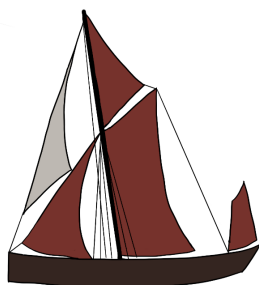

AQA MITOSIS NOTES

Science Exams Sorted



2021

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AQA Mitosis Notes

Mitosis: the process of cell division that produces **two genetically identical, diploid daughter cells**. Mitosis is part of the cell cycle.

The Cell Cycle: the growth and division of cells.

Role of Mitosis: growth and repair of cells and as a method of asexual reproduction.

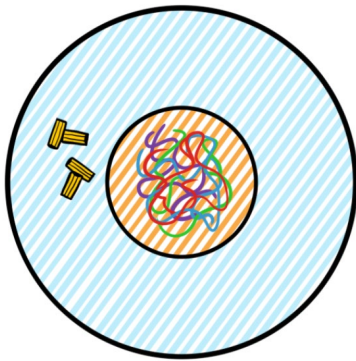
Stages of Mitosis

There are four stages of mitosis. **Prophase, Metaphase, Anaphase and Telophase**. I use P-MAT to remember the order. Questions on the order can be asked in exams so make sure you learn it. 😊

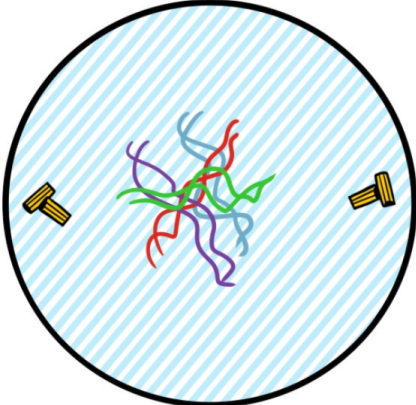
Really important note: Interphase (which is actually before Prophase) is not a stage of Mitosis! BUT! The cell uses interphase to get ready for mitosis. The DNA and centrioles are both **replicated** in interphase. Again, Interphase is **NOT** a stage of mitosis.

Exam note: for AQA you do not need to know about the stages of mitosis. However, if you don't know the stages you can't know mitosis in any detail so I have included them below to increase your knowledge 😊

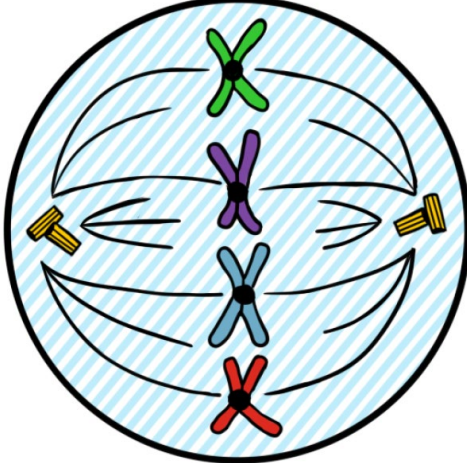
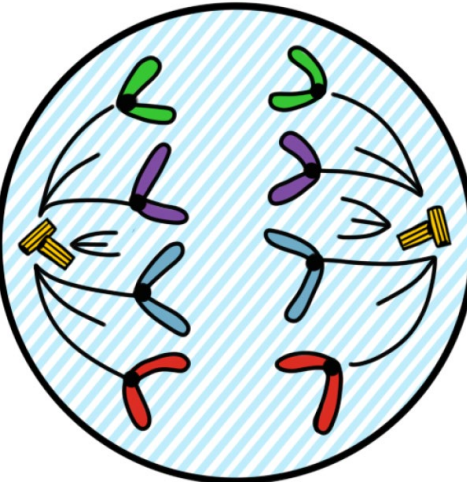
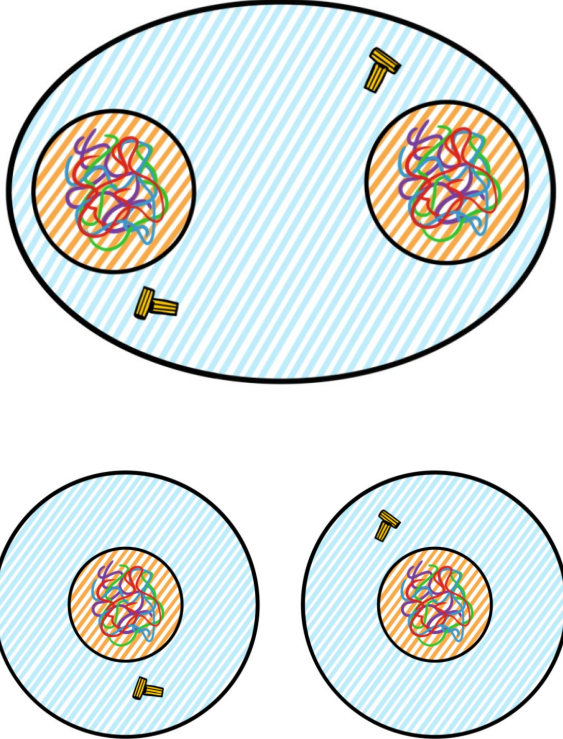
Interphase – not a stage of mitosis.



Before mitosis the cell is in interphase. This is when the cell is just being a cell, doing its job and making proteins. In this stage the cell looks like it normally does. The DNA is in a jumble called **chromatin**.

Stage	Diagram	What happens in each stage
Prophase		1. The nuclear membrane breaks down. 2. The chromatin condenses into chromosomes. 3. The centrioles begin to move to opposite poles of the cell.

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Metaphase		1. The chromosomes line up along the equator of the cell. 2. The spindle fibres attach to the chromosomes at a point in the middle of the chromosomes called the centromere.
Anaphase		1. The spindle fibres shorten, this pulls one copy of each chromosome to either pole of the cell.
Telophase		1. The nuclear membrane reforms. 2. The spindle fibres breakdown. 3. The cells split into two in a process called cleavage. 4. The two cells then move apart by cytokinesis. Each daughter cell is genetically identical to the other. Both are diploid.

AQA Mitosis Notes

Growth

During the course of an animal's life its cells grow, they reproduce and they differentiate.

Growth: an increase in size as a result of an increase in the number and size of cells. This is the result of cell division.

Animals also have many different types of cells. All cells in the body come from just a single cell which is the fertilised egg, the **zygote**. In order to have many different types of cells the cells must differentiate.

Cell differentiation: a less specialised cell becomes more specialised for a particular function.

Stem Cells

Stem cells: unspecialised cells that can form cells which can differentiate into any specialised cells.

There are two different types of animal stem cells:

1. **Embryonic stem cells** – these can differentiate to form any type of cells.
2. **Adult stem cells** – these can be found in many places such as bone marrow, muscles and the eyes. These can differentiate to form only one type of cell.

There is one type of plant stem cell

1. **Meristems** – cells of the meristem can differentiate to produce all types of plant cells at any time during the life of the plant. The main meristems are close to the tip of the shoot, and the tip of the root.

Potential Benefits and Risks of Stem Cells in Medicine

There is great potential for the use of stem cells in medicine, but we are very much in the early stages of learning how to use them and how they work best. In addition to this there are big ethical issues with using embryonic stem cells mainly, as using these destroys a potentially viable embryo. There are fewer ethical issues around the use of adult stem cells.

The **benefits** of using stem cells in medicine are:

1. **Treating patients with conditions that we don't currently have a treatment or cure for.** E.g. Type 1 diabetes.
2. **The possibility of growing an organ from someone's own stem cells.** This avoids the risk of "organ rejection" in organ transplants.

Special note:

Organ rejection: when your own body's immune system attacks the organ that you have received in a transplant. Your immune system is just doing its job, attacking cells it considers to be foreign or non self.

The **risks** of using stem cells in medicine are:

1. **Cancer** – If stem cells keep dividing this can lead to a cancer.
2. **Rejection** – Each individual would need to have a treatment made just for them. Your own stem cells will only work for you and no one else. If the stem cells of another person are used in a treatment for you this could lead to rejection, when the body's immune system attacks and destroys them.