

**GCSE Science**

![MCj00887200000[1]]()

**Module B1 – You and your genes**

**What you should know**

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|  **Name:** **Science Group:** **Teacher:** |

**R.A.G. each of the statements to help focus your revision:**

*R = Red: I don’t know this A = Amber: I partly know this G = Green: I know this*

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| **B1.1 What are genes and how do they affect the way that organisms develop?** | **R.A.G.** |
| I can recall that instructions to control how an organism develops and functions are found in the nucleus of its cells and are called genes |  |
| I can recall that genes are instructions for a cell that describe how to make proteins |  |
| I can recall that proteins may be structural (e.g. collagen) or functional (e.g. enzymes such as amylase) |  |
| I can recall that genes are sections of very long DNA molecules that make up chromosomes in the nuclei of cells |  |
| I understand that some characteristics are determined by genes (e.g. dimples), some are determined by environmental factors (e.g. scars), and some are determined by a combination of genes and the environment (e.g. weight) |  |
| I understand that many characteristics are determined by several genes working together (e.g. eye colour). |  |

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| **B1.2 Why can people look like their parents, brothers and sisters, but not be identical to them?** | **R.A.G.** |
| I can recall that body cells contain pairs of chromosomes and that sex cells contain only one chromosome from each pair |  |
| I understand that chromosomes in a pair carry the same genes in the same place, but that there may be different versions of genes called alleles |  |
| I can recall that an individual usually has two alleles for each gene |  |
| I can recall that in an individual the two alleles of each gene can be the same **(homozygous)** or different **(heterozygous)** |  |
| I understand that during sexual reproduction, genes from both parents come together and produce variation in the offspring |  |
| I understand that offspring have some similarities to their parents because of the combination of maternal and paternal alleles in the fertilised egg |  |
| I understand that different offspring from the same parents can differ from each other because they inherit a different combination of maternal and paternal alleles |  |
| I understand that an allele can be dominant or recessive, and that: |  |
|  a. an individual with one or both dominant alleles (in a pair of alleles) will show  the associated dominant characteristic |  |
|  b. an individual with one recessive allele (in a pair of alleles) will not show the  associated recessive characteristic |  |
|  c. an individual with both recessive alleles (in a pair of alleles) will show the  associated recessive characteristic |  |
| **B1.2 Why can people look like their parents, brothers and sisters, but not be identical to them? *Continued*** | **R.A.G.** |
| I can recall that human males have XY sex chromosomes and females have XX sex chromosomes | . |
| **I understand that the sex-determining gene on the Y chromosome triggers the development of testes, and that in the absence of a Y chromosome ovaries develop** |  |
| I can use and interpret genetic diagrams (family trees and Punnett squares) showing: a) the inheritance of single gene characteristics with a dominant and recessive allele and b) the inheritance of sex chromosomes |  |
| **I understand that the term genotype describes the genetic make-up of an organism (the combination of alleles), and the term phenotype describes the observable characteristics that the organism has.** |  |

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| **B1.3 How can and should genetic information be used? How can we use our knowledge of genes to prevent disease?** | **R.A.G.** |
| I understand that a small number of disorders are caused by faulty alleles of a single gene, including Huntington’s disease and cystic fibrosis | . |
| I canrecall that disorders may be caused by dominant alleles (e.g. Huntington’s disease) or recessive alleles (e.g. cystic fibrosis) |  |
| I can recall the symptoms of Huntington’s disease – to include late onset, tremor, clumsiness, memory loss, inability to concentrate, mood changes |  |
| I can recall the symptoms of Cystic fibrosis – to include thick mucus, difficulty breathing, chest infections, difficulty in digesting food |  |
| I understand that a person with one recessive allele (in a pair of alleles) will not show the symptoms of the disorder, but is a carrier and can pass the recessive allele to their children | . |
| I can interpret through genetic diagrams (family trees and Punnett squares) the heritance of a single gene disorder, including the risk of a child being a carrier |  |
| I can describe uses of genetic testing for screening adults, children and embryos, limited to:a) testing embryos for embryo selection **(pre-implantation genetic diagnosis)** |  |
| b) predictive testing for genetic diseases |  |
| c) testing an individual before prescribing drugs |  |
| I understand that testing adults and fetuses for alleles that cause genetic disorders has implications that need to be considered, including:a) risk of miscarriage as a result of cell sampling for the genetic test |  |
| b) using results that may not be accurate, including false positives and false negatives |  |
| c) whether or not to have children at all |  |
| d) whether or not a pregnancy should be terminated |  |
| e) whether other members of the family should be informed |  |
| **B1.3 How can and should genetic information be used? How can we use our knowledge of genes to prevent disease? *Continued*** | **R.A.G.** |
| **I understand the implications of testing embryos for embryo selection prior to implantation** |  |
| I understand the implications of the use of genetic testing by others (for example, for genetic screening programmes by employers and insurance companies). | . |

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| **B1.4 How is a clone made?** | **R.A.G.** |
| I understand that bacteria, plants and some animals can reproduce asexually to form clones (individuals with identical genes) | . |
| I understand that any differences between clones are likely to be due only to environmental factors |  |
| I understand that clones of plants occur naturally when plants produce bulbs or runners |  |
| I understand that clones of animals occur:a. naturally, when cells of an embryo separate (identical twins) |  |
| **b. artificially, when the nucleus from an adult body cell is transferred to an empty unfertilised egg cell** | . |
| I understand that there are different types of stem cells:a) adult stem cells which are unspecialised cells that can develop into many (but not all) types of cells |  |
| b) embryonic stem cells which are unspecialised cells that can develop into any type of cell | . |
| I understand that, as a result of being unspecialised, stem cells from embryos and adults offer the potential to treat some illnesses |  |
| I understand that the majority of cells of multicellular organisms become specialised during the early development of the organism. |  |

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| **Grades A\* - C (Higher)** | All statements shown in **bold** as well as all statements shown in normal type. |
| **Grades C – G (Foundation)** | All statements shown in normal type. |