

Edexcel (B) Biology A-level

Topic 2 - Cells, Viruses and Reproduction

Definitions and Concepts

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2.1 - Eukaryotic and prokaryotic cell structure

Cell theory - A concept that defines cells as a fundamental unit of structure, function and organisation in all living organisms. †

Cell wall - A tough outer layer which surrounds some cell types and is made of peptidoglycan in bacteria and cellulose in plants.

Centrioles - Structures found in the cytoplasm made of microtubules that produce the spindle fibres during mitosis.

Chloroplasts - Organelles found in plants and algae which are the site of photosynthesis.

Differential staining - Using multiple different stains to distinguish different parts of a specimen.

Eukaryotic cell - A type of cell that contains a nucleus along with membrane bound organelles.

Golgi apparatus - An organelle found in eukaryotic cells that is involved in the modification and packaging of proteins.

Gram-negative bacteria - A type of bacteria with an outer membrane and a thin inner peptidoglycan cell wall which does not retain the crystal violet stain during gram staining.

Gram-positive bacteria - A type of bacteria with thick outer peptidoglycan cell walls which retain the crystal violet stain during gram staining.

Light microscope - A type of microscope that uses a series of lenses to magnify the visible light reflecting off a specimen.

Lysosomes - Membrane-bound vesicles found in the cytoplasm that contain a hydrolytic enzyme called lysozyme.

Magnification - How much bigger an image appears compared to the original object calculated using the following formula:

$$\text{Image size} = \text{Actual size} \times \text{Magnification}$$

Mitochondria - The organelles found in eukaryotic cells which are the sites of aerobic respiration.

Nucleoid - The area in prokaryotic cells where the chromosomes are found.

Nucleolus - A dense region found inside the nucleus that contains proteins and RNA and is involved in synthesizing new ribosomes.

Nucleus - An organelle found in eukaryotic cells that stores the genetic information of the cell



as chromosomes and is surrounded by a membrane called the nuclear envelope.

Organ - A group of specialised tissues working together to carry out a specific function.

Organ system - A group of specialised organs working together to carry out a specific function.

Permanent vacuole - A membrane bound structure found in plant and fungal cells that contains cell sap.

Plasmids - Circular loops of DNA found in the cytoplasm of prokaryotic cells separate from the nucleoid.

Prokaryotic cell - A type of cell that does not contain any membrane bound organelles or a nucleus.

Resolution - The ability to distinguish two different nearby points in a specimen.

Ribosomes - Organelles which are the site of protein production in the process of translation.

Rough endoplasmic reticulum (RER) - A membrane-bound organelle that is involved in the synthesis and packaging of proteins.

Scanning electron microscope (SEM) - A type of electron microscope that passes a beam of electrons over the surface of a specimen to produce an image.

Smooth endoplasmic reticulum (SER) - A membrane-bound organelle involved in lipid synthesis.

Tissue - A group of specialised cells working together to carry out a specific function.

Tonoplast - The membrane which surrounds the permanent vacuole.

Transmission electron microscope (TEM) - A type of electron microscope that passes a beam of electrons through a sample to produce an image.

2.2 - Viruses

Acquired Immunodeficiency Syndrome (AIDS) - A condition caused by HIV which is characterised by a large decrease in proper immune function.

Antivirals - A class of drugs which work to inhibit viral replication to stop or suppress the infection caused by a virus.

Ebola virus - An RNA virus which causes major internal bleeding and is spread through contact with bodily fluids of an infected person.



Epidemic - An infectious disease which has spread to many individuals within a community or region concurrently.

Human Immunodeficiency Virus (HIV) - An RNA retrovirus which is transmitted through certain bodily fluids like blood or semen and attacks the immune system which can lead to the development of AIDS (acquired immunodeficiency syndrome).

λ (lambda) phage virus - A type of DNA virus which infects the bacterium E. coli.

Latency - The amount of time between exposure to a pathogen and the presentation of symptoms caused by the pathogen.

Lytic cycle - The replication of a virus within a host cell which ultimately leads to the rupture and death of the host cell.

Pandemic - An epidemic which has spread over a wider geographical area (typically internationally).

Tobacco mosaic virus (TMV) - A type of single stranded RNA virus which infects plant cells and causes discolouration of the leaves in a mosaic-like pattern and hinders their growth.

2.3 - Eukaryotic cell cycle and division

Anaphase - The third stage in mitosis where the chromosomes are pulled apart to the poles of the cell by the spindle fibres.

Asexual reproduction - The production of genetically identical offspring from one parent through the process of mitosis.

Cell cycle - The series of stages preparing the cell for division consisting of 3 main phases (interphase, mitosis and cytokinesis).

Chromosome non-disjunction - Failure of homologous chromosome separation during meiosis which leads to daughter cells which have an abnormal amount of chromosomes.

Chromosome translocation - A mutation which is caused when part of a chromosome breaks off and then rejoins to a different chromosome.

Crossing over - The exchange of genetic material between two chromosomes in a bivalent.

Diploid - Cells with two copies of each chromosome.

Down's syndrome - A genetic condition which causes intellectual disability and physical birth defects and is caused by the presence of an extra chromosome (a third copy of chromosome 21).



G1 (Gap 1) phase - The first growth phase in interphase where the cell synthesises proteins and RNA, duplicates its organelles and increases in size before DNA replication in S phase.

G2 (Gap 2) phase - The second growth phase of interphase where the cell continues to increase in size and synthesise biomolecules.

Haploid - Cells with only one copy of each chromosome.

Homologous chromosomes - Two chromosomes with similar gene loci but different alleles, one inherited from each parent.

Independent assortment - A source of variation in meiosis where the bivalent chromosomes can line up either way around on the metaphase plate.

Interphase - The largest part of the cell cycle where cells spend most of their time growing, synthesising biomolecules and preparing for mitosis.

Meiosis - A type of cell division used to produce gametes that produces four genetically different haploid daughter cells from one parent cell.

Metaphase - The second stage in mitosis where the chromosomes attach to the spindle fibres and align in the centre of the cell along the metaphase plate.

Mitosis - The division of a cell to produce two genetically identical daughter cells.

Monosomy - A condition where an organism has only one copy of a chromosome.

Polysomy - A condition where an organism has at least one extra chromosome than normal.

Prophase - The first stage in mitosis where the nuclear envelope breaks down, the centrosomes move to opposite poles of the cell, the mitotic spindle begins to form and the chromosomes condense.

Recombinant chromosomes - The chromosomes produced by the crossing over and exchange of genes during metaphase 1.

S (synthesis) phase - The second phase in the cell cycle where the DNA in the cell is replicated.

Telophase - The final stage of mitosis where new nuclear envelopes begin to form around the separated sets of chromosomes.

Turner's syndrome - A genetic condition where the second X chromosome in females is either partially or fully missing.



2.4 - Sexual reproduction in mammals

Acrosome - The head portion of a sperm cell which contains digestive enzymes to break down the outer membrane of an egg cell during fertilisation.

Blastocyst - A fluid filled mass of cells which contains the inner cell mass (ICM) which later becomes the embryo.

Blastomere - The cells which result from the immediate divisions of a fertilised ovum.

Capacitation - Maturation of sperm cells which happens after ejaculation and allows them to fertilise the oocyte.

Cortical reaction - The reaction that occurs in a fertilised oocyte to harden the zona pellucida and prevent multiple sperm from fertilising the oocyte.

Fertilisation - The fusion of a sperm cell nucleus and an egg cell nucleus to produce a diploid zygote.

Gametes - Mature haploid sex cells (sperm and egg cells) which can fuse during fertilisation to create a diploid zygote.

Germ cells - Diploid cells which give rise to gametes through meiosis.

Oogenesis - The formation of a mature haploid ovum from the differentiation of immature diploid Oogonium.

Polyspermy - The fertilisation of an oocyte by multiple sperm.

Somatic cells - All diploid body cells except gametes.

Spermatogenesis - The formation of mature haploid sperm cells from diploid germ cells.

Zona pellucida - The outer layer surrounding oocytes made of glycoproteins.

Zygote - A diploid fertilised egg cell formed from the fusion of a sperm and ovum.

2.5 - Sexual reproduction in plants

Anther - The part of a flower which contains pollen grains.

Diploid - Cells with two copies of each chromosome.

Double fertilisation - The fertilisation event occurring in seed plants where one sperm cell fertilises the egg cell to produce a diploid zygote and the other fuses with the two polar nuclei to form a triploid endosperm.

Embryo sac - A sac which contains the female ovule of a flowering plant.



Endosperm - A mass of tissue formed from the fusion of a sperm cell with the two polar nuclei (and subsequent division) which provides energy and nutrition for the growing seed.

Generative nucleus - The haploid nucleus found in the pollen grains of flowering plants which divides by mitosis to form the two sperm nuclei.

Haploid - Cells with only one copy of each chromosome.

Micropyle - A small opening in the ovule which the pollen tube grows towards. It allows for the entry of sperm nuclei into the ovule.

Ovule - The structure in seed plants which contains the embryo sac and becomes the seed after it has been fertilised.

Pollen - Grains produced by flowers which contain the male gametes from the plant.

Pollen tube digestive enzymes - Enzymes found in the tip of the pollen tube which break down the style to create a path for tube growth from the pollen grain to the embryo sac.

Pollen tube - The tube used to transport the sperm nuclei from the pollen grain to the micropyle on the embryo sac for fertilisation of the ovule.

Triploid - Cells with three copies of each chromosome.

Tube nucleus - The nucleus found in the pollen grains of flowering plants which controls the growth of the pollen tube.

✦ Definition taken from: [Edexcel Biology B Specification \(9BI0\) 2015 \(Pearson\)](#)

