Respiration

1. Respiration is a chemical reaction that gives out heat (**exothermic**)
2. All living things respire.
3. Respiration is carried out in all cells continuously.
4. The purpose of respiration is to release energy for organisms to use.
5. Living things need energy for movement, keeping warm and for other chemical reactions to build molecules
6. Aerobic means 'requiring oxygen'
7. The word equation for aerobic respiration is:

Glucose + oxygen → carbon dioxide + water

Respiration and exercise

8. During exercise, cells require a greater rate of respiration to provide more energy for movement
9. Heart rate, breathing rate and breathing volume all increase during exercise to meet the increase demand for the reactants during respiration.

Anaerobic respiration

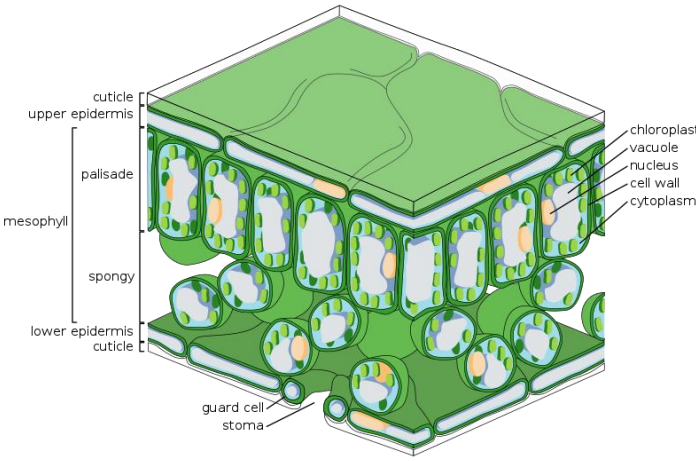
10. Anaerobic means 'without oxygen'
11. Anaerobic respiration takes place without oxygen and releases less energy than aerobic respiration
12. During intense exercise, if there is not enough oxygen then anaerobic respiration takes place
13. Aerobic respiration uses oxygen and releases more energy than anaerobic respiration
14. Anaerobic respiration in muscle cells causes a build-up of lactic acid which results in an oxygen debt
15. After a long period of intense exercise, muscles become fatigued and cannot contract normally
16. The word equation for anaerobic respiration is:
    Glucose → lactic acid (in animal muscles)
17. Anaerobic respiration in yeast cells is called fermentation and is used to make bread and alcoholic drinks
18. The word equation for fermentation is:
    Glucose → ethanol + carbon dioxide (in yeast)

Photosynthesis

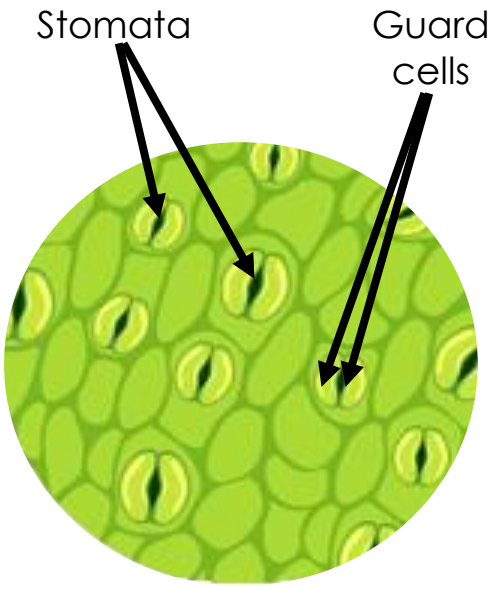
19. Plants and algae make their own food using a process called photosynthesis.
20. Almost all life on Earth depends on photosynthetic organisms
21. Light provides the energy needed for photosynthesis
22. Water and carbon dioxide are the reactants required for photosynthesis.
23. Plants make **carbohydrates** in their leaves by photosynthesis and gain mineral nutrients and water from the soil via their roots.
24. The products of photosynthesis are oxygen and glucose.
25. The word equation for photosynthesis is:

carbon dioxide + water → glucose + oxygen

26. Plants use glucose for energy by the process of respiration.
27. Photosynthesis maintains levels of oxygen in the atmosphere.
28. Leaves are the primary site of photosynthesis in plants.
29. Chloroplasts in plant cells contain a green pigment called **chlorophyll** which uses the energy in light for photosynthesis.
30. Leaves have a number of adaptations which allow them to carry out photosynthesis effectively.



31. Plant roots are adapted in order to allow water to be absorbed for photosynthesis.
32. Water leaves the plant via the **stomata** on the underside of leaves.



33. **Epidermis**– thin and transparent to allow more light to pass through leaf to get to chloroplasts
34. **Palisade mesophyll** - site of photosynthesis and contains lots of chloroplasts to absorb max sunlight
35. **Spongy mesophyll** – contains lots of air spaces to increase surface area and allow carbon dioxide and oxygen to diffuse easily
36. **Stomata** – holes in the leaf to allow carbon dioxide to diffuse in and oxygen to diffuse out
37. **Guard cells** – to open and close the stomata to let substances in and out and to close it in order to prevent water loss
38. Plants require light, carbon dioxide and water for photosynthesis.
39. The xylem and phloem are **transport vessels** that arrive into the leaf carrying useful substances.
40. **Xylem** transport **water** from **roots to leaves** and the wall is strengthened with **cellulose** and **lignin**
41. **Phloem** transport **water and glucose** in a **two way system**.
42. Some plants are **non-photosynthetic**, which means they cannot carry out photosynthesis
43. Non-photosynthetic plants tend to be **parasitic**, growing in/on/around other plants so they can obtain the food they need. For example, the Indian pipe plant eats mushrooms.