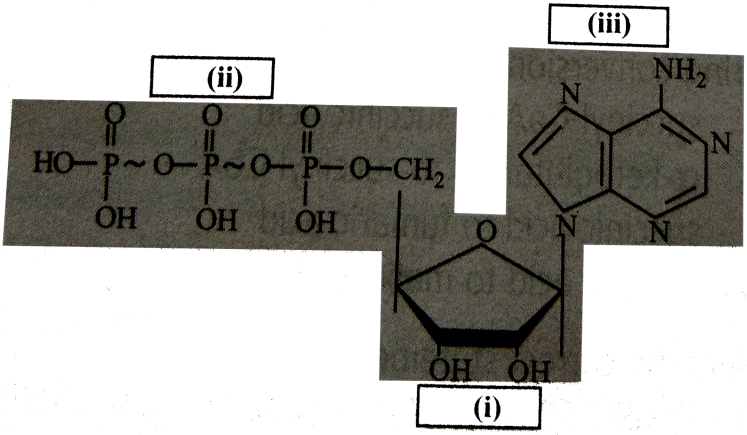
61. Identify the three components [(i),(ii) and (iii)] of ATP molecule shown in the give figure.



A. (i) Ribose (ii) Triphosphate group (iii). Adenine

B. (i) Adenine (ii) Triphosphate group (iii). Ribose

C. (i) Glucose (ii) Triphosphate group (iii). Adenine

D. (i) Ribose (ii) Triphosphate group (iii). Guanine

Answer: A

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62. Amount of energy released during hydrolysis of a high energy bond of ATP is

A. $73 kcal mol^{-1}$

B. $0.73 kcal mol^{-1}$

C. $3.4 kcal mol^{-1}$

D. $7.3 kcal mol^{-1}$

Answer: d

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63. All of the following processes can release CO_2 except

A. alcoholic fermentation

B. oxidative decarboxylation and Krebs' cycle

C. oxidative phosphorylation

D. conversion of α-ketoglutarc acid to succinic acid.

Answer: C

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64. Select the option that correctly fills the blanks in the following statements.

A. Glucose has $\underline{(i)}$ carbon atoms, pyruvic acid has $\underline{(ii)}$ carbon atoms and the acetyl group has $\underline{(iii)}$carbon atoms.

B. Electrons enter the electron transport system as parts of hydrogen atoms attached to $\underline{(i)}$ and $\underline{(ii)}$.

A. $\begin{matrix} A \\ (i)-6(ii)-4(iii)-3 \end{matrix}$ $\begin{matrix} B \\ (i)-NADH(ii)-FADH_2 \end{matrix}$

B. $\begin{matrix} A \\ (i)-6(ii)-3(iii)-2 \end{matrix}$ $\begin{matrix} B \\ (i)-NADH(ii)-FADH_2 \end{matrix}$

C. $\begin{matrix} A \\ (i)-6(ii)-3(iii)-2 \end{matrix}$ $\begin{matrix} B \\ (i)-ATP(ii)-GTP \end{matrix}$

D. $\begin{matrix} A \\ (i)-6(ii)-4(iii)-3 \end{matrix}$ $\begin{matrix} B \\ (i)-ATP(ii)-GTP \end{matrix}$

Answer: b

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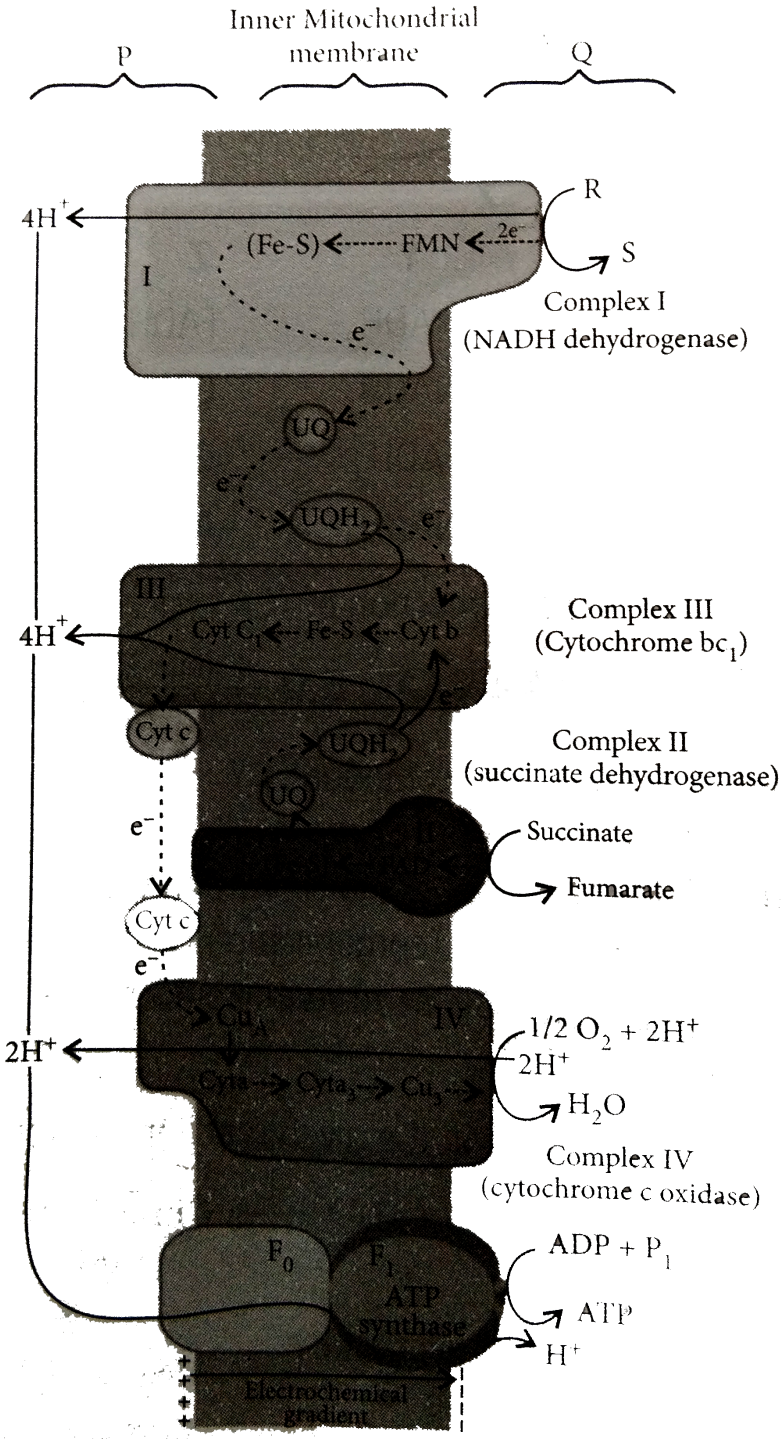
65. Identify P,Q,R and S in the given diagram of electron transport system.



A. P Matrix Q Outer chamber R $FMNH_2$ S $NADH_2$

B. P Inter-membrane space Q Matrix R $NaDH + H^+$ S NAD^+

C. P Inter-membrane Q Cristae R NAD^+ S $NADH + H^+$

D. P Cristae Q Outer chamber R $NADH + H^+$ S NAD^+

Answer: b

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66. Match column I with column II and select the correct option from the given codes.

$ColumnI$	$COlumnII$
$A.$ Glycolysis	(i)Inner mitochondrial membrane
$B.$ TCAcycle	(ii)Mitochondrial matrix
$C.$ ETS	(iii)Cytoplasm

A. A-(iii),B-(i),C-(ii)

B. A-(iii),B-(ii),C-(i)

C. A-(i),B-(ii),C-(iii)

D. A-(ii),B-(i),C-(iii)

Answer: b

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67. Electron transport chain (ETC) is a set of_____electroncarries present in a specific sequence along_____mitochondrial membrane.

A. seven, inner

B. six,inner

C. seven,outer

D. six,outer

Answer: a

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68. In the electron transport system present in the inner mitochondrial membrane complexes I and IV are respectively

A. NADH dehydrogenase and $FADH_2$

B. $FADH_2$ and $NADH$ dehydrogenase

C. $NADH$ dehydrogenase and cytochrome c oxidase complex

D. NADH dehydrogenase and ATP synthase

Answer: C

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69. Oxidation of one $NADH$ and one $FADH_2$ respectively gives rise to____and ____ATP molecules.

A. 3 and 2

B. 2 and 1

C. 2 and 3

D. 1 and 1

Answer: a

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70. Study the incorrect statement with respect to an overview of the electron transport system (ETS).

A. Ubiquinone receives reducing equivalents via, $FADH_2$ (complex II) that is generated during oxidation of succinate in the TCA cycle.

B. As the electron move down the system, energy is released and used to form ATP

C. $2ATPs$ are formed for every pair of electrons that enters by way of $NADH$ and $3ATPs$ are formed for every pair of electrons that enters by way of $FADH_2$

D. Oxygen, the final e^- acceptor becomes a part of water.

Answer: c

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71. Last e^- acceptor during ETS is

A. O_2

B. cyt a

C. cyt a_2

D. cyt a_3

Answer: A

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72. Which of these are respiratory poisons or inhibitor of ETC?

A. Cyanides

B. Antimycin A

C. Carbon monoxide

D. All of these

Answer: d

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73. During electron transport system (ETS) electron transport proceeds from carriers that have _____redox potential to those having____redox potential. This electront transport down the energy gradient leads to the formation of ATP from ADP and Pi, which is referred to as_____.

A. low, high, oxidative phosphorylation

B. low, high, oxidative decarboxylation

C. high, low, oxidative phosphorylation

D. high, low, oxidative decarboxylation

Answer: a

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74. Read the given statements and select the correct option.

Statement 1: During photophosphorylation (of photosynthesis), light energy is utilised for the production of proton gradient during ATP synthesis.

Statement 2 : In respiration, energy of oxidation-reduction is utilised for the phosphorylation and thus the process is called oxidative phosphorylation.

A. Both statements 1 and 2 are correct

B. Statement 1 is correct but statement 2 incorrect

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: a

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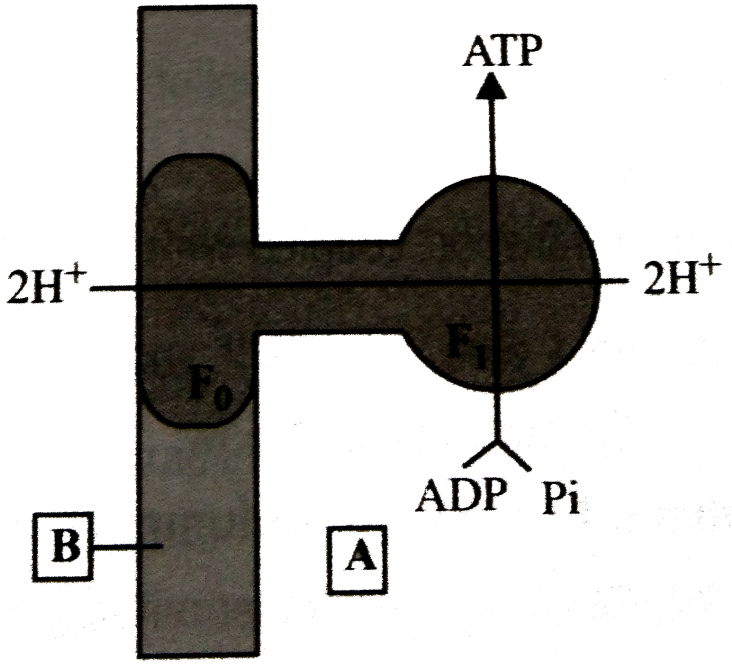
75. Identify A and B in the given diagram showing ATP synthesis in mitochondria.



A. A = Mitochondrial matrix

B = Outer mitochondrial membrane

B. A= Mitochondrial matrix

B = Inner mitochondrial membrane

C. A = Cell cytoplasm

B = Inner mitochondrial membrane

D. A = Cell cytoplasm

B = Outer mitochondrial membrane

Answer: b

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76. As per chemiosmotic coupling hypothesis, in mitochondria, protons accumulate in the

A. outer membrane

B. inner membrane

C. intermembrane space

D. matrix

Answer: c

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77. Study the following statements regarding chemiosmotic hypothesis in mitochondria and select the correct ones.

(i) F_1 headpiece contains the site for the synthesis of ATP from $ADP + \Pi$.

(ii) F_0 par forms the channel through which protons cross the inner membrane.

(iii) For each ATP produced, $2H^+$ pass through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: d

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78. Select the wrong statement.

A. Oxidative decarboxylation of pyruvic acid requires the presence of enzyme pyruvate dehydrogenase.

B. All living cells whether aerobic or anaerobic, perform glycolysis.

C. Cyanide does not stop chemiosmosis

D. Respiratory chain uses O_2 as final hydrogen acceptor.

Answer: c

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79. Which of the following cellular metabolic processes can occur both in the presence or absence of O_2?

A. Glycolysis

B. Fermentation

C. TCA cycle

D. Electron transport coupled with chemiosmosis

Answer: a

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80. Match column I with colum II and select the correct option from the codes given below.

$Column I$	$Column II$
$A.\ TCA$ cycle	(i) Inner mitochondrial membrane
$B.\ F_0 - F_1$ particles	(ii) Hans Krebs
$C.$ End product of glycolysis	(iii) Oxidative decarboxylation
$D.$ Pyruvate dehydrogenase	(iv) Pyruvic acid

A. A-(ii),B-(i),C-(iv),D-(iii)

B. A-(i),B-(ii),C-(iv),D-(iii)

C. A-(ii),B-(iii),C-(iv),D-(i)

D. A-(iii),B-(ii),C-(i),D-(iv)

Answer: a

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81. Select the correct statements.

(i) Between temperature range $0 - 25^{\circ} C$, rate of respiration doubles for every $10^{\circ} C$ rise in temperature.

(ii) Cytochromes are iron-porphyrin compounds.

(iii) Respiratory rate of wounded or injured plant parts generally decreases.

A. (i) and (ii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: a

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82. Which of the following statements is correct with respect to the effect of temperature on rate of respiration ?

A. Rate of respiration increases with an increase in temperature from $0^\circ C$ to $30^\circ C$

B. Rate of respiration doubles for every $10^\circ C$ rise in temperature, thus temperature co-efficient (Q_{10}) for respiration is 2.

C. At very high temperatures such as $50^\circ C$ or more, rate of respiration decreases due to enzymatic degradation.

D. All of these

Answer: d

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83. During complet metabolism of glucose, the number of ATP formed is

A. 2

B. 12

C. 36

D. 44

Answer: c

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84. How many ATP molecules will be generated in a plant system during complet oxidation of 40 molecules of glucose?

A. 180

B. 360

C. 1440

D. 3040

Answer: c

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85. The balance sheet for ATP production in glycolysis has been given below. Select the option which correctly fills up the blanks for P,Q,R and S. ['X' stands for 'nil'].

Steps	ATP Utilisa
1. Glucose rarrGlucose-6-phosphate	P
2. Fructose-6-phosphate $\rightarrow$ Fructose-1,6-bisphosphate	1
3.1.3 $-$ bisphosphoglyceric acid $\rightarrow$ 3 $-$ Phosphoglyceric acid	X
4.2 $-$ Phosphenol pyuvic acid $\rightarrow$ Pyruvic acid	S

A. $\begin{matrix} P & Q & R & S \\ 1 & X & X & 2 \end{matrix}$

B. $\begin{matrix} P & Q & R & S \\ 1 & X & 2 & X \end{matrix}$

C. $\begin{matrix} P & Q & R & S \\ 2 & 1 & X & 1 \end{matrix}$

D. $\begin{matrix} P & Q & R & S \\ X & 1 & 2 & X \end{matrix}$

Answer: b

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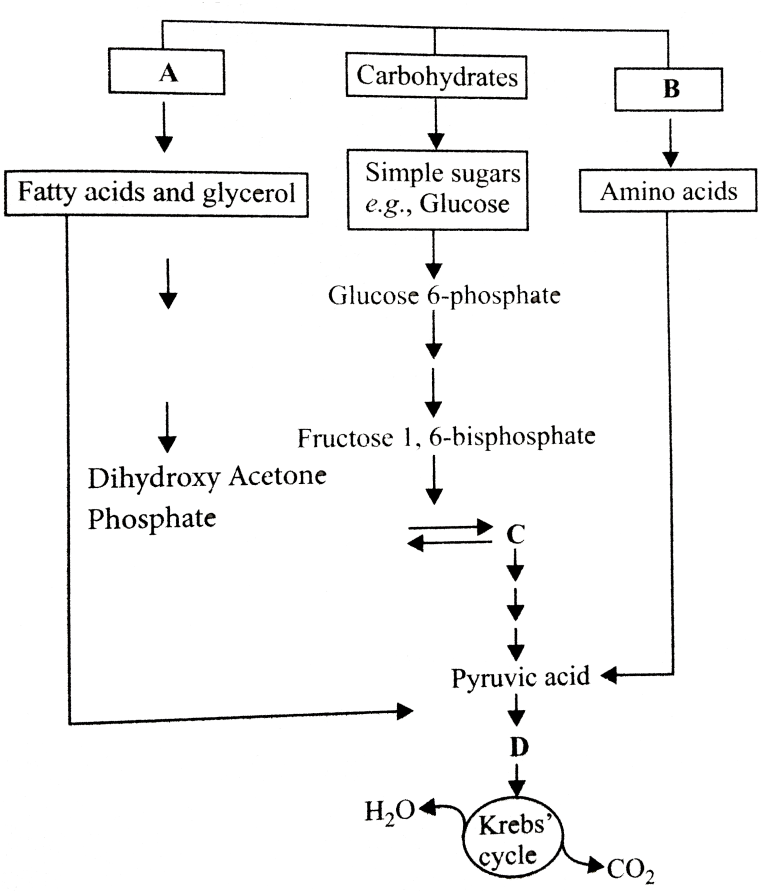
86. Refer to the given figure and select the correct option for A,B,C and D.



A. A Fats B Proteins C $3-PGAL$ D AcetylCoA

B. A Fats B Proteins C $3-PGAL$ D CO_2

C. A Proteins B Fats C $AcetylCoA$ D PEP

D. A Proteins B Fats C PEP D AcetylCoA

Answer: a

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87. Which of the following statements regarding metabolic pathways is incorrect?

A. Many of the steps of glycolysis can run in reverse.

B. Strach, sucrose or glycogen must be hydrolysed before if can enter the glycolysis

C. After fats are digested, glycerol enters glycolysis by forming DHAP

D. After fat digestion, fatty acids can no longer participate in cellular respiration.

Answer: d

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88. Respiratory pathway is

A. catabolic

B. amphibolic

C. anabolic

D. endergonic

Answer: b

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89. Respiratory quotient may be represented as

A. O_2 taken in $/CO_2$ evolved

B. CO_2 evolved $/O_2$ taken in

C. O_2 taken in

D. CO_2 taken in

Answer: b

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90. which out of the following statements is incorrect ?

A. The breakdown product of glucose which enters into mitochondrion during aerobic respiration is pyruvic acid generated in the cytosol.

B. When the electrons pass from one carrier to another via complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP from ADP and Pi

C. The ratio of volume of O_2 consumed in respiration to the volume of CO_2 evolved is called as the respiratory quotient (RQ).

D. Compensation point is the point reached in a plant when the rate of photosynthesis is equal to the rate of respiration.

Answer: c

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91. Respirometer is an instrument used to measure

A. rate of respiration

B. respiratory quotient

C. both of these

D. none of these

Answer: c

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92. Refer the given equation.

$2(C_{51}H_{98}O_6) + 145O_2 \rightarrow 102CO_2 + 98H_2O +$ Energy The RQ in this case is

A. 1

B. 0.7

C. 1.45

D. 1.62

Answer: b

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93. Consider the following statements with respect to respiration.

(i) Glycolysis occurs in the cytoplasm of the cell.

(ii) Aerobic respiration takes place within the mitochondria.

(iii) Electron transport system is present in the outer mitochondrial membrane.

(iv) $C_{51}H_{98}O_6$ is the chemical formula of tripalmitin, a fatty acid.

(v) Respiratory quotient $= \frac{\text{Volume of} O_2 \text{evolved}}{\text{Volume of} CO_2 \text{consumed}}$ of the above statements

A. (i),(ii) and (iv) are correct

B. (ii),(iii) and (iv) are correct

C. (iii),(iv) and (v) are correct

D. (ii),(iv) and (v) are correct

Answer: a

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94. Select the wrong statement.

A. When tripalmitin is used as a substrate in respiration the RQ is 0.7

B. The intermediate compound which links glycolysis with Krebs' cycle is malic acid

C. One glycose molecule yields a net gain of 36 ATP molecules during aerobic respiration

D. One glycose molecule yields a net gain of 2 ATP molecules during glycolysis

Answer: b

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95. RQ of proteins, carbohydrates, fats and organic acids are in order

A. $< 1, 1, < 1, > 1$

B. $> 1, < 1, 1, 1$

C. $1, 1, 0, -1$

D. $0, < 1, 1, > 1$

Answer: a

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96. Select the correct combination of the respiratory substrates and their respective RQs.

A.

Organic acid	Fats	Succulents
1.3	0.7	*Zero*

B.

Organic acid	Fats	Succulents
Infinity	0.7	*Zero*

C. | Organic acid | Fats | Succulents |
|---|---|---|
| *Zero* | 1.3 | 0.7 |

D. | Organic acid | Fats | Succulents |
|---|---|---|
| *zero* | 0.7 | 1.3 |

Answer: a

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97. Match column I with column II and select the correct option from the codes given below.

ColumnI	*ColumnII*
A. *RQ*	(i)Chemiosmotic ATP syntheis
B. Mitchel	(ii)Muscle fatigue
C. Cytochromes	(iii)Inner mitochondrial membrane
D. Lactic acid	(iv)Alcoholic fermentation
E. Yeast	(v)Respirometer

A. A-(v),B-(i),C-(iii),D-(ii),E-(iv)

B. A-(v),B-(i),C-(iii),D-(iv),E-(ii)

C. A-(i),B-(v),C-(ii),D-(iii),E-(iv)

D. A-(v),B-(ii),C-(iv),D-(iii),E-(i)

Answer: a

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98. If volume of CO_2 liberated during respiration is more than the volume of O_2 used, then the respiratory substrate will be

A. carbohydrate

B. fat

C. protein

D. organic acid

Answer: d

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99. Valume of RQ in succulents is

A. unity

B. infinite

C. less than unity

D. zero

Answer: d

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100. RQ in anaerobic respiration is

A. 0.7

B. 0.9

C. unity

D. infinity

Answer: d

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101. Study carefully the following statements and select the incorrect ones.

When fats are used in respiration, the RQ is more than unity because fats contain more O_2 and require relatively less amount of O_2 for oxidation.

(ii) The most important energy carrier is ATP. This energy rich compound is mobile and can pass from one cell to another.

(iii) Before pyruvic acid enter Krebs' cycle, one of the two carbon atoms of pyruvic acid is reduced to carbon dioxide in the reaction called reductive carboxylation.

(iv) A special electron carrier system located in the mitochondrial membrane is called shuttle system. It transfers electron from the hydrogens of cytoplasmic NADH to the mitochondrial electron carriers across the mitochondrial membrane.

(v) Zymase is a complex mixture of many enzymes which requires several coenzymes for its action. The enzyme complex-zymase catalyses series of reaction taking place during fermentation leading to the production of ethyl alcohol.

A. (i) and (ii)

B. (iii) and (iv)

C. (i),(ii) and (iii)

D. (iii),(iv) and (v)

Answer: c

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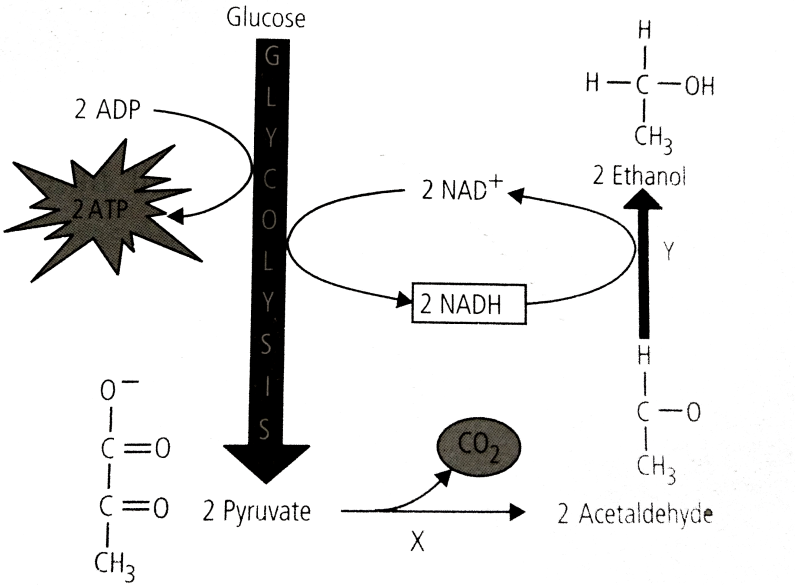
102. Select the incorrect statements with respect to the given representation.



A. X is the enzyme pyruvate dehydrogenase and Y is the enzyme ethanol decarboxylase

B. This process is involved in brewing industry for producing beverages like beer, rum, whisky, etc.

C. Accumulation of the end product (i.e., ethanol) during this process, in a culture of yeast, stops the multiplication of yeast cells and may even lead to death of cells.

D. None of these

Answer: a

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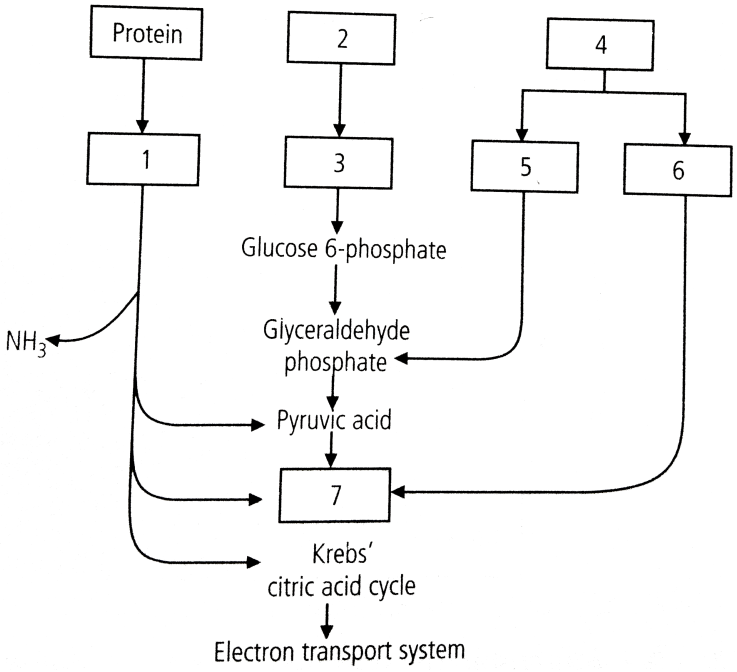
103. Refer to the following flow chart representing the cellular respiration and its fuels. Blanks 1,2,3,4,5,6 and 7 are respectively



A. amino acids, carbohydrate, glucose, fats, glycerol, fatty acid, acetyl Co-A

B. fats, acetyl Co-A amino acid, fatty acid, carbohydrate, glycerol, glucose

C. fatty acid, glucose, acetyl Co-A glycerol, fats, carbohydrate, amino acid

D. carbohydrate, fats, glycerol, fatty acids, amino acid, glycose, acetyl Co-A

Answer: a

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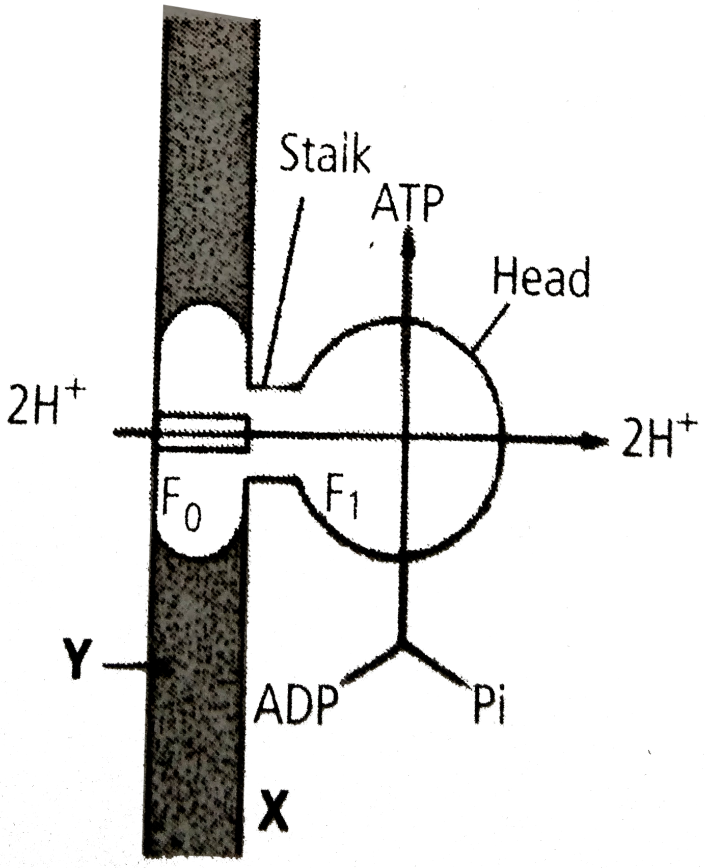
104. Study the given figure and select the incorrect option regarding this.



A. The figure represents chemiosmotic ATP synthesis by oxysomes where X is the mitochondrial matrix and Y is the inner mitochondrial membrane.

B. Enzyme required for ATP synthesis is ATP synthase, considered to be the complex,-V of ETS

C. The figure represents oxidative phosphorylation which is the syntheis of energy rich ATP molecules with the help of energy liberated during oxidation of reduced co-enzymes $(NADH - FADH_2)$ produced in respiration

D. ATP synthase becomes active only when there is a proton gradinet having higher concentration of protons $\left(H^+\right)$ on the inner side (F_1 side) as compared to the outer side (F_0 side).

Answer: d

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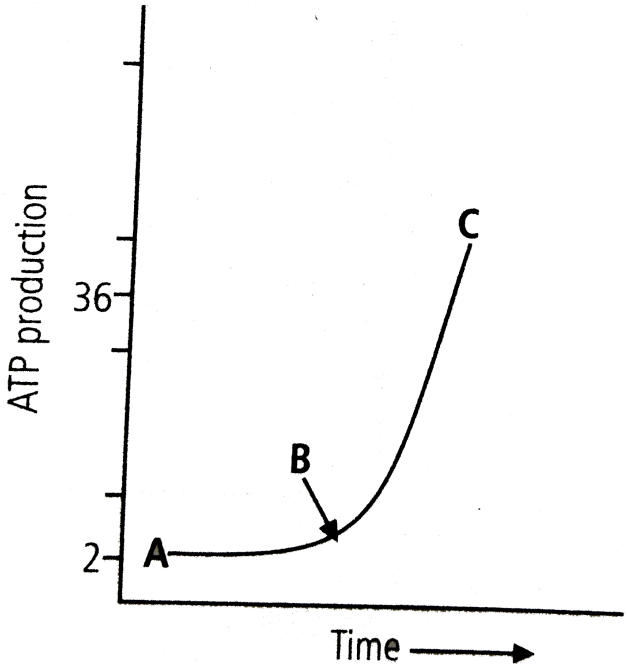
105. Animal cells are suspended in a culture medium that contains excess glucose. The graph below shows glucose utilisation under different

growth conditions (A),(B), and (C) in the graph indicate



A. A-Anaerobic respiration

B-Introduction of O_2 to culture medium

C- Aerobic respiration

B. A-Aerobic respiration

B-Introduction of O_2 to culture medium

C- Anaerobic respiration

C. A-Aerobic respiration

B-Supply of organic triphosphate

C-Aerobic respiration

D. A-Aerobic respiration

B-Introduction of CO to culture medium

C-Anaerobic respiration.

Answer: a

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106. In addition to the normal process of oxidation of carbohydrates through glycolysis and Krebs' cycle, there is another process by which plants could oxidise carbohydrates to obtain energy. In this process, hexose sugars undergo oxidative degradation through 5-C sugar intermediates and hence it is known as pentose phosphate pathway (P P P). Which of the following statements is not true with regard to P P P?

A. It is an alternative to glycolysis and also acts as a safety value or shunt to glycolysis and also acts as a

B. It is common in plants and occurs in certain specialised tissues of animal body, e.g., liver, adipose tissue, testes, ovary, adrenal cortex, lactating mammary gland, eye lens and cornea.

C. It occurs only in cytoplasm but not in any cell organelle.

D. It is also called as hexose monophosphate shunt (HMP pathway).

Answer: c

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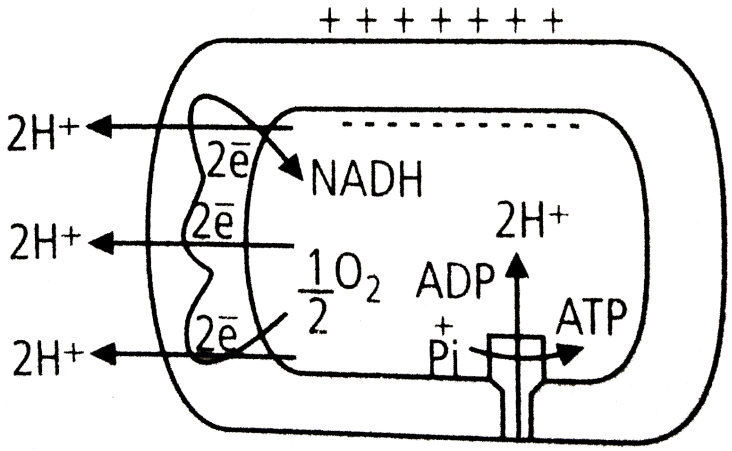
107. Mechanism of phosphorylation is depiected in the diagram below. Study it carefully and mark the correct option.



A. a) The diagram depicts photosynthetic phosphorylation taking place in the chloroplast. The incident light should be shown in the diagram

B. b) The diagram depicts oxidative phoshorylation taking place in mitochondria. However, the flow of electrons should be shown in reverse direction.

C. c) Diagram depicts the basic process of both oxidative as well as photosynthetic phosphorylation. However, the proton concentration should be high inside and low outside.

D. d) The diagram correctly depicts the oxidative phosphorylation occuring in all heterotrophic organisms.

Answer: b

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108. The ultimate electron acceptor of respiration in an aerobic organism is

A. cytochrome

B. oxygen

C. hydrogen

D. glucose

Answer: b

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109. Phosphorylation of glucose during glycolysis is catalysed by

A. phosphoglucomutase

B. phosphoglucoisomerase

C. hexokinase

D. phosphorylase

Answer: c

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110. Pyruvic acid, the key product of glycolysis can have many metabolic fates. Under aerobic condition it forms

A. lactic acid

B. $CO_2 + H_2O$

C. acetyl $CoA + CO_2$

D. ethanol $+ CO_2$

Answer: c

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111. Electron Transport system (ETS) is located in mitochondrial

A. outer membrane

B. inter membrane space

C. inner membrane

D. matrix

Answer: c

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112. Which of the following exhibits the highest rate of respiration?

A. Growing shoot apex

B. Germinating seed

C. Root tip

D. Leaf bud

Answer: b

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113. Mitochondria are called power house of the cell. Which of the following observations support this statement?

A. Mitochondria synthesise ATP

B. Mitochondria have a double membrane

C. The enzymes of the Krebs' cycle and the cytochromes are found in mitochondria

D. Mitochondria are found in almost all plant and animal cells.

Answer: a

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114. The end product of oxidative phosphorylation is

A. NADH

B. Oxygen

C. ADP

D. $ATP + H_2O$

Answer: d

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115. Match the following and choose the correct option from those given below.

$Column A$	$Column B$
A. Molecular oxygen	i. $\alpha -$ Ketoglutaric acid
B. Electron acceptor	ii. Hydrogen acceptor
C. Pyruvate dehydrogenase	iii. Cytochrome$C$
D. Decarboxylation	iv. AcetylCoA

A. A-ii,B-ii,C-iv,D-i

B. A-iii,B-iv,C-ii,D-i

C. A-ii,B-I,C-iii,D-iv

D. A-iv,B-iii,C-I,D-ii

Answer: a

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116. Assertion : Respiration is the breaking of the C-C bonds of complex compounds through oxidation within the cells and release of large amount of energy.

Reason : The compounds that are oxidised during respiration are called respiratory substrates.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: b

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117. Assertion : ATP acts as the energy currency of the cell.

Reason : ATP can be broken down to release energy wherever and whenever energy needs to be utilised.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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118. Assertion : Plants have no specialised respiratory organs.

Reason : There is very little transport of gases from one plant part to another.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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119. Assertion : Glycolysis is also called EMP pathway.

Reason : It is the only process of respiration in aerobic organisms.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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120. Assertion : This conversion of 1,3-bishosphoglycerate (BPGA) to 3-phosphoglyceric acid (PGA) is an energy yielding step.

Reason : This energy is trapped by the formation of ATP

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: b

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121. Assertion : Fermentation is the incomplete oxidation of glucose into lactic acid or ethanol.

Reason : It takes place under anaerobic conditions in prokaryotes only.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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122. Assertion : Anaerobic respiration sometimes occurs in our skeletal muscles during strenous exercise.

Reason : Pyruvic acid is reduced to lactic acid by lactate dehydrogenase in the absence of oxygen.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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123. Assertion : The first step in TCA cycle is the condensation of pyruvate with oxaloacetic acid and water.

Reason : This reaction is catalysed by enzyme pyruvate synthase.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: d

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124. Assertion : The metabolic pathway through which the electron passes from one carrier to another is called the electron transport system (ETS)

Reason : ETS is present in the inner mitochondrial membrane.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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125. Assertion : Complex II and complex III of ETS are NADH dehydrogease and cytochrome oxidase complex respectively.

Reason : Cytochrome c acts as a mobile carrier for transfer of electrons between complex II and III.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: d

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126. Assertion : Oxidation of one molecule of NADH gives rise to 3 molecules of ATP and that of one molecule of $FADH_2$ produces 2 molecules of ATP

Reason : The number of ATP molecules synthesised depends on the nature of the electron donor.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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127. Assertion : In electron transport system, the electrons are passed on to oxygen resulting in the formation of H_2O

Reason : Oxygen is the ultimate acceptor of electrons.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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128. Assertion : During aerobic respiration, pyruvic acid formed as a result of glycolysis, undergoes phosphorylation reaction to form acetyl CoA.

Reason : There is net gain of 18 ATP molecules during aerobic respiration of one molecule of glucose.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: d

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129. Assertion : Respiratory pathway is an amphibolic pathway.

Reason : In respiration, there is breakdown of many substances (catabolism) and synthesis of many substances (anabolism) by respiratory intermediates.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: a

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130. Assertion : When carbohydrates are used as substrate and are completely oxidised, the RQ is equal to 1.

Reason : When proteins are used in respiration, the RQ is greater than 1.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: c

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