GCSE Biology (Separate Science)

Success Criteria: Reproduction

I can…	
Describe sexual reproduction as a fusion between two gametes (sex cells) to produce a zygote with a mixture of genes from two parents.	
Describe asexual reproduction as production of offspring from a single parent, producing a genetically identical organism (clone).	
Explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms (including how quickly the organisms can reproduce verses the need for the introduction of variation in a population caused by environmental pressures)	
Recognise that some organisms reproduce by both methods depending on the circumstances malarial parasites = asexually in human host, but sexually in mosquito Many fungi = asexually by spores but also sexually to give variation Many plants = sexually (flowers/seeds) but also asexually by runners (eg. Strawberry) or bulb division (eg. Daffodils)	
Use the term 'diploid' to describe a cell with two of each chromosomes (pairs) eg. body cells, AND use the term 'haploid' to describe a cell with single chromosomes (half the amount) eg. gametes.	
Identify Meiosis as the type of cell division that produces gametes (sex cells). Meiosis only occurs in reproductive organs to produce gametes.	
Describe the stages that occur during Meiosis • chromosome <u>pairs</u> line up in the middle of the cell, one chromosome from each pair is pulled to each end of the cell and the cell divides for the first time to form two intermediate cells. (CHROMOSOME PAIR SPLIT) • Single chromosomes then line up in the middle of the cell, the <u>chromatids</u> are pulled to each end of the cell. The cells then divide for a second time to form four non-identical cells. (CHROMATIDS SPLIT)	
Explain the role of meiotic cell division in halving the chromosome number to form gametes (haploid), AND that this maintains diploid cells when gametes combine during fertilisation.	
Describe how the four gametes produced during meiosis are non-identical…therefore meiosis is a source of genetic variation.	
State that genetic material is DNA, a molecule made of two polymer strands twisted into a double helix. In eukaryotic cells each stand of DNA is wrapped up into a chromosome.	
Describe a gene as a code to build a protein. (eg fur colour gene). Each chromosome contains hundreds of genes.	
Describe the 'genome' as the entire genetic material of an organism- eg. every gene. The whole human genome has now been sequenced (read) and scientists are trying to determine what each gene is responsible for.	
Discuss how the understanding of the human genome has helped scientists with: • The search of genes linked with different types of diseases • The understanding and treatment of inherited disorders • Tracing human migration pattern from the past	

DNA structure and function (protein synthesis)

I can…	
Name DNA as an example of a nucleic acid. Know that nucleic acids are made up of monomers called nucleotides. Each nucleotide consists of a sugar (deoxyribose), a phosphate group and a nitrogen containing base. There are four different bases A,C,G,T.	
Describe the structure of DNA (two polymer strands made up on nucleotide monomers, 'double helix'. Complementary base pairing between A-T, C-G holding two strands together.	
State the function of DNA as a code to build proteins. The sequence of bases is the code that determines the order of amino acids in the final protein.	
Describe the basic principle of protein synthesis. • unzipping of the DNA molecule containing the gene • Transcription = making a copy of the gene in the nucleus (out of a chemical called mRNA) • the RNA gene copy leaves the nucleus • Translation = a ribosome in the cytoplasm reads the base sequence of the gene copy (3 bases at a time) and joins together amino acids in order	
Understand that the order of the amino acids gives the protein its specific shape. Shape is very important for protein function (eg. Enzyme active site has to be formed exactly to work)	
Explain how a change in sequence of bases of DNA (a mutation) can affect the function of the protein produced.	
Understand that mutations occur continually, but usually do not have an effect in the protein.	
Describe how not all parts of DNA code for proteins. Non-coding parts of DNA act as switches to turn on/off genes. Recognise how mutations in non-coding parts can affect when proteins are made (gene expression)	

Inheritance

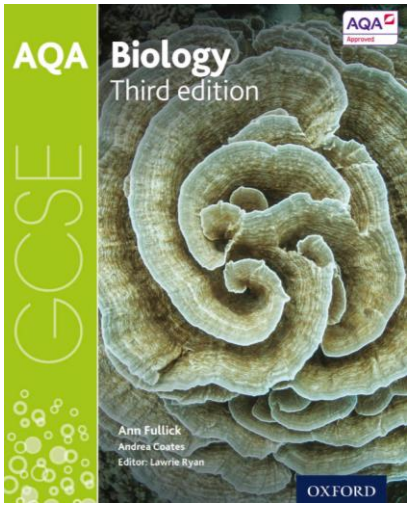
I can…	
Use the following correctly Gametes (sex cells eg. sperm, eggs, pollen) Chromosomes (structure in nucleus, tightly wrapped strand of DNA, 46 in human cell) Gene (section of DNA, code of how to build a protein) Allele (version of a gene) Dominant (an allele that is always shown in the phenotype if present, one copy needed) Recessive (an allele that is only shown in the phenotype if no dominant present, two copies needed) Homozygous (two copies of the same allele) Heterozygous (two different alleles) Genotype (the allele combination, often represented using letters BB or Bb) Phenotype (the observable characteristic, the result of the genotype)	
Describe a phenotype when given the genotype	
Use a Punnett square (genetic cross) diagram to predict the outcome of a monohybrid cross using the theory of probability. (split parental genotype to form gametes then do a cross. Give the probability as a ratio or fraction/percentage.	
Explain why Punnett squares cannot be used to work out possible genotypes in offspring for the majority of human traits. (most characteristics are controlled by multiple different genes, not just one).	
Explain why we only get the expected ratios in a genetic cross if there are large numbers of offspring. (fertilisation is a random process)	
Use a family tree (pedigree) to work out where an individual is likely to be homozygous or heterozygous for particular alleles.	
Name and give characteristics of the following inherited disorders cystic fibrosis (caused by a faulty allele that is recessive) build up of thick mucus in airways, digestive system and reproductive system. Difficulty breathing. and polydactyly (caused by a faulty allele that is dominant) ‘many digits’ more than usual fingers and/or toes.	
Use a genetic cross (Punnett Square) to explain how inherited disorders are passed on.	
Outline the methods used to screen embryos (IVF to create embryo, removal of a cell from the embryo to test, implantation of unaffected embryos only, discarded affected embryos)	
State advantages and disadvantages of embryo screening. (healthy baby born/unaffected by inherited disease, many embryos discarded – ethical considerations)	
Carry out a genetic cross to show sex inheritance. In female the sex chromosomes are the same (XX) In male the sex chromosomes are different (XY)	

AQA exam specification:

- 4.6.1 Reproduction

Additional support:

Access the appropriate textbook on kerboodle.com, create your own revision notes of the key points of the topic and attempt the summary questions.



Separate Biology GCSE textbook

Reproduction
Pages 194-200

DNA structure and function
Pages 204-208

Inheritance
Pages 208-216

Write your own summary notes (bullet points of the key ideas /keywords list with definitions/ annotated diagrams/ mind-maps or flash cards) to go over the main content of the topic.

Attempt the textbook summary questions.

Utilise online revision resources to support your class notes, such as…

Attempt past paper questions using www.physicsandmathstutor.com and self-mark your answers using the official exam mark schemes.

Extension work/extra challenge:

Ask your teacher for extension tasks…

- Strange Reproduction: Parthonogenesis and Hermaphrodites
- Epigenetics
- Cracking the Code: Learning from DNA