

## **IGCSE Biology (9-1) Specification 3(b)**

### **(b) Inheritance**

#### **Students should:**

- 3.14** understand that the genome is the entire DNA of an organism and that a gene is a section of a molecule of DNA that codes for a specific protein
- 3.15** understand that the nucleus of a cell contains chromosomes on which genes are located
- 3.16B** describe a DNA molecule as two strands coiled to form a double helix, the strands being linked by a series of paired bases: adenine (A) with thymine (T), and cytosine (C) with guanine (G)
- 3.17B** understand that an RNA molecule is single stranded and contains uracil (U) instead of thymine (T)
- 3.18B** describe the stages of protein synthesis including transcription and translation, including the role of mRNA, ribosomes, tRNA, codons and anticodons
- 3.19** understand how genes exist in alternative forms called alleles which give rise to differences in inherited characteristics
- 3.20** understand the meaning of the terms: dominant, recessive, homozygous, heterozygous, phenotype, and genotype
- 3.21B** understand the meaning of the term codominance
- 3.22** understand that most phenotypic features are the result of polygenic inheritance rather than single genes
- 3.23** describe patterns of monohybrid inheritance using a genetic diagram
- 3.24** understand how to interpret family pedigrees
- 3.25** predict probabilities of outcomes from monohybrid crosses
- 3.26** understand how the sex of a person is controlled by one pair of chromosomes, XX in a female and XY in a male

Dr. James Peros (PhD, BS, BS, BA, AS, CED)

- 3.27** describe the determination of the sex of offspring at fertilisation, using a genetic diagram
- 3.28** understand how division of a diploid cell by mitosis produces two cells that contain identical sets of chromosomes
- 3.29** understand that mitosis occurs during growth, repair, cloning and asexual reproduction
- 3.30** understand how division of a cell by meiosis produces four cells, each with half the number of chromosomes, and that this results in the formation of genetically different haploid gametes
- 3.31** understand how random fertilisation produces genetic variation of offspring
- 3.32** know that in human cells the diploid number of chromosomes is 46 and the haploid number is 23
- 3.33** understand that variation within a species can be genetic, environmental, or a combination of both
- 3.34** understand that mutation is a rare, random change in genetic material that can be inherited
- 3.35B** understand how a change in DNA can affect the phenotype by altering the sequence of amino acids in a protein
- 3.36B** understand how most genetic mutations have no effect on the phenotype, some have a small effect and rarely do they have a significant effect
- 3.37B** understand that the incidence of mutations can be increased by exposure to ionising radiation (for example, gamma rays, x-rays and ultraviolet rays) and some chemical mutagens (for example, chemicals in tobacco)
- 3.38** explain Darwin's theory of evolution by natural selection
- 3.39** understand how resistance to antibiotics can increase in bacterial populations, and appreciate how such an increase can lead to infections being difficult to control