

## **B2: Cells and control: Fact sheet**

1. Mitosis is a type of cell division.
2. Before mitosis occurs interphase (when sub cellular structures are replicated) and DNA replication occur.
3. The stages of mitosis in the correct order are Prophase, metaphase, anaphase, telophase and cytokinesis.
4. Mitosis is used for growth and repair.
5. Mitosis produces two genetically identical daughter cells each with a genetically identical diploid nucleus. A diploid nucleus has two sets of parental chromosomes, in humans this means that all the cells produced by mitosis have 46 chromosomes.
6. The only reason that a body cell produced by mitosis would be different to the others is if there has been a mutation in the genetic code – the genome. This is likely to have occurred as a result of an error in DNA replication.
7. Mutations in DNA replication can be due to the deletion, substitution or insertion of a different nucleotide base within the DNA sequence during the process of transcription.
8. Cancer tumours occur when mitosis encounters a problem, mutations occur and the process of mitosis occurs too rapidly and too frequently. This results in a clump of abnormal cells, which may cause secondary harm to the body – a tumour.
9. Asexual reproduction is entirely based upon mitosis. Some organisms such as bacteria will almost entirely reproduce using this method instead of sexual reproduction.
10. Some organisms such as the strawberry plant can reproduce using both sexual and asexual techniques.
11. Asexual reproduction produces genetic clones.
12. Mitosis is a form of asexual reproduction that occurs at a cellular level.
13. Human growth is monitored on percentile charts. Children should ideally be within the 25<sup>th</sup> to 75<sup>th</sup> percentiles.
14. If growth crosses more than one percentile curve on the graph this is a warning sign to medical professionals and would likely start further investigations.
15. Cell differentiation is the process by which an unspecialised stem cell can change and become a differentiated or specialised cell.
16. During embryonic development of an animal embryonic stems have the ability to differentiate into any type of cell. Modern cell therapies look to utilise this power to create laboratory grown tissues and even organs, which can be transplanted into patients.
17. Once the embryo has differentiated into all the required specialised cells no further differentiation can occur – hence if you lose an arm you can't re-grow a new one.
18. There however are pockets of adult stem cells, in the skin, brain and bone marrow that can differentiate into a limited few types of specialised cells.

19. Plants have a different system. They have the ability to differentiate into any of their cell types at any time at special locations behind the tips of roots and shoots called meristems.
20. Plant meristems contain a zone of cell division followed by a zone of elongation and then a zone of cell differentiation. This system allows plants to re-grow from cuttings when particular hormone (powders) are supplied.
21. The nervous system is comprised of the brain, spinal cord and the nerves (bundles of individual neurones).
22. The transmission of an electrical impulse along nerves is known as neurotransmission.
23. Sense organs in the body contain receptor cells that detect external stimuli. The receptors then generate an electrical impulse that travels down a neurone.
24. A neurone consists of a cell body, dendrites, axon terminals, axon and a myelin sheath.
25. The Reflex arc is an involuntary response to a potentially dangerous external stimulus. It is designed to be fast and does not involve processing of information by the CNS.
26. The sequence of neurones in a reflex arc is: (stimulus), receptor, sensory neurone, relay neurone, motor neurone, effector (and response).
27. The sequence of neurones in a voluntary action is: (stimulus), receptor, sensory neurone, relay neurone, motor neurone, effector (and response).
28. Between neurones (between the dendrites of one-neurone and axon terminals of another) is a gap known as the synapse.
29. Electrical impulses cannot go across the synapse. Instead, a neurotransmitter substance is released at the axon terminals of one neurone when the electrical impulse reaches some vesicles containing the substance. The neurotransmitter substance then diffuses across the synapse and is detected by receptors on the dendrites of the next neurone and a new electrical impulse is generated.