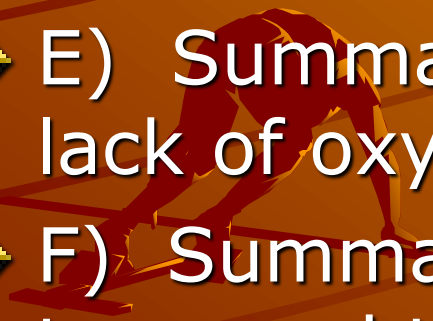
Cellular Respiration

Chapter 9

Pages 220-232

Objectives: Students will

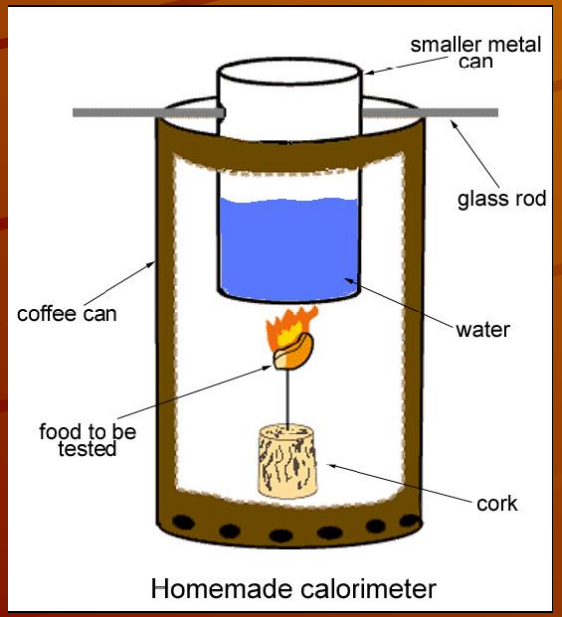
- A) Define calorie
- B) Relate glucose to ATP
- C) Define respiration and write the chemical formula
- D) Summarize the location, reactants and products of the three stages of respiration
- E) Summarize what happens when there is a lack of oxygen
- F) Summarize how energy is used in the short term and the long term
- G) Compare respiration to PSN



A) Define calorie

Why do we eat?

- Raw materials for cell growth
- Energy



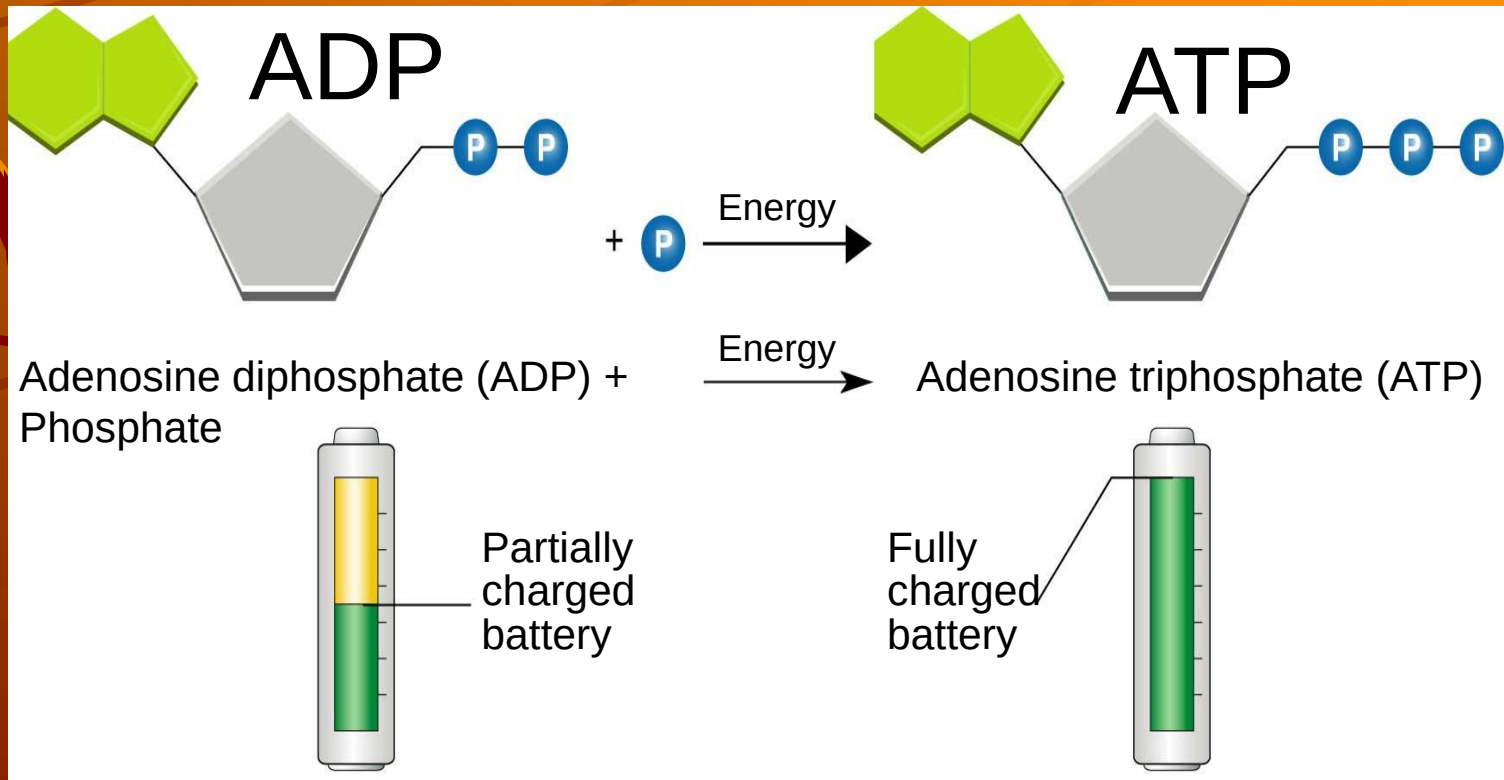
Homemade calorimeter

What represents energy in food?

- Calorie = unit of energy in food, measured as heat
- Calorimeter = determines calories in food

B) Relate glucose to ATP

- Glucose = food energy source
- ATP = chemical energy our cells use
- Glucose becomes ATP = respiration



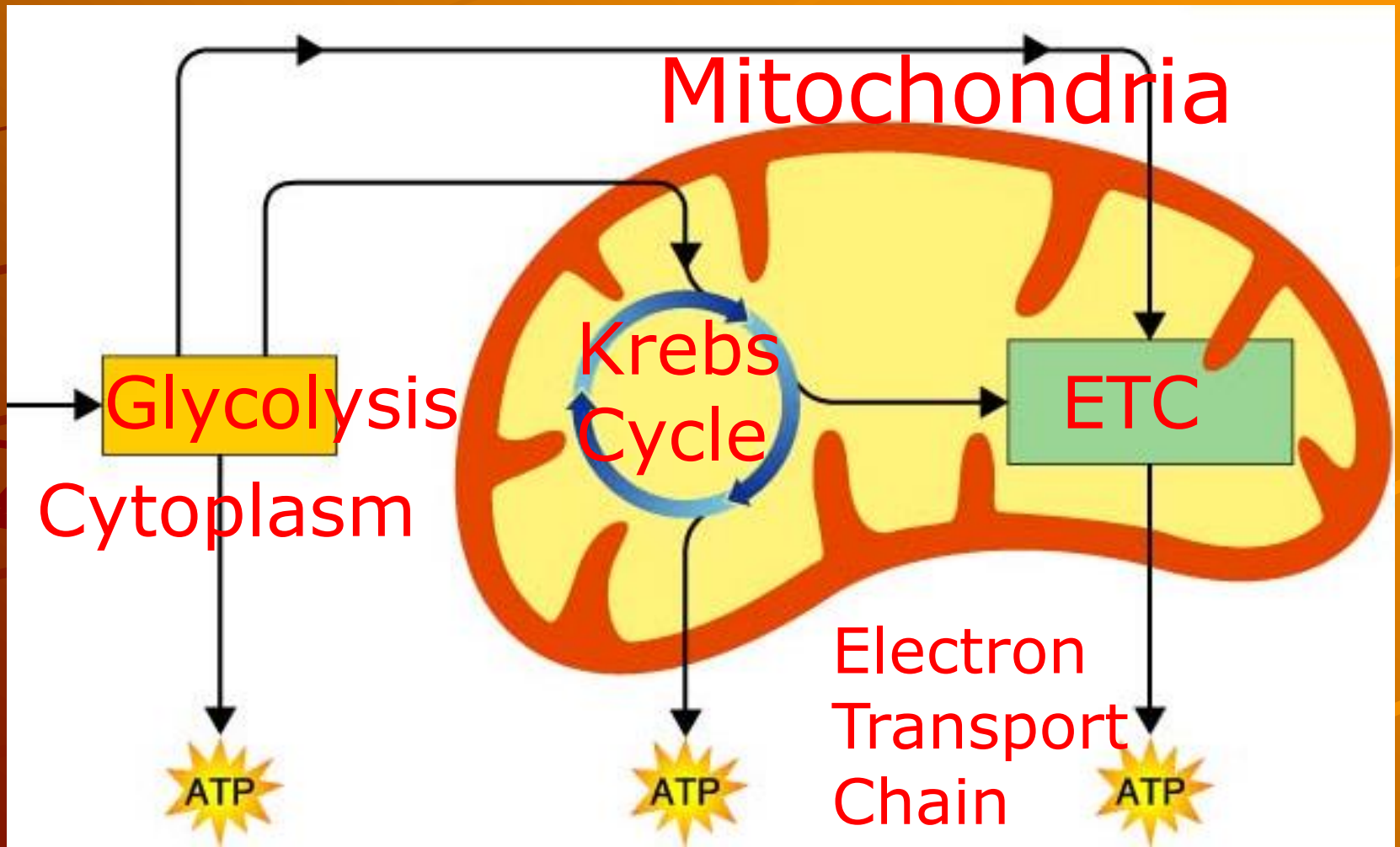
C) Define respiration and write the chemical formula

Cellular respiration

- Releases energy by breaking down glucose in the presence of oxygen
- Gradual process, takes time
- $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_20 + 36$ ATP
- Sugar + 6 oxygen → 6 Carbon Dioxide + 6 Waters + Energy

D) Summarize the **location**, reactants and products of the three stages of respiration

Girls Kick Every Thug's Crack

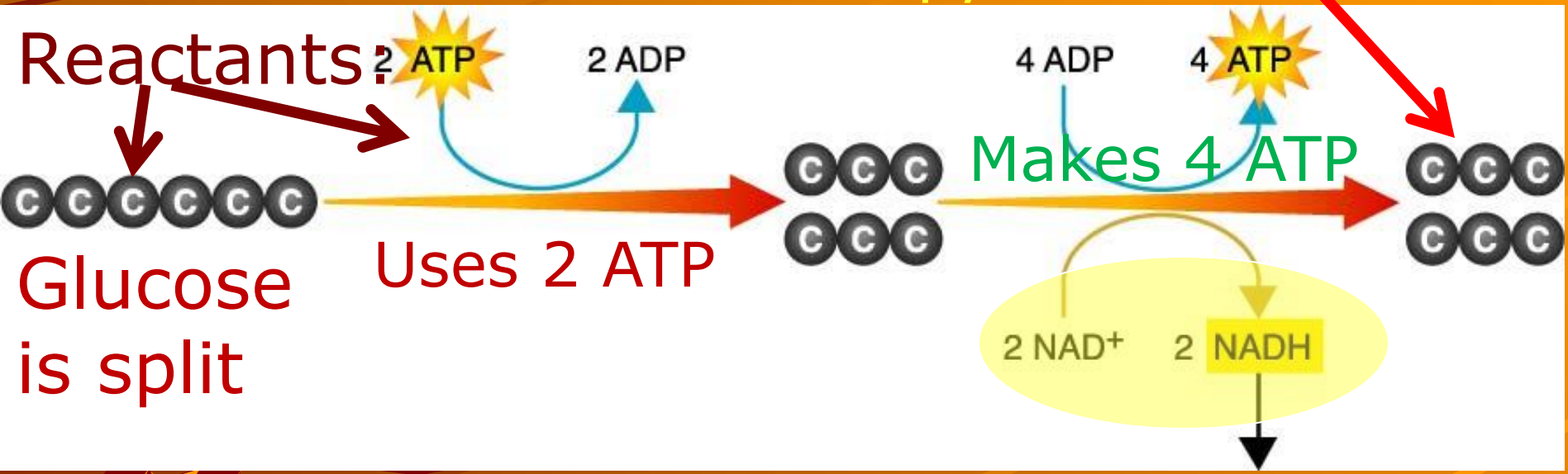


D) Summarize the location, reactants and products of the three stages of respiration

Where?
Cytoplasm

Glycolysis

Produces 2 molecules of pyruvic acid



Products (3 of them):

1. 2 ATP = Net Profit
2. 2 NADH = ETC energy, e- carrier
3. 2 Pyruvic Acids

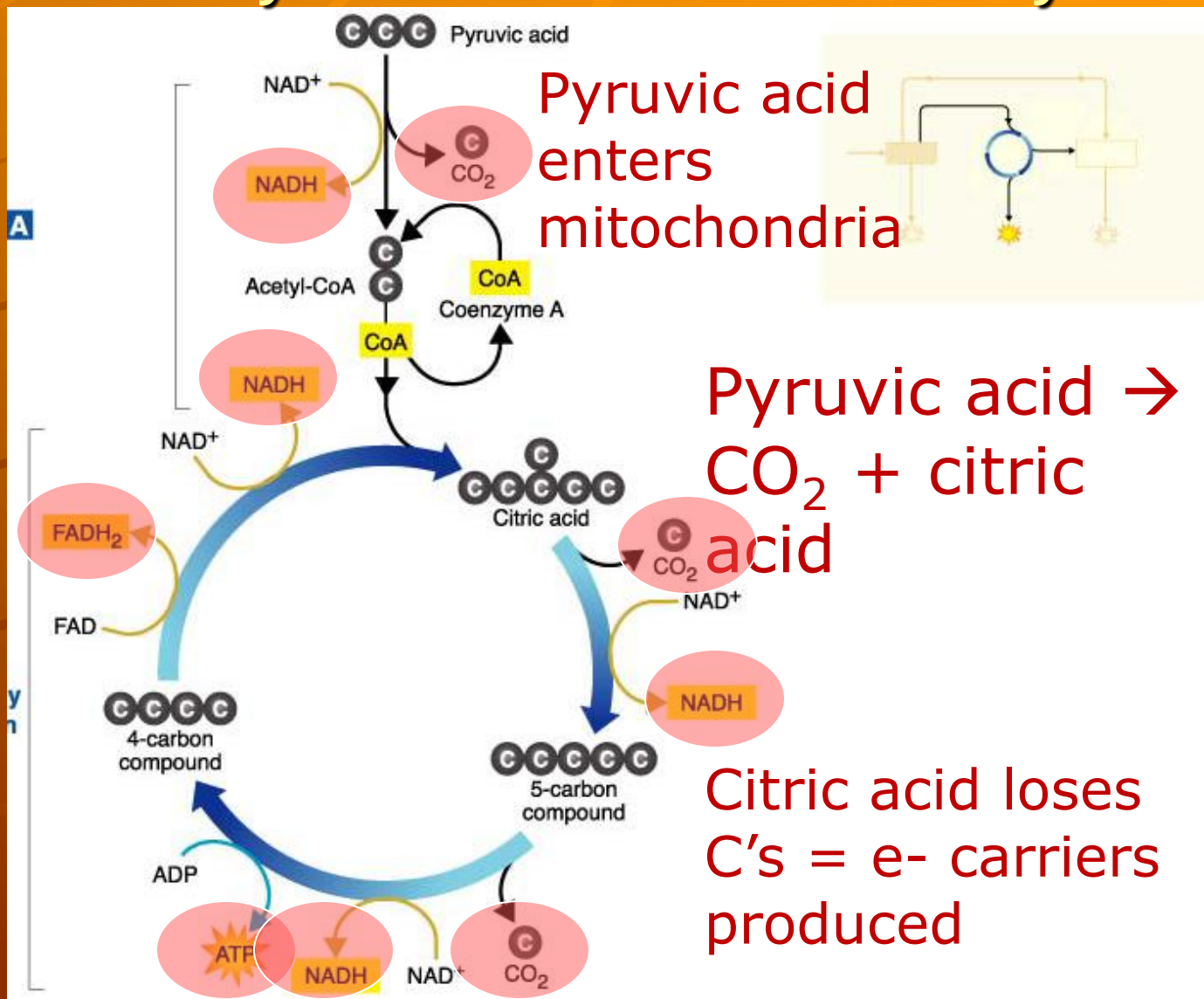
D) Summarize the location, reactants and products of the three stages of respiration

Krebs Cycle : AKA Citric Acid Cycle

Where?
Mitochondria

Reactants?
Pyruvic Acid

Products:
CO_2
1 ATP
4 NADH = e- carrier
1 $FADH_2$ = e- carrier



Pyruvic acid enters mitochondria

Pyruvic acid → CO_2 + citric acid

Citric acid loses C's = e- carriers produced

D) Summarize the location, reactants and products of the three stages of respiration

Electron Transport Chain

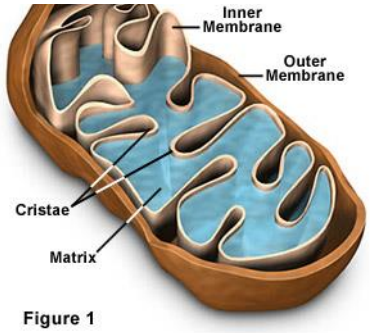


Figure 1

Where?

Mitochondria

Reactants?

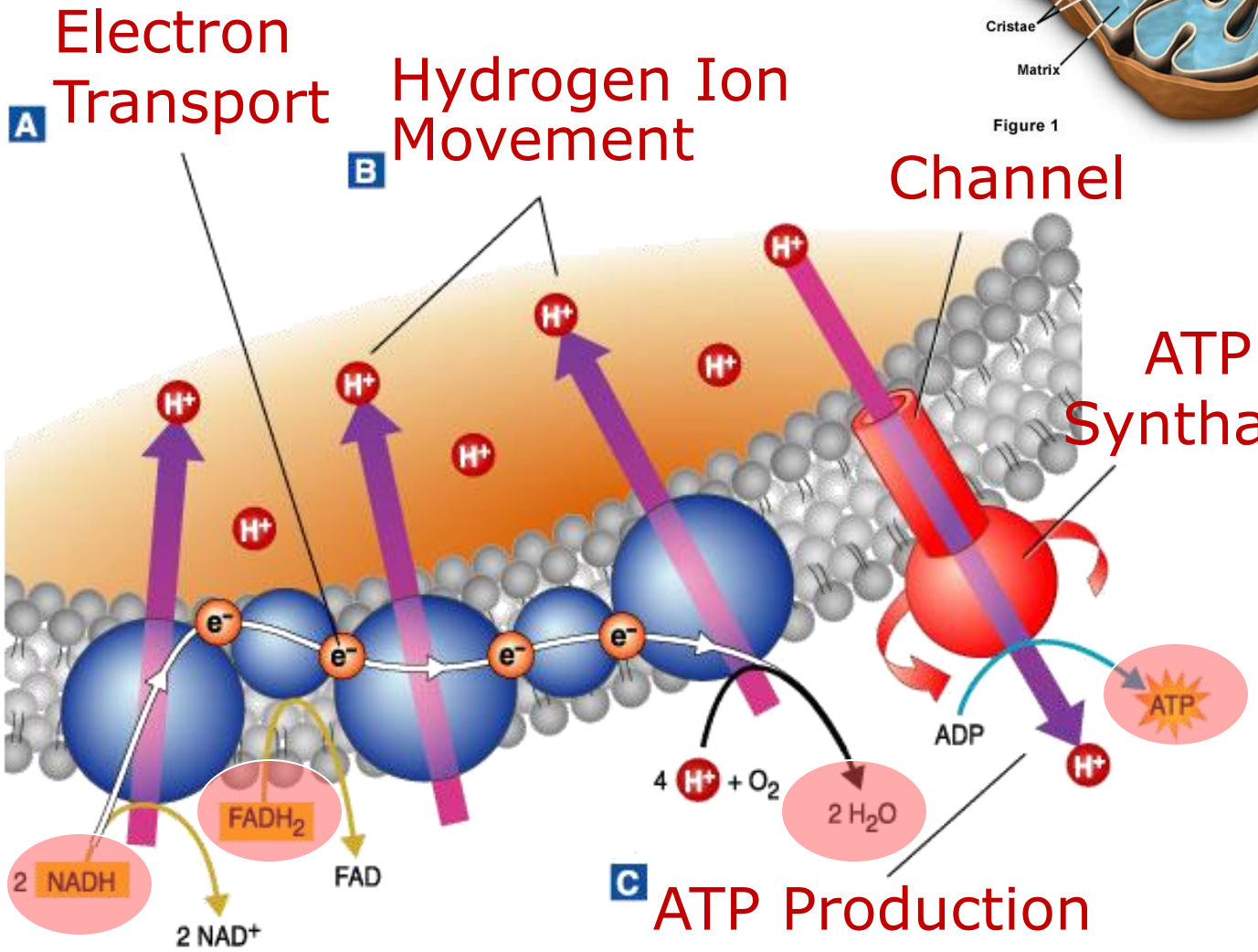
2 NADH

$FADH_2$

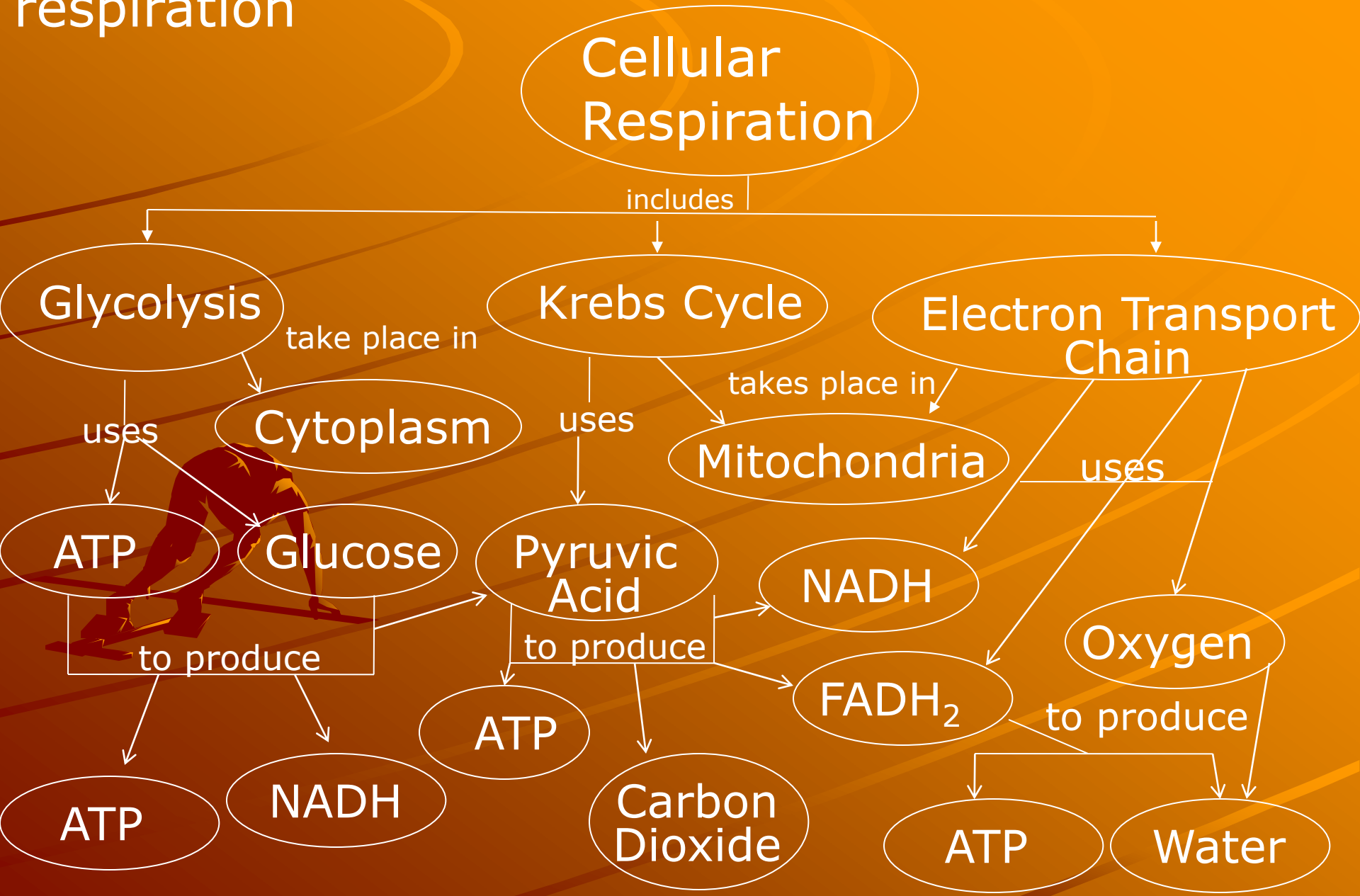
Products?

H_2O

ATP

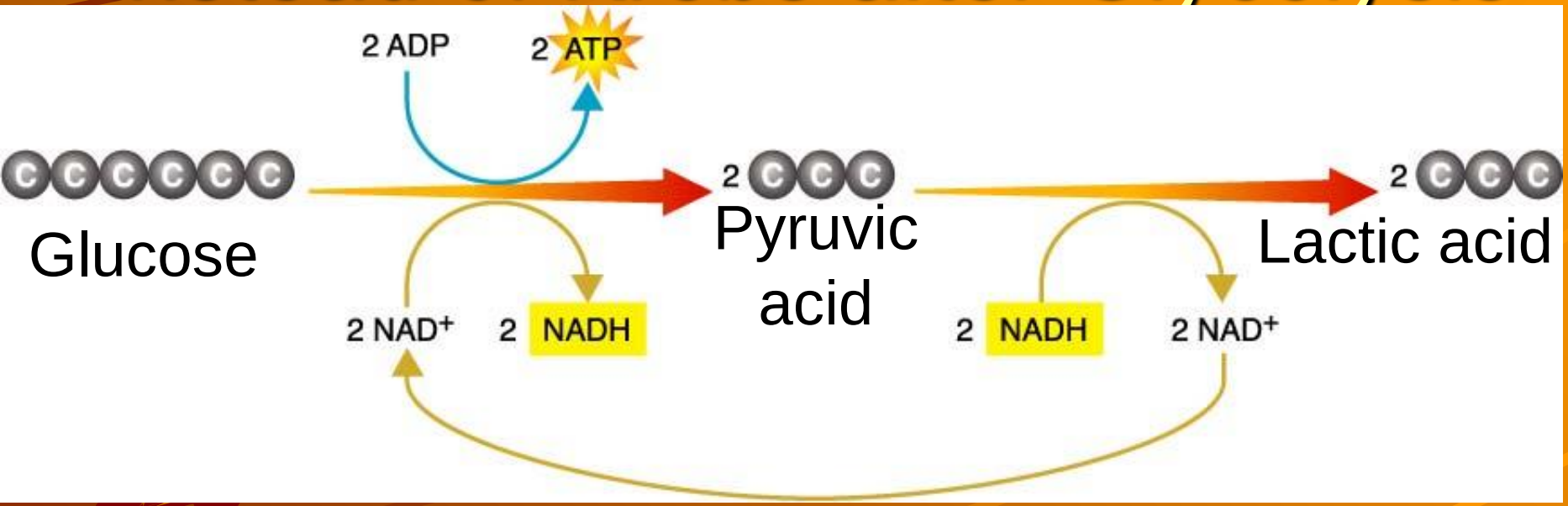


C) Summarize the three stages of cellular respiration



E) Summarize what happens when there is a lack of oxygen

Lactic Acid Fermentation = instead of Krebs after Glycolysis



Products:

1. 2 Lactic Acids
2. 2 NAD + = e- carrier

Where?
Muscle Cells = Sore muscles

F) Summarize how energy is used in the short term and the long term

- Quick Energy = intense exercise
- First few seconds = ATP
- After this, lactic acid fermentation = ~ 90 s.

- Long Term Energy
- Cellular respiration (15-20 min.)
- After this, stored molecules (fat) is burned

D) Compare respiration and PSN

PHOTOSYNTHESIS

Make glucose

Give off O_2

Use sunlight as energy

Use CO_2

RESPIRATION

Break apart glucose

Use oxygen

Make cell energy

Give off CO_2

D) Compare respiration and PSN

Equation Comparison:

Photosynthesis

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

Respiration

$C_6H_{12}O_6 + 6O_2 \rightarrow 36\ ATP + 6CO_2 + 6H_2O$

Reactants for PSN = Products of Resp.

Reactants of Resp. = Products of PSN

Answer the following questions from the video or your notes:

1. What is the formula of respiration?
2. List the three steps of respiration
3. How much total ATP is produced from respiration?
4. Why do gym trainers encourage individuals to work out for a minimum of 20 minutes?