

Heredity

5.1 Reproduction

- Mechanisms of reproduction
 - Analysing sexual and asexual methods of reproduction in a variety of organisms
 - Animals: advantages of external and internal fertilisation
 - Plants: asexual and sexual reproduction
 - Fungi: budding, spores
 - Bacteria: binary fission
 - Protists: binary fission, budding
- Features of fertilisation, implantation and hormonal control of pregnancy and birth in mammals
- Impact of scientific knowledge on the manipulation of plant and animal reproduction in agriculture

5.2 Cell Replication

- Model the processes involved in cell replication
 - Mitosis and meiosis
 - DNA replication using the Watson and Crick DNA model, including nucleotide composition, pairing and bonding
- Cell replication processes and the continuity of species

5.3 DNA and Polypeptide Synthesis

- Model and compare the forms in which DNA exists in eukaryotes and prokaryotes
- Process of polypeptide synthesis
 - Transcription and translation
 - Assessing the importance of mRNA and tRNA in transcription and translation
 - Analysing the function and importance of polypeptide synthesis
 - Assessing how genes and environment affect phenotypic expression
- Structure and function of proteins in living things

5.4 Genetic Variation

- Predict variations in the genotype of offspring (meiosis, crossing over of homologous chromosomes, fertilisation and mutations)
- Formation of new combinations of genotypes produced during meiosis
 - Interpreting examples of autosomal, sex-linkage, co-dominance, incomplete dominance and multiple alleles
 - Constructing and interpreting information and data from pedigrees and Punnett squares
- Frequencies of characteristics in a population
 - Examining frequency data
 - Analysing single nucleotide polymorphism (SNP)

5.5 Inheritance Patterns in a Population

- Technologies to determine inheritance patterns in a population
 - DNA sequencing and profiling
- Use of data analysis from a large-scale collaborative project to identify trends, patterns and relationships
 - Use of population genetics data in conservation management
 - Population genetics studies used to determine the inheritance of a disease or disorder
 - Population genetics relating to human evolution

Genetic Change

6.1 Mutation

- How mutagens operate
 - Electromagnetic radiation sources
 - Chemicals
 - Naturally occurring mutagens
- Causes, processes and effects of different types of mutation
 - Point mutation
 - Chromosomal mutation
- Somatic mutations and germ-line mutations and their effect on an organism
- 'Coding' and 'non-coding' DNA segments in the process of mutation
- Genetic variation relating to the processes of fertilisation, meiosis and mutation
- Mutation, gene flow and genetic drift effects on the gene pool of populations

6.2 Biotechnology

- Uses and applications of biotechnology (past, present and future)
 - Social implications and ethical uses of biotechnology, including plant and animal examples
 - Researching future directions
 - Benefits for society of research using genetic technologies
 - Changes to the Earth's biodiversity due to genetic techniques

6.3 Genetic Technologies

- Current genetic technologies that induce genetic change
- Reproductive technologies
 - Artificial insemination
 - Artificial pollination
- Cloning
 - Whole organism cloning
 - Gene cloning
- Recombinant DNA technology
 - Transgenic organisms in agricultural and medical applications
- Genetic technologies in agricultural, medical and industrial applications
- Effect on biodiversity of using biotechnology in agriculture
- Influence of social, economic and cultural contexts on a range of biotechnologies

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LEARNING

Infectious Disease

7.1 Causes of Infectious Disease

- Infectious diseases caused by pathogens
 - Classifying pathogens that cause disease in plants and animals
 - Transmission of a disease during an epidemic
 - Microbial testing of water or food samples
 - Modes of transmission of infectious diseases (direct contact, indirect contact and vector transmission)
- Work of Robert Koch and Louis Pasteur
 - Koch's postulates
 - Pasteur's experiments on microbial contamination
- Causes and effects of diseases on agricultural production
 - Plant diseases
 - Animal diseases
- Adaptations of different pathogens that facilitate their entry into and transmission between hosts

7.2 Responses to Pathogens

- Response of an Australian plant to a pathogen
 - Fungal pathogens
 - Viral pathogens
- Responses to the presence of pathogens by assessing the physical and chemical changes that occur in the host animals cells and tissues

7.3 Immunity

- Innate and adaptive immune systems in the human body
- How the immune system responds after primary exposure to a pathogen, including innate and acquired immunity

7.4 Prevention, Treatment and Control

- Factors involved in limiting local, regional and global spread of an infectious disease
- Procedures to prevent the spread of disease
 - Hygiene practices
 - Quarantine
 - Vaccination, including passive and active immunity
 - Public health campaigns
 - Use of pesticides
 - Genetic engineering
- Pharmaceuticals as treatment strategies for the control of infectious disease
 - Antivirals
 - Antibiotics
- Environmental management and quarantine methods to control an epidemic or pandemic
- Data relating to the incidence and prevalence of infectious disease in populations
 - Mobility of individuals and the portion that are immune or immunised
 - Malaria or Dengue Fever in South East Asia
- Historical, culturally diverse and current strategies to predict and control the spread of disease
- Contemporary application of Aboriginal protocols in the development of particular medicines and biological materials in Australia
 - Bush medicine
 - Smoke bush in Western Australia

Non-infectious Disease and Disorders

8.1 Homeostasis

- Negative feedback loops that show homeostasis
 - Temperature
 - Glucose
- Mechanisms used by organisms to maintain their internal environment within tolerance limits
 - Trends and patterns in behavioural, structural and physiological adaptations in endotherms that assist in maintaining homeostasis
 - Internal coordination systems that allow homeostasis to be maintained, including hormones and neural pathways
 - Mechanisms in plants that allow water balance to be maintained

8.2 Causes and Effects

- Non-infectious diseases in humans
 - Genetic diseases
 - Diseases caused by environmental exposure
 - Nutritional diseases
 - Cancer
- Incidence, prevalence and mortality rates of non-infectious diseases
 - Nutritional diseases
 - Diseases caused by environmental exposure

8.3 Epidemiology

- Analyse patterns of non-infectious diseases in populations, including their incidence and prevalence
 - Nutritional diseases
 - Diseases caused by environmental exposure
- Treatment/management, and possible future directions for further research, of a non-infectious disease
- Evaluate the method used in an epidemiological study
- Evaluate the benefits of engaging in an epidemiological study

8.4 Prevention

- Evaluate the effectiveness of current disease-prevention methods and develop strategies for the prevention of a non-infectious disease
 - Educational programs and campaigns
 - Genetic engineering

8.5 Technologies and Disorders

- Causes of disorders - structures and functions of the relevant organs
 - Hearing loss
 - Visual disorders
 - Loss of kidney function
- Technologies used to assist with the effects of a disorder
 - Hearing loss: cochlear implants, bone conduction implants, hearing aids
 - Visual disorders: spectacles, laser surgery
 - Loss of kidney function: dialysis
- Effectiveness of a technology used to manage and assist with the effects of a disorder