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RESPIRATION {class 3}

{targets}

- → Glycolysis.
- → Link reaction (transition Rx.
- → Research + Assignment
- → Next stop.

{Glycolysis}

- {sugar}
- break-down {splitting}

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SENIOR FIVE TERM 3

TOPIC 4: RESPIRATION

Section-1 Competence: Examine the relationship between the structure of the mitochondrion and the stages of cellular respiration in living organisms.

a) Study images of the ***ultrastructure*** *of a* ***mitochondrion,*** *and make drawings.*

b) Discuss the ***structural relationship*** *of the mitochondrion to its* ***functions*** *and* ***hydrolysis of Adenosine triphosphate (ATP) to release energy*** *using* ***concept mapping.***

Section-2 Competence: Analyse the biochemical processes leading to ATP production in living organisms, and how these processes are affected by physical activities and respiratory poisons (cyanide). ***(Details of biochemistry are NOT required)***

a) Use ***simulations*** *that demonstrate the* ***process of glycolysis,*** *focusing on its stages, where it* ***occurs, key molecules*** *involved, and its* ***significance in cellular respiration.***

b) Using the ***jigsaw strategy,*** *discuss the* ***central role*** *of* ***acetyl Coenzyme A (acetyl-CoA)*** *in the* ***metabolism of carbohydrates, lipids, and proteins*** *(Create a summary chart showing the integration of these pathways through acetyl-CoA.)*

c) Discuss the ***citric acid cycle [Krebs Cycle- fate of Acetyl CoA, NAD & FAD],*** *focusing on* ***key steps (substrate-level phosphorylation, decarboxylation, and the production of NADH and*** $FADH_2$***)*** *constructing a flowchart, to visualise the cycle.*

d) Discuss ***oxidative phosphorylation*** *in the mitochondrion. Watch a video clip or role play the* ***events of electron transport*** *focusing on the* ***role of protein complexes, NADH, FADH2, and oxygen.***

e) Watch an animation explaining ***how cyanide disrupts the electron transport system.***

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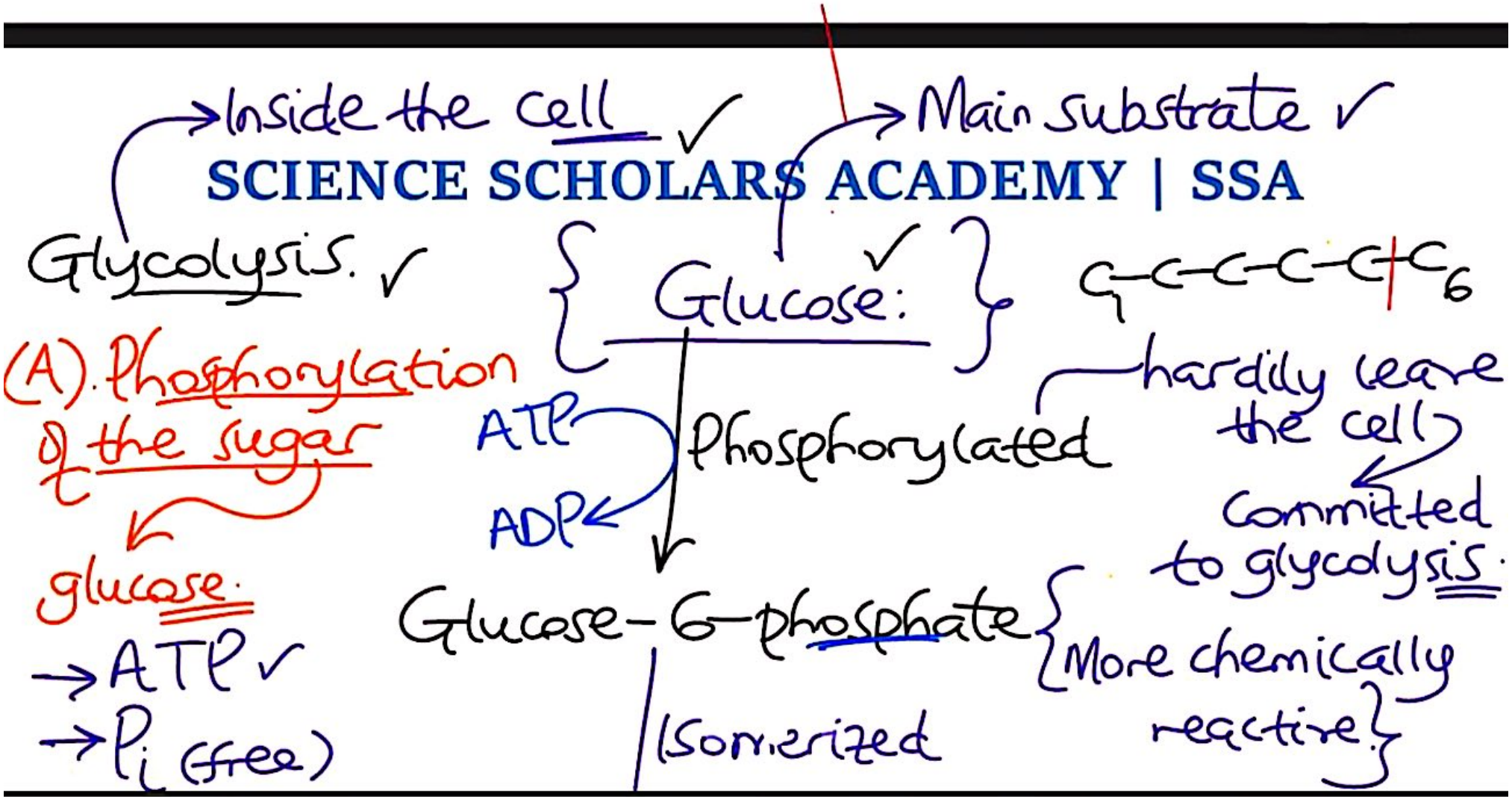
NADH NAD



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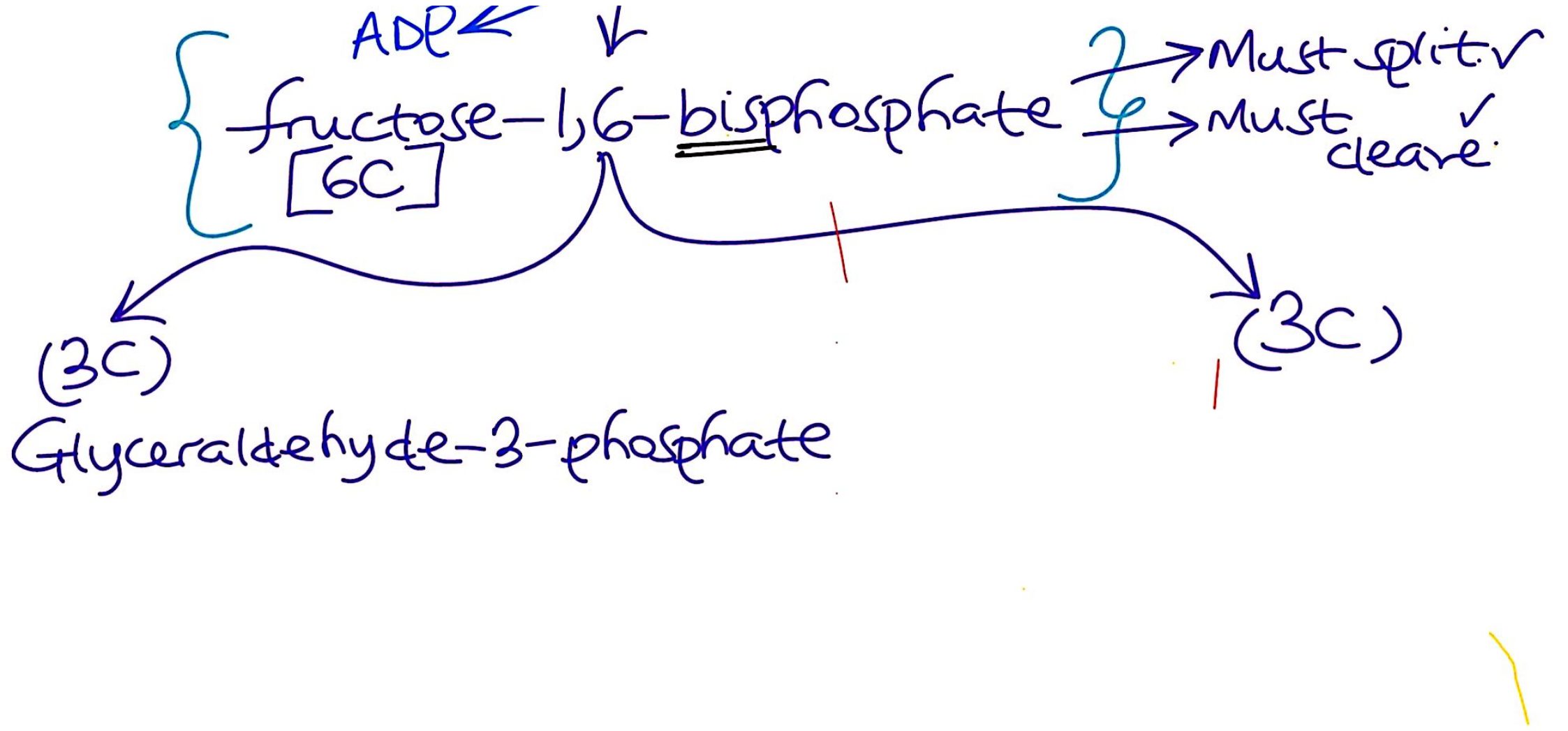

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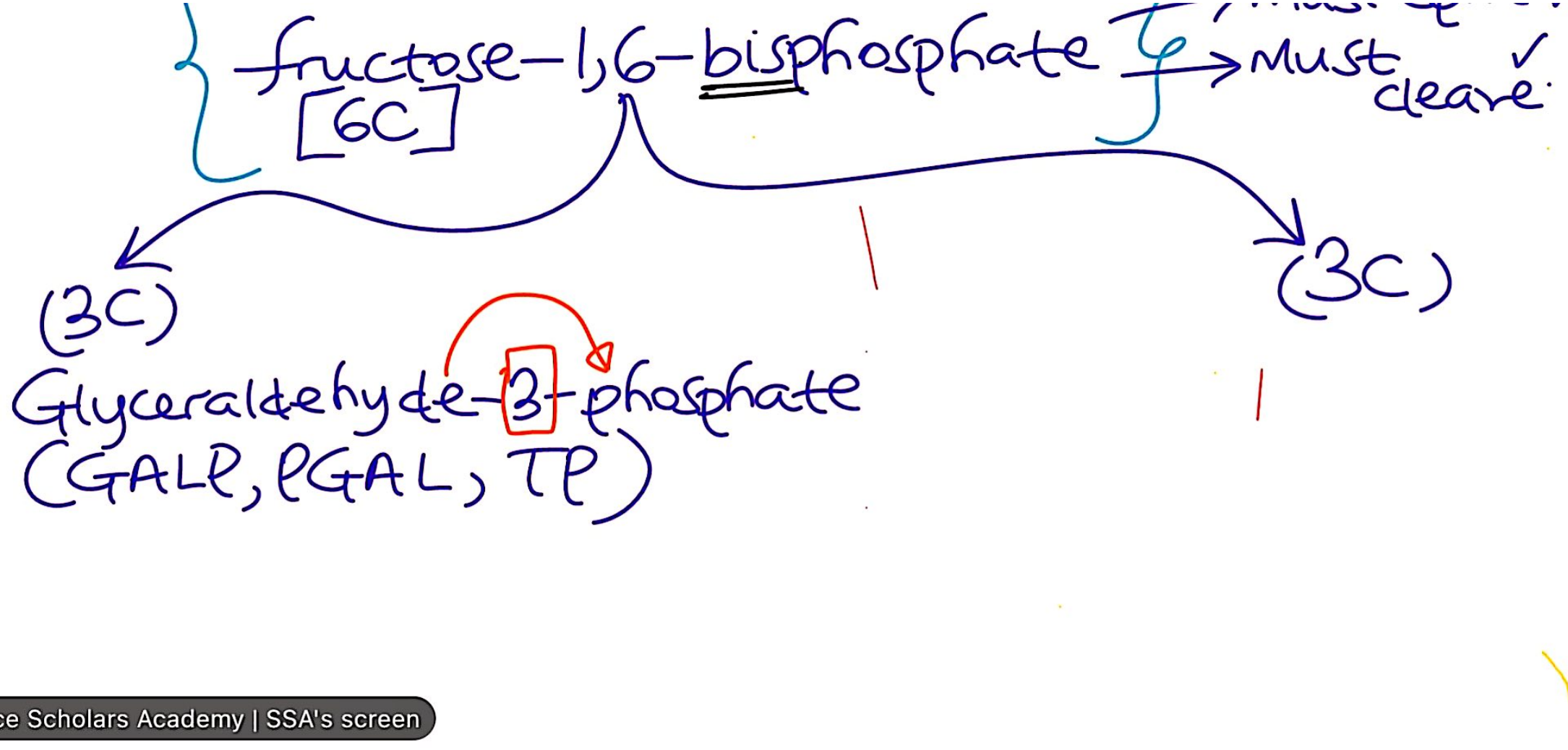

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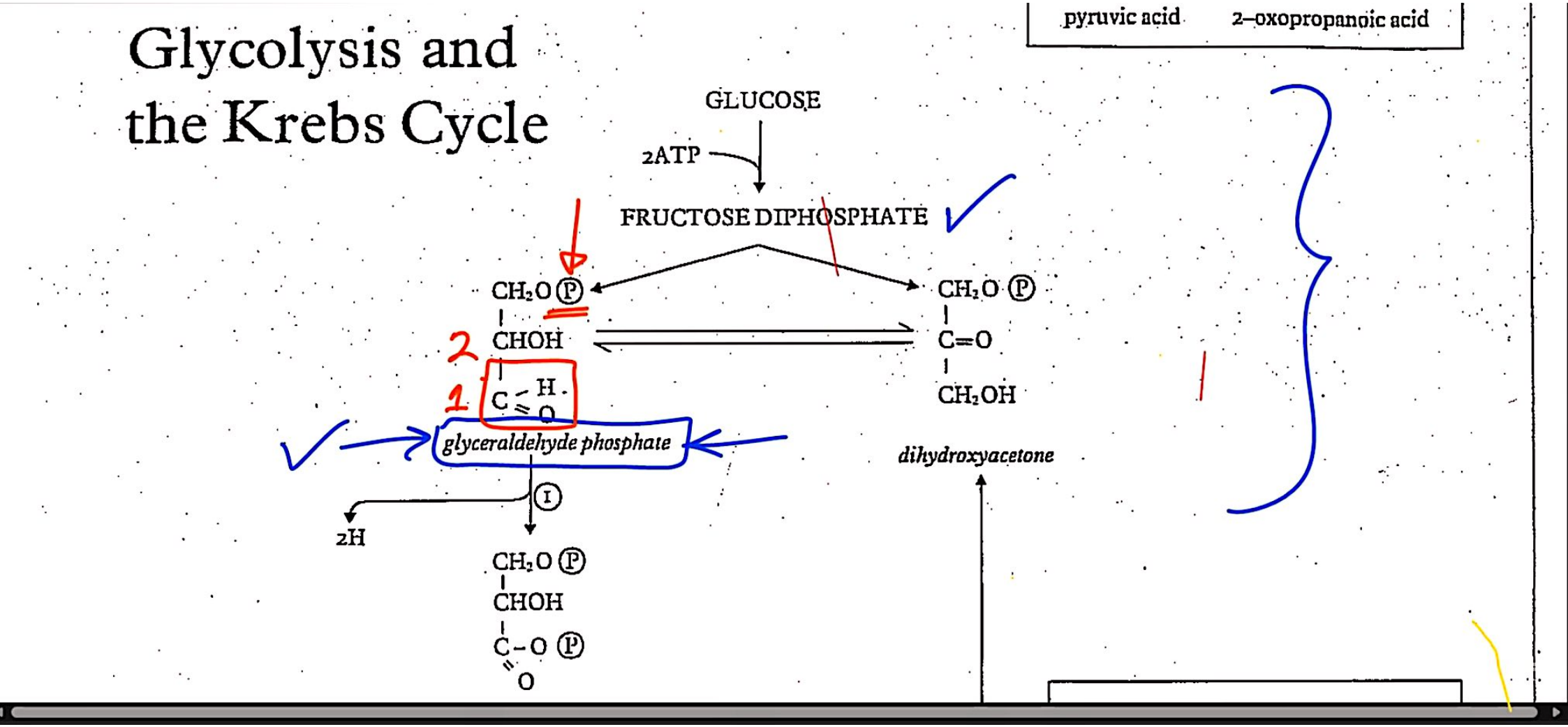
Glycolysis and the Krebs Cycle



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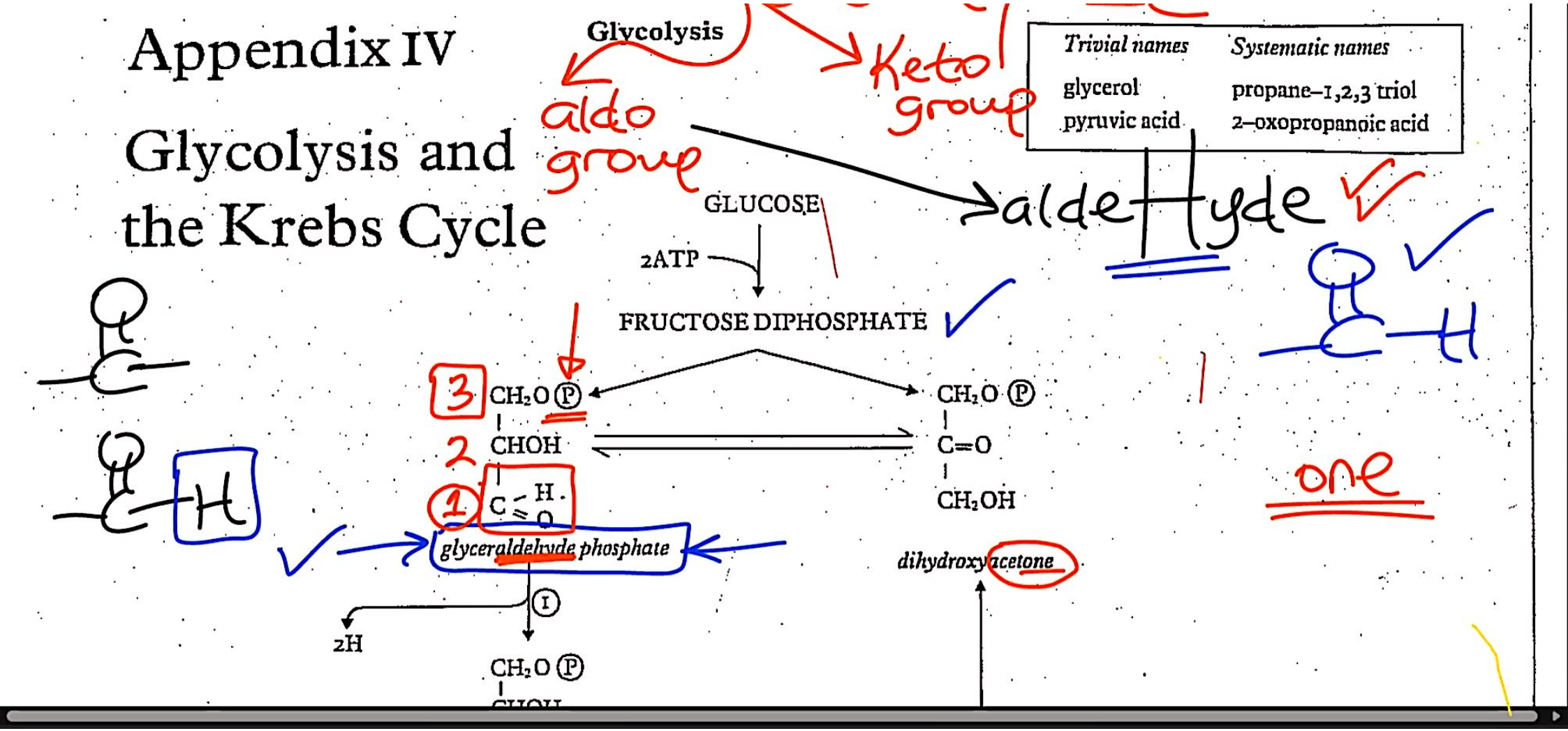
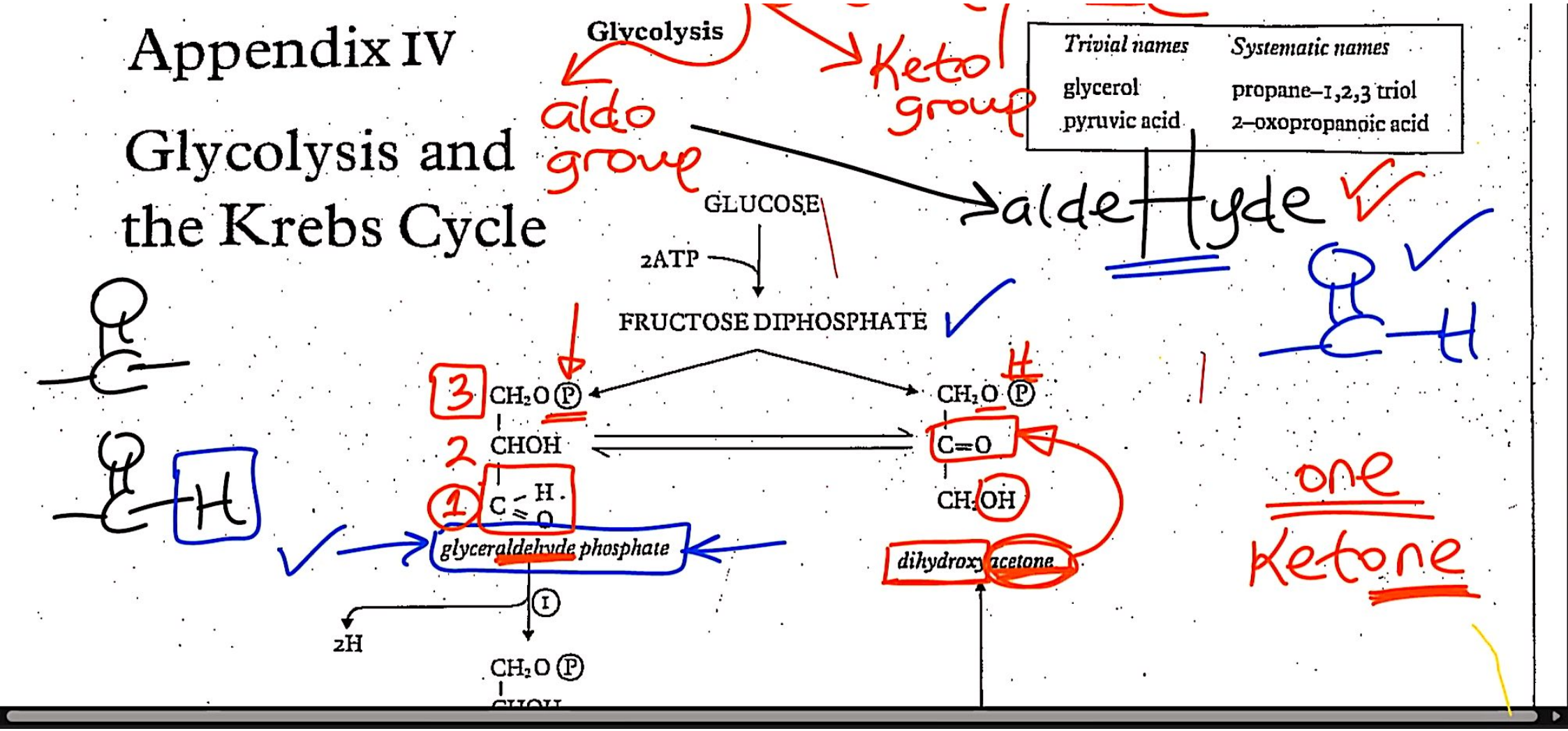
Appendix IV

Glycolysis and the Krebs Cycle



Appendix IV

Glycolysis and the Krebs Cycle



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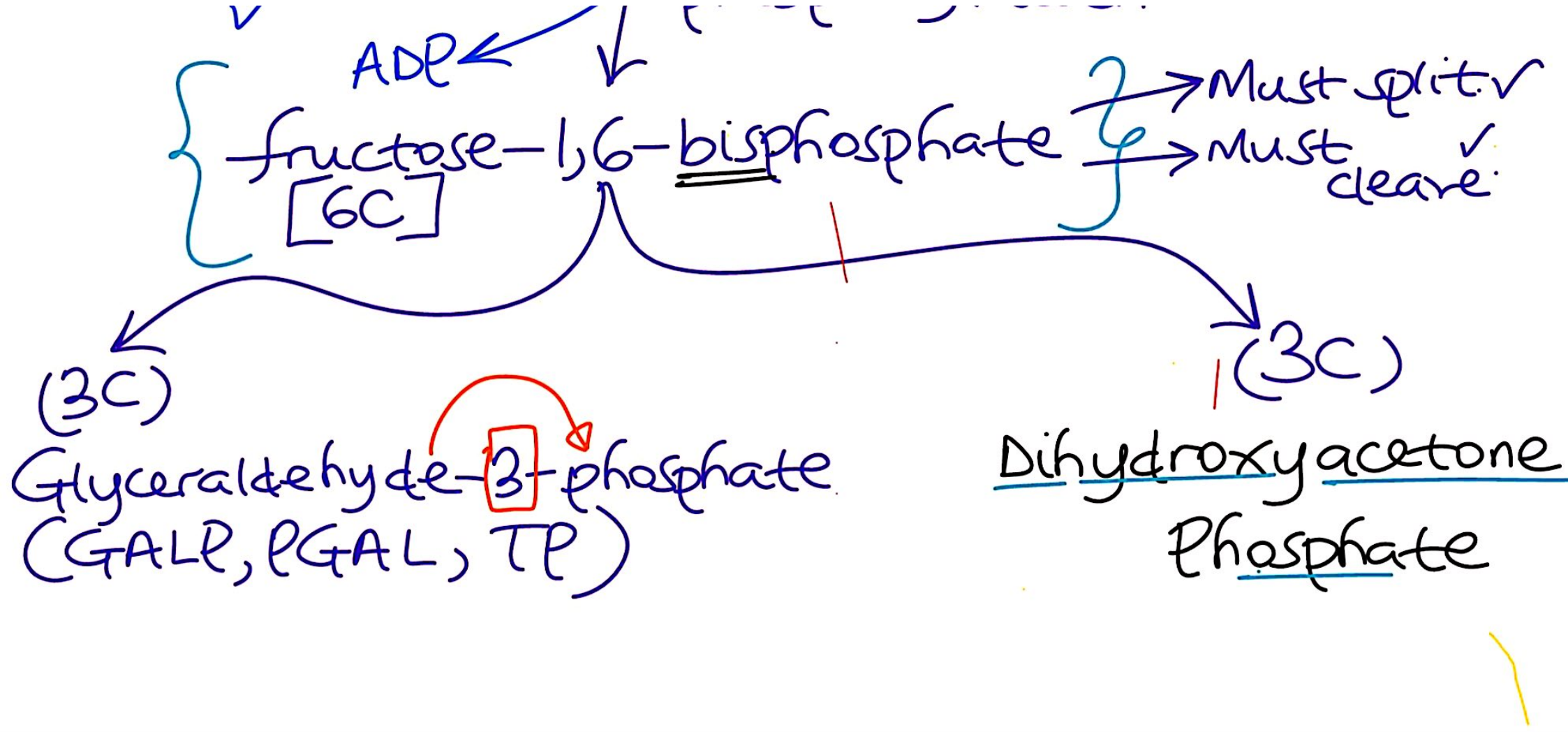

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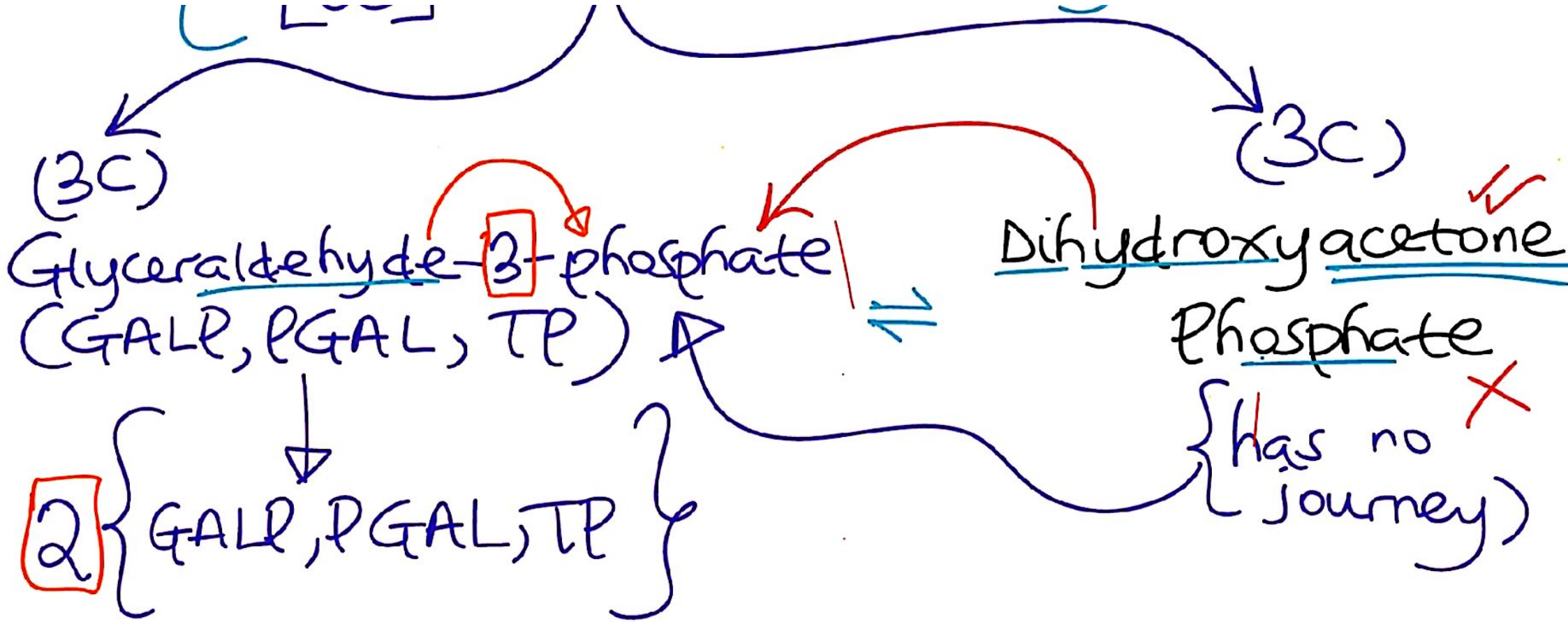

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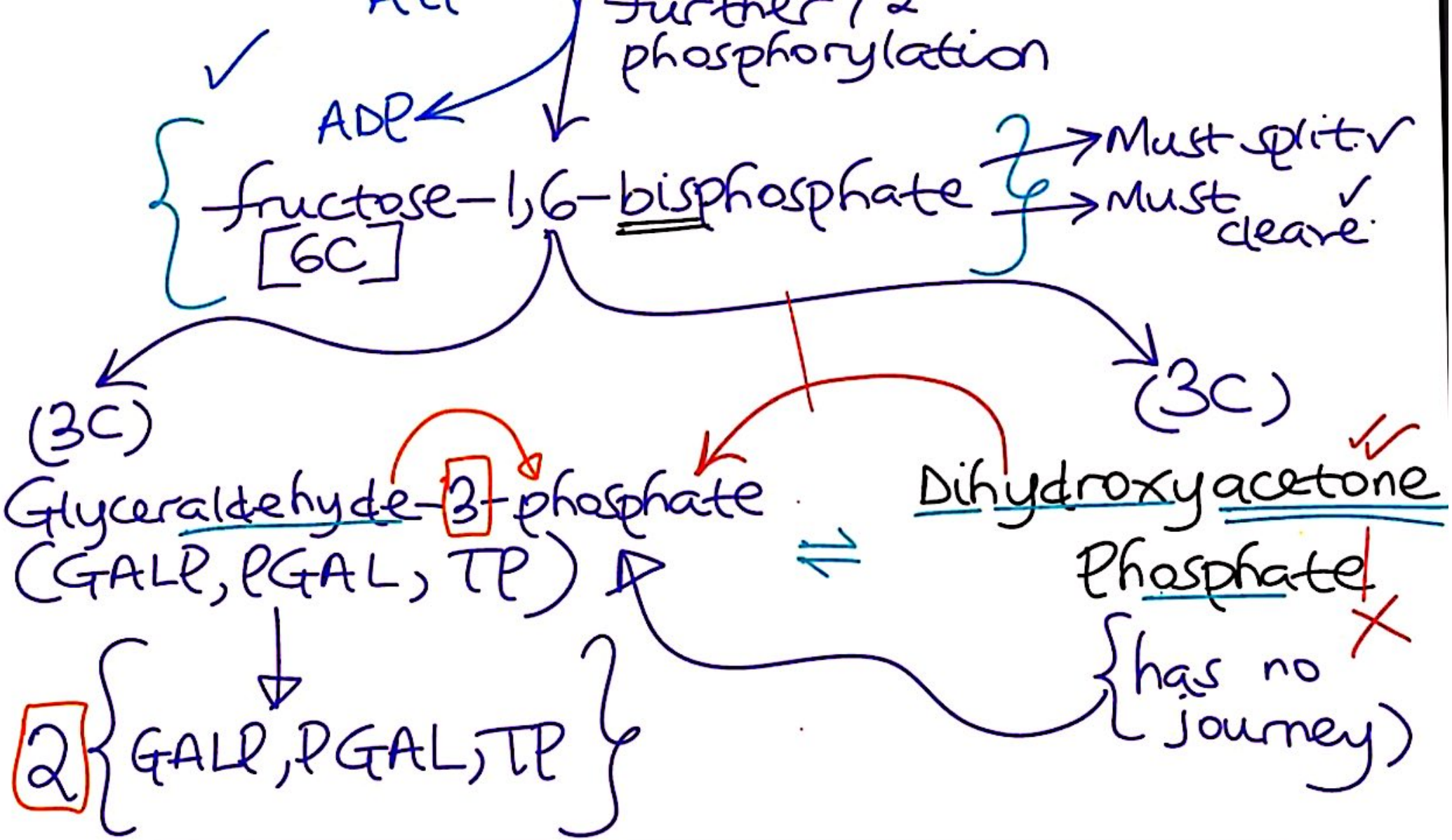

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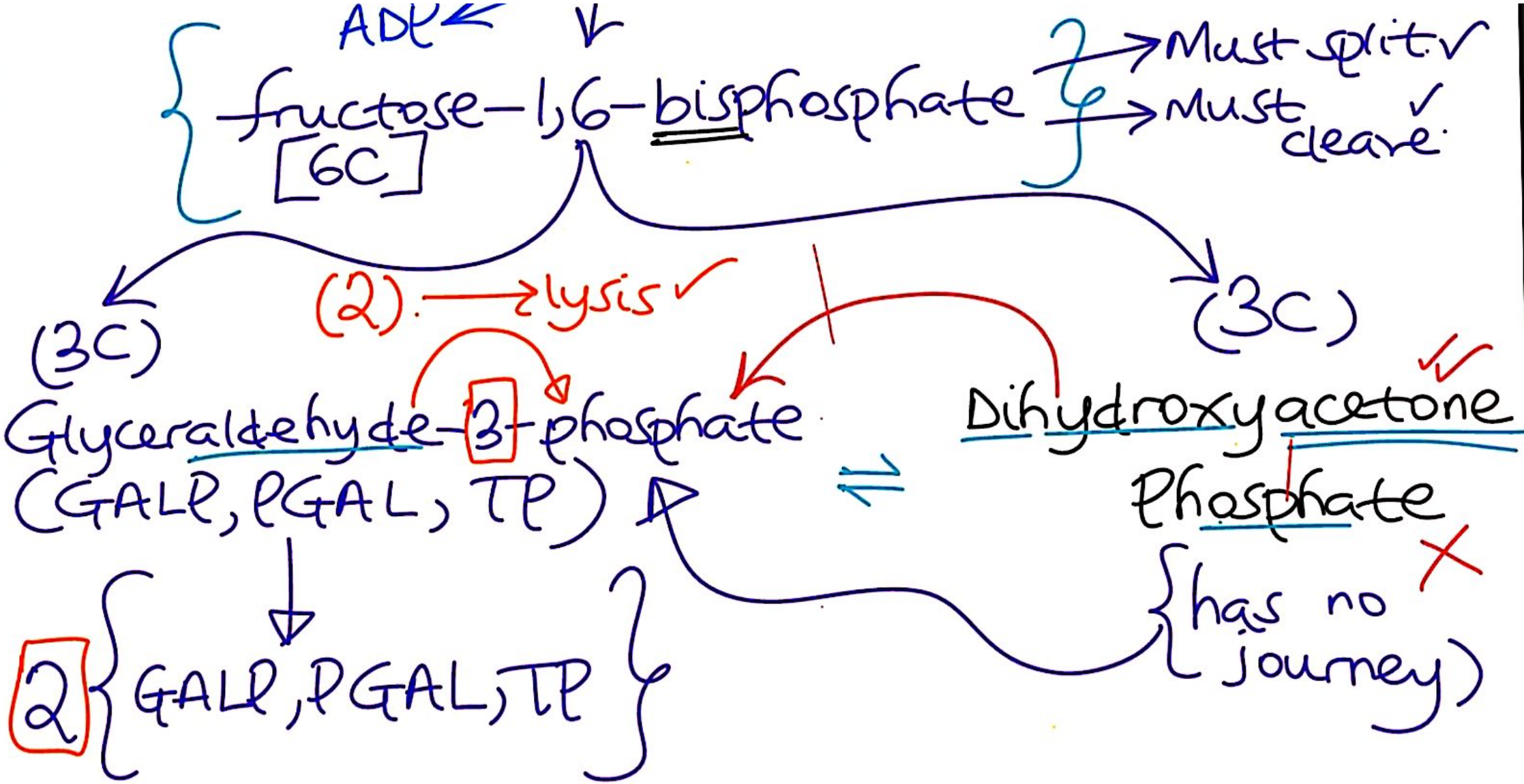

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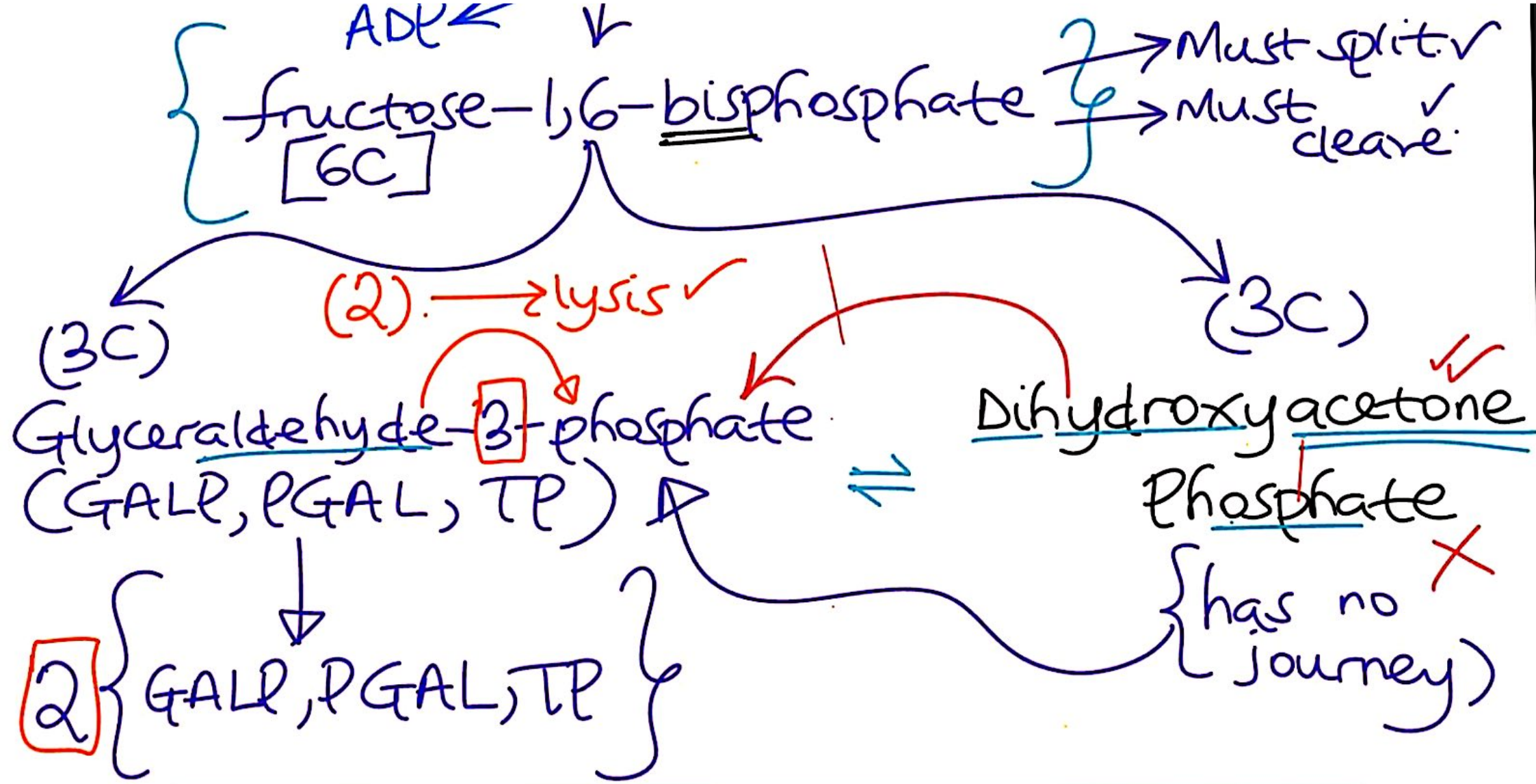

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Glyceric Acid ⟶ Glycerate

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2 (Glyceraldehyde-3-phosphate)

↓

2× (1,3-bisphosphoglycerate)

↓

[3-phosphoglycerate]

C3 Nutrition:

PGA *

N ↓ R ↑

1,3-bisPGA *

N ↓ R ↑

GALP *

C4 Nutrition:

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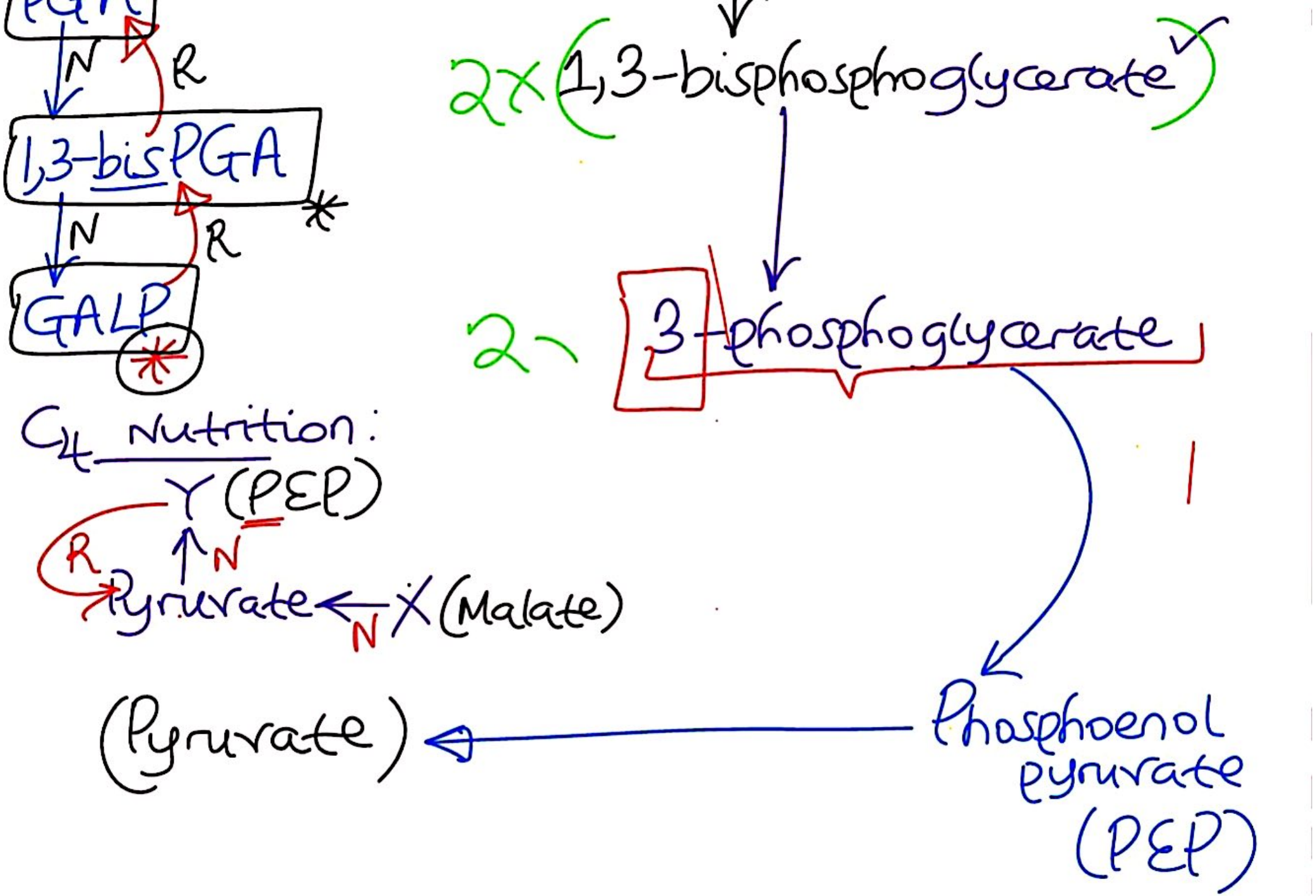

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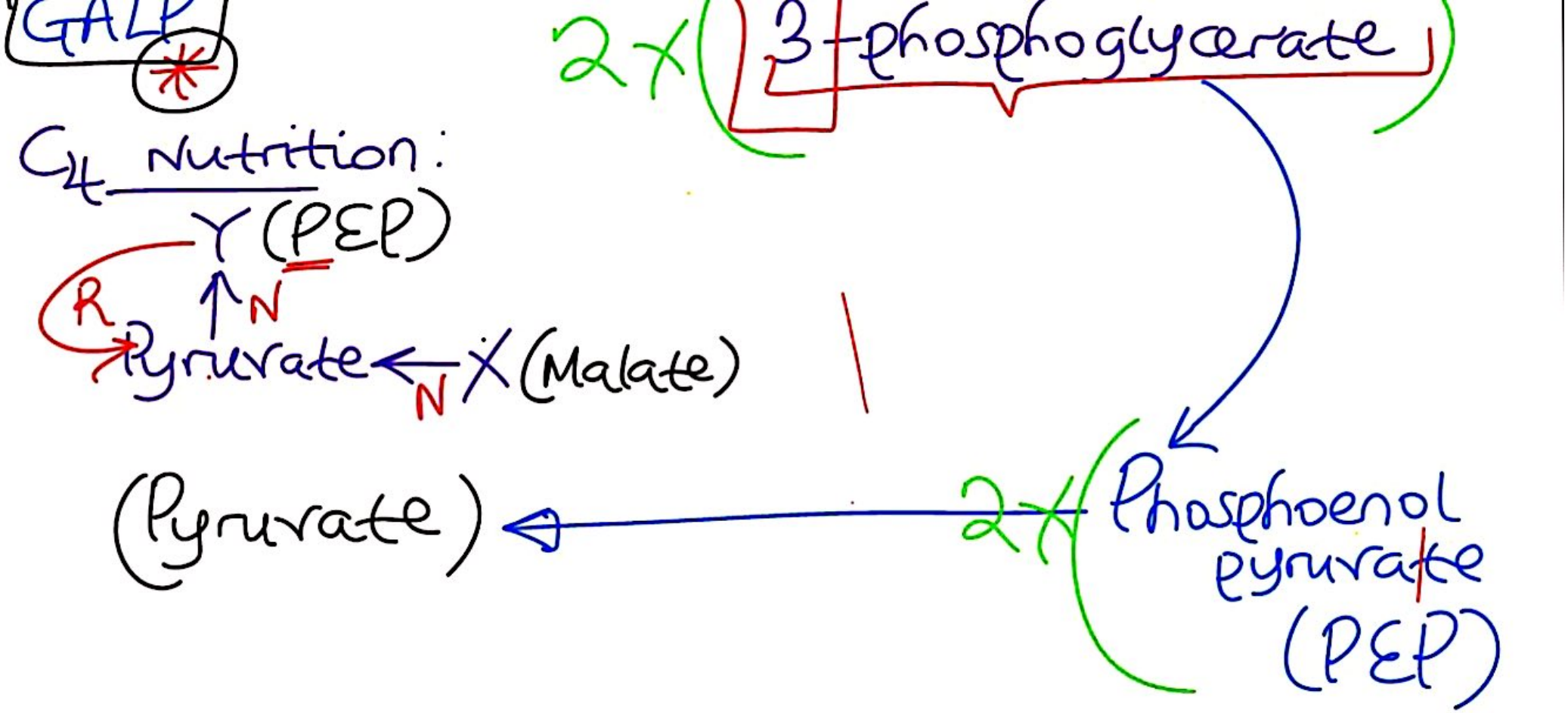

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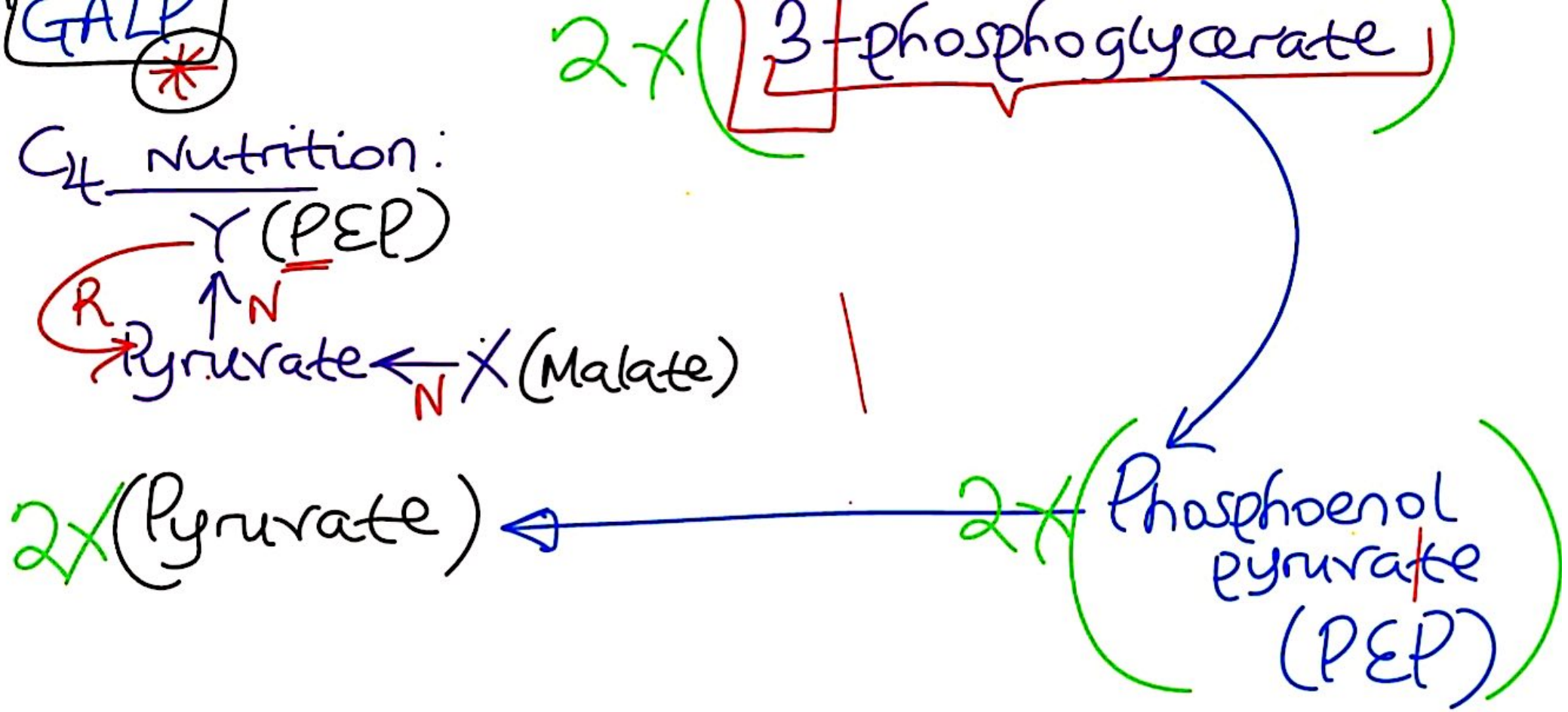

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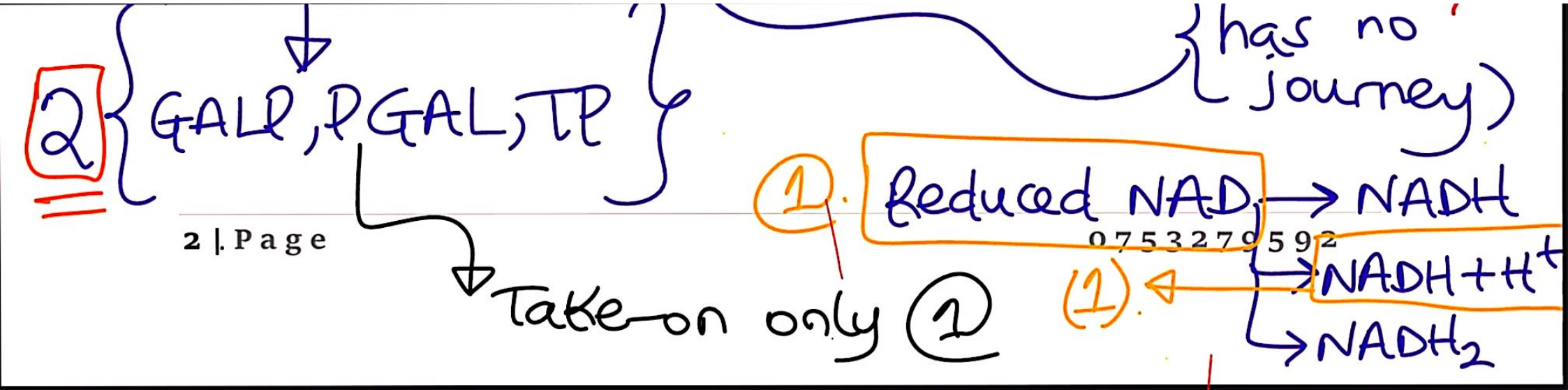

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Glyceric Acid ⟶ Glycerater

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2 (Glyceraldehyde-3-phosphate)

NAD+

C3

Nutrition

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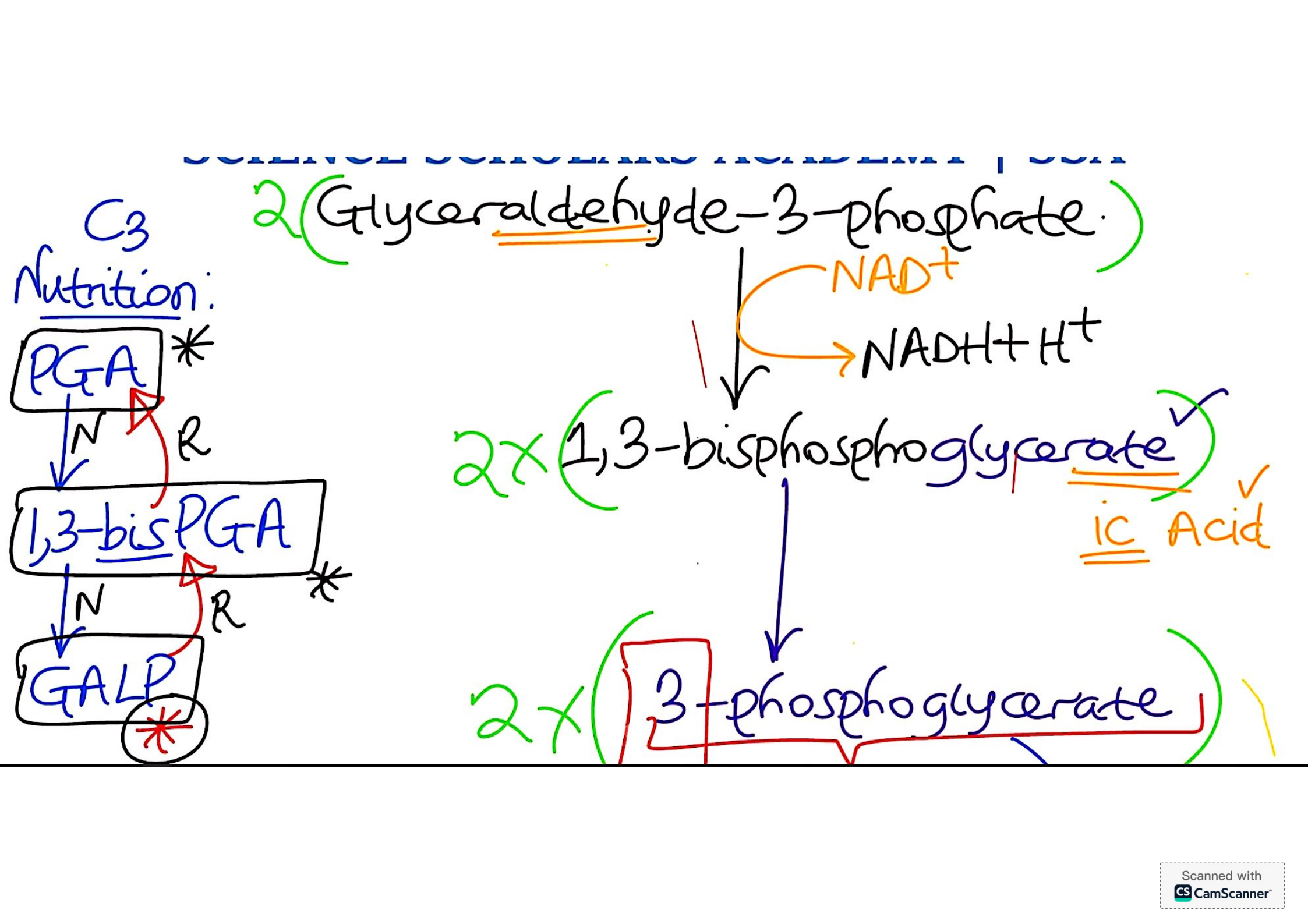

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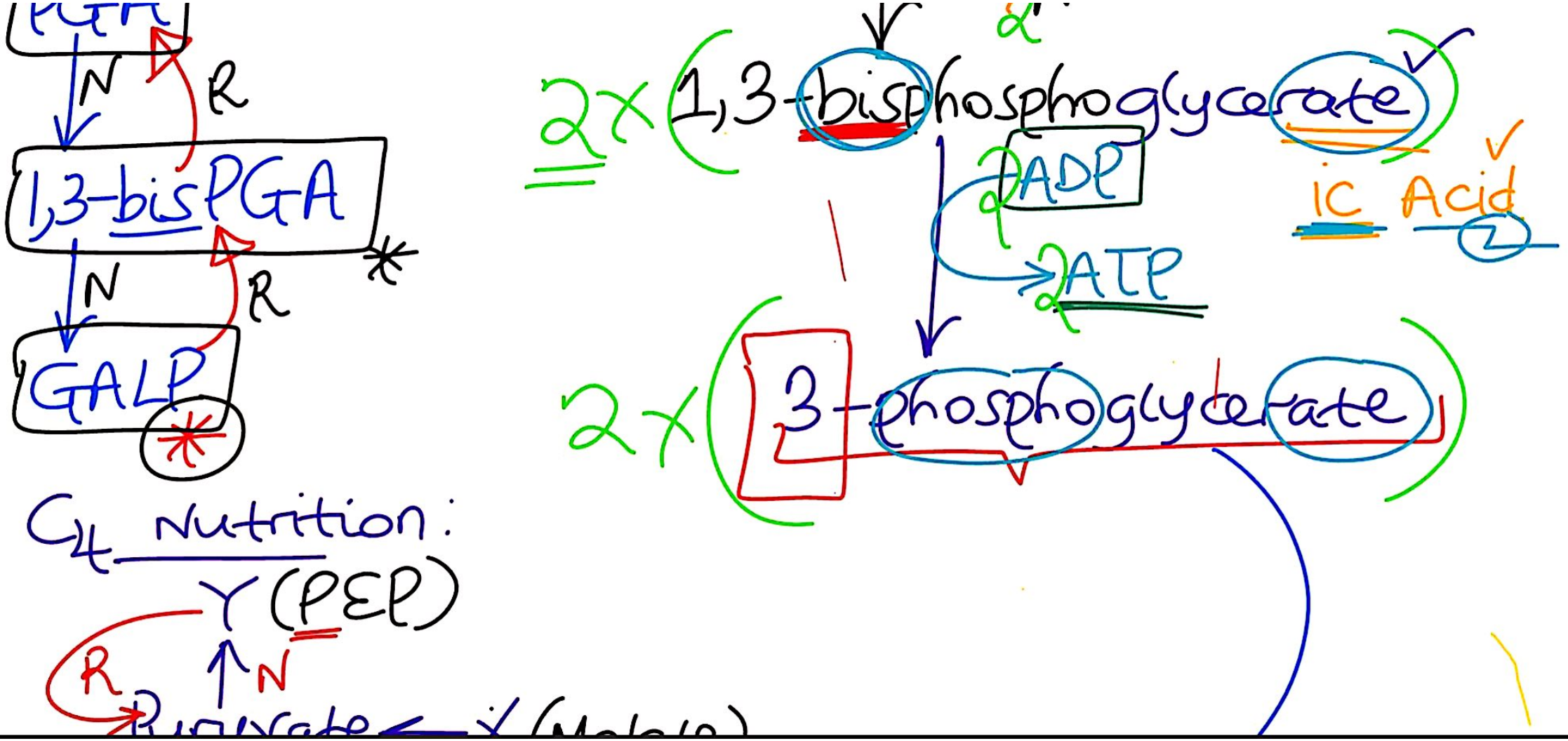
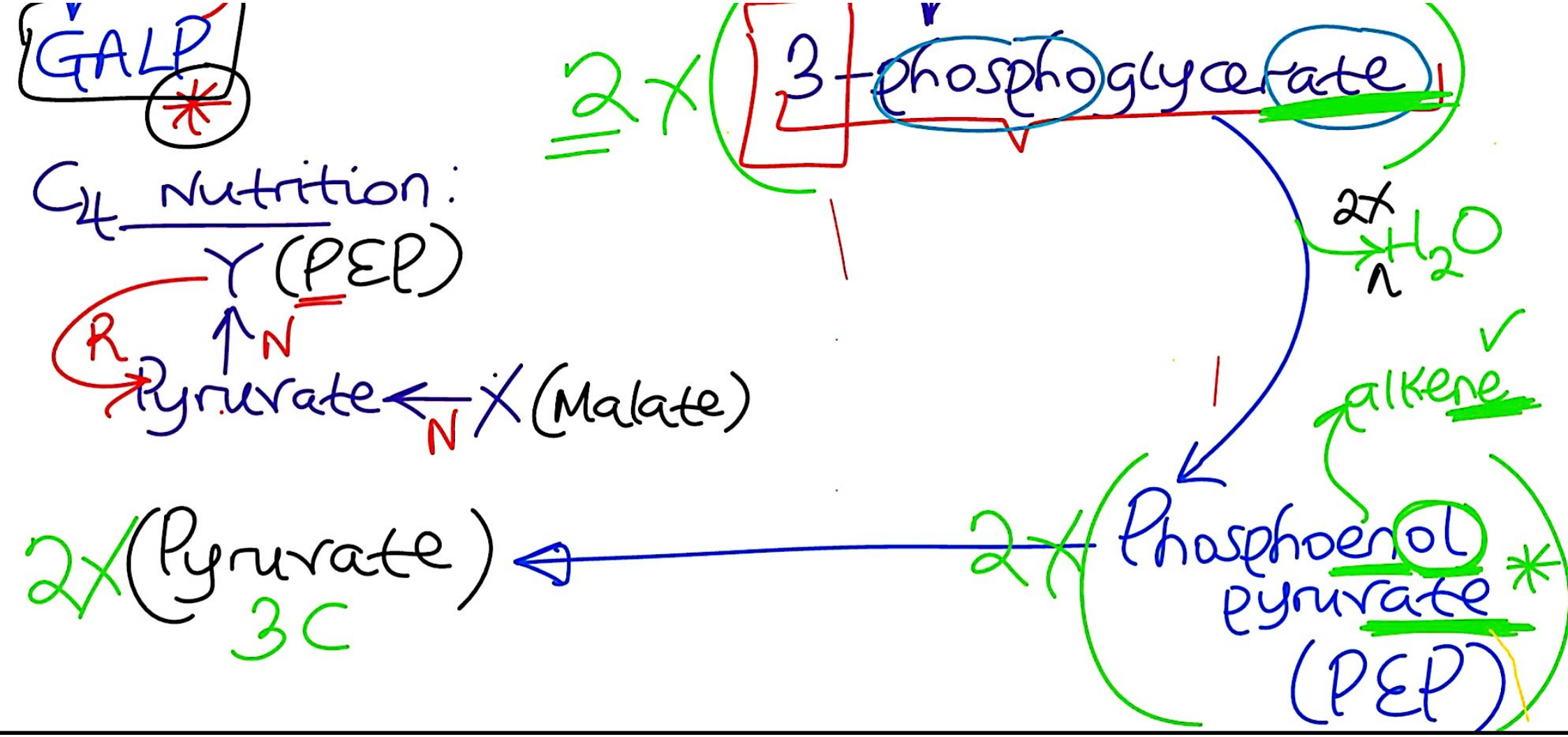
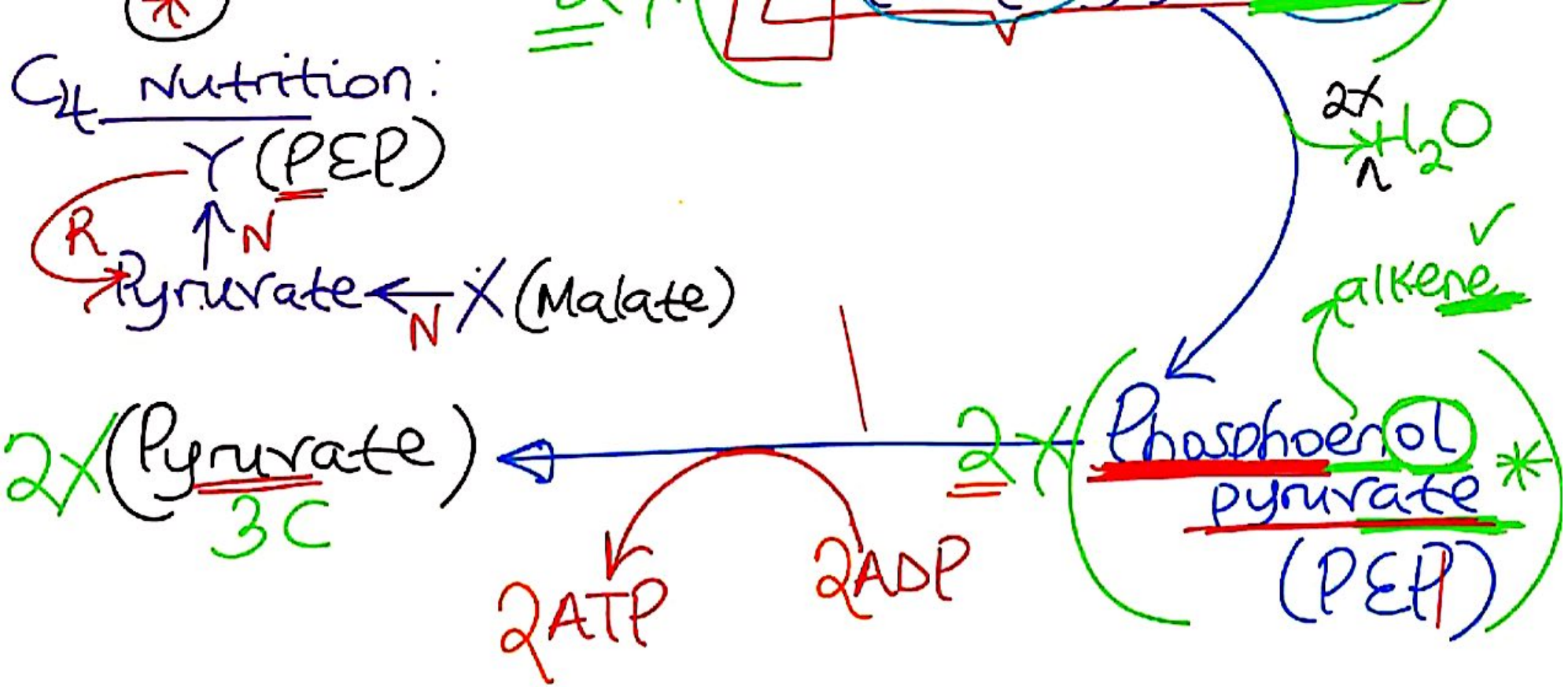

N
R
1,3-bisPGA
N
R
GALP
2x
1,3-bisphosphoglycerate
ADP
ATP
IC Acid
2x
3-phosphoglycerate
C4 Nutrition:
Y (PEP)
R
N


GALP
2x
3-phosphoglycerate
C4 Nutrition:
Y (PEP)
R
N
Pyruvate
N
X (Malate)
2x
H2O
alkene
2x
Phosphoenol pyruvate
(PEP)
2x
(Pyruvate)
3C



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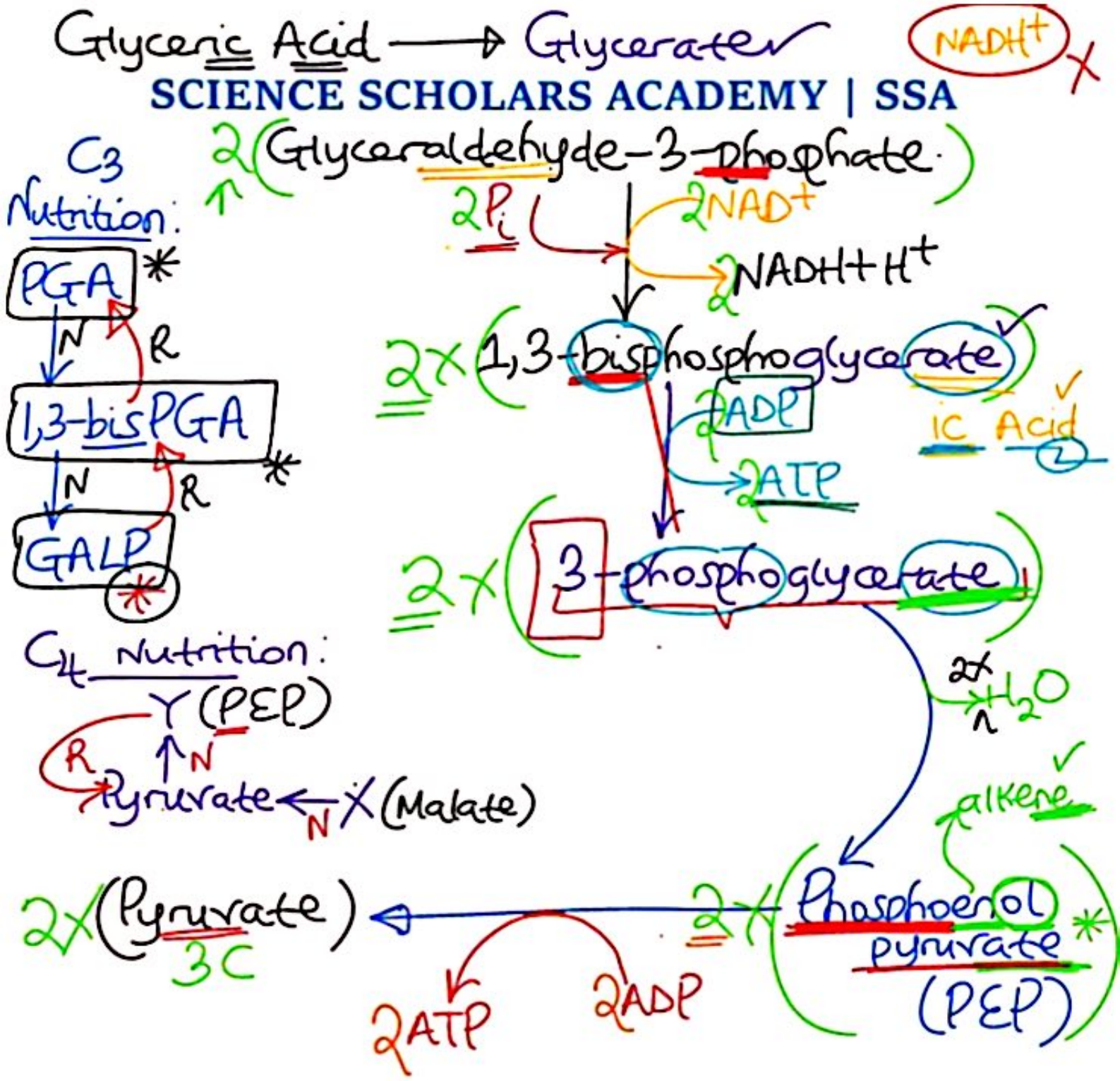

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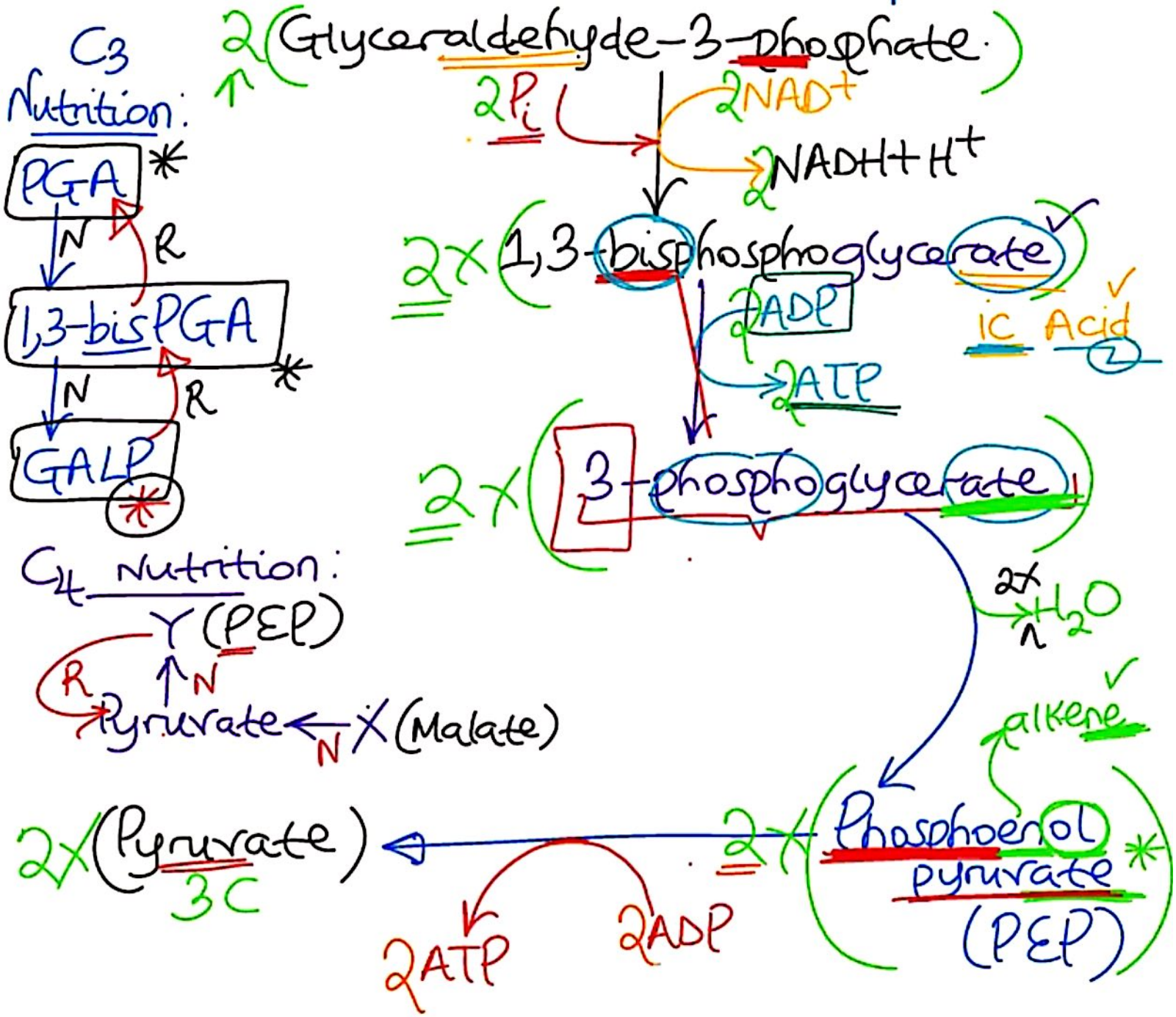

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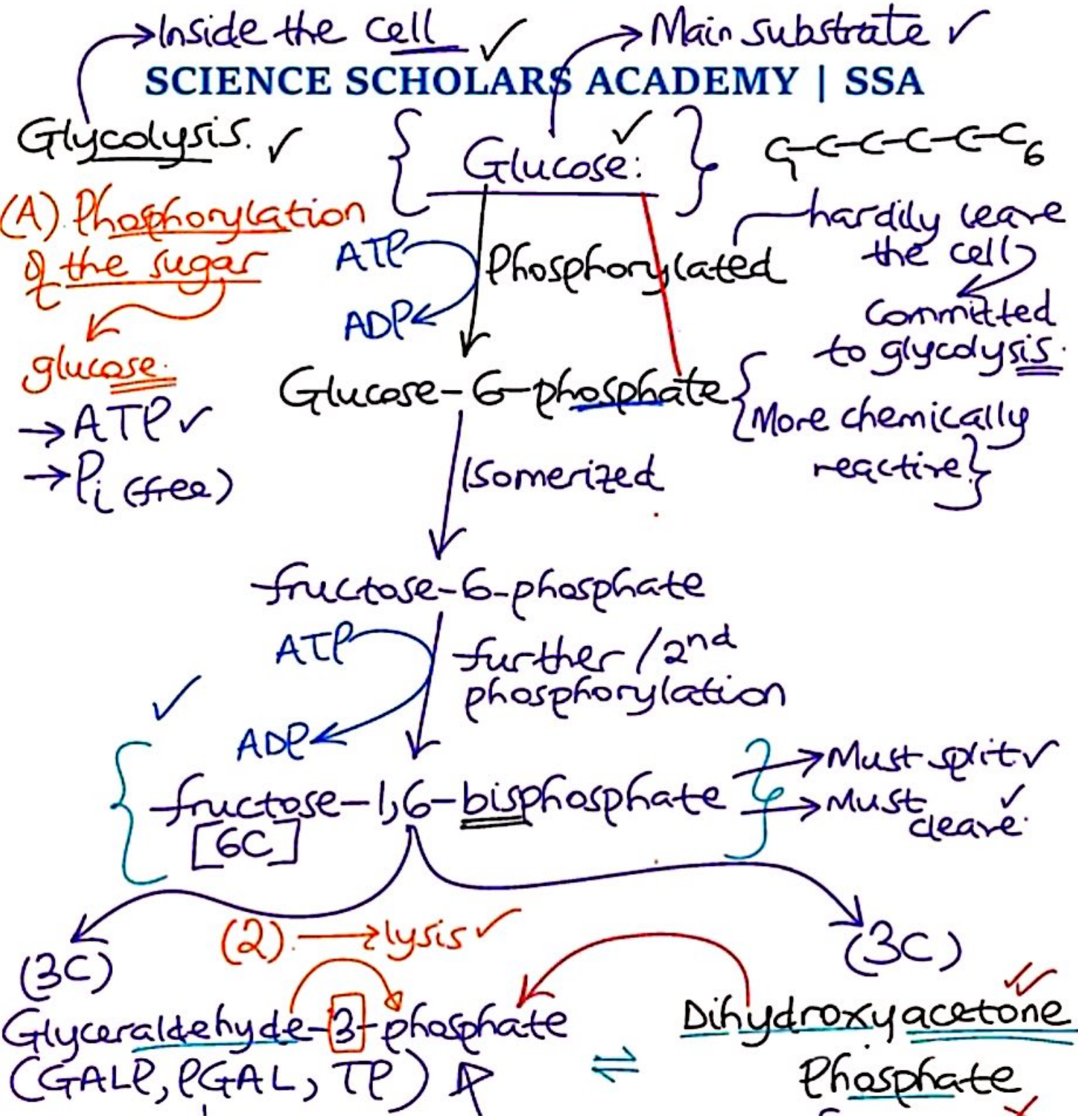

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What has been used & how much? vs What has been formed & how much.

- ATP (2)
- NAD^+ (2)
- ADP (4)

- ADP (2)
- NADH + H^+ (2)
- ATP (4)

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Net 2ATP formed & 2ADP used ✓

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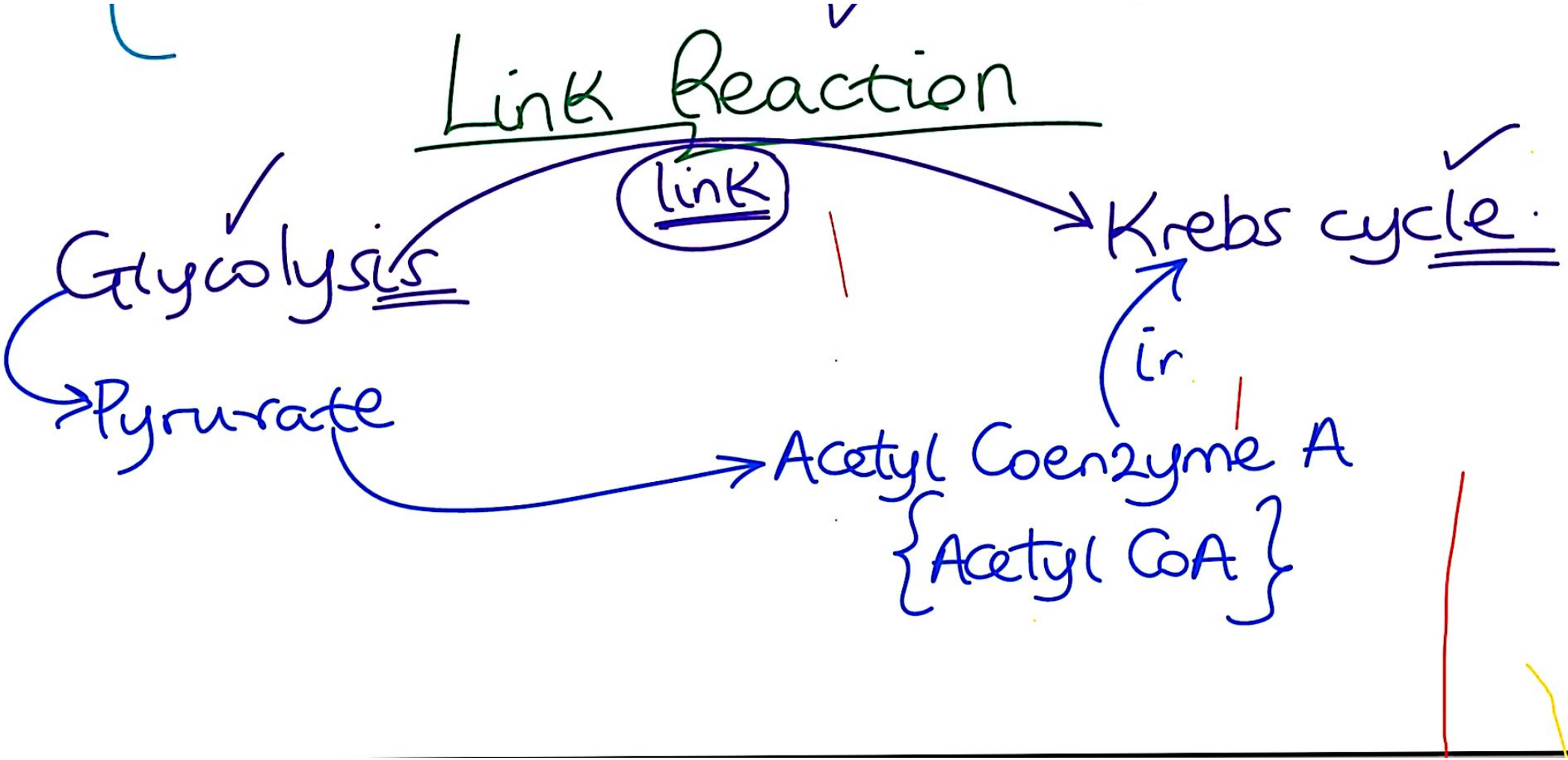

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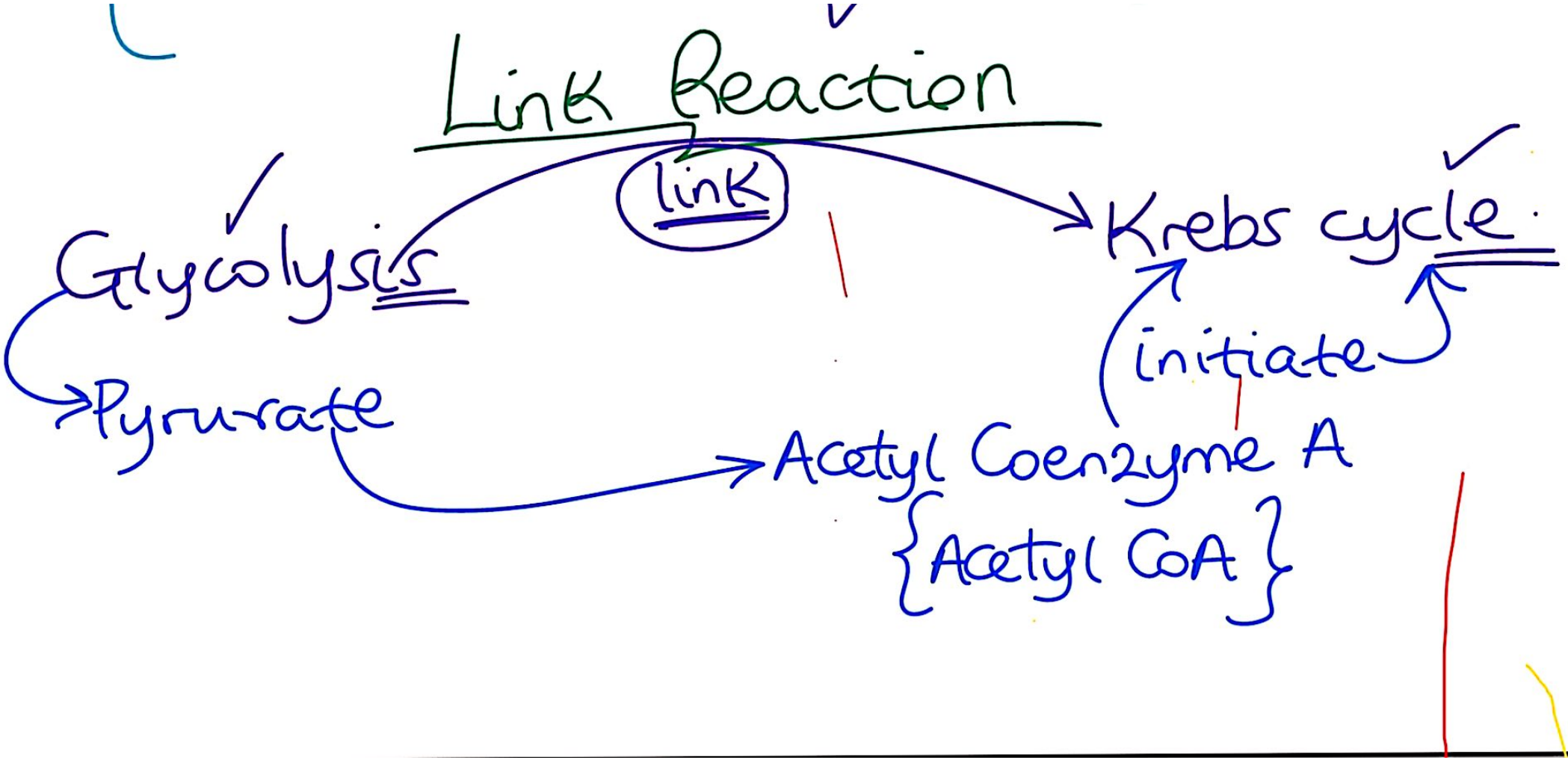

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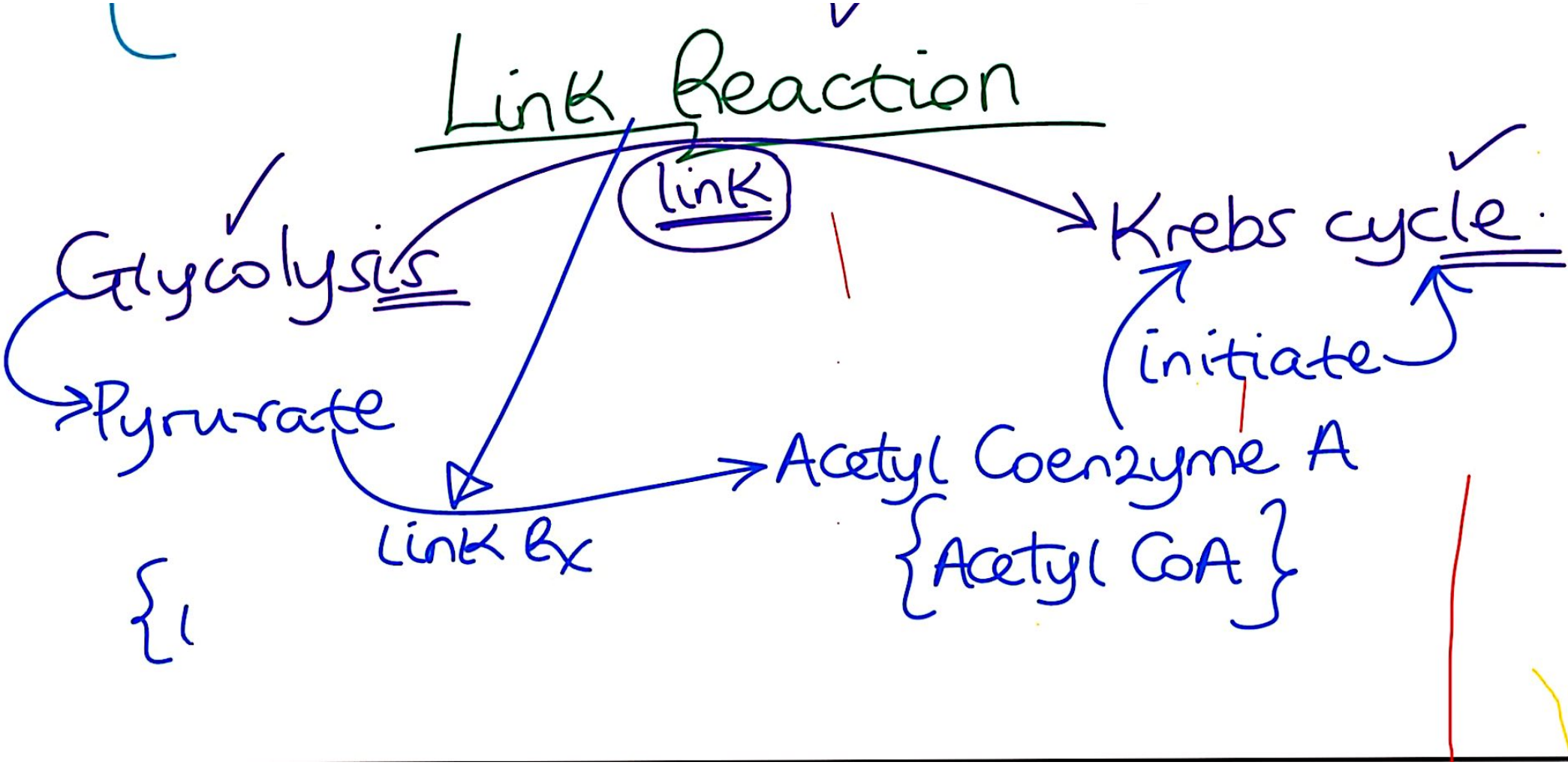

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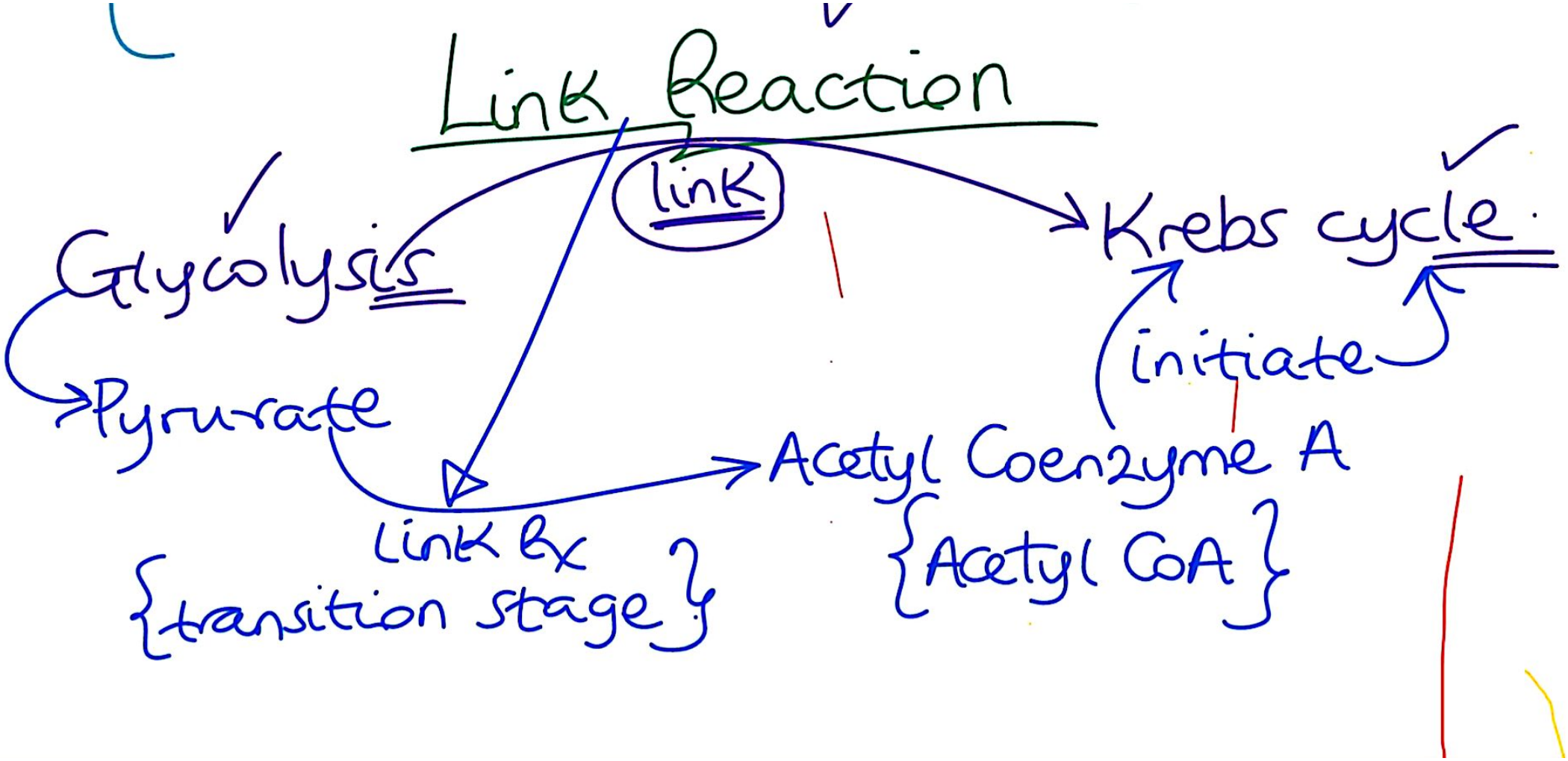

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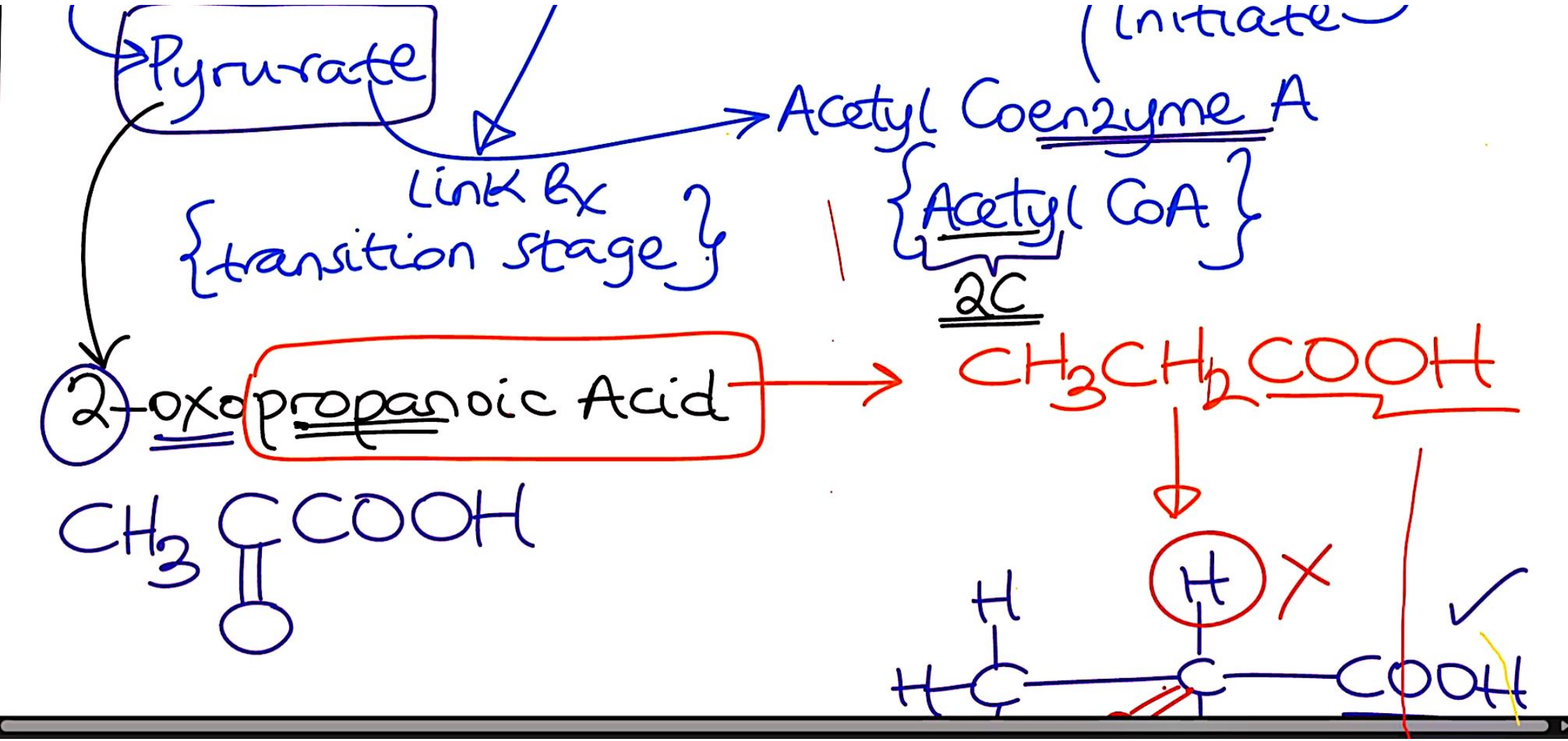
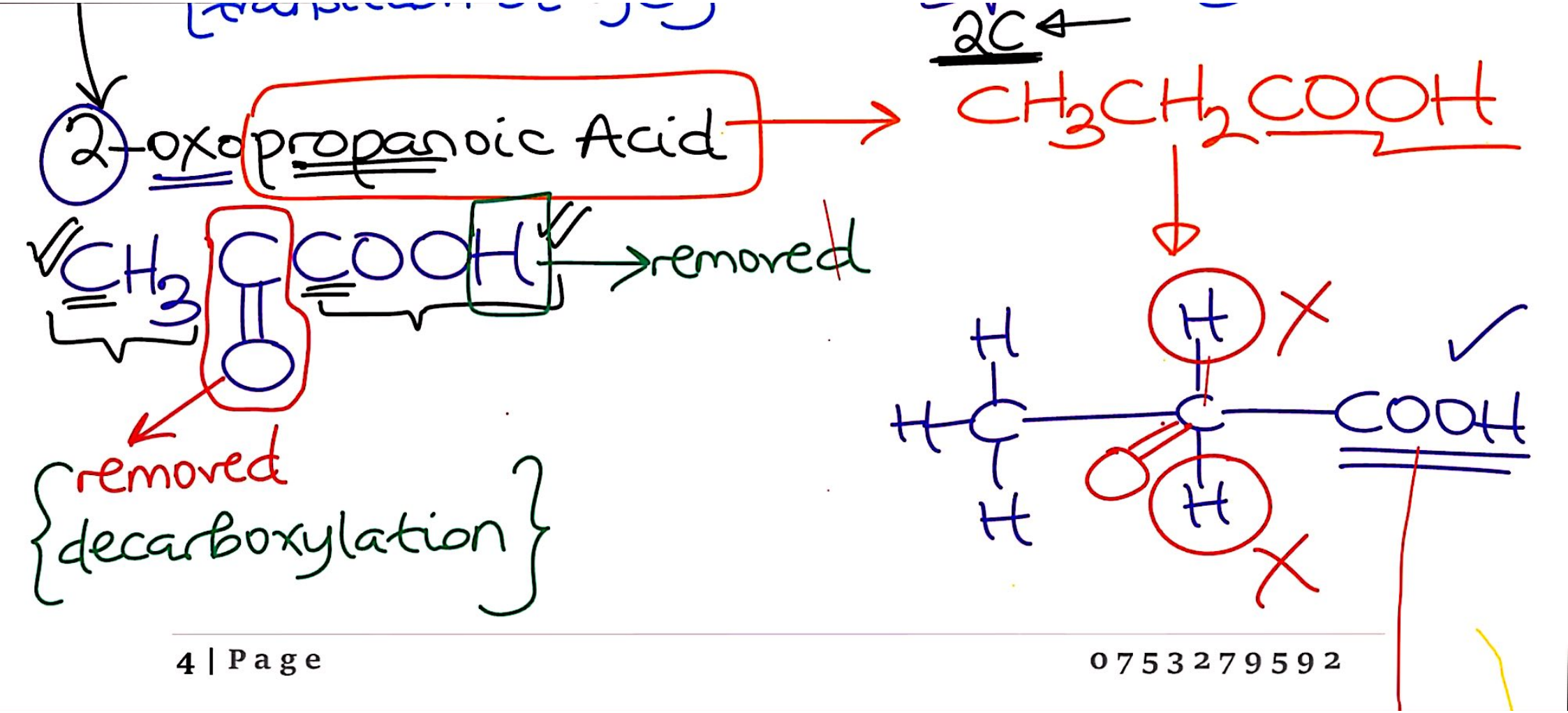

Pyruvate
Link Rx
{transition stage}
Acetyl Coenzyme A
{Acetyl CoA}
2C
2-oxopropanoic Acid
CH3CH2COOH
CH3 C COOH
H
X
COOH



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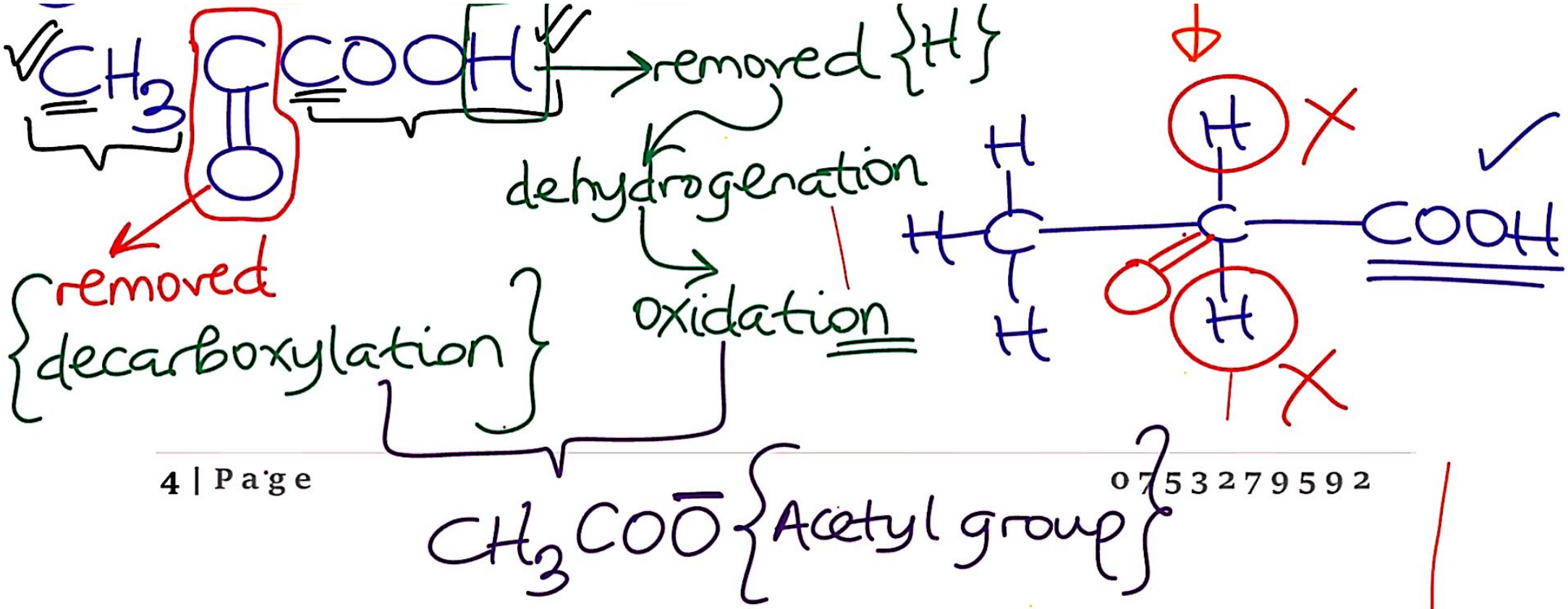

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CH_3COO^- {Acetyl group}

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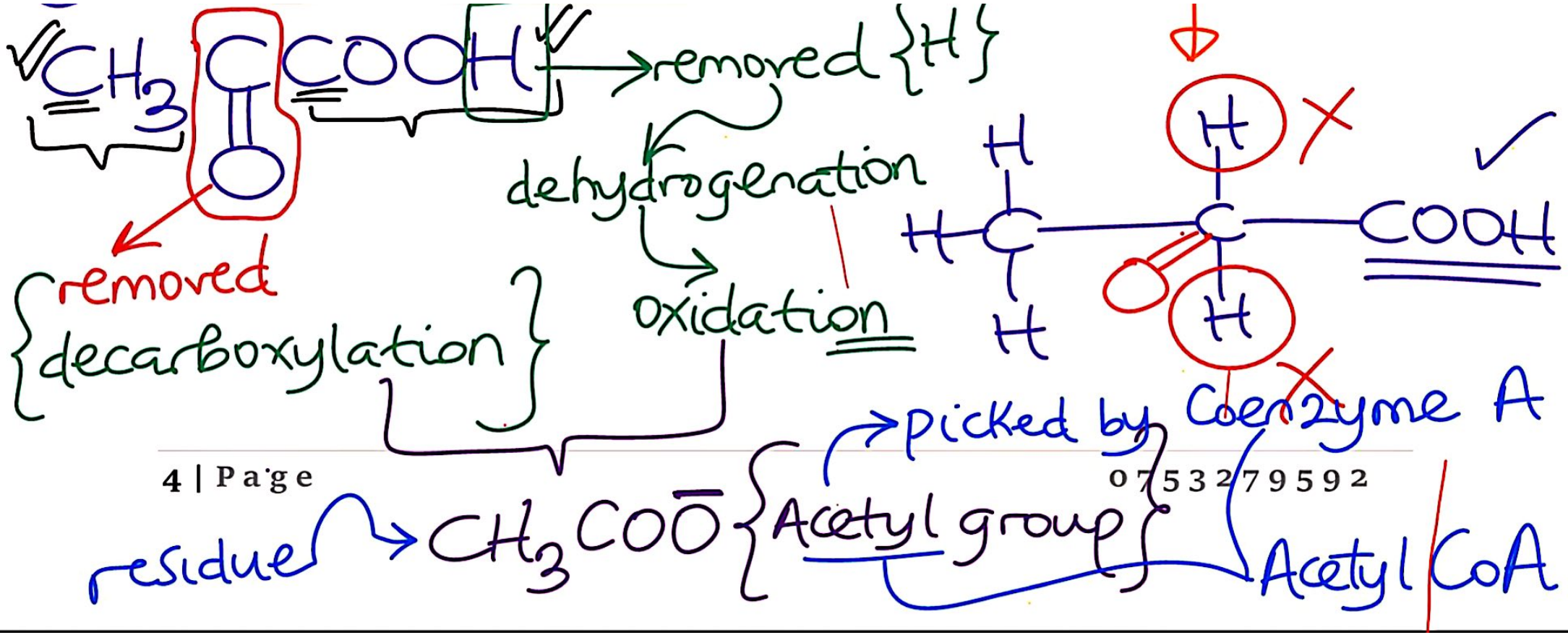

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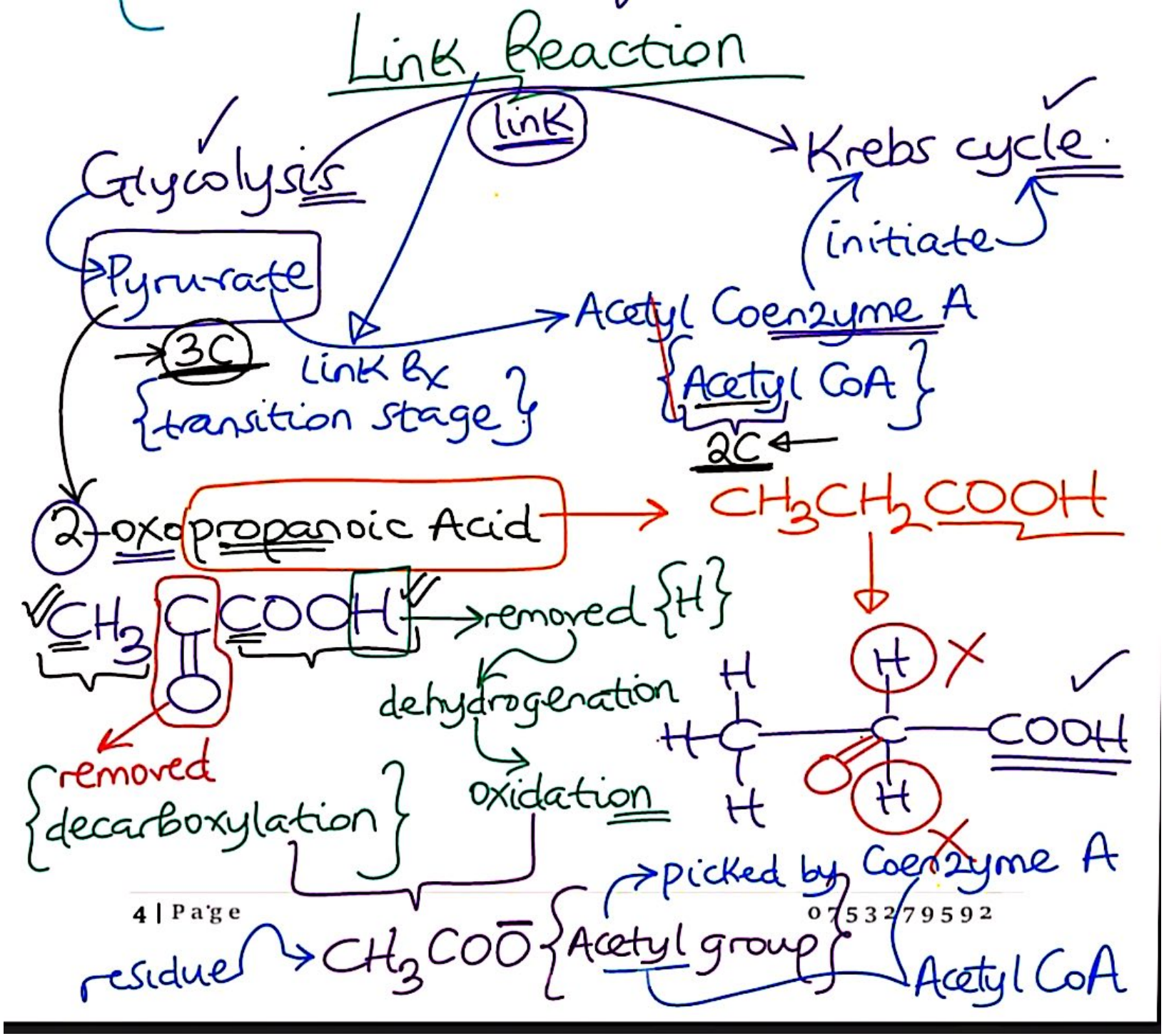

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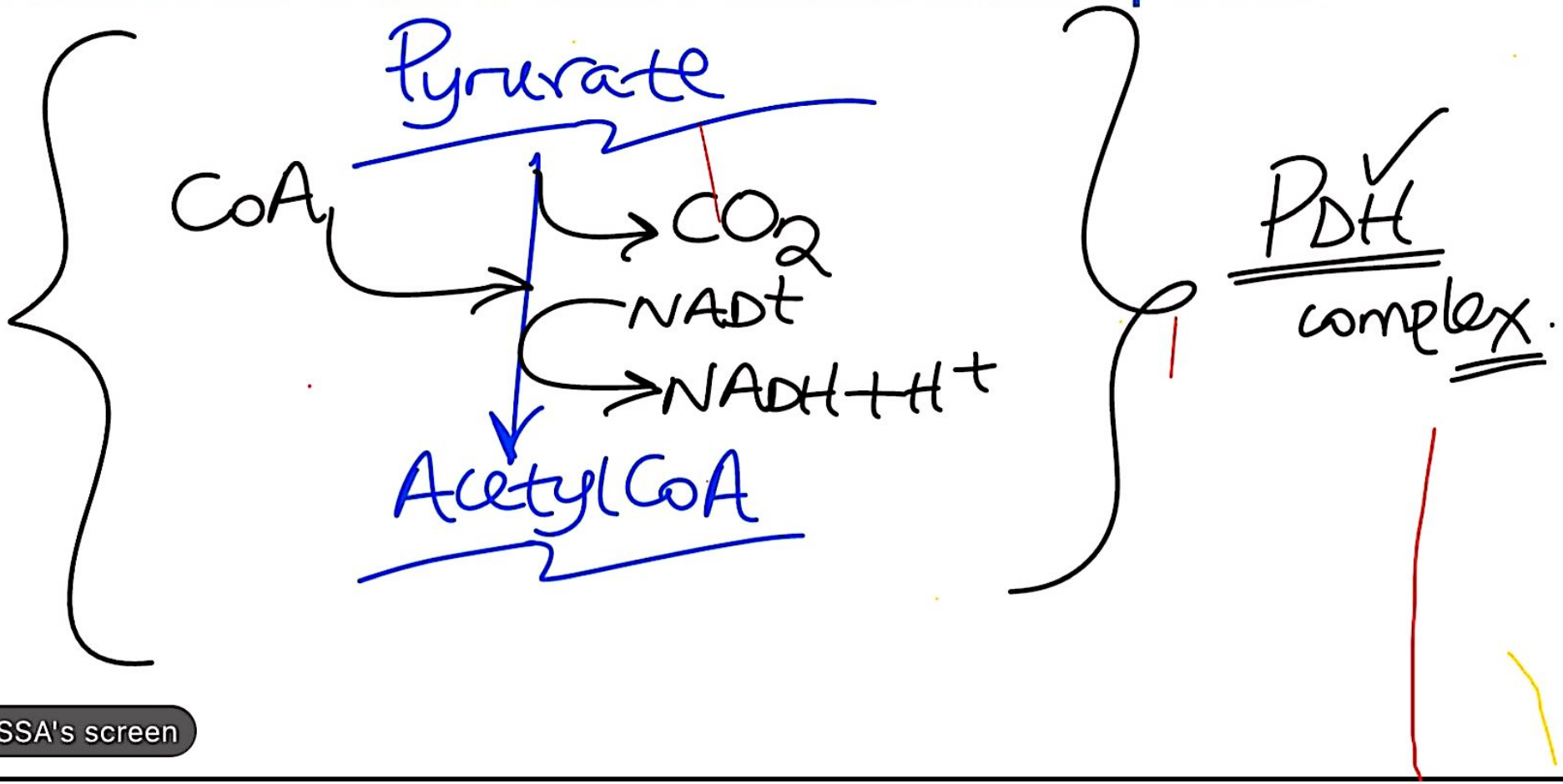

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