



MED437  
KING SAUD UNIVERSITY



# Sacrum and Pelvic

Lecture 7

Please check our [Editing File](#).

هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ  
{حَسْبُهُ}

# Objectives

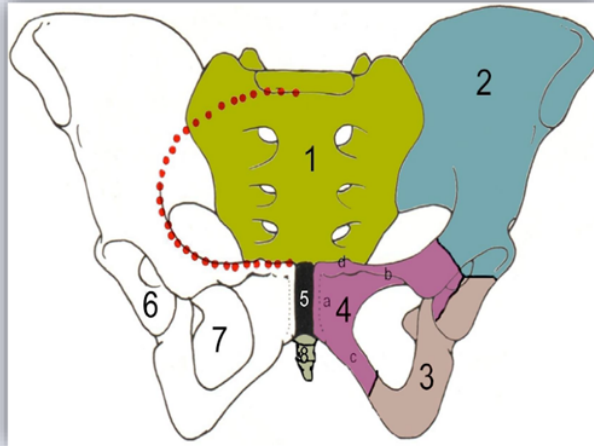
- Describe the bony structures of the pelvis.
- Describe in detail the hip bone, the sacrum, and the coccyx.
- Describe the boundaries of the pelvic inlet and outlet.
- Identify the structures forming the Pelvic Wall.
- Identify the articulations of the bony pelvis.
- List the major differences between the male and female pelvis.
- List the different types of female pelvis.
  
- Text in **BLUE** was found only in the boys' slides
- Text in **PINK** was found only in the girls' slides
- **Text in RED is considered important**
- Text in **GREY** is considered extra notes

# Bony Pelvis

From team 436

Location	SHAPE	Structure: Pelvis can be regarded as a basin with holes in its walls. The structure of the basin is composed of:	
Pelvis is the region of the trunk that lies below the abdomen.	Bowl shaped	4 bones	4 joints

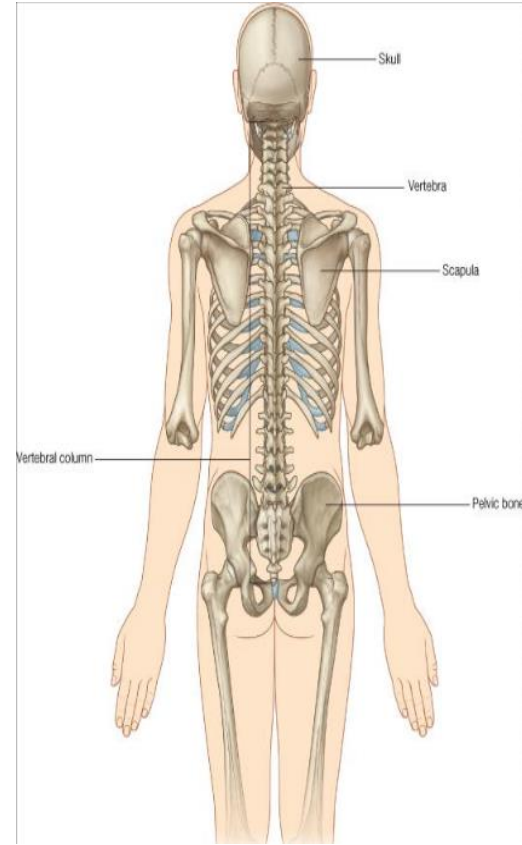
- 1-sacrum
- 2-ilium
- 3-ischium
- 4-pubic
- 5-pubic symphysis
- 6-Acetabulum



- A. Two hip bones: These form the lateral and anterior walls of the bony pelvis.
- B. Sacrum: It forms most of the posterior wall.
- C. Coccyx: It forms most of the posterior wall.

# Bony Pelvis, Functions:

- ❖ The skeleton of the pelvis is a basin-shaped ring of bones with holes in its walls that connect the vertebral column (Trunk) to both femora (lower extremities).
- ❖ Its **Primary Functions** are:
  - **Bears** the weight of the upper body when sitting and standing “the most important function”.
  - **Transfers** that weight from the axial skeleton to the lower appendicular skeleton when standing and walking.
  - Provides attachments and withstands the forces of the **powerful** muscles of locomotion (movement) and posture.
- ❖ Its **Secondary Functions** are:
  - **Contains and Protects** the pelvic and abdominopelvic viscera (inferior parts of the urinary tracts, internal reproductive organs)
  - **Provides** attachment for external reproductive organs and associated muscles and membranes.



# Pelvic Girdle :

- ❖ Compared to the Pectoral Girdle, the pelvic girdle is Larger, heavier, and stronger.
- ❖ The total weight of the upper body rests on the pelvis.
- ❖ **Composed of:**
  - Two hip (coxal) bones

Important to know the difference between:

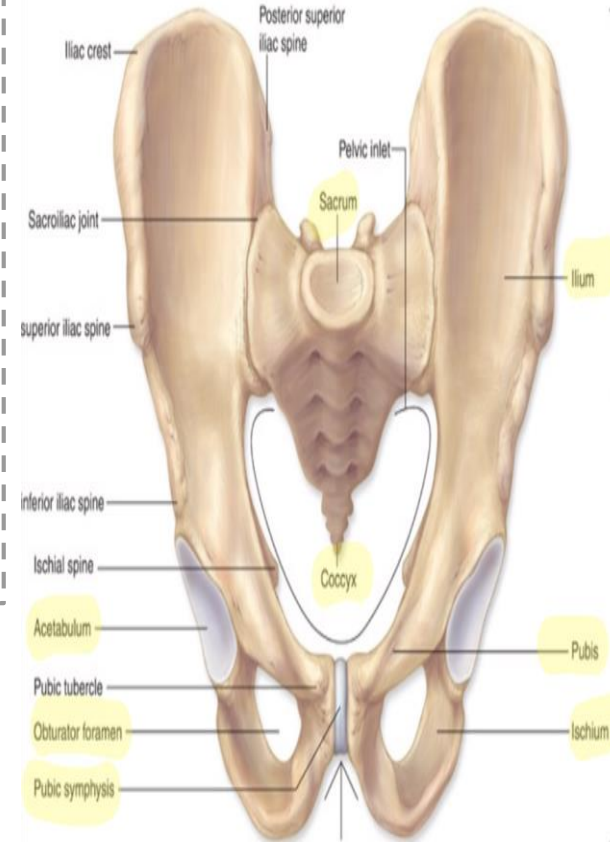
Bony Pelvis : hip bones, sacrum and coccyx.

Pelvic girdle: only the two hip bones.

\*Acetabulum: The socket of the hip bone, into which the head of the femur fits.

# Hip Bone :

- ❖ Each one is a large irregular bone.
- ❖ Formed of three bones:
  - Ilium (superior)
  - Ischium (inferior posterior)
  - Pubis (inferior anterior)
- ❖ They are joined at a deep socket (**Acetabulum**)\*
- ❖ During childhood, these sections are separate bones, joined by **Y shaped cartilage.**
- ❖ During puberty, they fuse together to form a single bone.



# Ilium

▪ It is the Upper Flattened Part of the **hip bone**.

\*Waist: body below the ribs and above the hips

The **Inner** surface has:

- **Iliac Fossa** (forms false pelvis). *Smooth*
- **Auricular surface** ( for articulation with the sacrum). *Rough*
- **Iliopectinial (Arcuate) Line:**
- Runs downwards & forwards.
- It separates between the False & the True pelvis

**Iliac Crest:** An important anatomical landmark below the \*waist.

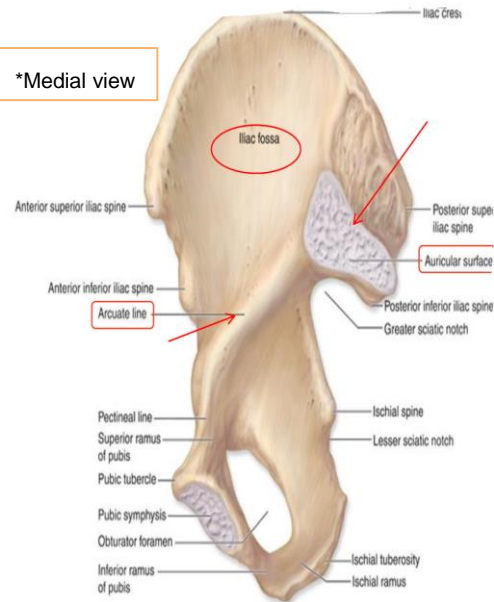
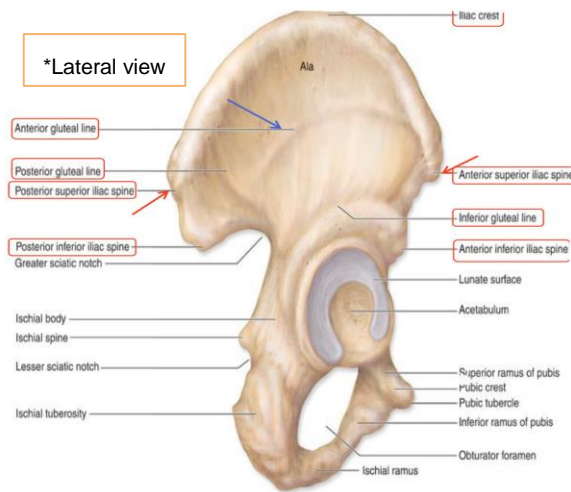
- It runs between the Anterior and Posterior Superior Iliac Spines.
- Below are the corresponding Anterior and Posterior Inferior Iliac Spines. (Total 4 spines)

▪ **It Possesses:**

▪ It has: **two** surfaces:

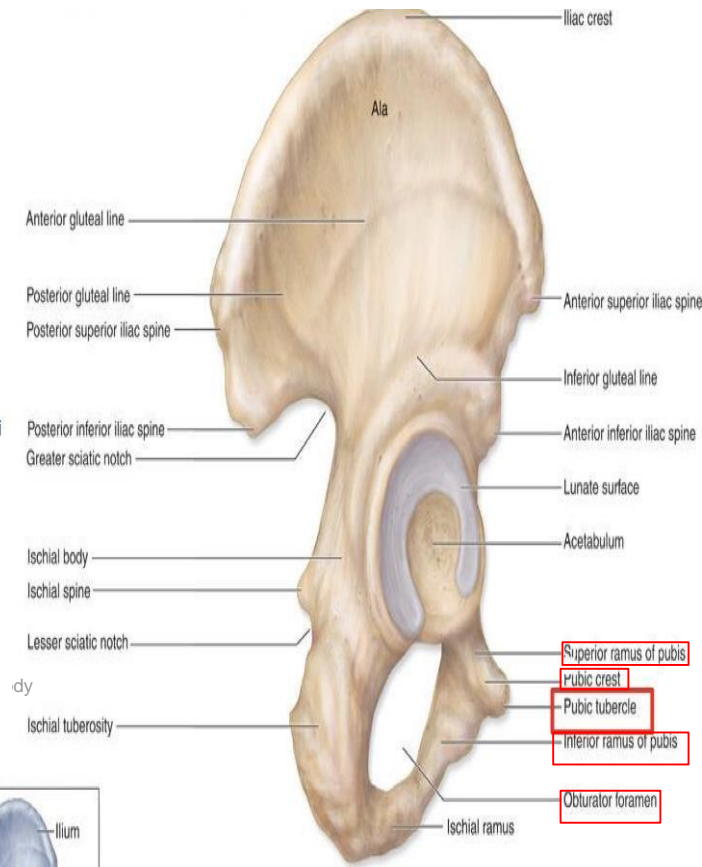
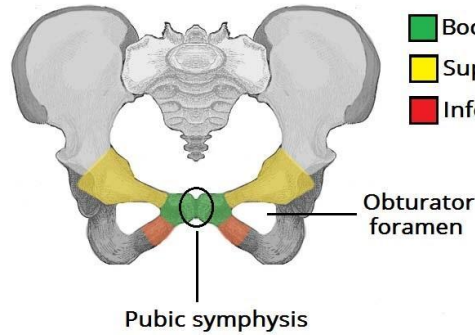
▪ The **Outer** Surface: rough and has **three Gluteal Lines**

Outer surface: called "Gluteal surface" because it has 3 gluteal lines, which serves as an attachment for gluteal muscles, (Maximus, medius, minimus).



- Forms the Anterior & Inferior part of the hip bone.
- It is composed of:
  - **Body**; bears the Pubic Crest and Pubic Tubercle.
  - **Two pubic Rami**; Superior & Inferior.
  - They bound the **Obturator Foramen**, which is closed partially by the obturator membrane. leaving the obturator canal for passing of blood vessels & nerves into the thigh

# Pubis (3 parts)



The greater and lower sciatic notches are separated by the ischial spine

# Ischium:

• Forms the Posterior & inferior part of the hip bone

• **Ischial Tuberosity:**

A roughened area that receives body weight in sitting العظمة الي نجلس عليها

• **Ischial Spine:**

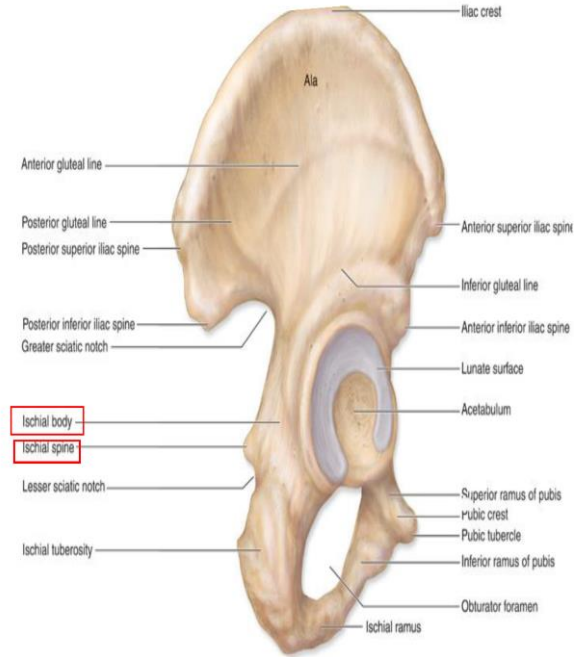
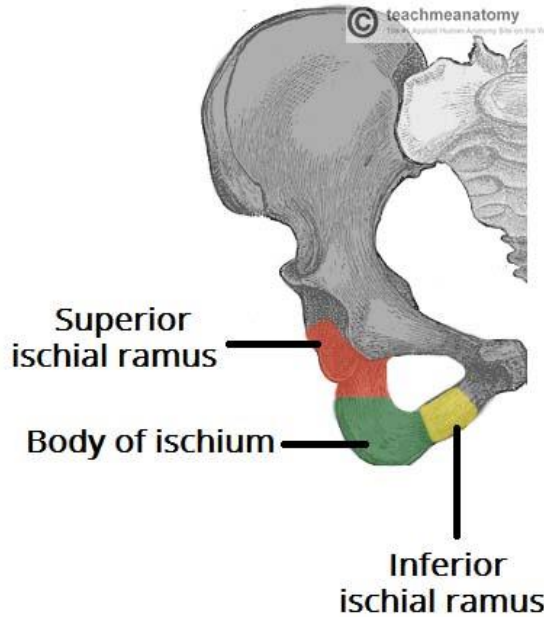
Superior to the tuberosity, it is important landmark in pregnant women. (obstetrics)

• **Greater sciatic notch.**

Allow sciatic nerve & vessels to pass from the pelvis to the thigh.

• **Lesser sciatic notch.**

allow vessels & nerves to pass from pelvic to \*perinium.



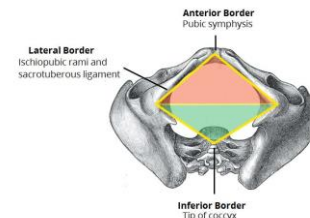
In Living patients:

- Greater Sciatic Foramen
- Lesser Sciatic Foramen

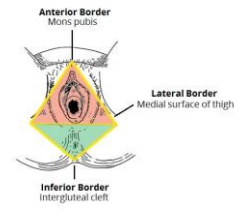
\*The distance between two spines help us know weather the women will have a normal birth or not.

\*Extra: The perinium

Anatomical Borders:



Surface Borders:





# Articulations of hip bone

## symphysis pubis:

-a secondary cartilaginous joint between the two pubic bones

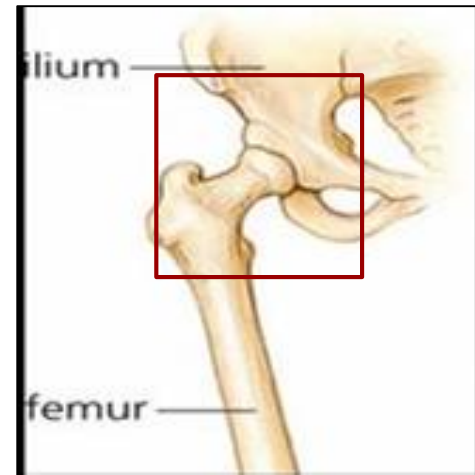
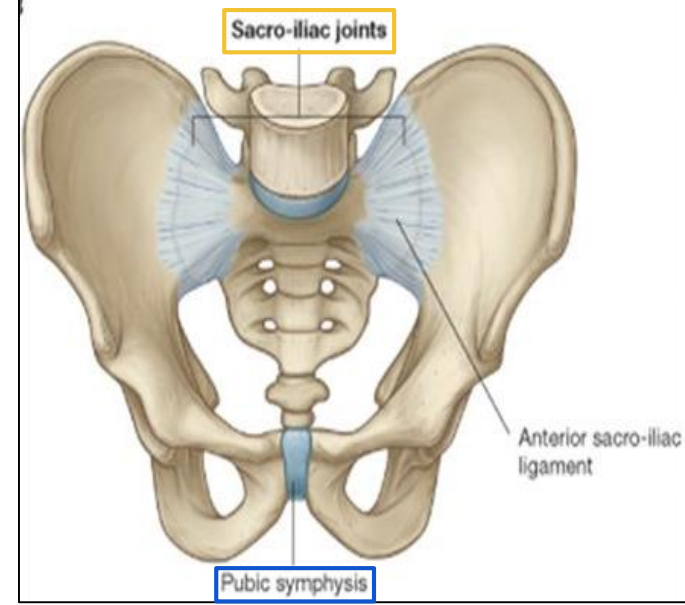
## Sacroiliac joints:

-strong synovial joints, between the auricular surfaces of both iliac bones and the sacrum

-transmit the weight of the body from vertebral column to the bony pelvis

## Hip joints:

-The outer surface articulates at the acetabulum with the head of the femur.



# Sacrum And Coccyx:

## \*Sacrum:

- A single wedge shaped bone.
- Consist of **Five** rudimentary **بدائية** vertebrae fused together.
- The anterior and posterior surfaces possess on each side **four Sacral Foramina**.
- The fused vertebral foramina form the **\*Sacral Canal**.
- Its lower limit is the **Sacral Hiatus**.

## Sacral promontory:

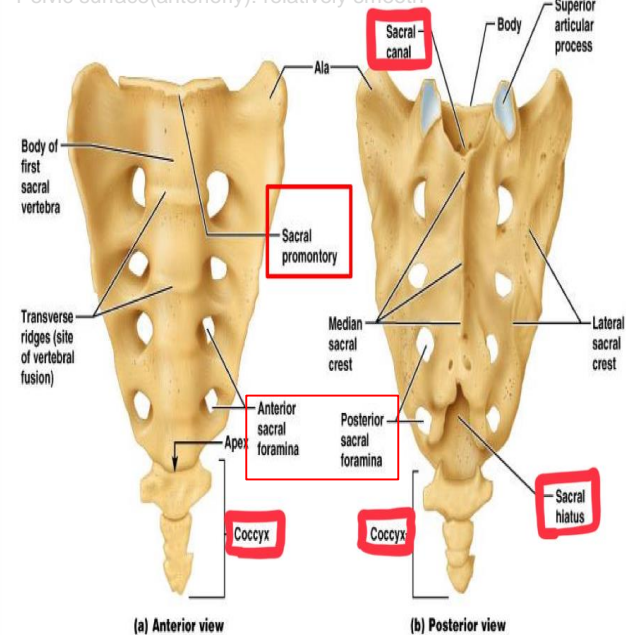
- 1) The anterior and upper margin.(represent the body of the first sacral vertebrae)
- 2) It is tilted forward forming the **lumbosacral angle**.

\*Sacral Canal: The cauda equina, pass through the canal to send their dorsal and ventral rami through the corresponding sacral foramina.

## Coccyx:

- Consists of **four** vertebrae fused together forming a single Triangular piece.

\*Dorsal surface(Posterior): rough & ridge  
Pelvic surface(anteriorly): relatively smooth



# Articulation Of Sacrum

## 1) Lumbosacral joint:

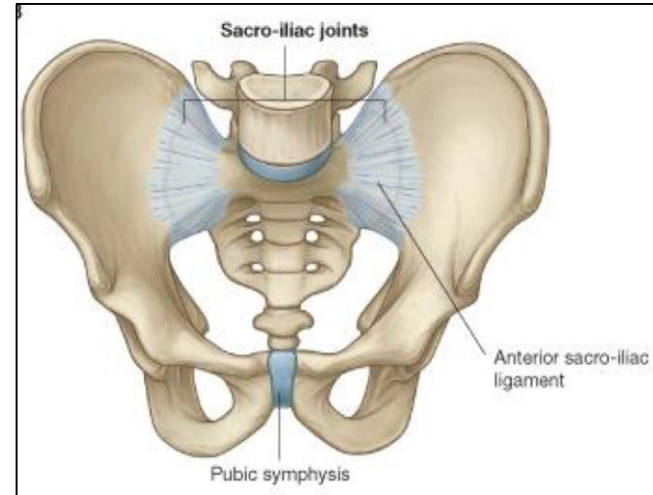
The upper border articulates with the 5th lumbar vertebra.

## 2) Sacrococcygeal joint:

The inferior part articulates with the Coccyx.

## 3) Sacroiliac joints:

Lateral articulation with both hip bones.



These joints + pubic symphysis form the bony pelvis; by joining the sacrum and the hip bones together

# Foramina in Body pelvis

- The holes of the basin are called **foramina**.
- The important foramina in the bony pelvis include:

## Anterior sacral foramina

- These are present on the anterior surface of the sacrum (which forms the posterior surface of the bony pelvis)
- Through these foramina pass the anterior rami of the sacral spinal nerves.

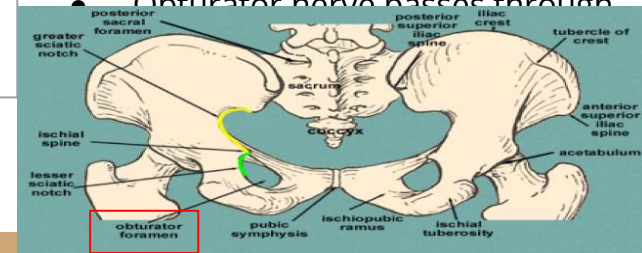
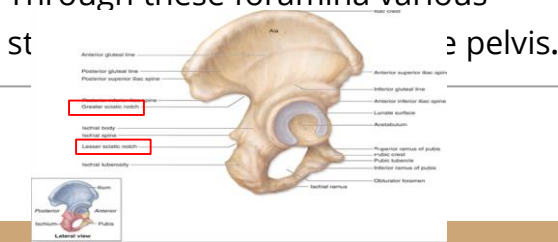
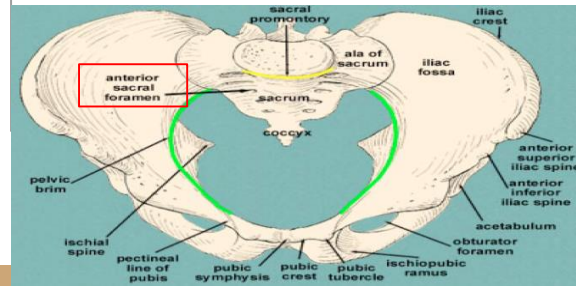
## Greater and lesser sciatic foramina

- These are the **major foramina of the pelvis**.
- In the bony pelvis, they are present as greater and lesser sciatic notches but by the attachment of **sacrospinous** and **sacrotuberous** ligaments, these notches are converted to respective foramina.
- Through these foramina various st

## Obturator foramen

- Each lateral wall of the pelvis has a large hole, called the **obturator foramen**.
- In living subjects, this hole is closed by the obturator membrane except for a small opening, which represents the obturator canal.

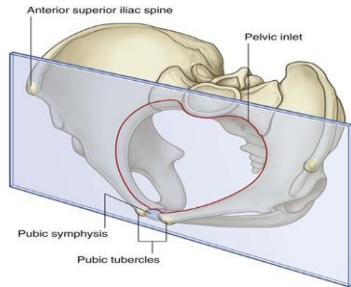
• Obturator nerve passes through



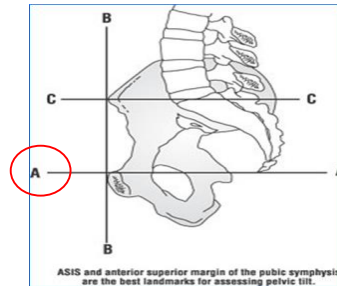
# Orientation of the Pelvis

It is the **Correct Position** of the bony pelvis relative to the trunk (in the anatomical position):

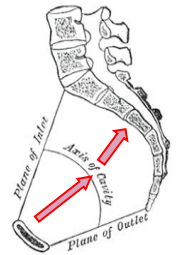
1. The Anterior Superior iliac spine and the front of the Symphysis pubis (The pubic tubercles) are in the same **vertical plane**.



2. The coccyx and the upper margin of the pubic symphysis are in the same **horizontal plane**.



3. The axis of the pelvic cavity running through the central point of the inlet and the outlet, almost parallels the curvature of the sacrum.

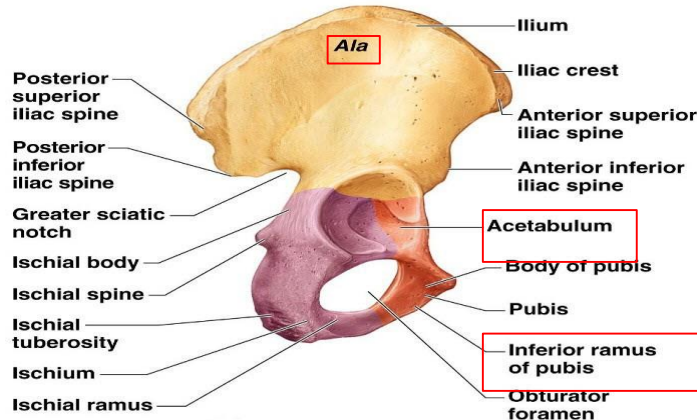


In this position: The anterior surface of the **Sacrum** is directed forward and downward while the pelvic surface of **symphysis pubis** faces upward and backward.

# Fractures of the Bony Pelvis

The weakest parts of the bony pelvis are:

- ❑ **Pubic rami**
- ❑ **Acetabula**
- ❑ **Region of sacroiliac joint**
- ❑ **Alae of the ilium**



- ❖ Pelvic Fractures can result from direct trauma to the pelvic bones as occurs in car accidents or by forces transmitted to these bones from the lower limbs during falls on the feet.
- ❖ Pelvic fractures may cause injury to the pelvic soft tissues, blood vessels, nerves and organs.

# Subdivision of the bony pelvis

The bony pelvis is divided into two parts by the **Pelvic Brim**.

The brim is formed

- Posteriorly: Sacral Promontory
- Laterally: Iliopectineal line
- Anteriorly: Symphysis pubis.

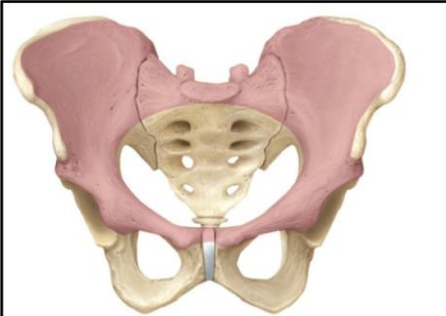
Only in girl's slides →

- **Above** the pelvic brim lies the **False Pelvis**, which is not of much clinical importance.
- **Below** the brim is the **True Pelvis**

## False Pelvis (Greater pelvis)

Lies **superior** to the pelvic brim.

- Enclosed by the **Fossae of the iliac bones**
- Forms the inferior region of the abdominal cavity.
- Houses the **Inferior abdominal organs**



(c) Anterior view of false pelvis (pink)

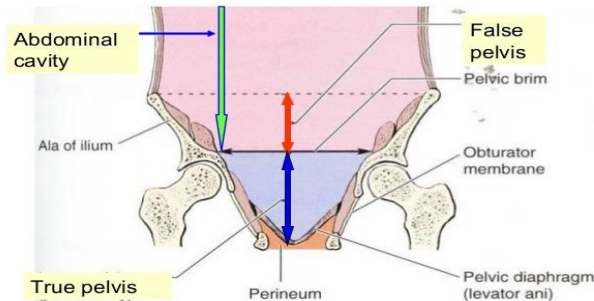
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## True Pelvis (lesser pelvis)

Lies **inferior** to the pelvic brim.

- Encloses the **pelvic cavity**.
- Contains the pelvic organs.
- It has :  
**Inlet**  
**Outlet**  
**Pelvic walls**

### TRUE & FALSE PELVIS

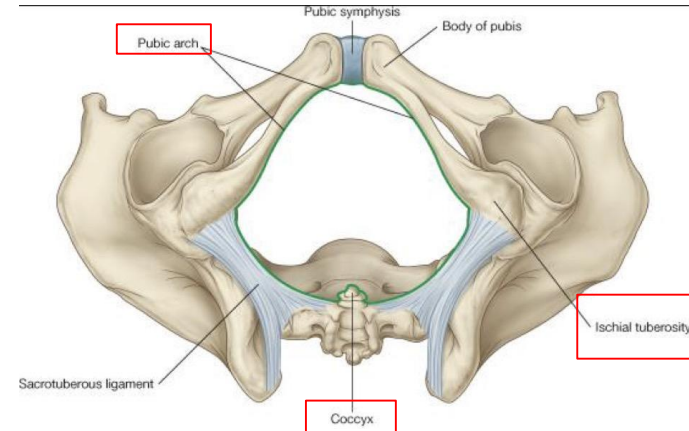
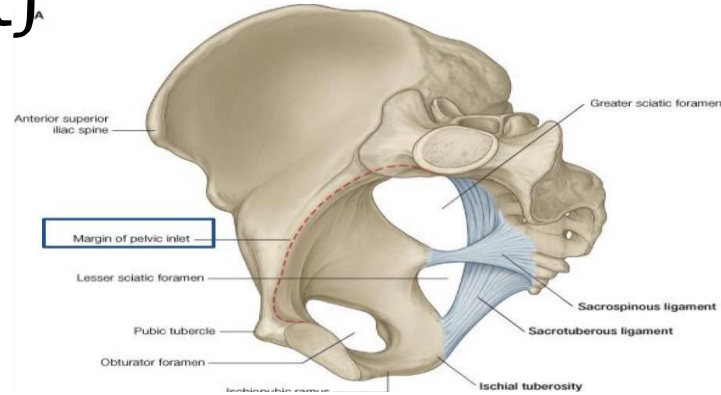
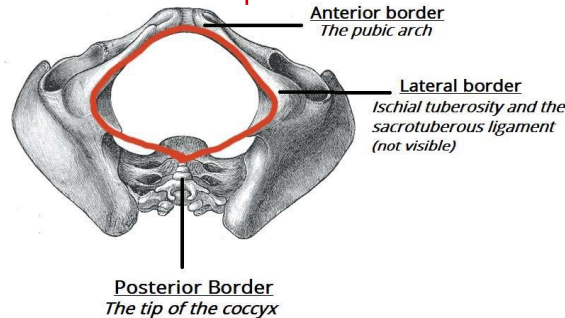
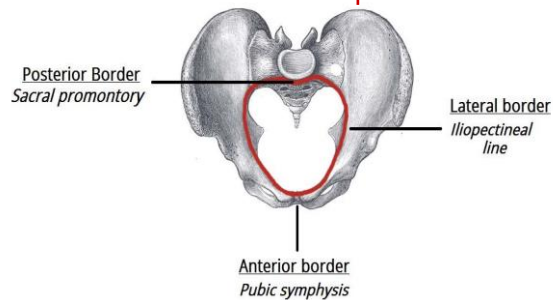


(d) Anterior view of true pelvis (blue)



# True Pelvis (pelvic inlet and outlet)

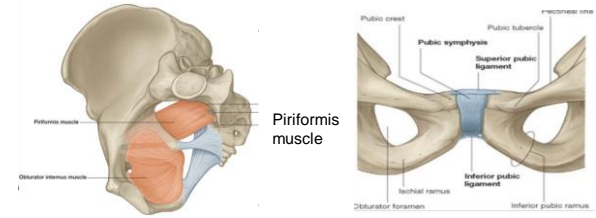
	Pelvic Inlet (pelvic brim)	Pelvic outlet
Bounded by:	1- Sacral promontory 2- Symphysis pubes 3- Iliopectineal lines	1- Tip of Coccyx 2- Ischial tuberosities 3- Pubic arches



# Pelvic Walls

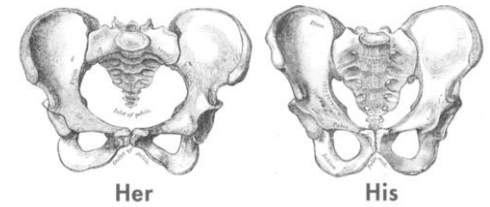
- Formed by bones and ligaments
- Lined with muscles, and covered with fascia

This slide is only in males lecture

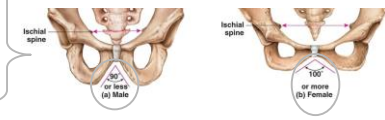


Anterior wall	Posterior wall	Lateral wall
<ul style="list-style-type: none"> <li>- Posterior surfaces of bodies of pubic bones</li> <li>- Pubic rami</li> <li>- Symphysis pubes</li> </ul>	<ul style="list-style-type: none"> <li>- <u>Sacrum and coccyx</u></li> <li>- Piriformis muscles, and their covering of parietal pelvic fascia</li> </ul>	<ul style="list-style-type: none"> <li>- hip <b>bone</b> below the pelvic inlet (pelvic brim)</li> <li>- Obturator <b>membrane</b></li> <li>- Sacrotuberous and sacrospinous <b>ligaments</b></li> <li>- Obturator internus <b>muscle</b> and covering fascia</li> </ul>

# Differences between the male and female pelvis









Because of the everted tuberosity



The other 3 vertebrae are only bound by ligaments, during pregnancy, the ligaments relax and the sacrum moves backwards

Wide= roomer

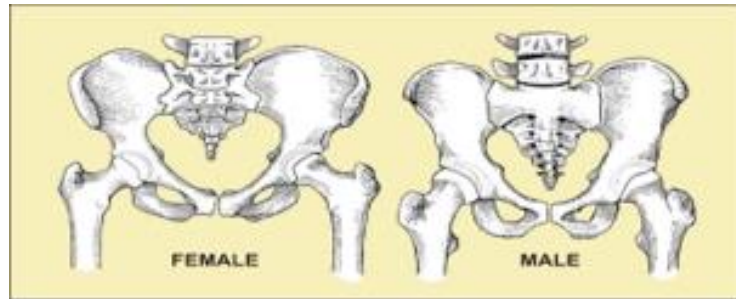
Bony pelvis	Male	Female
● General structure	Thick & heavy	Thin, Smaller & lighter
● False (major) pelvis	Deep	Shallow
● True (lesser) pelvis	Narrow & Deep	Wide & Shallow
Pelvic inlet	Heart shaped 	Oval or Rounded 
Pelvic outlet	Small 	Larger 
Pubic arch	Narrow 	Wide 
● subpubic angle	Acute angle	obtuse angle
● Obturator foramen	Round	Oval
Acetabulum	Large	Small
● Auricular surface.	Sacrum articulates with 3 vertebrae, is fixed	Sacrum articulates with 2 vertebrae
● Ischial tuberosities	Turned in	Everted
● Ischial spines		Shorter and farther apart
● Pelvic cavity	Less, small	Wide "for normal birth"

Mostly the iliac fossa

The deeper it is the smaller the cavity

# Differences between the male and female sacrum

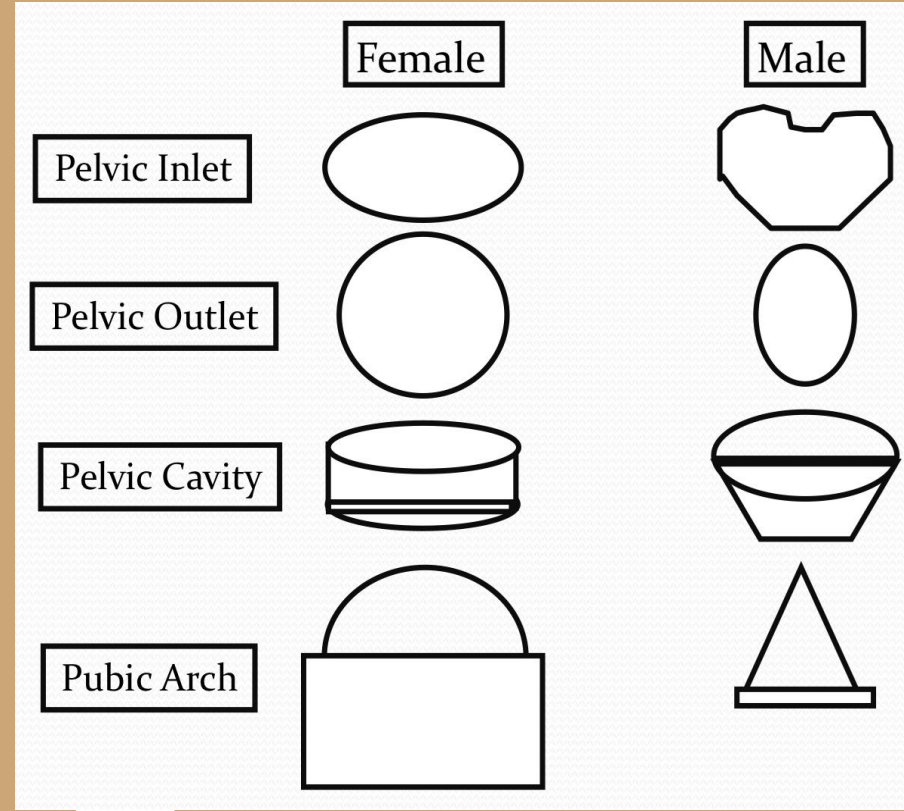
Male	Difference	Female
Longer	Length	Shorter
Narrower	Breadth	Wider
More curved	Curvature	Less curved



# Forensic Medicine and Bony Pelvis

For identification of human skeletal remains, the bony pelvis is of prime focus of attention because sexual differences are clearly visible.

Even parts of the pelvis are useful in making a diagnosis of sex.



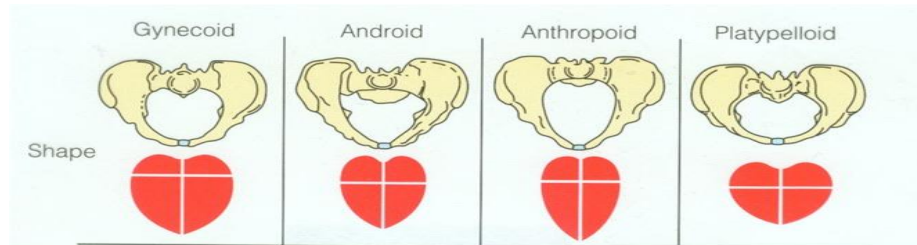
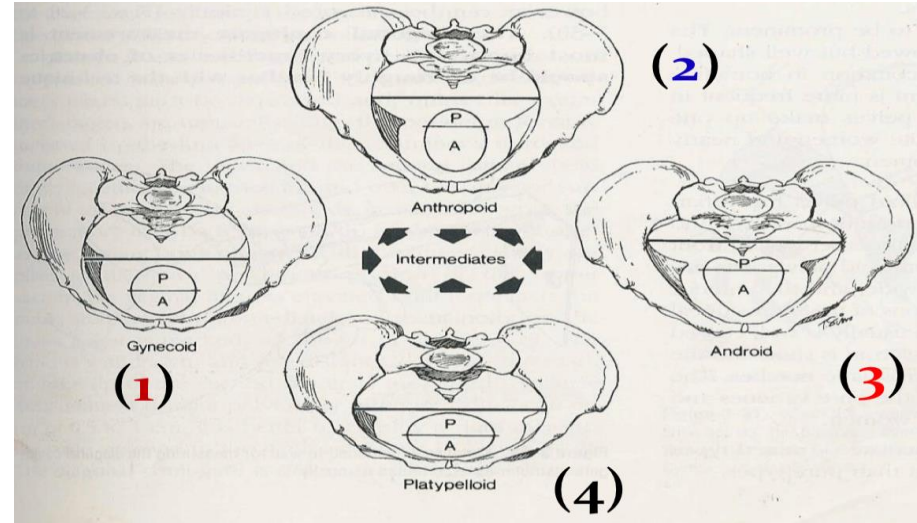
# Types of Obstetrical Female Pelvis

(1) Gynaecoid: the typical female type.

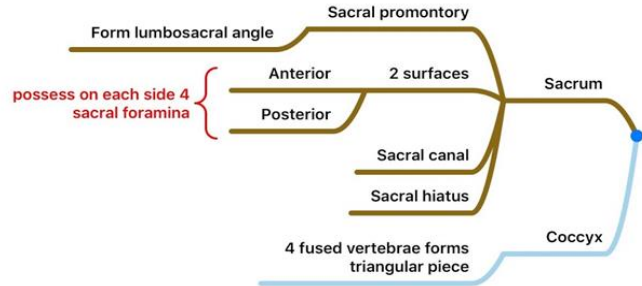
(2) Anthropoid: long, narrow, and oval shaped. (Between Male & Female pelvis)

(3) Android: funnel shaped with contracted outlet. (It causes hazards to normal vaginal delivery) (close to male pelvis)

(4) Platypelloid: wide, flattened at the brim, with forward promontory. (Transverse is wider than usual)

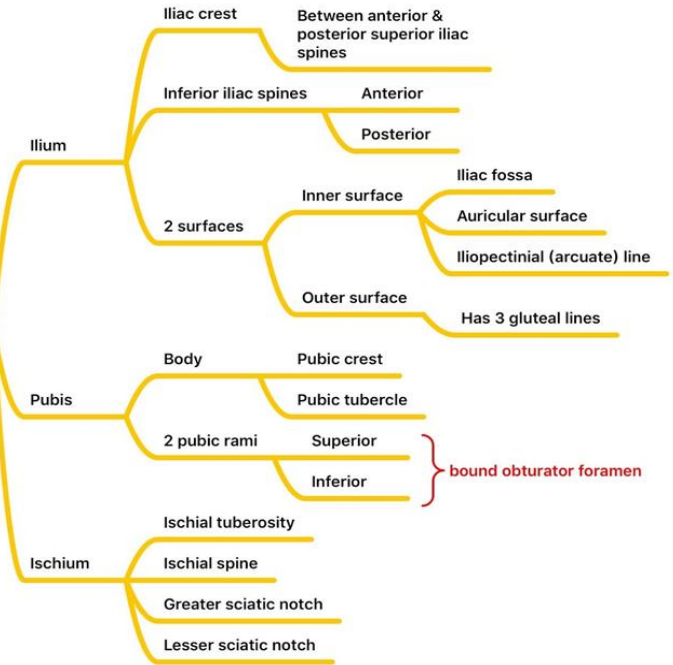


# summary:



Pelvic girdle

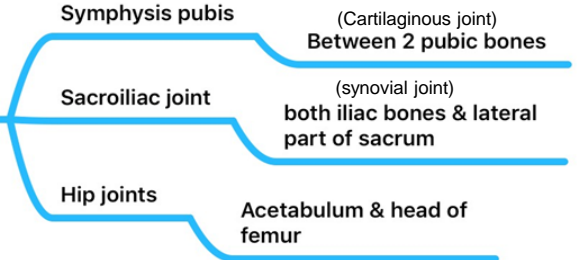
Hip (coxal) bones



Sacrum

Articulation

Hip bone



# summary:

## Foramina in Bony Pelvis:

foramina	Location	importance
(4) Sacral foramina	(2) On anterior surface of the sacrum (2) On posterior surface of the sacrum	Passes through them the anterior & posterior rami of the sacral spinal nerves
Greater and lesser sciatic foramina	Above and below the Ischial Spine <small>*Which separates between them</small>	allow sciatic nerve & vessels to pass from pelvis to thigh (Greater) & perinium (Lesser)
Obturator foramen	the large hole on each lateral wall of the pelvis	Obturator nerve passes through it



# Questions

- 1) Which of the following is a secondary function of the Pelvic girdle?
- Bears weight of upper body while sitting
  - Provides attachments & endures the forces of the muscles of locomotion and posture.
  - Provides attachment for external reproductive organs
- 2) The Iliac crest of Ilium :
- Runs between the Anterior and Posterior Superior Iliac Spines.
  - Runs between the lateral and medial superior iliac spines
  - Runs between the anterior and posterior inferior iliac spines
- 3) pubis bone bounds the:
- Iliac fossa
  - Obturator foramen
  - acetabulum
- 4) How many types of articulations does the hip bone have?
- 1
  - 2
  - 3
- 5) the lumbosacral joint is articulation between:
- Sacrum and L3 vertebra
  - Upper border of Sacrum and L5 vertebra
  - Sacrum and coccyx
- 6) The weakest part of the pelvis is:
- Acetabula
  - Pubic bone
  - Ischium
- 7) The bony pelvis of the male is:
- Thick & Heavy
  - Thin, Smaller & lighter
  - Same as female
- 8) which type of female pelvis is likely to cause hazards during normal vagina delivery?
- Gynaecoid
  - Android
  - Platypelloid

Answers: 1. C 2. A 3. B 4. C 5. B 6. A 7. A 8. B

# Team Members

Lamia Abdullah Alkuwaiz (Team Leader)

Rawan Mohammad Alharbi

Abeer Alabduljabbar  
Afnan Abdulaziz Almustafa  
Ahad Algrain  
Alanoud Almansour  
Albandari Alshaye  
AlFhadah abdullah alsaleem  
Arwa Alzahrani  
Dana Abdulaziz Alrasheed  
Dimah Khalid Alaraifi  
Ghada Alhaidari  
Ghada Almuhanha  
Ghaida Alsanad  
Hadeel Khalid Awartani  
Haifa Alessa  
Khulood Alwehabi  
Layan Hassan Alwatban  
Lojain Azizalrahman  
Lujain Tariq AlZaid

Maha Barakah  
Majd Khalid AlBarrak  
Norah Alharbi  
Nouf Alotaibi  
Noura Mohammed Alothaim  
Rahaf Turki Alshammari  
Reham Alhalabi  
Rinad Musaed Alghoraiby  
Sara Alsultan  
Shahad Alzahrani  
Wafa Alotaibi  
Wejdan Fahad Albadrani  
Wjdan AlShamry

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Akram Alfandi  
Saad Aloqile  
Saleh Almoaiqel  
Abdulaziz Alabdulkareem  
Abdullah Almeaither  
Yazeed Aldossari  
Muath Alhumood  
Abdulrahman Almotairi

Abdulelah Aldossari  
Abdulrahman Alduhayyim  
Hamdan Aldossari  
Mohammed Alomar  
Abdulrahman Aldawood  
Saud Alghufaily  
Hassan Aloraini  
Khalid Almutairi

Abdulmajeed Alwardi  
Abdulrahman Alageel  
Rayyan Almousa  
Sultan Alfuhaid  
Ali Alammari  
Fahad alshughaihthry  
Fayez Ghyiath Aldarsouni  
Mohammed Alquwayfili

Abduljabbar Al-yamani  
Sultan Al-nasser  
Majed Aljohani  
Zeyad Al-khenaizan  
Mohammed Nouri  
Abdulaziz Al-drgam  
Fahad Aldhowaihy  
Omar alyabis