5.1

* Dna and RNA are required to make proteins
  + DNA is the information molecule
    - Stores genetic material that enables a cell to put together the right sequences of amino acids needed to produce specific proteins
    - Double stranded spiral
    - Made of 4 bases
      * Adenine (A)
      * Thymine (T)
      * Cytosine (C)
      * Guanine (G)
    - Adenine always pairs with thymine
    - Cytosine always pairs with guanine
  + **Replication** – the process of copying the DNA of a cell
    - Parent DNA molecule is made up of two strands
    - The two strands separate and are used as templates
    - Two new identical DNA molecules are formed
* RNA is needed to make proteins
  + **RNA** – ribonucleic acid, carries the information from DNA to a ribosome where the amino acids are brought together to form a protein
    - Made of 4 bases
      * Adenine (A)
      * Uracil (U)
      * Cytosine (C)
      * Guanine (G)
    - 3 types of RNA
      * Messenger RNA (mRNA)
      * Ribosomal RNA (rRNA)
      * Transfer RNA (tRNA)
    - **Transcription** – the process of transferring information from DNA to RNA
    - **Translation** – the process of taking an RNA molecule and creating an amino acid chain in the correct sequence to make a protein

5.2

* Changes in DNA can produce variation
  + DNA sequences can change
    - **Mutation** – any change in DNA
    - Cells can repair mistakes in a DNA sequence but sometimes a mutation cannot be fixed
      * Three possible outcomes of mutation
        + Mutation causes no effect
        + The effect of a mutation is minor
        + The effect of a mutation is great
  + Mutations can cause genetic disorders
    - **Genetic disorder** – a disease or condition that results from mutations that affect the normal functioning of a cell
    - **Pedigree** – a diagram of family relationships that includes two or more generations
  + Cancer is a genetic disorder that affects the cell cycle
    - **Cancer** is a group of disorders characterized by the uncontrolled division of cells
    - Most cancers are caused by mutations to DNA that happen during a person’s lifetime
    - Some people may inherit a tendency for a particular cancer but it is not a guarantee that the cancer will occur

5.3

* Modern genetics uses DNA technology
  + Changes in DNA can change an organism
    - **Selective breeding** – the process of selecting and breeding parent organisms to pass on particular traits to the offspring
      * Can be successful as long as the desirable traits are controlled by genes
    - **Genetic engineering** – the process in which a sequence of DNA from an organism is first isolated, then changed, and then returned to the organism or to another organism.
  + There are risks and benefits associated with genetic engineering
  + DNA technology has many applications
    - **DNA identification** – crime scene analysis
    - Studying Genes
      * **Genome** – all the genetic material in an organism
      * **Cloning** – a technique that uses technology to make copies of DNA