# Cell Energetics - BIG IDEAS

1. organisms need energy to do cell work.
2. Photosynthesis converts the sun's energy into the chemical potential energy of food.
3. Cell respiration converts the chemical potential energy stored in food to the chemical potential energy stored in ATP.
4. ATP supplies the energy to do cell work.

## Photosynthesis

- light energy converted to chemical energy by autotrophs to create glucose
- occurs in chloroplasts

$$6CO_2 + 6H_2O \xrightarrow{\text{light energy}} C_6H_{12}O_6 + 6O_2$$

carbon dioxide — water — glucose — oxygen

3 steps

① Light absorption

- energy from light required to start photo.
- pigments (chlorophyll) absorb photons
- chlorophyll reflects green & yellow wavelengths
- " absorbs red & blue

($H_2O$ is split here, releasing H & O. Some O will be released as $O_2$ gas)

② Light energy is converted to chemical energy

- temporary storage molecules are created (ATP & NADPH)
- the energy in these will be used in the next step

## ③ Manufacturing of carbohydrates

- use energy stored in ATP & NADPH
- $CO_2$ is transferred into glucose $C_6H_{12}O_6$
- this is called carbon fixation

* organisms (autotrophs) gain mass through the production of carbohydrates

## Rate of photosynthesis

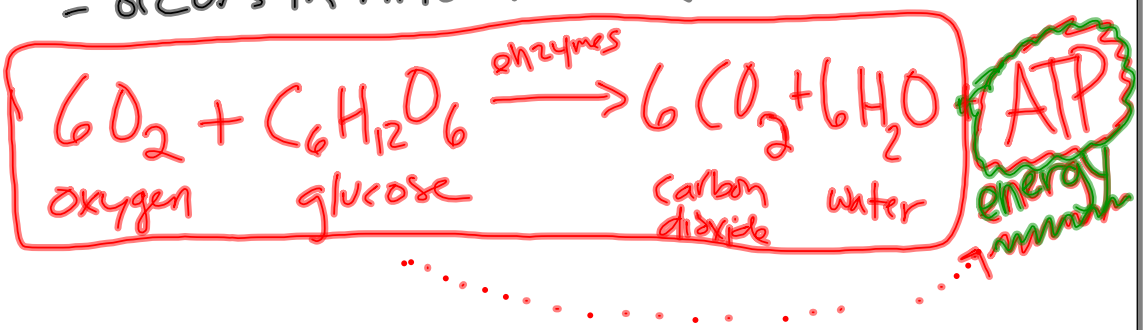
light intensity

$CO_2$ levels

temperature

# Cellular Respiration

- The process in which cells make ATP by breaking down organic compounds (glucose)
- Happens in all organisms (autotrophs and heterotrophs)
- occurs in mitochondria



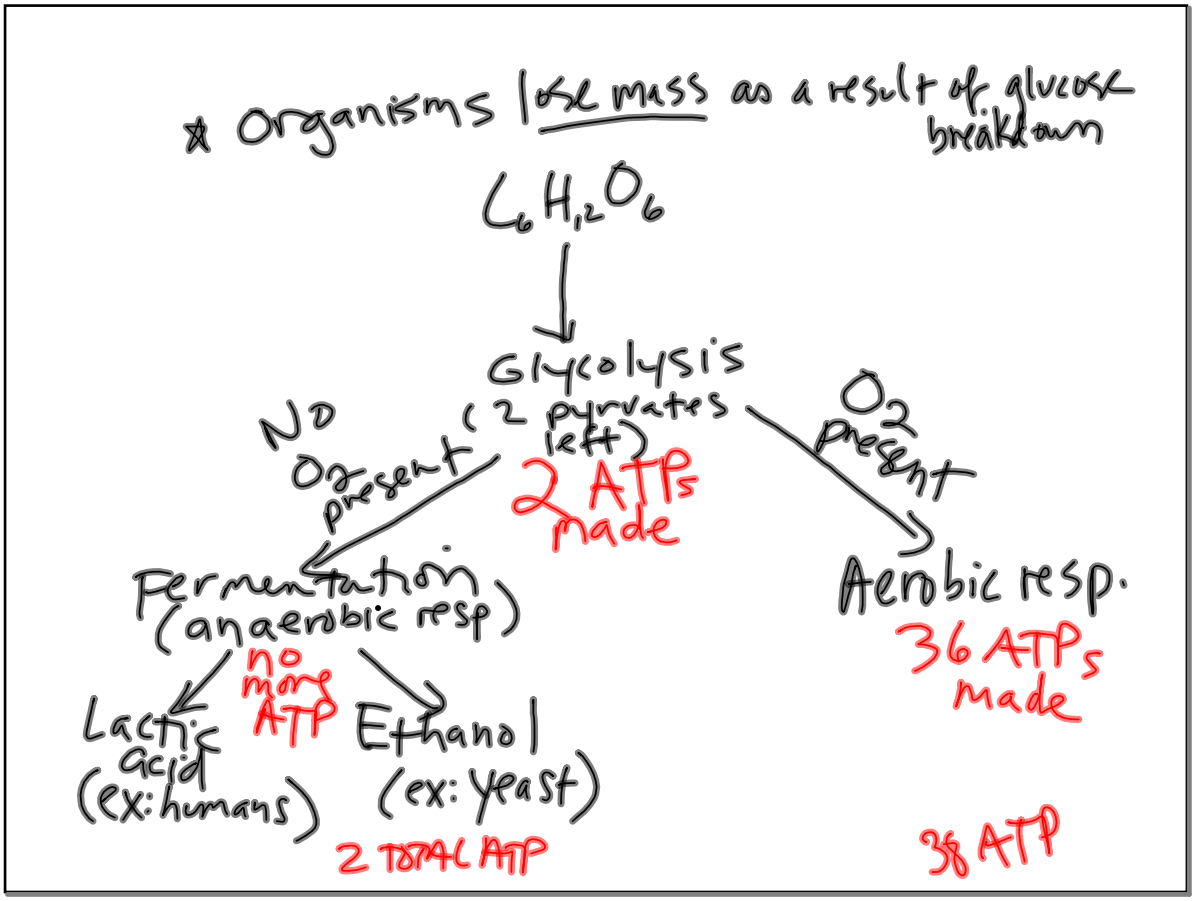

overview

① Glycolysis - glucose broken down into pyruvic acid (2 ATP's are made from the energy released here)

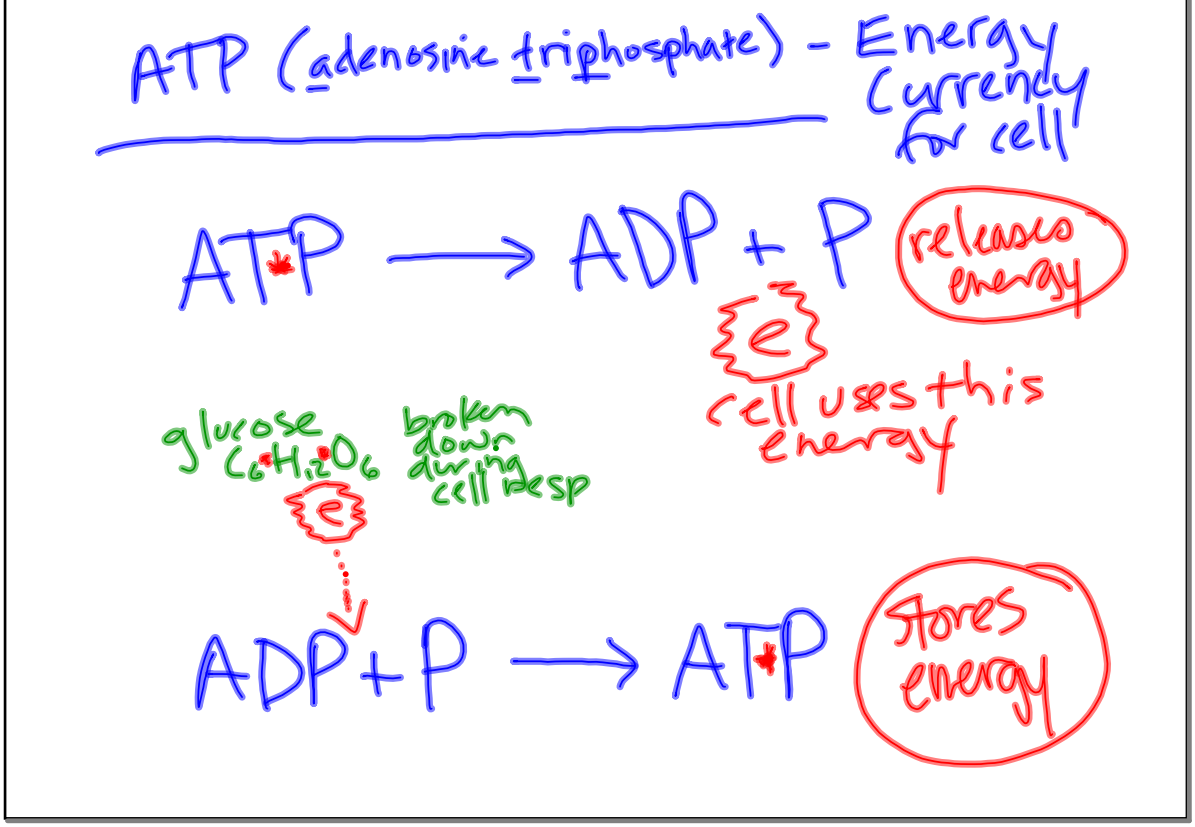
② a. If no $O_2$, pyruvic acid turns into lactic acid (animal) or ethanol (yeast).
anaerobic respiration / fermentation

b. If $O_2$ is present, pyruvic acid enters aerobic respiration (next step).

③ Aerobic respiration has two stages which makes 36 ATP's.




http://www.youtube.com/watch?v=TgJt4KgKQJI



aerobic respiration

http://www.youtube.com/watch?v=PQMsJSme780&feature=related

anaerobic respiration

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