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