MEDICAL EDUCATION RESOURCE

Bones:Frequently Asked Questions,MCQs, Viva Voce

Frequently Asked Questions

1. What are the main parts of the lower limb?

- The lower limb is divided into **four regions**:
    1. **Gluteal region** – buttock and hip area.
    2. **Thigh** – between hip and knee.
    3. **Leg** – between knee and ankle.
    4. **Foot (Pes)** – distal part bearing body weight.

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2. Name the bones forming the pelvic girdle.

- **Two hip bones** (each made of ilium, ischium, and pubis).
- They articulate posteriorly with the **sacrum** and anteriorly at the **pubic symphysis**.

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3. What bones contribute to the formation of the acetabulum?

- **Ilium (upper two-fifths)**
- **Ischium (posterior two-fifths)**

- **Pubis (anterior one-fifth)**
  ? All three meet at the *Y-shaped cartilage* in the acetabulum.

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4. Which bone is the longest and strongest in the body?

- **Femur** — transmits weight from the hip to the tibia.

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5. What is the angle of inclination of the femoral neck with the shaft?

- About **125°–130°** in adults.
  - **Decreased angle (<120°)** ? *Coxa vara*
  - **Increased angle (>135°)** ? *Coxa valga*

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6. What is the largest sesamoid bone?

- **Patella**, located within the tendon of *quadriceps femoris*.

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7. What is the function of the patella?

- Increases **leverage of quadriceps femoris**.
- Protects **anterior surface of knee joint**.

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8. Which bone is known as the “shin bone”?

- **Tibia**, the medial and weight-bearing bone of the leg.

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9. Which bone is commonly used for bone grafting?

- **Fibula**, as it is non–weight-bearing and expendable.

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10. Which nerve winds around the neck of the fibula?

- **Common peroneal (fibular) nerve** — injury leads to **foot drop**.

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11. Name the largest tarsal bone.

- **Calcaneus** — forms the **heel** of the foot.

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12. Name the smallest tarsal bone.

- **Intermediate cuneiform** — lies between the medial and lateral cuneiforms.

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13. Which tarsal bone has no muscular attachments?

- **Talus** — covered only by articular cartilage and ligaments.

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14. What is the sustentaculum tali and what is its importance?

- A **medial shelf-like projection of calcaneus** supporting the head of the talus.
- Provides surface for *spring ligament* and *flexor hallucis longus* tendon.

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15. Which bone transmits body weight from the tibia to the foot?

- **Talus**, articulating above with the tibia and below with the calcaneus.

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16. Which tarsal bone ossifies last?

- **Navicular bone**, ossifying at about **3–4 years of age**.

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17. Which tarsal bone ossifies first after birth?

- **Cuboid bone**, around the **9th month intrauterine or at birth**.

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18. What is the tuberosity of the 5th metatarsal?

- A large **styloid process** on the base of 5th metatarsal for insertion of *peroneus brevis*.

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19. What are sesamoid bones? Give examples in the foot.

- Small bones embedded in tendons that reduce friction.
- **Examples in foot:**
  - Two beneath head of 1st metatarsal (in *flexor hallucis brevis* tendons).
  - *Os peroneum* in *peroneus longus* tendon (near cuboid).

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20. What is the function of sesamoid bones?

- Reduce tendon friction.
- Modify pressure on joints.
- Improve leverage of muscle pull.

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21. Which bones form the medial longitudinal arch of the foot?

- **Calcaneus, talus, navicular, three cuneiforms, and first three metatarsals.**
  ? *Keystone:* Talus.

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22. Which bones form the lateral longitudinal arch?

- **Calcaneus, cuboid, 4th and 5th metatarsals.**
  ? *Keystone:* Cuboid.

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23. Which bones form the transverse arch of the foot?

- **Cuneiforms, cuboid, and bases of metatarsals.**

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24. Which ligaments support the medial longitudinal arch?

- **Plantar calcaneonavicular (spring) ligament** — main ligament.
- **Deltoid ligament** and **long plantar ligament** also contribute.

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25. What are the weight-bearing points of the foot?

- **Posteriorly:** Calcaneal tuberosity (heel).
- **Anteriorly:** Heads of 1st and 5th metatarsals (ball of foot).

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26. What is Pott's fracture?

- **Bimalleolar fracture** of ankle due to *forced eversion*.

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- Medial malleolus fractures ? deltoid ligament tension.
- Talus pushes laterally ? fracture of fibula.

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27. What is Osgood–Schlatter disease?

- **Painful inflammation of the tibial tuberosity** due to traction of *patellar ligament* in adolescents.

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28. What is March fracture?

- **Stress fracture** of the **2nd or 3rd metatarsal** due to repetitive strain in soldiers or runners.

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29. What is Jones fracture?

- **Avulsion fracture of the base of 5th metatarsal**, due to pull of *peroneus brevis* tendon.

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30. What is the commonest site of avascular necrosis in the lower limb bones?

- **Head of femur** (after fracture neck femur) and **body of talus** (after neck fracture).

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31. What is the normal range of Böhler's angle in X-ray of calcaneus?

- **20°–40°**
  ? Decreased in *calcaneal compression fracture.*

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32. Which bone is known as the "keystone" of the medial arch of the foot?

- **Talus.**

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33. Which bone forms the heel prominence?

- **Calcaneus.**

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34. Which bones articulate with the navicular?

- **Posteriorly:** Talus
- **Anteriorly:** Three cuneiforms
- **Laterally:** Sometimes cuboid

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35. Which is the first tarsal bone to ossify in fetal life?

- **Calcaneus** – ossification starts at the **6th month intrauterine life**.

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36. What are the main differences between upper and lower limbs?

- Lower limb ? locomotion and weight-bearing.
- Upper limb ? manipulation and dexterity.
- Lower limb bones ? thicker, stronger, limited movement but stable joints.

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37. What is the function of the plantar aponeurosis?

- Protects plantar structures.

- Maintains **longitudinal arches** of the foot.
- Assists in propulsion during walking.

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38. Why does the talus have high risk of avascular necrosis?

- Blood supply is from small arterial branches entering non-articular surfaces.
- Fractures easily disrupt these, leading to ischemic necrosis.

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39. What is the surgical importance of the iliac crest and tibial surface?

- **Iliac crest:** Site for bone marrow biopsy and bone grafts.
- **Upper tibia:** Site for emergency intraosseous infusion.

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40. What bones form the ankle (talocrural) joint?

- **Lower end of tibia**, **medial malleolus**, **lateral malleolus (fibula)**, and **superior surface of talus**.

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41. Which bone in the leg transmits body weight to the foot?

- **Tibia**, through its **lower articular surface** to the *talus*.

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42. Which bone is called “seat of the body”?

- **Ischial tuberosity** — bears body weight while sitting.

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43. What are the parts of the hip bone?

- **Ilium**, **ischium**, and **pubis**, fusing at the *acetabulum*.

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44. Which bone forms the medial malleolus?

- **Tibia.**

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45. Which bone forms the lateral malleolus?

- **Fibula.**

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46. Which ligament connects the patella to the tibial tuberosity?

- **Ligamentum patellae.**

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47. What is the function of arches of the foot?

- Provide **shock absorption**, **elasticity**, and **weight distribution** during standing and walking.

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48. Which tarsal bone articulates with the 4th and 5th metatarsals?

- **Cuboid.**

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49. Name the bones forming the transverse arch of foot.

- **Cuneiforms, cuboid, and bases of metatarsals.**

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50. What are the major functions of the lower limb skeleton?

- **Support of body weight**
- **Locomotion**
- **Postural balance**
- **Shock absorption** through arches of the foot

Multiple Choice Questions (MCQs) – Lower Limb Bones

1. Which of the following bones forms the acetabulum?

A. Ilium, ischium, and pubis
B. Ilium and pubis only
C. Pubis and ischium only
D. Ilium, ischium, and sacrum
? **Answer:** A
? The acetabulum is formed by all three parts of the hip bone meeting at the Y-shaped cartilage.

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2. The largest and strongest bone of the human body is:

A. Tibia
B. Femur
C. Fibula
D. Humerus
? **Answer:** B
? The femur supports body weight and forms the major lever for locomotion.

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3. The longest and thickest bone in the lower limb is:

A. Tibia
B. Femur
C. Fibula
D. Calcaneus
? **Answer:** B

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4. The ischial tuberosity gives origin to which of the following muscles?

A. Rectus femoris
B. Hamstrings
C. Gluteus medius
D. Tensor fasciae latae
? **Answer:** B
? The hamstrings—biceps femoris (long head), semitendinosus, semimembranosus—arise from the ischial tuberosity.

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5. The bone known as the “seat bone” is:

A. Ilium
B. Ischium
C. Pubis
D. Sacrum
? **Answer:** B
? Ischial tuberosity bears body weight in sitting posture.

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6. The patella is a:

A. Flat bone
B. Irregular bone
C. Sesamoid bone
D. Short bone
? **Answer:** C
? It is the largest sesamoid bone, embedded in the quadriceps tendon.

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7. The tibia articulates with all except:

A. Femur
B. Fibula
C. Talus
D. Navicular
? **Answer:** D
? Tibia articulates with femur (knee), fibula (upper and lower ends), and talus (ankle).

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8. Which of the following is the non–weight-bearing bone of the leg?

A. Femur
B. Tibia
C. Fibula
D. Talus
? **Answer:** C
? Fibula serves for muscle attachment and lateral ankle support but does not bear weight.

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9. Which nerve winds around the neck of the fibula?

A. Tibial nerve
B. Common peroneal nerve
C. Sural nerve
D. Saphenous nerve
? **Answer:** B
? Injury here causes foot drop due to paralysis of dorsiflexors.

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10. The largest tarsal bone is:

A. Talus
B. Navicular
C. Calcaneus
D. Cuboid
? **Answer:** C
? The calcaneus forms the heel and bears body weight posteriorly.

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11. The tarsal bone without muscular attachment is:

A. Talus
B. Calcaneus
C. Cuboid
D. Navicular
? **Answer:** A
? Talus is covered by articular cartilage and ligaments only.

---

12. Which bone forms the heel prominence?

A. Talus
B. Navicular
C. Calcaneus
D. Cuboid
? **Answer:** C

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13. The sustentaculum tali is a part of which bone?

A. Talus
B. Navicular
C. Calcaneus
D. Cuboid
? **Answer:** C
? It supports the talar head and carries the tendon of flexor hallucis longus below it.

---

14. Which tarsal bone ossifies last?

A. Talus
B. Calcaneus
C. Navicular
D. Cuboid
? **Answer:** C
? Navicular ossifies at 3–4 years, last among tarsals.

---

15. The cuboid bone articulates with how many bones?

A. 4
B. 5
C. 6
D. 7
? **Answer:** B
? Articulates with calcaneus, lateral cuneiform, navicular, 4th and 5th metatarsals.

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16. The 5th metatarsal gives attachment to which muscle?

A. Tibialis posterior
B. Peroneus brevis
C. Tibialis anterior
D. Peroneus longus
? **Answer:** B
? Peroneus brevis inserts on the tuberosity of the 5th metatarsal.

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17. Which is the first tarsal bone to ossify in intrauterine life?

A. Talus
B. Calcaneus
C. Cuboid
D. Navicular
? **Answer:** B
? Calcaneus ossifies in the 6th month IU.

---

18. Which tarsal bone ossifies first after birth?

A. Navicular
B. Cuboid
C. Talus
D. Lateral cuneiform
? **Answer:** B

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19. The keystone of the medial longitudinal arch is:

A. Navicular
B. Talus
C. Cuboid
D. Calcaneus
? **Answer:** B

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20. The keystone of the lateral longitudinal arch is:

A. Talus
B. Cuboid
C. Navicular
D. Calcaneus
? **Answer:** B

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21. The bone commonly fractured in a fall from height landing on the heel is:

A. Talus
B. Calcaneus
C. Cuboid
D. Navicular
? **Answer:** B
? Axial compression fractures the calcaneus, reducing Böhler's angle.

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22. Which artery is most at risk in fracture of the neck of femur?

A. Lateral circumflex femoral artery
B. Medial circumflex femoral artery
C. Obturator artery
D. Inferior gluteal artery
? **Answer:** B
? Provides major blood supply to femoral head via retinacular branches.

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23. Böhler's angle is used in X-ray assessment of:

A. Talus fracture

B. Femur fracture

C. Calcaneus fracture

D. Fibula fracture

? **Answer:** C

? Normal 20°–40°, reduced in calcaneal compression.

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24. The commonest site for stress fracture (march fracture) is:

A. Tibia

B. Femur

C. 2nd metatarsal

D. 5th metatarsal

? **Answer:** C

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25. The largest sesamoid bone in the human body is:

A. Patella

B. Os peroneum

C. Fabella

D. Sesamoid under great toe

? **Answer:** A

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26. Which bone of the foot is last to complete ossification?

A. Navicular

B. Cuboid

C. Lateral cuneiform

D. Talus

? **Answer:** A

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27. Which bone articulates with all three cuneiform bones?

A. Navicular

B. Cuboid

C. Talus

D. 2nd metatarsal

? **Answer:** A

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28. Which ligament forms the floor of the talonavicular joint?

A. Long plantar ligament

B. Spring ligament

C. Short plantar ligament

D. Deltoid ligament

? **Answer:** B

? The *plantar calcaneonavicular (spring) ligament* supports the talar head.

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29. The transverse arch of the foot is mainly maintained by:

A. Long plantar ligament

B. Peroneus longus tendon

C. Tibialis posterior tendon

D. Both B and C

? **Answer:** D

? Crossing tendons of peroneus longus and tibialis posterior maintain the transverse arch.

---

30. Which tarsal bone lies between the talus and cuneiforms?

A. Navicular

B. Cuboid

C. Calcaneus

D. Lateral cuneiform

? **Answer:** A

---

31. The tibial tuberosity gives attachment to which structure?

A. Semitendinosus tendon

B. Patellar ligament

C. Sartorius tendon

D. Gracilis tendon

? **Answer:** B

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32. Which bone is used for bone-marrow biopsy and grafting?

A. Fibula

B. Iliac crest

C. Calcaneus

D. Tibia

? **Answer:** B

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33. The ischial spine gives attachment to which ligament?

A. Sacrotuberous ligament

B. Sacrospinous ligament

C. Iliofemoral ligament

D. Pubofemoral ligament

? **Answer:** B

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34. Which is the main weight-bearing bone of the leg?

A. Femur

B. Fibula

C. Tibia

D. Talus

? **Answer:** C

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35. Which structure passes below the sustentaculum tali?

A. Flexor digitorum longus

B. Flexor hallucis longus

C. Tibialis posterior

D. Peroneus longus

? **Answer:** B

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36. Which of the following is a feature of the cuboid bone?

A. Groove for tibialis posterior tendon
B. Groove for peroneus longus tendon
C. Groove for flexor hallucis longus tendon
D. Groove for flexor digitorum longus tendon
? **Answer:** B

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37. Which of the following bones of the foot does *not* participate in the formation of the medial longitudinal arch?

A. Talus
B. Calcaneus
C. Cuboid
D. Navicular
? **Answer:** C

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38. The navicular bone articulates with how many bones?

A. 4
B. 5
C. 6
D. 7
? **Answer:** B
? Talus + 3 cuneiforms + sometimes cuboid.

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39. The bone forming the “keystone” of the lateral longitudinal arch is:

A. Calcaneus
B. Cuboid
C. Talus
D. Navicular
? **Answer:** B

---

40. The flat surface under the 1st metatarsal head bears how many sesamoid bones?

A. One

B. Two

C. Three

D. None

? **Answer:** B

? Medial and lateral sesamoids in *flexor hallucis brevis* tendons.

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41. The bone used to assess full-term maturity of a newborn on X-ray is:

A. Talus

B. Calcaneus

C. Cuboid

D. Navicular

? **Answer:** C

? Presence of ossification centre in cuboid indicates full-term fetus.

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42. The commonest site of avascular necrosis in the lower limb is:

A. Head of femur

B. Shaft of tibia

C. Base of 5th metatarsal

D. Patella

? **Answer:** A

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43. The bone forming the lateral malleolus is:

A. Tibia

B. Fibula

C. Talus

D. Calcaneus

? **Answer:** B

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44. The bone forming the medial malleolus is:

A. Tibia
B. Fibula
C. Talus
D. Navicular
? **Answer:** A

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45. The pelvic brim is formed by which part of the ilium?

A. Body
B. Ala
C. Arcuate line
D. Iliac crest
? **Answer:** C

---

46. Which bone is subcutaneous throughout its length in the leg?

A. Tibia
B. Fibula
C. Talus
D. Calcaneus
? **Answer:** A

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47. Which bone has a groove for the peroneus longus tendon?

A. Talus
B. Navicular
C. Cuboid
D. Calcaneus
? **Answer:** C

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48. The head of the talus articulates with:

A. Calcaneus
B. Navicular
C. Cuboid

D. Lateral cuneiform

? **Answer:** B

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49. The anterior cruciate ligament attaches to which part of the tibia?

A. Lateral condyle

B. Medial condyle

C. Anterior intercondylar area

D. Posterior intercondylar area

? **Answer:** C

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50. Which of the following bones contributes to both the medial and transverse arches of the foot?

A. Talus

B. Navicular

C. Cuboid

D. Lateral cuneiform

? **Answer:** B

Viva Voce – Lower Limb (Bones)

General and Pelvic Girdle

Q1. How many bones form the lower limb skeleton?

A. Thirty bones — 1 hip bone, 1 femur, 1 patella, 1 tibia, 1 fibula, and 26 bones of the foot.

Q2. Name the bones forming the pelvic girdle.

A. Two hip bones, each formed by fusion of ilium, ischium, and pubis.

Q3. What is the acetabulum?

A. A deep cup-shaped cavity on the lateral side of the hip bone where the head of femur articulates to form the hip joint.

Q4. Which bones take part in forming the acetabulum?

A. Ilium, ischium, and pubis.

Q5. What is the obturator foramen and what passes through it?

A. A large oval opening formed by ischium and pubis; closed by obturator membrane except for the *obturator canal* through which obturator nerve and vessels pass.

Q6. What is the significance of the ischial spine?

A. Landmark between greater and lesser sciatic foramina; gives attachment to the *sacrospinous ligament*.

Q7. What is the ischial tuberosity known for?

A. It bears the weight of the body while sitting and gives origin to hamstring muscles.

Q8. What is the function of the pubic symphysis?

A. Joins the two hip bones anteriorly via fibrocartilage, allowing limited movement.

Femur

Q9. Which is the longest and strongest bone in the body?

A. Femur.

Q10. Name the parts of the femur.

A. Upper end, shaft, and lower end.

Q11. What is the normal neck-shaft angle of the femur?

A. About 125°–130°.

Q12. What is coxa vara and coxa valga?

A. *Coxa vara* – decreased neck-shaft angle; *Coxa valga* – increased angle.

Q13. Name the structures attached to the greater trochanter.

A. Gluteus medius, minimus, piriformis, obturator internus, and gemelli.

Q14. What is the importance of the lesser trochanter?

A. Insertion site for *iliopsoas*, the chief flexor of the thigh.

Q15. Which artery supplies the head of the femur?

A. Medial circumflex femoral artery (via retinacular branches).

Q16. What happens if these arteries are damaged in neck fracture?

A. Avascular necrosis of the femoral head.

Patella

Q17. What type of bone is the patella?

A. Sesamoid bone.

Q18. In which tendon is the patella present?

A. Quadriceps femoris tendon.

Q19. What is the function of the patella?

A. Increases leverage of quadriceps during knee extension.

Q20. What is the clinical importance of patellar fracture?

A. Disrupts the extensor mechanism of the knee.

Tibia

Q21. Which bone forms the medial malleolus?

A. Tibia.

Q22. What is the function of the tibial tuberosity?

A. Insertion site for the *patellar ligament*.

Q23. Which surface of tibia is subcutaneous?

A. The anterior surface and medial border — palpable along the “shin”.

Q24. What is Osgood–Schlatter disease?

A. Painful inflammation at the tibial tuberosity due to traction from quadriceps in adolescents.

Q25. What does the upper articular surface of tibia form?

A. The *tibial plateau* for articulation with femoral condyles.

Fibula

Q26. Is the fibula weight-bearing?

A. No, it is non–weight-bearing and mainly for muscle attachment.

Q27. What is the head of the fibula related to clinically?

A. Common peroneal nerve winds around its neck — injury leads to foot drop.

Q28. What does the lower end of the fibula form?

A. The lateral malleolus of the ankle.

Q29. What are the uses of the fibula in surgery?

A. Used as a donor bone for grafting without functional loss.

Tarsal Bones

Q30. Name the tarsal bones.

A. Talus, calcaneus, navicular, cuboid, and three cuneiforms (medial, intermediate, lateral).

Q31. Which is the largest tarsal bone?

A. Calcaneus.

Q32. Which tarsal bone lies between talus and cuneiforms?

A. Navicular.

Q33. Which tarsal bone has no muscular attachment?

A. Talus.

Q34. What is sustentaculum tali?

A. Medial projection from calcaneus supporting talar head and groove for flexor hallucis longus tendon.

Q35. What is the function of the calcaneus?

A. Forms the heel and transmits body weight to the ground.

Q36. Which bone forms the keystone of the medial longitudinal arch?

A. Talus.

Q37. Which bone forms the keystone of the lateral longitudinal arch?

A. Cuboid.

Metatarsals and Phalanges

Q38. How many metatarsal bones are there?

A. Five, numbered I to V from medial to lateral side.

Q39. Which is the shortest and thickest metatarsal?

A. First metatarsal.

Q40. What is the special feature of the fifth metatarsal?

A. Tuberosity (styloid process) for insertion of *peroneus brevis*.

Q41. What are the phalanges of the foot?

A. 14 in total — two in the great toe, three in each of the other toes.

Q42. What is the function of the distal phalanges?

A. Support the nail bed and terminal pad of toes.

Sesamoid Bones

Q43. What are sesamoid bones?

A. Small bones embedded in tendons where they pass over joints.

Q44. Name the constant sesamoid bones in the foot.

A. Two under the head of the first metatarsal (medial and lateral).

Q45. What is their function?

A. Reduce friction, protect tendons, and improve leverage of toe flexors.

Q46. What is sesamoiditis?

A. Inflammation of sesamoid bones causing forefoot pain (common in athletes).

Arches of the Foot

Q47. Name the arches of the foot.

A. Medial longitudinal, lateral longitudinal, and transverse arches.

Q48. What are the main ligaments maintaining the arches?

A. Spring ligament, long plantar ligament, and short plantar ligament.

Q49. What is the keystone of the medial arch?

A. Talus.

Q50. What is the clinical importance of the arches?

A. Maintain balance, distribute weight, and act as shock absorbers during locomotion.

Clinical-Oriented Viva

Q51. What is Pott's fracture?

A. Bimalleolar ankle fracture due to forced eversion injury.

Q52. What is March fracture?

A. Stress fracture of 2nd or 3rd metatarsal due to overuse.

Q53. What is Osgood–Schlatter disease?

A. Inflammation of tibial tuberosity in growing children due to repeated strain.

Q54. What is the consequence of a neck of femur fracture in elderly?

A. Shortening and external rotation of the limb due to loss of weight-bearing continuity.

Q55. Why is the talus prone to avascular necrosis?

A. Blood supply enters through small non-articular areas, easily disrupted by fractures.

Q56. What is flatfoot (pes planus)?

A. Collapse of the medial arch due to ligament or muscle weakness.

Q57. What is clubfoot (talipes equinovarus)?

A. Congenital inversion and adduction deformity of the foot.

Q58. What is the importance of the fibular head during injections?

A. Common peroneal nerve passes around it — must be avoided.

Q59. What is the purpose of the calcaneal tuberosity?

A. Insertion site of the *tendo calcaneus (Achilles tendon)*.

Q60. Which bone is commonly fractured in a fall from height?

A. Calcaneus.

Summary Viva Pearls

- **Femur** ? Longest, strongest bone.

- **Tibia** ? Weight-bearing bone, subcutaneous.
- **Fibula** ? Non–weight-bearing, nerve close to neck.
- **Patella** ? Largest sesamoid bone.
- **Talus** ? No muscle attachments, keystone of medial arch.
- **Calcaneus** ? Heel bone, largest tarsal.
- **Cuboid** ? Keystone of lateral arch.
- **Navicular** ? Last to ossify, articulates with 3 cuneiforms.
- **Cuneiforms** ? Wedge-shaped, maintain arch.
- **Metatarsals** ? 1st shortest and thickest; 5th has styloid process.
- **Sesamoid bones** ? Beneath head of 1st metatarsal.

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