Knowledge

1. Mitochondria
2. All the time
3. Glucose + oxygen → carbon dioxide + water
4. Glycogen is a polymer of glucose – a way of storing glucose so that it can be broken down when needed
5. When it is light
6. Carbon dioxide + water → glucose + oxygen
7. Temperature, light intensity, carbon dioxide concentration
8. The factor that is in the shortest supply for photosynthesis and is therefore holding the rate up
9. Respiration without the use of oxygen

10.

	Aerobic	Anaerobic
Use of oxygen	Yes	No
Waste products	Carbon dioxide and water	Lactic acid
Amount of energy released	lots	less

11. Metabolism is the sum of all the chemical reactions in an organism

12. glucose → ethanol + carbon dioxide

Application

1. Oxygen and glucose enter the cells by diffusion from the blood – from an area of high concentration (the blood) to low concentration (the cells)
2. During exercise the breathing is faster and deeper. This is to get more oxygen in as it is needed for more respiration to take place to release more energy needed during exercise. It also removes the additional carbon dioxide being made.
3. Muscle contraction, keeping body temperature steady, making larger molecules from smaller ones.

4a) The rate increases every time the light intensity increases

4b) Increasing the light intensity increases the rate of photosynthesis, up to a maximum of 40 arbitrary units

4c) increase the temperature to 30°C or increase the concentration of carbon dioxide past 0.4%

4d) the cost of the additional heat needed and how much additional growth he will get (ie cost vs benefit)

5. Because high intensity exercise usually relies on anaerobic respiration, which releases much less energy than aerobic, meaning muscles get fatigued.

6. Building up reactions (anabolic) – joining glucose to form starch or glycogen, joining amino acids to make proteins.

Breaking down reactions (catabolic) – breaking down large molecules into smaller ones, e.g breaking glucose down during respiration or breaking down excess amino acids into urea

Higher only

- Inverse square law is

  light intensity = $1/d^2$