Skeletal System

BERRYHILL & CASHION

HS1

DHO 7.3
Skeletal System Facts:

The skeletal system is made up of organs called bones.

An adult human has 206 bones, but babies are born with 270 bones. Why?

The male and female skeleton have 1 major difference - what is it?

The female pelvis is wider and deeper. Why?
Functions of the skeletal system:

There are 5 functions:

1. **Framework**: bones form a framework to support the body’s muscles, fat, and skin.

2. **Protection**: bones surround vital organs to protect them. Can you think of an example? The skull surrounds the brain. The ribs surround the heart and lungs.
Functions of the skeletal system:

3. **Levers**: muscles attach to bones to help provide movement.

4. **Production of blood cells**: bones help produce RBCs, WBCs, and platelets, a process called hemopoiesis or hematopoiesis.

5. **Storage**: bones store most of the calcium supply of the body in addition to phosphorus and fats.
Bones vary in shape & size depending on their locations within the body.

BONES OF THE EXTREMITIES ARE CALLED LONG BONES.
Parts of a long bone:

1. **Diaphysis** – long shaft
2. **Epiphysis** – the 2 ends
3. **Medullary Canal** – cavity in the diaphysis
4. **Yellow Marrow** – found in the medullary canal, it is a storage area for fat cells.
   - Contains cells that form WBCs (leukocytes)
5. **Endosteum** – membrane that lines the medullary canal and keeps the yellow marrow intact.
   - It produces some bone growth.
6. **Red Marrow** – found in certain bones (vertebrae, ribs, sternum, cranium, and in the proximal ends of humerus & femur)

- Produces RBCs, platelets, and some WBCs.
- Red marrow is used to diagnose blood diseases & can be transplanted in people with diseases of the immune system.
Parts of a long bone:

7. **Periosteum** – tough membrane that covers the outside of the bone.
   - It contains blood vessels, lymph vessels, and **osteoblasts** (special cells that form new bones).

8. **Articular cartilage** – covers the epiphysis and acts as a shock absorber when 2 bones meet to form a joint.
Long Bone

Diagram of long bone from DHO
The skeletal system is responsible for the production of:

A) Adrenalin.
B) Red blood cells.
C) Vitamins A and D.
D) Calcium.

And the answer is... B
Do you know?

- Of the following bones, which would MOST LIKELY contain red marrow?
  A) Metacarpals
  B) Sternum
  C) Patella
  D) Fibula

And the answer is ....B
What is the function of an osteoblast?
A) To form new bone tissue
B) To fight infection
C) To produce erythrocytes and leukocytes
D) Protection

And the answer is...A
Skeletal system is divided into 2 sections:

**Axial skeleton**
- Forms the main trunk of the body and is composed of the skull, spinal column, ribs, and breastbone

**Appendicular skeleton**
- Forms the extremities and is composed of the shoulder girdle, arm bones, pelvic girdle, and leg bones
Axial Skeleton: Skull

- Made of cranial & facial bones
- **Cranium** = spherical structure that surrounds and protects the brain.
- It is made of 8 bones
  - 1 frontal, 2 parietal, 2 temporal, 1 occipital, 1 ethmoid, 1 sphenoid
Axial Skeleton: Skull

- Facial bones – 14 bones
  - 1 mandible, 2 maxilla, 2 zygomatic, 2 lacrimal, 5 nasal, 2 palatine
At birth the cranium isn’t solid bone. There are spaces that allow for the enlargement of the skull as brain growth occurs.

What are these spaces called?

**Fontanels** or soft spots

They are made of membrane and cartilage and turn to solid bone by about 18 months of age.
Fontanels

- Posterior fontanel
- Sagittal suture
- Coronal sutures
- Anterior fontanel
Fontanels

- Soft spots with no bones when babies are born. (Connective tissue)
Axial Skeleton:

**Sutures**: areas where cranial bones have joined together

**Sinuses**: air spaces in the bones of the skull that act as resonating chambers for the voice. They are lined with mucous membranes.

**Foramina**: openings in bones that allow nerves and blood vessels to enter or leave the bone
Skull bones and sutures diagram from DHO
Axial Skeleton: Spinal Column

- **Vertebrae**: 26 bones form spinal column. **Why?** To protect the spinal cord & support head & trunk.
- 7 cervical (neck)
- 12 thoracic (chest)
- 5 lumbar (waist)
- 1 sacrum
- 1 coccyx (tailbone)
- Intervertebral disks- pads of cartilage that separate the vertebrae. Act as shock absorbers & permit bending and twisting motions of the vertebral column
Axial Skeleton:

- **Ribs** - 12 pairs. They attach to the thoracic vertebrae on the dorsal surface of the body.

- **True ribs** - 1\textsuperscript{st} 7 pairs, they attach directly to the sternum

- **False ribs** - Next 5 pairs. The 1\textsuperscript{st} 3 pairs of false ribs attach to the cartilage of the rib above.

- **Floating ribs** - Last 2 pairs of false ribs, they have no attachment on the front of the body.
Axial Skeleton:

**Sternum** = breastbone

**Xiphoid process** – small piece of cartilage at the bottom of the sternum

The ribs are attached to the sternum with **costal cartilages** to form a cage that protects the heart and lungs.
Shoulder girdle is made of 2 clavicles (collarbones) and 2 scapulas (shoulder bones).

The scapula provide for the attachment of the upper arm bones.
Appendicular Skeleton: Arm

Bones of the arm:

- 1 **humerus** (upper arm)
- 1 **radius** (lower arm, thumb side)
- 1 **ulna** (larger bone of the lower arm with projection called the **olecranon process** at its upper end that forms the elbow)
- 8 **carpals** (wrist)
- 5 **metacarpals** (palm)
- 14 **phalanges** (3 on each finger, 2 on thumb)
Appendicular Skeleton: Pelvic Girdle

- Pelvic girdle is made of 2 **os coxae** (coxal, or hip bones), which join the **sacrum** on the dorsal part of the body. On the ventral part of the body the os coxae join together at a joint called the **symphysis pubis**.
- Each os coxae is made of 3 fused sections: **ilium**, **ischium**, and **pubis**.
- Pelvic girdle contains 2 recessed areas or sockets called **acetabula** which provide for the attachment of the smooth rounded head of the femur.
- **Obturator foramen**- opening between the ischium and pubis, it allows for the passage of nerves and blood vessels to and from the legs.
Appendicular Skeleton: Leg

- Bones of the leg:
  - 1 femur (thigh)
  - 1 patella (kneecap)
  - 1 tibia (shin bone, it is the larger weight bearing bone of the lower leg)
  - 1 fibula (slender, smaller bone of lower leg that attaches to the proximal end of the tibia)
  - 7 tarsals (ankle)
  - 5 metatarsals (instep of foot), and 14 phalanges (2 on great toe, 3 on other toes)

- Heel is formed by the large tarsal bone - calcaneous
Do you know?

- The vertebrae are part of the:
  A) Pelvic girdle.
  B) Shoulder girdle.
  C) Axial skeleton.
  D) Appendicular skeleton.

And the answer is...C
Do you know?

- What two bones articulate with each other?
  A) Patella and ulna
  B) Vertebrae and sternum
  C) Metacarpals and phalanges
  D) Carpals and humerus

And the answer is... C
Joints - areas where 2 or more bones join together. Connective tissue bands, called ligaments, help hold long bones together at joints.

There are 3 main types of joints:

1. **Diarthrosis or synovial** – freely movable joint. Can you name an example?
   - Ball-and-socket joints of the shoulder and hip or hinge joints of the elbow and knee
2. **Amphiarthrosis** – slightly movable joint. Can you name an example?
   - Attachment of ribs to thoracic vertebrae or the joint between the 2 pelvic bones (symphysis pubis)

3. **Synarthrosis** – immovable joint. Can you name an example?
   - Suture joints of the cranium