# Diversity of Living Things

# What connects all Living things?

- Organisms live in almost every imaginable habitat in, on and above the Earth's surface.
- The human body is home to trillions of microbes
- The thread that binds all living things and is responsible for the unity and diversity for life is DNA

# What makes you different from each other? From a flower? From a starfish?

# DNA is the foundation of unity and diversity of Living Things

- The variation in living things we see around us is due to DNA.
- DNA is made of many nucleotides linked together in a specific order.
- DNA exists in chromosomes, which contain thousands of genes.
- The structure of DNA is important to passing on information.
- The different genetic make-up of organisms is reflected in the diversity of living things.

# What do all of these pictures have in common?

- In groups of 3, try to identify at least 3 things that all of these pictures have in common

# Characteristics of Living Things

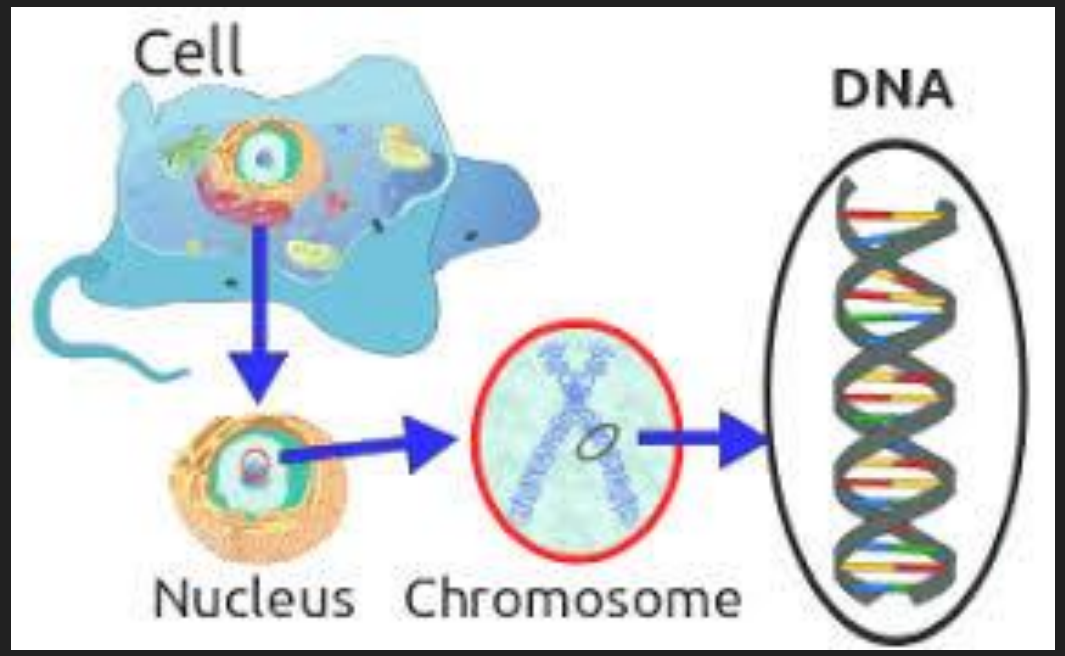
- Made up of cells
- Use/obtain energy
- Grow
- Reproduce
- Respond to Stimuli
- Change over time
- Have a universal genetic code

# The variation we see in life is due to DNA

- All living things have DNA.
- Variations among all organisms are due to DNA.

# DNA

- **DNA:** deoxyribonucleic acid
  - Genetic material
  - Stores genetic information
  - Influences appearance and life processes
- Differences in DNA result in variations in characteristics and allow organisms to exist in diverse aquatic and terrestrial ecosystems.

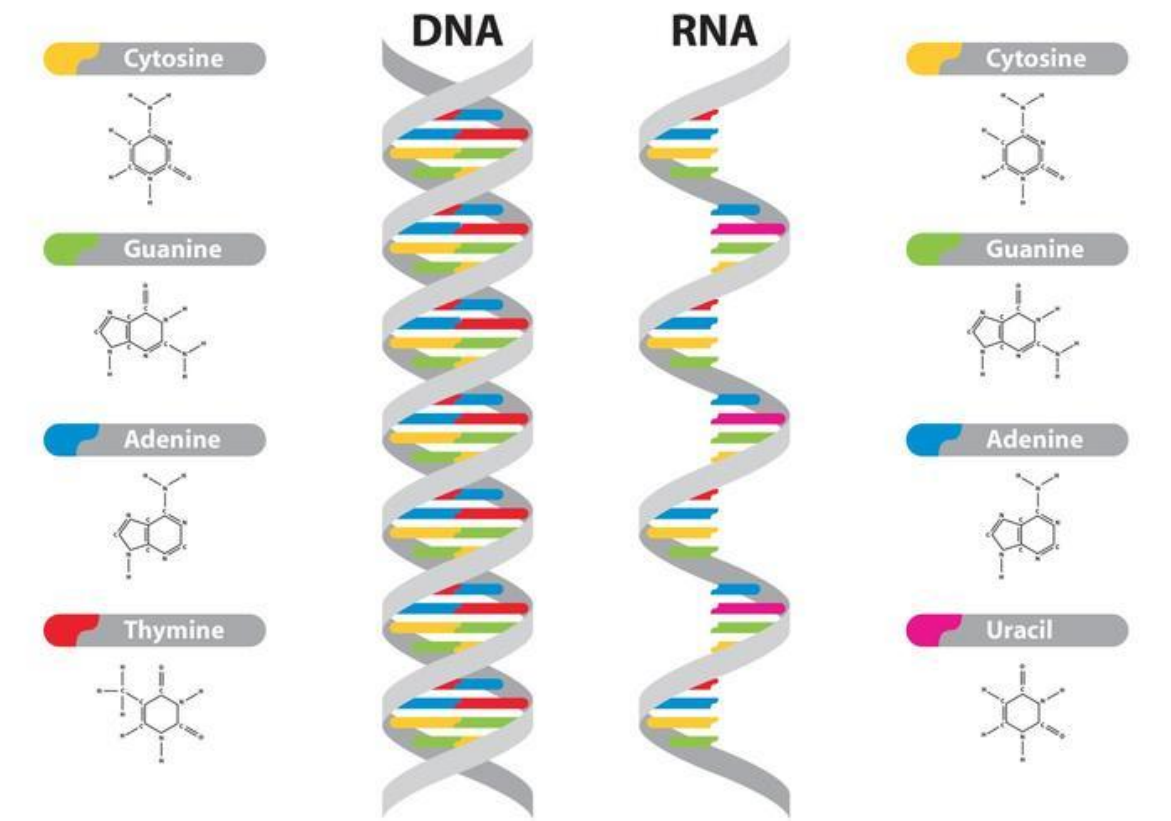


# Why is Variation Important?

- A healthy ecosystem is one where there is lots of different types of species and lots of variation among species.
- With a partner, discuss why this is, and why variation is important.

# DNA is made of many nucleotides linked together in a specific order

- Nucleotides are the basic building blocks of nucleic acids.
- There are two types of nucleic acids:
  1) DNA (deoxyribonucleic acid)
  2) RNA (ribonucleic acid)



# The Structure of DNA

**Nucleotides** consists of three components:

1) a phosphate group
2) a sugar
3) a nitrogenous base

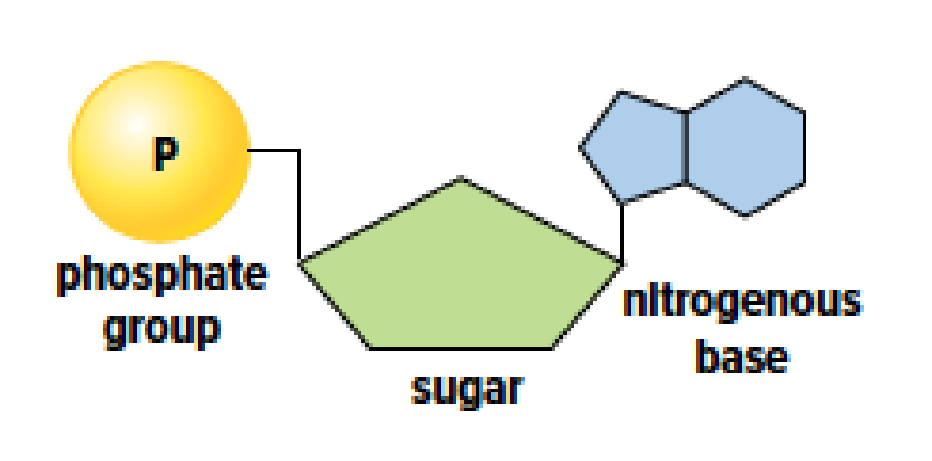



Figure 1.2: Nucleotides are the basic building blocks of DNA and RNA.

# The Structure of DNA (cont'd)

**Nitrogenous bases** in DNA include:

1) adenine (A)
2) cytosine (C)
3) guanine (G)
4) thymine (T)

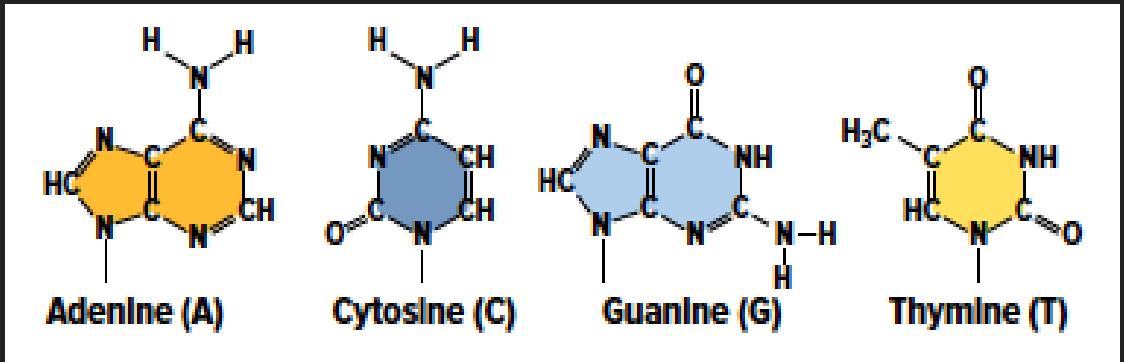



Figure 1.2: Nucleotides are the basic building blocks of DNA and RNA.

# Complementary Base Pairing

Nitrogenous bases that pair together are **complementary bases:**

- adenine (A) and thymine (T)
- cytosine (C) and guanine (G)

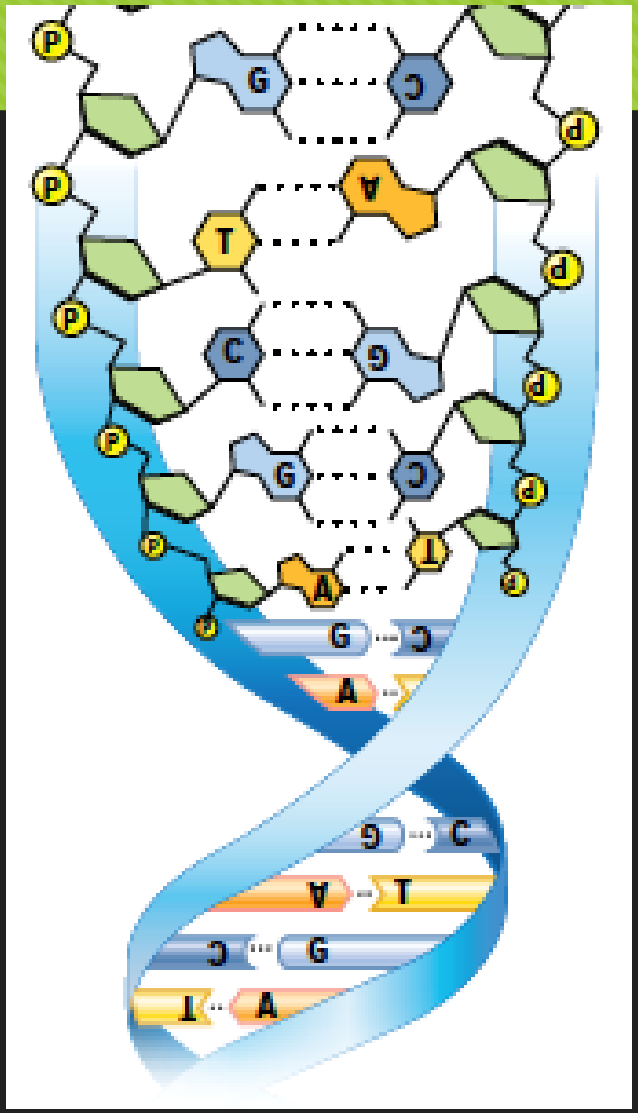


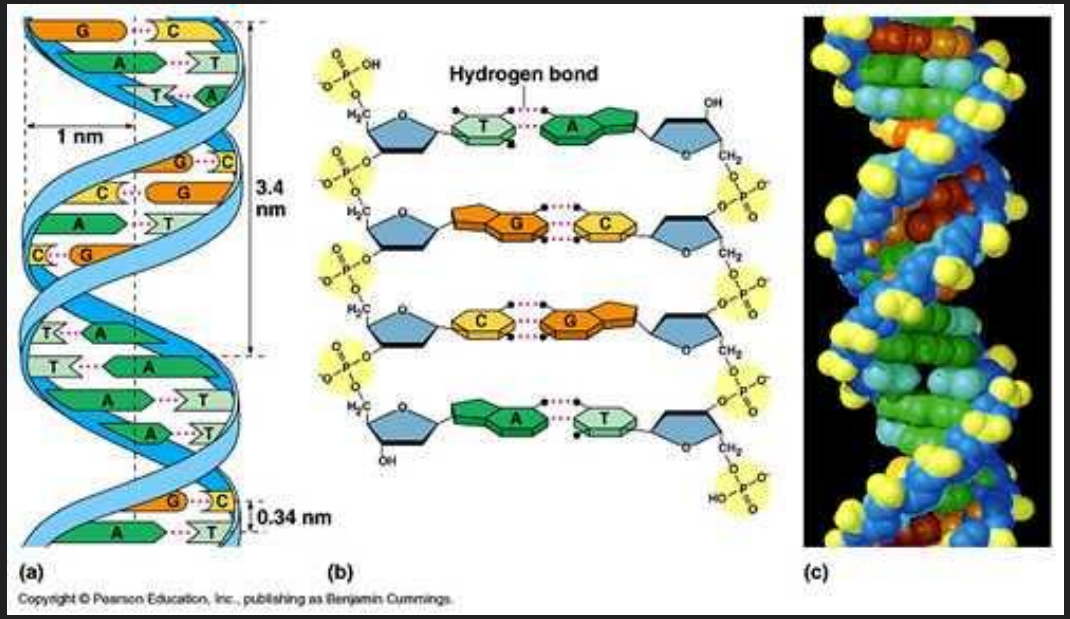
Figure 1.3: DNA is found in the nucleus of a cell. The bases of the nucleotides pair only in specific ways.

# Question!

- If the bases on one strand of DNA are ATGGGCTA, what is the sequence of complementary bases on the other strand of DNA?

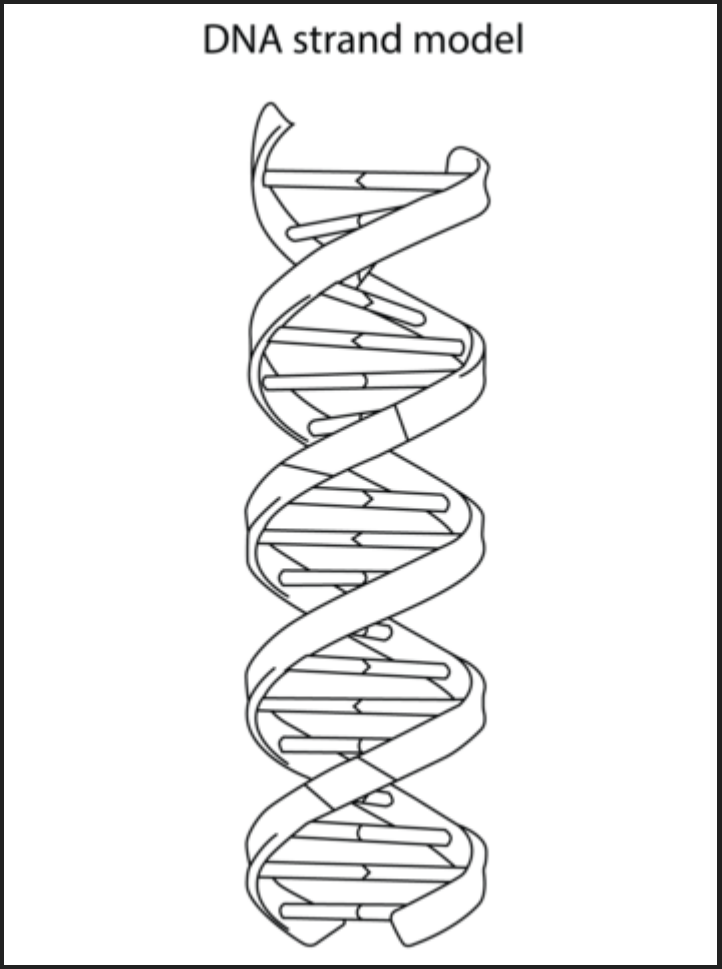
# Characteristics of the DNA molecule:

- Two strands of nucleotides
  - Twisted ladder (double helix) structure
  - Sides of ladder made up of sugar and phosphate groups
  - Rung of ladder is made of two nitrogenous bases held together by hydrogen bonds



# Colour/Identify the Following:

- DNA MOLECULE
  - Nucleotides
  - Complementary Base Pairing



# Function of DNA

- DNA stores genetic information.
- Parents pass their DNA on to their offspring.

# What DNA Codes for

- DNA tells each cell which **proteins** to make and how to make them
  - **Proteins** are essential for life functions
    - Make up much of the structure of cells in all organisms
    - Make up tissues in plants and animals
    - Various proteins control how a cell is formed and how it functions
- Instructions provided by DNA are responsible for the development/function of an organism

# PROTEINS
## Type and Function

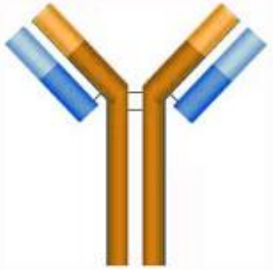
*Actin & Myosin*

Contractile

*Insulin*


Hormonal

*Antibody*

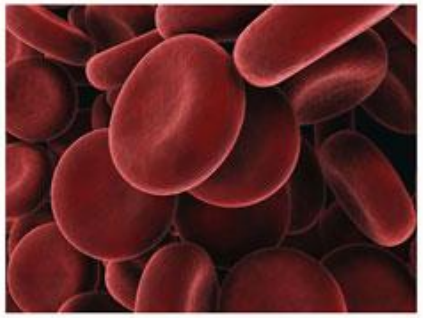


Protection

Structural

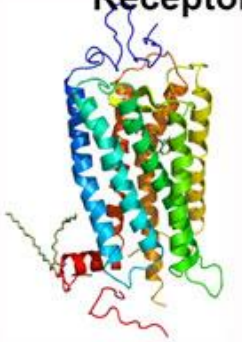
*Spiders silk*

*Haemoglobin*



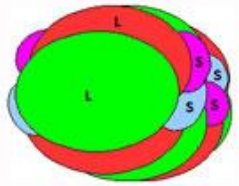
Transport

Receptor



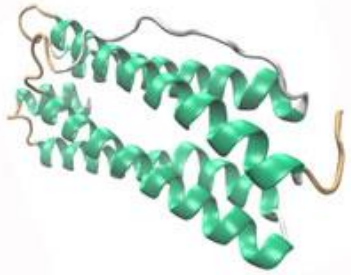
*Rhodopsin*

Enzyme




*Rubisco*

Storage



*Ferritin*

AXT

# Genome

- A complete sequence of DNA is called a **genome**
- Human Genome consists of over 3 billion base pairs
  - Found in the 46 chromosomes in almost every cell in the human body.