What is the chemical equation for cellular respiration? Photosynthesis? What do you notice?

Cellular Respiration : C6H12­O6 + 602 🡪 6H2­O + 6CO2 + 29 ATP

Photosynthesis :6CO2 + 6H2O + light energy 🡪 C6H12O6 + 6O2

They are the reverse of each other except for the energy produced. Important to note that cell respiration is exergonic and photosynthesis is endergonic.

What is the main purpose for cellular respiration? How many ATP are produced?

This is the transfer of energy from glucose to ATP. 29 ATP

What type of metabolism is photosynthesis? What type of metabolism is cellular respiration?

Photosynthesis=anabolic; cell respiration=catabolic

What are the three phases of cellular respiration? What happens in each phase? What is produced in each phase? What is used in each phase? Where does each phase occur?

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| --- | --- | --- | --- | --- | --- |
| Step | Where? | An/aerobic | Consumes? | Produced? | Equation |
| Glycolysis | cytosol | Anaerobic | Glucose  2 ATP | 2 pyruvate  2 NADH  4 ATP (net of 2) | glucose+ 2ATP 2 NAD+🡪 pyruvate + 2 NADH + 4 ATP |
| Pyruvate🡪 acetyl-coA | cytosol | Aerobic | pyruvate | Acetyl-coA  CO2  NADH | Pyruvate + NAD+🡪Acetyl-coA + NADH+ CO2 |
| Citric acid cycle | Mitochondrial matrix | Aerobic | Acetyl-coA | 3 NADH  1 FADH2  1 ATP  2 CO2 | Acetyl-coA + 4C intermediate + 3NAD+ + FAD + ADP + Pi 🡪 4C intermediate + 3 NADH + FADH2 + ATP + 2 CO2 |
| Electron transport chain | Inner mitochondrial membrane | aerobic | 10 NADH  2 FADH2  1/2 O2 | H2O  ATP | MAGIC!! (it goes through stuff you don't need to know. Electrons are released and pump through. Go through ATP synthase to produce energy) |

\*\* Remember, you produce 2 pyruvate per glucose. Everything after glycolysis gets doubled. Highlight is a change from what I said in SI. I made a mistake in my calculation.

What do NADH and FADH2 do?

They carry electrons to the electron transport chain.

What is chemiosmosis?

Energy stored in the form of hydrogen ion gradient across membrane drive cellular work (ATP synthesis)

What two types of respiration exist? Describe both

1. aerobic-occurs in presence of oxygen. Produce a lot of ATP

2. anaerobic- occurs not in presence of oxygen. Glycolysis and fermentation. Regenerates NAD+ for glycolysis to continue occurring.

FERMENTATION: basically, takes pyruvate and reduces it so that NADH can be oxidized to NAD+ for glycolysis to continue to occur.

At which steps do proteins, carbohydrates and lipids enter into cellular respiration?

Proteins: enter as pyruvate, intermediates of citric acid cycle, and acetyl-CoA (depends on amino acid)

Fats- glycerol enters in glycolysis. Fatty acids tails enter as acetyl-CoA. (break apart into 2 Carbon chunks)

Carbohydrates-generally enter at the beginning.

Where does photosynthesis occur?

Photosynthesis occurs in cells with chloroplasts.

Photosynthesis occurs within the chloroplast.