Function of a Cell Membrane

- **Regulation** of what moves into and out of a cell

- Maintains **homeostasis**
Composition of a Cell Membrane:

1. **Phospholipid** Bilayer
2. **Proteins**
Two Important Terms:

1. Hydrophilic
2. Hydrophobic
1. Phospholipid Bilayer:

Hydrophilic Heads

Hydrophobic Tails
Hydrophilic

- **Water-loving:**
  - Term applied to polar (charged) molecules
  - *Water* molecules are *attracted* to this *end* of the phospholipid
  - This end forms a *hydrogen* bond with *water*
Hydrophobic

- **Water-fearing.**
  - Term applied to nonpolar molecules that **cannot** bond with water.
  - Water tends to **push** this part of the molecule **away**.
  - Creating a **Non**-polar **interior** zone.
Hydrophobic vs Hydrophilic: Soaps and Detergents

- Hydrophobic tail
- Hydrophilic head

H₂O

micelle:
- ~50-100 soap molecules
- Hydrophobic interior dissolves "grease" molecules
- Hydrophilic exterior remains soluble in water
Phospholipid Model - Group of 4

- Each person make a part and then put it together
  - Glycerol backbone
  - Fatty acid #1
  - Fatty acid #2
  - Phosphate Group
Phospholipid Review: shaped like a head with two tails.
Bilayer

- Caused by the **tails** of the **phospholipid** being **pushed** away by the **water** on the **inside** and **outside** of the cell.

**THIS CREATES A TRUE BARRIER SEPARATING THE CELL FROM ITS SURROUNDING.**
Fluid Mosaic Model

- **Fluid:**
  - The phospholipid **bilayer** is fluid like a **soap bubble**.
  - Lipids **move** around in their **side** of the bilayer.
  - Lipid **molecules** do **NOT** move from one layer to the other. (**rare**)
    - They can move **side to side** but **not** up and down.
Mosaic:

- The membrane is **studded** with an assortment of different **proteins**, some which float in only **one** of the of the lipid layers and some that are **inserted** all the way through.
2. **Role of proteins on the surface of the membrane**

Three types:

1. **Receptor Proteins**
2. **Marker Proteins**
3. **Channel Proteins**

**On your note templates, circle and label each type of protein on the diagram.**
Receptor Protein:

- **Transmits** info from the **world** outside to the **interior** of the cell.

- Specifically **shaped** proteins that fit all the way through the lipid **bilayer**.

- On the **outside** of the cell, a **specifically** shaped **molecule** fits into the protein (like a **hand in a glove**)
  - which in turn causes a **change** in the **opposite** side of the **membrane**.
    - This causes a **change** in the **cell**.

- **Ex.** **Hormones**
Receptor Protein Example

- Hormones
Marker Protein:

- Proteins that allow the body to recognize self and non self.
- Found only in the outer layer of the bilayer.
- Ex. Transplants
  - Your body relies on marker proteins to tell one cell from another.
Channel Protein:

- Specifically **shaped** proteins that fit all the way **through** the lipid bilayer.
  - used to transport **polar sugars**, **amino acids** and **ions** (Na+).
- Particular channels **fit** only **certain** particles
  - molecule must **fit** a certain **shape**, similar to a **lock** and **key**
Proteins in the membrane

Markers

Enzymes

Receptors

Pumps and Channels
Types of Membranes

- **Permeable:**
  - nearly *all* molecules can *pass* through

- **Impermeable:**
  - *Nothing* can pass through

- **Semipermeable (Selectively Permeable):**
  - many *molecules can pass*, many *cannot*
Fluid Mosaic Model

Cell membranes:

- Proteins
- Cholesterol
- Phospholipid

lipid bilayer

proteins

cholesterol

phospholipid