The Skeletal System

The Human Skeleton

- "Skeletal" is Greek for "dried up"
- Has living and non-living components
- Consists of 206 bones
- Accounts for about 14% of our body mass

Five Functions of the Skeletal System

- **Supports** tissues and provides a framework for our body
- **Protects** organs
- **Reservoir of minerals** such as phosphorus and calcium
- **Produces** red and white blood cells and platelets
- Provides the levers on which muscles pull to produce **movement**

Two Primary Differences Between Male and Female Skeletons

1. Pelvis Structure – Shape
2. Size and Weight – Males have longer and thicker bones

Two Primary Divisions of the Skelton:

1. **Axial Skeleton (80 bones)**
   a) consists of
      i) Skull
      ii) Vertebral Column
      iii) Thoracic Cage (Sternum, ribs and spine)
   b) supports and protects the organs
   c) most muscular originates or attaches to it

2. **Appendicular Skeleton (126 bones)**
   a) upper and lower extremities
   b) the shoulder and pelvic griddles
   c) major role in movement

Colour the Axial Skelton in Blue
Colour the Appendicular Skeleton in Red

Classification of Bones

1. Long Bones
    a) Tubular shell with cavity in the middle
    b) found in arms, legs etc.
2. Short Bones
    a) no marrow cavity
    b) found in wrist and ankle
3. Flat Bones
    a) flat and thin (protection, broad surface for muscle attachment)
    b) found in cranium, pectoral and pelvic griddles
4. Irregular Bones
    a) specialized shape and function (support weight, dissipate loads, protect spinal cord)
    b) found in spinal column
5. Sesamoid Bones
    a) small bones embedded within a tendon or joint capsule
    b) found in knee, hand, thumb and big toe

Anatomy of The Long Bone

Bone consists of non-living materials and living cells.

Component	Function
Calcium carbonate	adds stiffness and resists compression
Calcium phosphate	adds stiffness and resists compression
Collagen	adds flexibility and resists tension

Bone Cells

1. Osteoblasts
    a) bone forming / reconstructing cells
    b) deposits osteoid (un-calcifed bone matrix) into the bone matrix to build up cortical bone
2. Osteocytes
    a) mature bone cells
3. Osteoclasts
    a) cells take break down and reabsorb bone
    b) secrete acids and enzymes to dissolve calcium and organic matrix of the bone

Anatomy

1. Periosteum
    a) a fibrous, cellular, vascular and highly sensitive life support sheath covering the length of the bone (not the ends)
    b) allows for ligaments and tendons to attach to the bone
2. Diaphysis
    a) the shaft or central part of the long bone
3. Medullary Cavity
    a) the cavity of the diaphysis that contains red and yellow marrow
4. Epiphysis
    a) the ends of the long bone
    b) outer surface made up of cancellous bone
    c) articulates (ie. makes contact) with adjacent bones
5. Articular Cartilage
    a) covers the end (epiphysis) of the long bone
    b) smooth, slippery, porous, malleable, insensitive, and bloodless surface that makes contact with adjacent bones
6. Nutrient Artery
    a) the principal artery and major supplier of oxygen and nutrients to the shaft of a bone

Types of Bone Tissue

1. Cancellous (Spongy) Bone
    a) consists of interwoven beams (trabeculae) of bone
    b) the spaces are filled with marrow
2. Compact (Cortical) Bone
    a) dense bone that forms in the walls of the diaphysis
    b) provides structural integrity

Types of Bone Marrow

1. Red Marrow
    - a gelatinous substance where blood (red and white) cell formation occurs
2. Yellow Marrow
    - fatty connective tissue that no longer produces blood cells (with age red marrow becomes yellow)