

Life and cells

- ✓ **Living things** grow, keep a stable internal state (homeostasis) and reproduce
- ✓ **Cell:** the smallest unit of life, enclosed in a membrane
- ✓ **Single-celled:** bacteria; **multicellular:** plants and animals, whose cells specialize
- ✓ The human body has about 30 trillion cells

Parts of a cell

- ✓ **Nucleus:** holds the DNA; the largest organelle (red blood cells have none)
- ✓ **Mitochondria:** produce energy, the "powerhouse"
- ✓ **Ribosomes:** make proteins
- ✓ **Cell membrane:** the barrier between the cell and its surroundings
- ✓ Plant cells also have:
 - **Cell wall:** a rigid structure; animal cells lack one, so they are rounder
 - **Chloroplasts:** carry out photosynthesis, turning sunlight into energy

Genetics

- ✓ **DNA:** the molecule holding an organism's genetic instructions
- ✓ **Gene:** a segment of DNA that produces a trait, passed to offspring
- ✓ **Heredity:** how genes pass from parents to offspring
- ✓ **Chromosomes:** packaged DNA; most humans have **23 pairs, 46** in all
- ✓ **Down syndrome:** an extra copy of chromosome 21, or extra material from it

Reproduction

- ✓ **Asexual:** one parent; offspring genetically identical to it; grows a population faster
- ✓ **Sexual:** two parents; about half the DNA from each; more genetic diversity, a better chance for the species

Mutations and evolution

- ✓ **Mutation:** a mistake in copying DNA; most are neutral, some harmful, a few beneficial
- ✓ **Substitution:** one nucleotide replaced by another
- ✓ **Insertion or deletion:** nucleotides added or removed
- ✓ **Frameshift:** an insertion or deletion that shifts how the rest is read into proteins
- ✓ **Evolution:** a population's inherited traits change over generations, driven by **natural selection** acting on mutations
- ✓ **"Survival of the fittest":** the traits that best *fit* the environment are passed on

The food web

- ✓ **Producers** (level 1): make their own food from sunlight: plants, algae
- ✓ **Primary consumers** (2): herbivores that eat producers: grasshoppers, rabbits, deer
- ✓ **Secondary consumers** (3): eat primary consumers; many are omnivores: rats, foxes, snakes, owls
- ✓ **Tertiary consumers** (4): eat secondary consumers: hawks, lions, sharks; with no predator of their own, **apex predators**
- ✓ **Decomposers** (every level): bacteria and fungi return dead matter to the soil as nutrients
- ✓ Each level up holds less energy, and usually fewer organisms