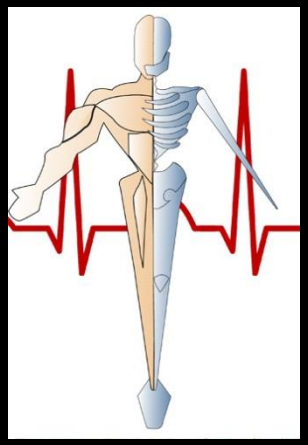
Three Phase CEUs Presents:

Topics in Radiography Volume I ©

"Mastery Test"

by

John Fleming, M.Ed.,RT(R)(MR)(CT)



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Forward:

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Our courses qualify as Category A (technical) points for the following: all ARRT recognized imaging modalities, ARRT-CQR, FDOH-Bureau of Radiation Control, NMTCB, and RCIS.

According to the ARRT, a current license as a general radiographer with the FDOH is required to qualify to complete this course. *This rule does not apply to either the NMTCB or RCIS credentials.*

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Mastery Test Instructions:

Please place an "X" over the correct response on your answer sheet. Feel free to write your answer down on a blank piece of paper if you do not have access to a printer. That is just as good.

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Question #1:

The arrow on this lateral position of the hip radiograph is pointing to the:

a. body of the ischium.

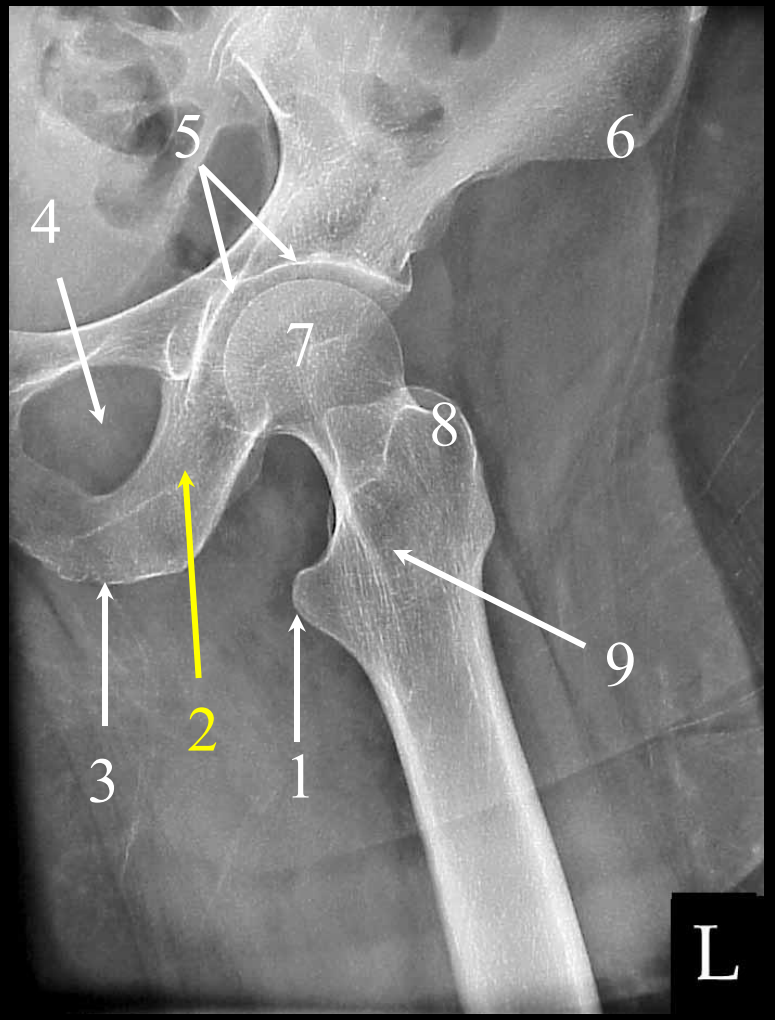
b. acetabulum.

c. superior ramus of the pubic bone.

d. ischial tuberosity.

Question #1: Review

1. Lesser Trochanter
2. Body of the Ischium
3. Ischial Tuberosity
4. Obturator Foramen
5. Acetabulum
6. ASIS
7. Head of the Femur
8. Greater Trochanter
9. Intertrochanteric Crest



Frog Hip

Question #2:

The arrow on this lateral position of the hip radiograph is pointing to the:

a. lesser trochanter.

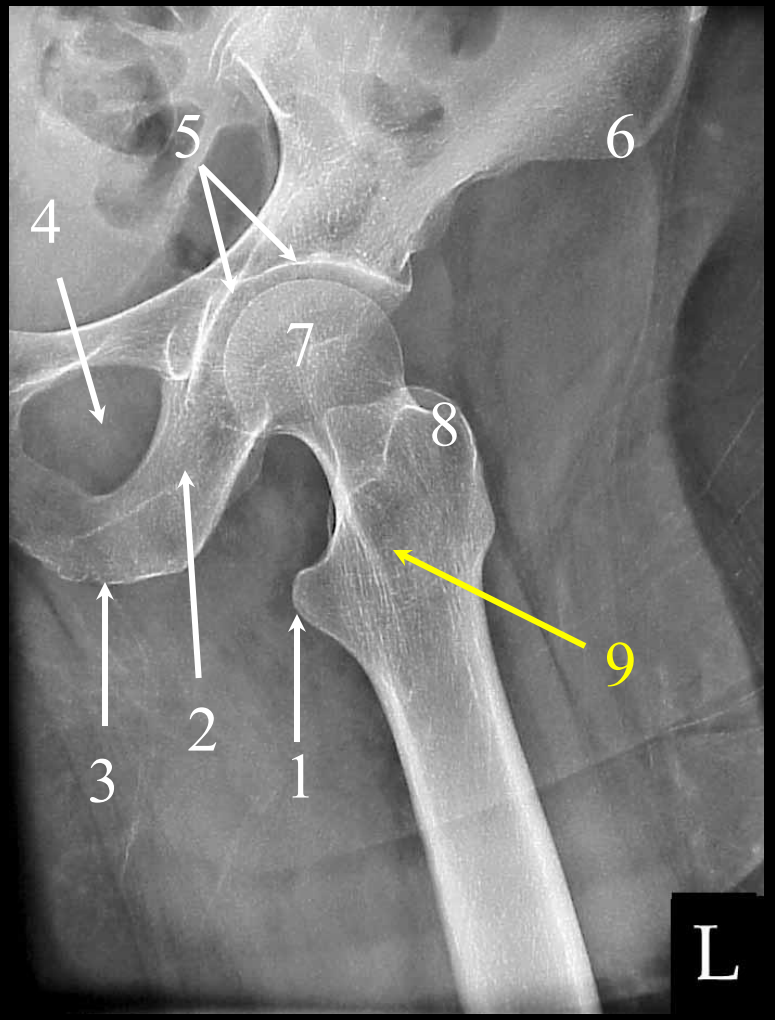
b. linea aspera.

c. intertrochanteric crest.

d. greater trochanter.

Question #2: Review

1. Lesser Trochanter
2. Body of the Ischium
3. Ischial Tuberosity
4. Obturator Foramen
5. Acetabulum
6. ASIS
7. Head of the Femur
8. Greater Trochanter
9. Intertrochanteric Crest



Frog Hip

Question #3:

Which of the following statements is true regarding the anode disc of an x-ray tube?

a. It is positively charged.
b. It is the source of electrons for the exposure.
c. The anode has an overall neutral charge.
d. It contains the focusing cup.

Question #3: Review

The anode disc is positively charged and thus attracts the electrons produced at the cathode during the exposure.

It contains the target (arrows) where x-rays are produced.

Question #4:

Which of the following is not one of the three primary technical factors employed to determine the dose (mR) used to produce a diagnostic image?

a. mA
b. time
c. focal spot
d. kVp

Question #4: Review

- There are three primary technical factors that are employed to determine the dose required to produce a diagnostic image.
- The three primary technical factors are as follows:

1. Kilovoltage Peak or kVp
2. Milliamperage or mA
3. Exposure Time

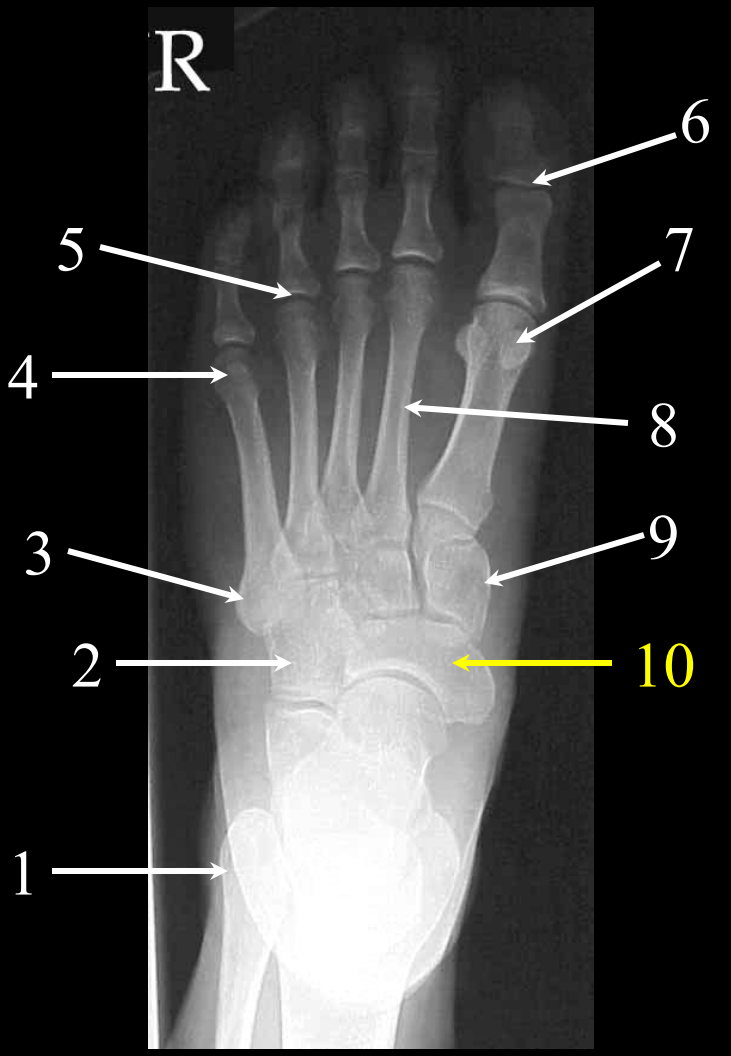
Question #5:

The arrow on this AP projection of the foot radiograph is pointing to the:

a. medial cuneiform.
b. base of the 5th metatarsal.
c. talus.
d. navicular.

Question #5: Review

1. Lateral Malleolus
2. Cuboid
3. Base of the 5th Metatarsal
4. Head of the 5th Metatarsal
5. 4th Metatarsophalangeal Joint
6. Interphalangeal Joint of the 1st Digit
7. Sesamoid Bone
8. 2nd Metatarsal
9. Medial Cuneiform
10. Navicular



AP Foot

Question #6:

The arrow on this AP projection of the foot radiograph is pointing to the:

a. lateral cuneiform.
b. cuboid.
c. navicular.
d. talus.

Question #6: Review

1. Lateral Malleolus
2. Cuboid
3. Base of the 5th Metatarsal
4. Head of the 5th Metatarsal
5. 4th Metatarsophalangeal Joint
6. Interphalangeal Joint of the 1st Digit
7. Sesamoid Bone
8. 2nd Metatarsal
9. Medial Cuneiform
10. Navicular

AP Foot

Question #7:

The brightness of a reading room for a radiologist should be kept to no more than _____ % of normal room lighting.

a. 5
b. 10
c. 25
d. 40

Question #7: Review

- The brightness of a reading room should be kept to no more than 25% of normal room lighting.

  This will facilitate image interpretation by the radiologist.
- Ambient lighting must also be kept to a minimum as this will degrade the image produced on the monitor.

  Windows are generally not recommended for reading rooms in order to avoid direct sunlight intrusion.

Question #8:

The term used to describe the sharpness of the structural edges recorded on the images is:

a. spatial resolution.
b. optimum kVp.
c. distortion.
d. quantization.

Question #8: Review

- Spatial Resolution (SR) or sharpness of detail refers to the sharpness of the structural edges recorded in the image.

  In other words, it is the ability to visualize sharp lines on a radiographic image.

- SR is measured in mm of unsharpness.

  This unit indicates the level of image SR that the radiographic image possesses.

Question #9:

Which of the following display monitor resolutions is typically used by a radiologist to make a radiographic diagnosis?

a. <1 mp
b. 3 mp
c. 5 mp
d. 10 mp

Question #9: Review

- The display monitor is the weakest link in the modern medical imaging chain.
- Monitor Resolution is controlled by the number of pixels in the display (matrix) and is measured in megapixels (mp).
- Below is a list of monitor matrix sizes:

1024 x 768 = <1 mp (typical workstation monitor)

2048 x 1536 = 3 mp (radiologist monitor)

2048 x 2560 = 5 mp (often used in mammography)

2560 x 4096 = 10 mp (not often used in radiography)

Question #10:

Which of the following statements is false regarding inorganic compounds?

a. Salts, acids and bases are considered inorganic compounds.
b. All inorganic compounds contain carbon.
c. Approximately 80% of the body's mass consists of water.
d. Water is the most abundant inorganic compound found in the human body.

Question #10: Review

- The following describes inorganic compounds which are one of the two major categories of molecules found in the human body:

  Inorganic compounds do not contain carbon, and they are essential in order to maintain homeostasis within the body.

  -Homeostasis refers to the body's ability to maintain a relatively constant state of well-being.

  Water (H_20) is the most abundant inorganic compound and molecule, for that matter, found in the body.

  Approximately 80% of the body's mass consists of water.

  Other inorganic compounds found within cells and in the body include salts (electrolytes), acids and bases.

Question #11:

Which of the following is the primary controlling factor for spatial resolution?

a. kVp
b. focal spot size
c. mA
d. time

Question #11: Review

- The focal spot (FS) is the primary controlling factor for SR.
- It is the only factor that exclusively affects SR.
- SR is controlled by adjusting the FS.
- The milliamperage (mA) station selected dictates the size of the focal spot employed.
- Higher mA stations produce more heat and require a larger focal spot in order to avoid damaging the filament.
- Generally, techniques $\geq$ 200 mA will require a large focal spot.

  This is dependent on the specifications of the manufacturer but is a good rule-of-thumb.

Question #12:

According to the National Council on Radiation Protection and Measurement (NCRP), what is the annual dose limit (DL) in rem for an occupationally exposed individuals that is pregnant?

a. 0.5
b. 1.0
c. 5.0
d. 50

Question #12: Review

- The following is a list of dose limits set by the NCRP for occupationally exposed individuals:

  Entire Body: 5 rem /year

  Lens of the Eye: 15 rem/year

  All other individual organs (liver, hands, skin etc.) of the body: 50 rem/year

- The maximum occupational lifetime dose is determined by multiplying your age in years by 1 rem.

  For example, a 30-year-old radiographer is allowed to have a total lifetime dose of no more than 30 rem (30 years old x 1 rem).

- Pregnant radiographers must keep their dose limits below the following levels:

  0.05 rem/ month

  0.5 rem/year

Question #13:

Beam restriction to the size of the image receptor (IR) or smaller will reduce the ability for scatter radiation to add noise to a radiographic image.

a. true
b. false

Question #13: Review

- Proper beam restriction will reduce the ability for scatter radiation to make it back to the IR.
- As a result, noise can be reduced by limiting the exposure area to only the anatomy of interest.
- The next slide demonstrates how scattered radiation can add noise to the IR when proper collimation is not employed.

Question #14:

The arrow on this lateral ankle radiograph is pointing to the:

a. shaft of the fibula.
b. shaft of the tibia.
c. medial malleolus.
d. ankle mortise.

Question #14: Review

1. Shaft of the Fibula
2. Shaft of the Tibia
3. Talus
4. Navicular
5. Cuboid
6. Calcaneous or Os Calcis

Lateral Ankle

Question #15:

The arrow on this lateral ankle radiograph is pointing to the:

a. cuboid.
b. talus.
c. calcaneous.
d. navicular.

Question #15: Review

1. Shaft of the Fibula
2. Shaft of the Tibia
3. Talus
4. Navicular
5. Cuboid
6. Calcaneous or Os Calcis

Lateral Ankle

Question #16:

During an x-ray exposure, electrons from the cathode strike the anode disc. How much of their kinetic energy is converted into heat?

a. 99.8%
b. 80%
c. 68%
d. 25%

Question #16: Review

- Kilovoltage Peak or kVp

  When the exposure is made, this factor releases the electrons from the negatively charged cathode so that they can strike the positively charged anode.

  kVp is the source of the kinetic energy that electrons must possess in order to strike the anode.

  When this occurs, approximately 99.8% of the energy imparted onto the target is converted into heat.

  Only 0.2% is converted into x-rays.

  As you can see, this is a very inefficient process.

  kVp provides the penetrating ability of the x-ray beam.

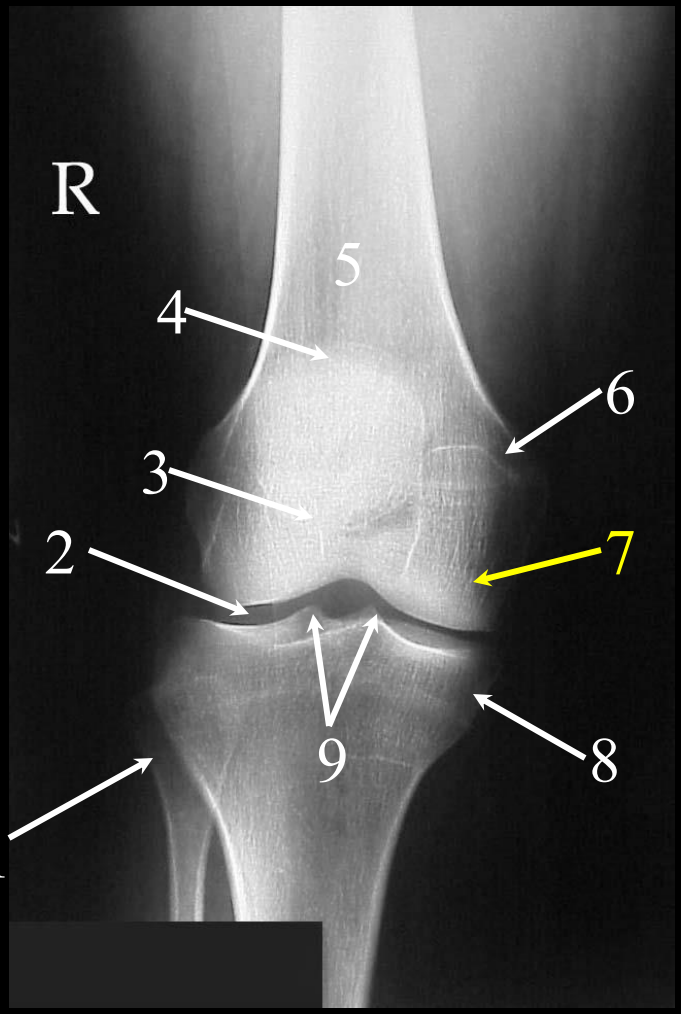
Question #17:

The arrow on this AP projection of the knee radiograph is pointing to the:

a. medial condyle of the femur.
b. medial epicondyle of the femur.
c. tibial plateau.
d. tibial tuberosity.

Question #17: Review

1. Head of the Fibula
2. Tibial Plateau
3. Apex of the Patella
4. Base of the Patella
5. Shaft of the Femur
6. Medial Epicondyle of the Femur
7. Medial Condyle of the Femur
8. Medial Condyle of the Tibia
9. Intercondylar Eminence



AP Knee

Question #18:

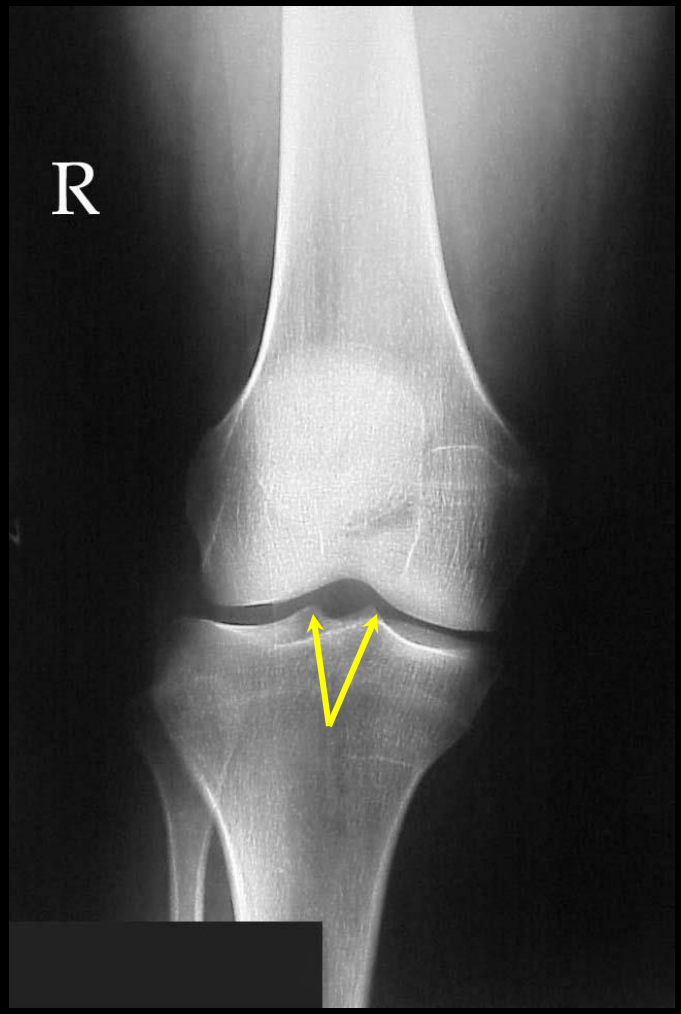
The arrows on this AP projection of the knee radiograph are pointing to the:

a. tibial plateau.

b. intercondylar eminence.

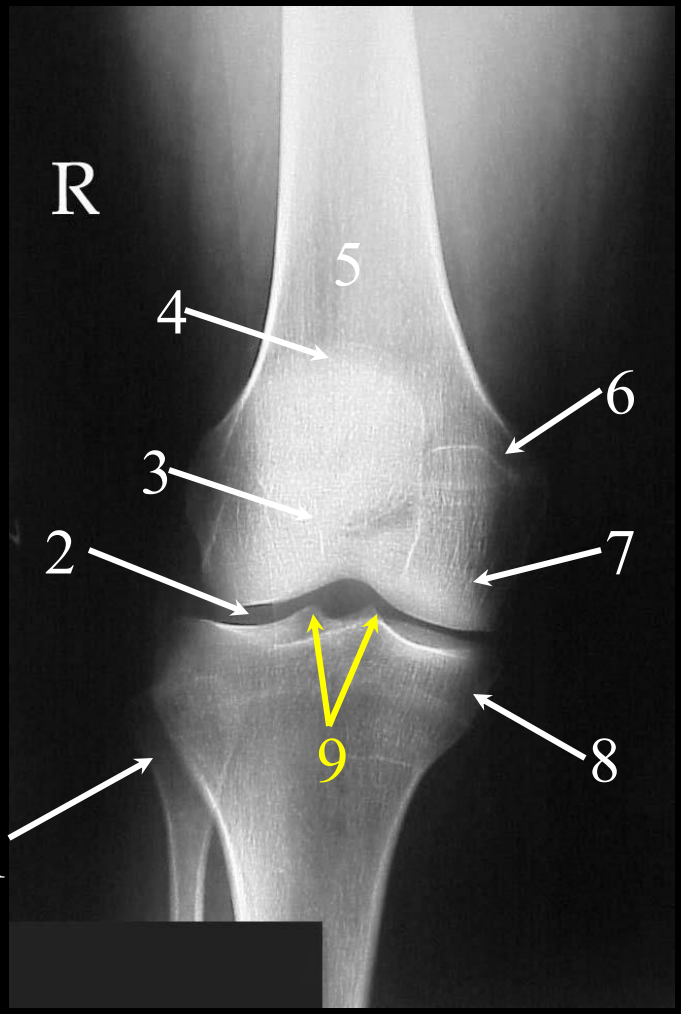
c. tibial tuberosity.

d. none of the above



Question #18: Review

1. Head of the Fibula
2. Tibial Plateau
3. Apex of the Patella
4. Base of the Patella
5. Shaft of the Femur
6. Medial Epicondyle of the Femur
7. Medial Condyle of the Femur
8. Medial Condyle of the Tibia
9. Intercondylar Eminence



AP Knee

Question #19:

Which of the following conventional units is used to describe the dose that a radiographer would receive on a dosimetry report?

a. roentgen
b. Curie
c. rem
d. rad

Question #19: Review

- The following is a list of conventional units that are used to describe ionizing radiation and particles.

  The roentgen (R) is used to describe a quantity of radiation intensity in air.

  -The roentgen is used to measure a quantity of ionizations that occur in a volume of dry air after exposure to either x-rays or gamma rays.

  -X-ray tube output is measured in mR (1R = 1000 mR)

  The rad is the unit of absorbed dose.

  -It is defined as 100 ergs of energy being absorbed by 1 gram of absorbing material.

  -The rad is the unit used most often to describe radiation exposure to the patient.

  The unit used to describe a quantity of radioactive material is the Curie.

  The unit for dose equivalence is the rem and it is the unit employed on dosimetry reports.

Question #20:

Which of the following is not a method that could be used to help prevent or minimize shape distortion on the image receptor (IR)?

a. Employ a small focal spot.
b. Ensure that the body part is parallel to the IR.
c. The central ray (CR) must be perpendicular to the IR.
d. Ensure the proper tube angulation is employed.

Question #20: Review

- How to prevent shape distortion:

1. Ensure that the body part is parallel to the IR.
2. The CR must be perpendicular to the IR.
3. Ensure that the proper tube angulation is employed.

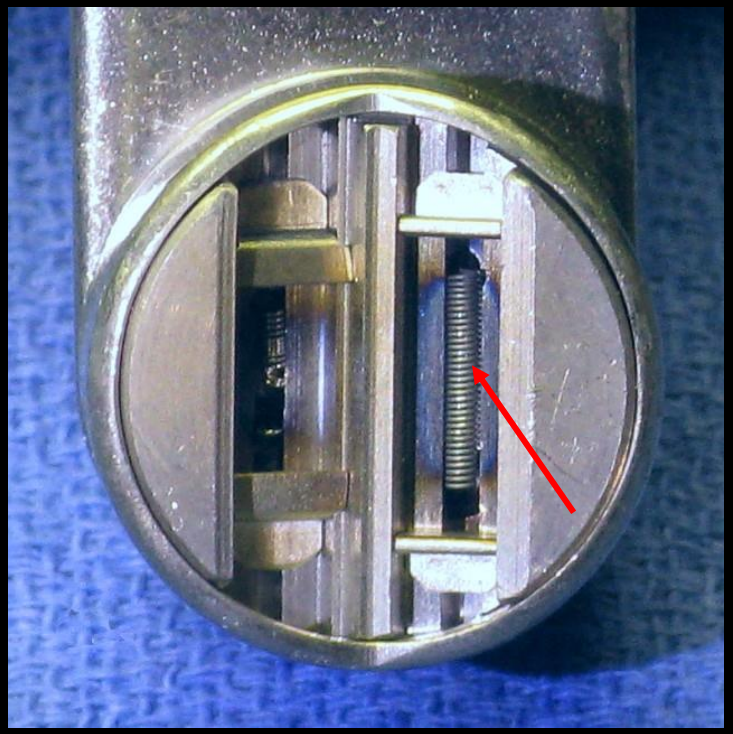
Question #21:

Which of the following statements is true regarding the cathode side of the x-ray tube?

a. It rotates during the exposure in order to dissipate heat.
b. The cathode side of the tube contains the target.
c. The cathode side of the tube contains the filament.
d. It has an overall positive charge.

Question #21: Review

The cathode side of the tube contains the filament (arrow), and it is heated to incandescence prior to making the exposure.



This heating causes electrons to be produced and results in the formation of an electron cloud around the filament.

The process of producing electrons in this manner is referred to as thermionic emission.

Question #22:

Which of the following concepts is used to estimate the impact of low-level exposure to ionizing radiation on the entire population?

a. ALARA
b. GSD
c. risk vs. benefit concept
d. 10-day rule

Question #22: Review

- The following is a list of concepts that are meant to help reduce the exposure of the general population to diagnostic levels of ionizing radiation:

  The genetically significant dose (GSD) is a figure that is used to estimate the impact of low-level exposure to ionizing radiation on the entire population.

  -The GSD is estimated at 20 to 30 mrem per person per year.

  The notion of keeping exposures as low as reasonably achievable (ALARA) is endorsed by the NCRP as a strategy to reduce the total GSD.

  -Radiographers achieve the concept of ALARA by using technical factors, positioning methods, and shield techniques based on sound educational methodologies.

  The Risk vs. Benefit Analysis is another import concept regarding the GSD.

  -For every procedure that is ordered, it must be determined that the benefits of helping to restore the patient back to good health outweigh the risks of exposing a patient to the potentially harmful effects of ionizing radiation.

  The 10-Day Rule states that nonemergency radiographic procedures on women in the child-bearing years (ages 11 to 50) should be performed within the first 10 days following the onset of menstruation.

  -It is unlikely that she would be pregnant during this time period.

Question #23:

According to the National Council on Radiation Protection and Measurement (NCRP), the exposure switch cord on mobile x-ray units (portable machines) must be at least _____ feet in length.

a. 2
b. 4
c. 6
d. 10

Question #23: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during general radiographic examinations:

  The protective tube housing must be designed to ensure that tube leakage is kept below 100 mR/hour at a distance of 1 meter.

  The collimator light field must be accurate to within +/- 2% of the SID that is set.

  -For example, at a 40" SID the light field may be off by as much as 0.8" in either direction (40" SID x 2% = 0.8").

  -To avoid missing required anatomy, you should not place body parts of interest within 0.8" of the edge of your light field.

  It is recommended that the central ray alignment must be accurate to within +/- 1 degree of perfect vertical.

  The source to image-receptor distance (SID) indicator or dial must be accurate to within 2% of the SID that is set.

  -This is to ensure that your "tape measure" is accurate.

  The exposure switch cord on mobile units (portable machines) must be at least 2 meters or 6 feet in length.

  -This allows the radiographer to stand a safe distance from the source.

Question #24:

In reference to grid construction, the value calculated by taking the height of the lead strip and dividing it by the distance between them is known as the grid:

a. frequency.
b. ratio.
c. radius.
d. focal range.

Question #24: Review

- Grid Ratio (GR)

  The value is calculated by dividing the height of the lead strips by the distance between them.

  GR = h/D

  With all other grid construction factors constant, the higher the GR, the greater the scatter clean-up.

  Higher GRs also require more accuracy in their use and result in a higher patient dose.

Question #25:

In reference to radiation dose-response relationships, which of the following conditions is an example of a stochastic effect?

a. epilation or hair loss
b. primary lung cancer
c. cataract formation
d. skin erythema

Question #25: Review

- The following refers to dose-response relationships and the salient differences between stochastic and non stochastic effects:

  Stochastic effects do not require a dose threshold and are considered to be randomly occurring somatic changes such as cancer formation.

  -In essence, as the dose increases, the likelihood that the individual acquiring cancer will also increase.

  -It is important to note that as the dose increases, the severity of the cancer will not be affected, only the likelihood of acquiring the cancer.

  -Therefore, it is an all-or-none response to ionizing radiation.

  Non stochastic effects differ from stochastic effects because as you increase the dose, the severity of the effect changes but not the effect itself.

  -Non stochastic effects are considered to be a threshold type of response to ionizing radiation.

  -After the threshold dose has been achieved, any dose above that will result in an increase in the severity of the response.

  -Examples include skin erythema (reddening), epilation (hair loss) and cataract formation.

Question #26:

Which of the following organelles is responsible for protein synthesis within a cell?

a. ribosomes
b. mitochondria
c. endoplasmic reticulum (ER)
d. golgi apparatus

Question #26: Review

- Organelles are small organs that perform specific functions within the cell and the following is a description of some of the more common ones:

  The endoplasmic reticulum (ER) consists of a network of tubes or channels that are closely associated with the nucleus

  -The ER is essentially the transport system from the nucleus to the cytoplasm.

  Ribosomes are small, round structures that are the site of protein synthesis.

  -They are either attached to the ER (often referred to as rough ER) or are loose within the cytoplasm.

  The golgi apparatus consists of a series of tubules that extend from the nucleus to the cell membrane.

  Mitochondria are bean-shaped organelles within the cytoplasm.

  -They are known as the powerhouse of the cell as their function is to produce energy for cell use.

  Lysosomes are small sacs that contain the digestive enzymes of the cell.

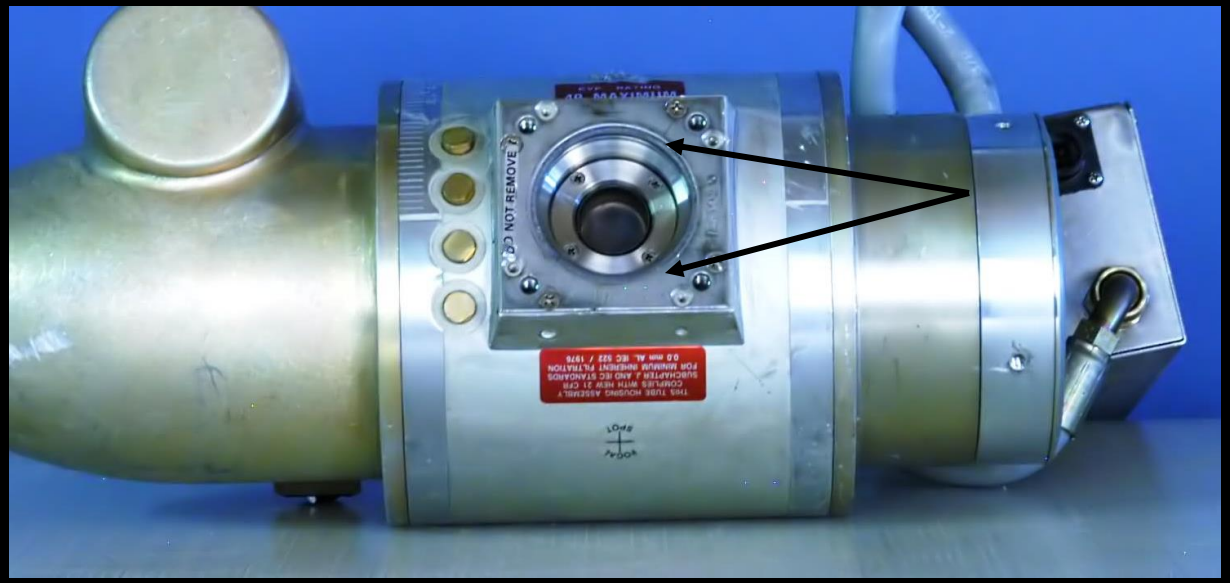
Question #27:

There are many benefits to adding filtration to the primary beam. Which of the following is one of the most important reasons for its use?

a. It will reduce the patient's skin dose.
b. Added filtration will improve spatial resolution.
c. It will reduce the patient's deep tissue skin dose.
d. Added filtration will decrease size distortion.

Question #27: Review

One of the primary reasons to add thin sheets of aluminum (left) to the port (arrows) of the x-ray tube to reduce the patient's skin dose.



The loss of these low energy x-rays will also reduce the overall RE.

Question #28:

Which of the following is the primary controlling factor for x-ray beam quality?

a. mA
b. time
c. collimation
d. kVp

Question #28: Review

- kVp is primarily a measurement of beam quality (penetration) but it does affect beam quantity (intensity) to a lesser extent.
- What is the primary controlling factor for beam quantity?

  mA or mAs
- If you increase the kVp, will more electrons be produced at the filament?

  No, electron production is controlled by either increasing the mA or mAs.

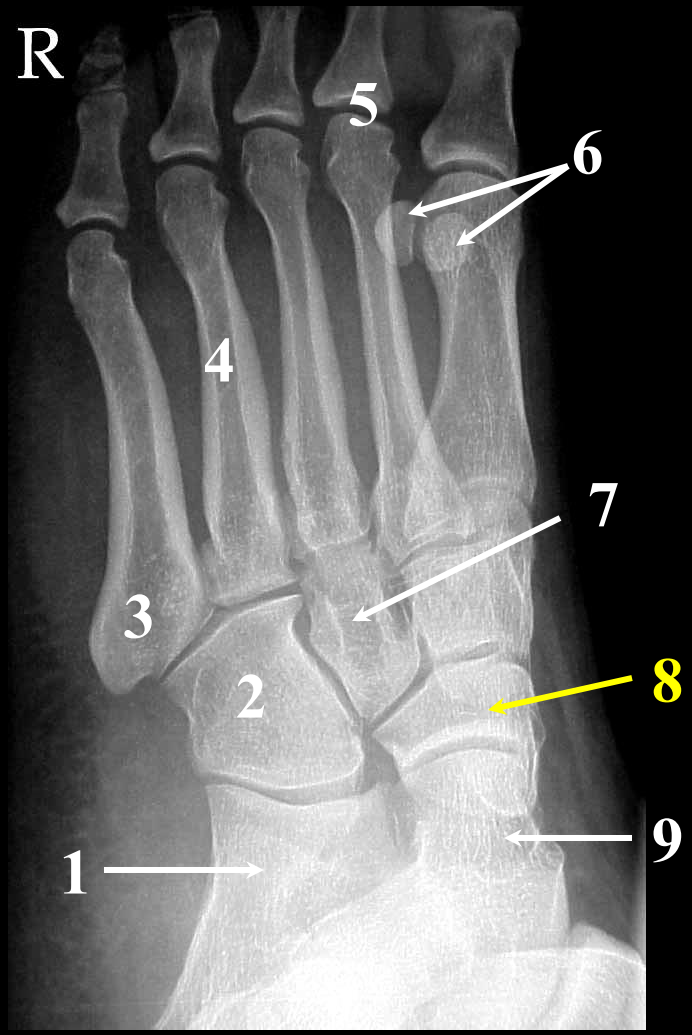
Question #29:

The arrow on this magnified view of an internal oblique foot radiograph is pointing to the:

a. cuboid.
b. navicular.
c. medial cuneiform.
d. base of the 5th metatarsal

Question #29: Review

1. Calcaneous or Os Calcis
2. Cuboid
3. Base of the 5th Metatarsal
4. Shaft of the 4th Metatarsal
5. 2nd Metatarsophalangeal Joint
6. Sesamoid Bones
7. Lateral Cuneiform
8. Navicular
9. Talus



Internal Oblique Foot: (Magnified)

Question #30:

The arrow on this magnified view of an internal oblique foot radiograph is pointing to the:

a. talus.
b. navicular.
c. cuboid.
d. lateral cuneiform.

Question #30: Review

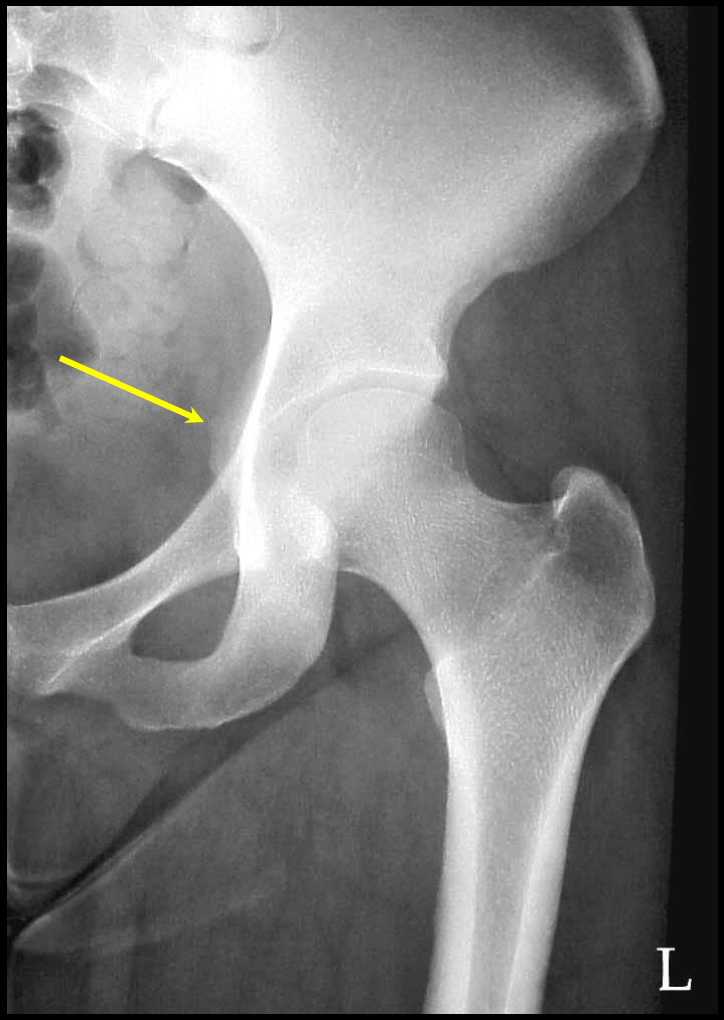
1. Calcaneous or Os Calcis
2. Cuboid
3. Base of the 5th Metatarsal
4. Shaft of the 4th Metatarsal
5. 2nd Metatarsophalangeal Joint
6. Sesamoid Bones
7. Lateral Cuneiform
8. Navicular
9. Talus

Internal Oblique Foot: (Magnified)

Question #31:

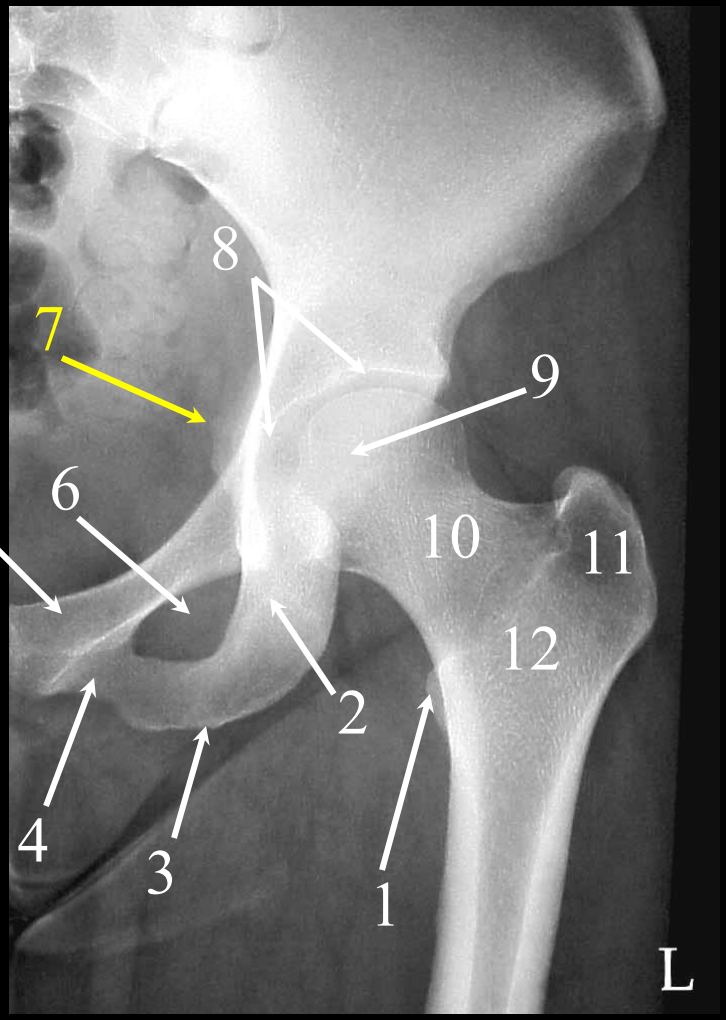
The arrow on this AP projections of the hip radiograph is pointing to the:

a. ischial spine.
b. body of the ischium.
c. acetabulum.
d. intertrochanteric crest.



Question #31: Review

1. Lesser Trochanter
2. Body of the Ischium
3. Ischial Tuberosity
4. Inferior Ramus of the Pubis
5. Superior Ramus of the Pubis
6. Obturator Foramen
7. Ischial Spine
8. Acetabulum
9. Head of the Femur
10. Neck of the Femur
11. Greater Trochanter
12. Intertrochanteric Crest

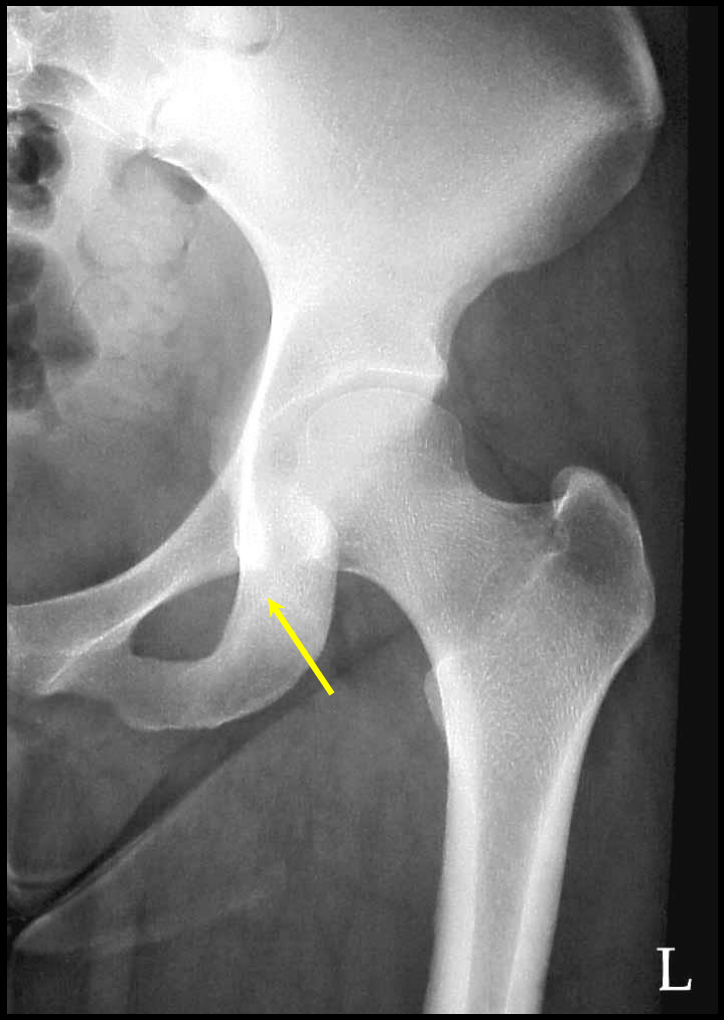


AP Hip

Question #32:

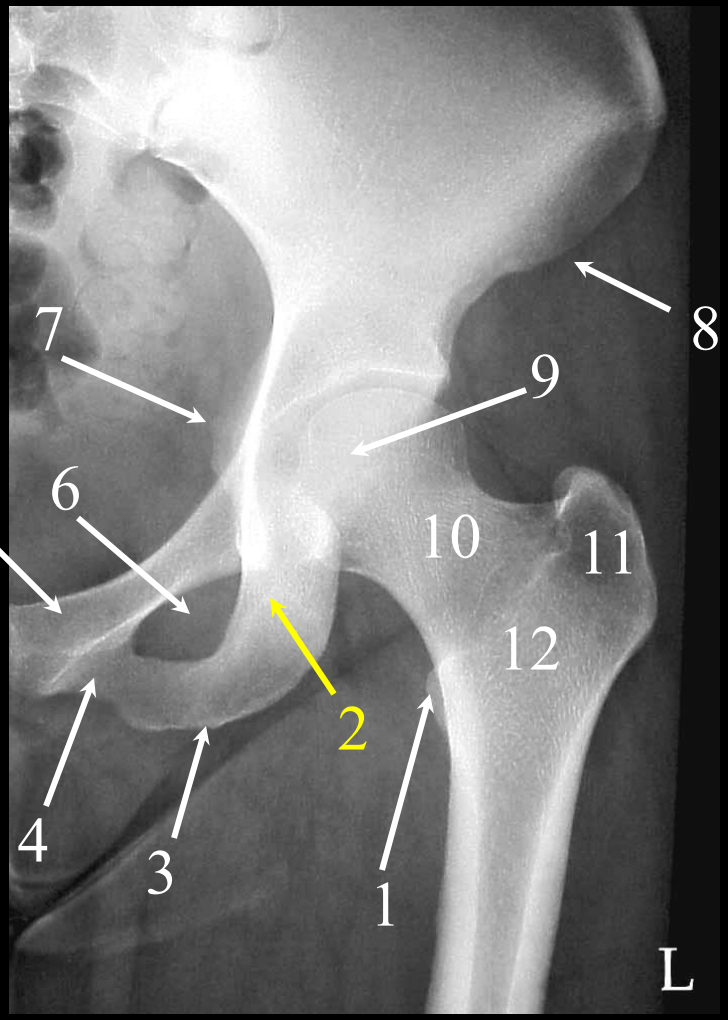
The arrow on this AP projection of the hip radiograph is pointing to the:

a. intertrochanteric crest.
b. body of the ischium.
c. superior ramus of the pubis.
d. linea aspera.



Question #32: Review

1. Lesser Trochanter
2. Body of the Ischium
3. Ischial Tuberosity
4. Inferior Ramus of the Pubis
5. Superior Ramus of the Pubis
6. Obturator Foramen
7. Ischial Spine
8. ASIS
9. Head of the Femur
10. Neck of the Femur
11. Greater Trochanter
12. Intertrochanteric Crest



AP Hip

Question #33:

DNA synthesis occurs during which of the following stages of mitosis?

a. Interphase
b. Prophase
c. Metaphase
d. Telophase

Question #33: Review

- The following is a description of the phases of somatic cell division or mitosis.

  Interphase consists of the following steps:

  -Gap 1 (resting phase)

  -DNA synthesis

  -Gap 2 (resting phase)

  During prophase, the nuclear membrane dissolves, the centrioles separate and move to opposite ends of the cell and the mitotic spindle fibers appear.

  During metaphase, the centromere of each chromosome attaches to a spindle fiber and align themselves at the equatorial plate of the cell.

  The centromere duplicates and the chromosomes begin to migrate towards opposite ends of the cell during anaphase.

  Telophase is characterized by the following events:

  -A division furrow appears as the cytoplasm and organelles are equally divided between the two daughter cells by a process called cytokinesis.

  -Each daughter cell now contains the required diploid number of 46 chromosomes.

Question #34:

According to the National Council on Radiation Protection and Measurement (NCRP), the generator reproducibility must not vary more than plus or minus ___ %.

a. 1
b. 2
c. 5
d. 10

Question #34: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during general radiographic examinations:

  The x-ray generator reproducibility refers to the ability of the machine to produce the same beam intensity with repeated exposures.

  -It must not vary more than +/- 5%.

  -For example, if the first exposure produced 100 mR, then the next exposure must produce between 95 to 105 mR to be within the 5% allowable variance.

  mA station linearity refers to ensuring that adjacent mA stations are calibrated properly.

  -They must not vary more than +/- 10%.

  -For example, if a constant kVp and time station are employed and the 200 mA station produced 100 mR then the 400 mA station should produce 200 mR.

  The most common thickness for protective apparel, such as lead aprons, gloves and thyroid shields, is 0.5 mm of lead and it will absorb 88% of the primary beam at 75 kVp.

  -Protective apparel made of 1.0 mm of lead will absorb approximately 99% of the primary beam at 75 kVp.

Question #35:

As the object image-receptor distance (OID) increases, size distortion will:

a. increase.
b. decrease.
c. no effect.

Question #35: Review

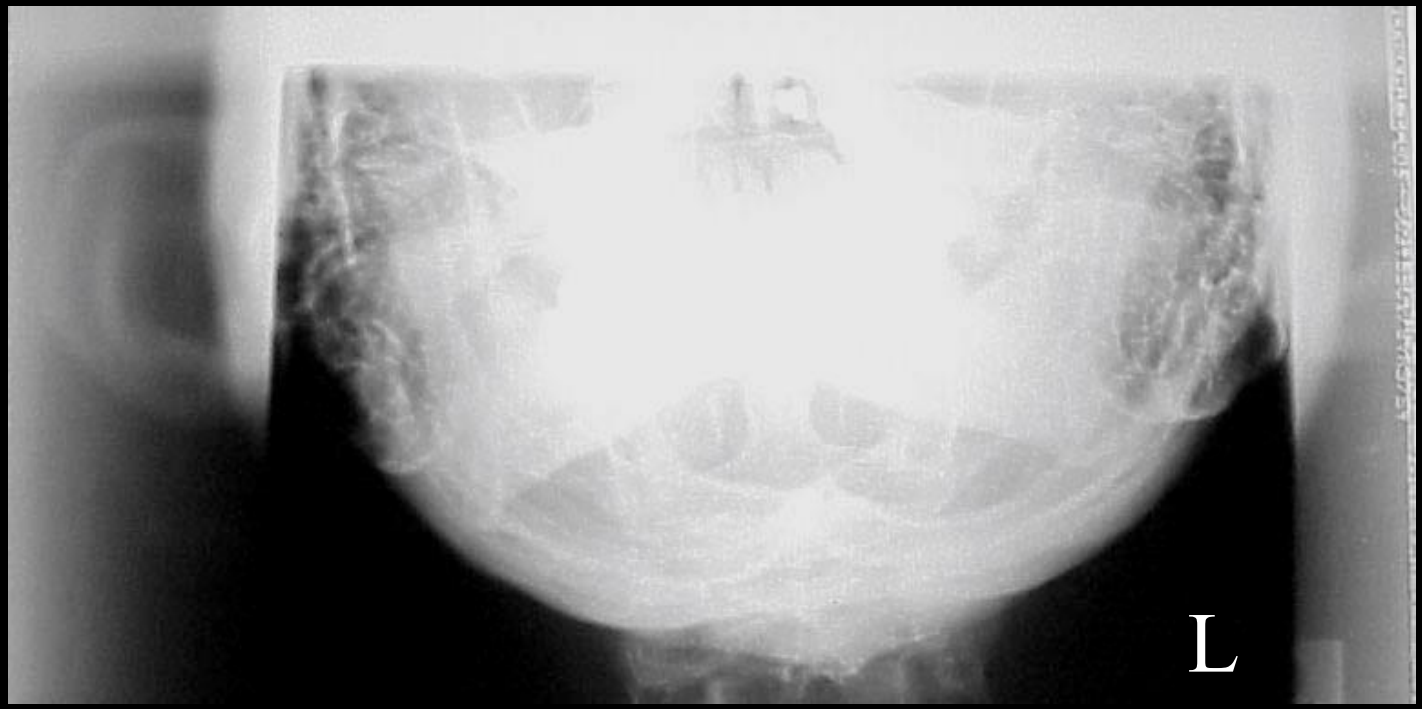
- As the object image-receptor distance (OID) is increased, size distortion will also increase.
- In regard to producing size distortion, OID has the most impact.
- Therefore, OID should be kept to a minimum for all radiographic images.
- The next slide will demonstrate this concept.

Question #36:

Approximately how much of the primary beam is made up of off-focus radiation?

a. 5 to 10%
b. 15 to 20%
c. 25 to 30%
d. 35 to 40%

Question #36: Review



Have you ever noticed how the patient's ears sometimes appear on a Fuchs's Method of an odontoid when you have close collimation? This is often confused with being produced by scatter radiation. Since radiation scattered by the patient cannot form an image, how does this ghosting affect appear? This is the result of off-focus radiation that is produced within the tube, and it can contribute to as much as 25 to 30% of the total primary beam.

Question #37:

According to the National Council on Radiation Protection and Measurement (NCRP), what is the annual dose limit (DL) in rem for the general population exposed to infrequent exposures?

a. 0.5
b. 5.0
c. 15
d. 50

Question #37: Review

- According to the NCRP, there are two categories for annual whole body dose limits for the general population, and they are as follows:

  Frequent Exposures: This group includes individuals that work in the hospital other than radiographers (secretaries, file room staff etc.) and their dose limit is 0.1 rem/year.

  -This guideline is meant to ensure that the x-ray rooms are properly designed to prevent radiation leakage.

  Infrequent Exposures: This group includes the general population, and their dose limit is 0.5 rem/year.

Question #38:

Which of the following is the term used to describe the path of the primary x-ray beam as it travels through the patient?

a. position
b. projection
c. medial
d. coronal

Question #38: Review

- The term projection is used to describe the path of the primary x-ray beam or central ray.
- The following is a list of terms that are examples of a projection.

Anteroposterior (AP)

- The CR will pass through the anterior aspect of the patient and exit the posterior aspect.

Posteroanterior (PA)

- The CR will pass through the posterior aspect of the patient and exit the anterior aspect.

Tangential

- The CR will skim the surface of the patient.

Axial

- Refers to a tube angle that directed along the long axis of a body part.

Question #39:

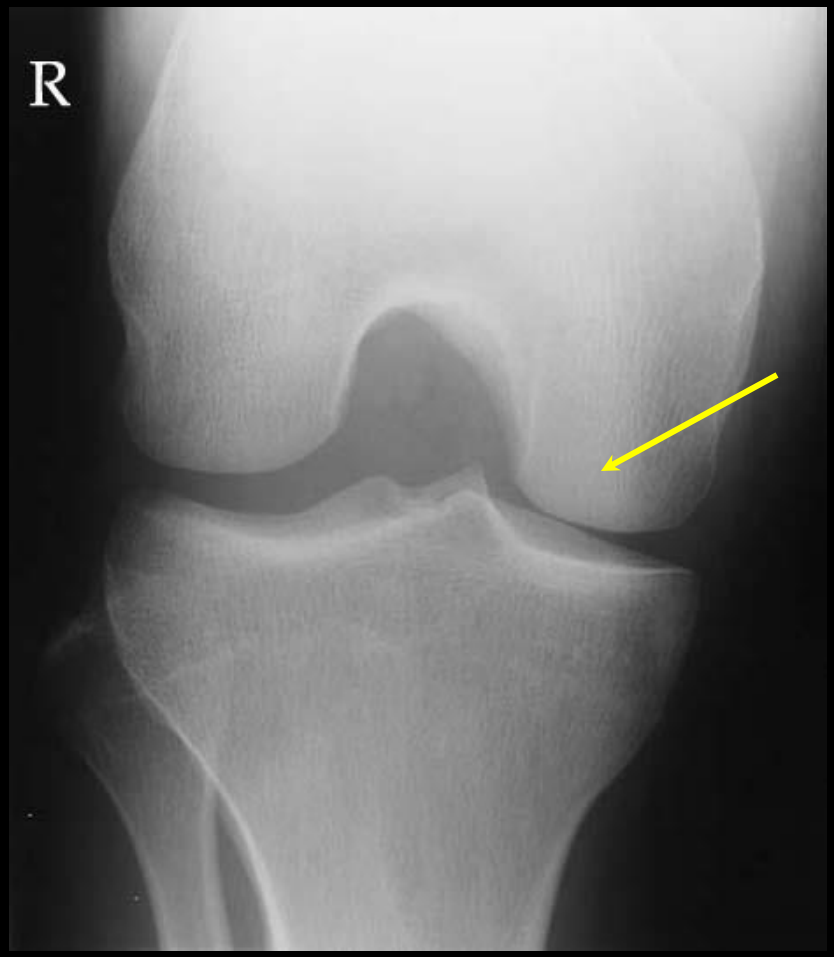
The arrow on this tunnel position of the knee radiograph is pointing to the:

a. lateral condyle of the femur.

b. medial condyle of the femur.

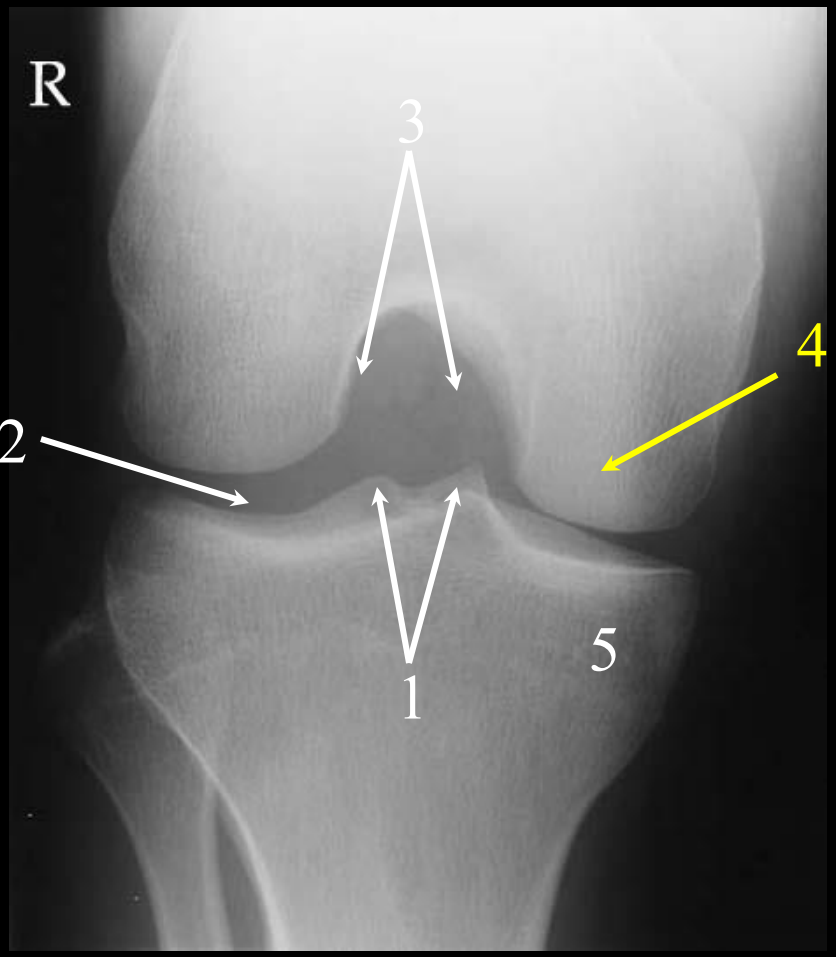
c. tibial plateau.

d. intercondylar fossa.



Question #39: Review

1. Intercondylar Eminence
2. Tibial Plateau
3. Intercondylar Fossa
4. Medial Condyle of the Femur
5. Medial Condyle of the Tibia



Intercondyloid Fossa or Tunnel Knee

Question #40:

The arrows on this tunnel position of the knee radiograph are pointing to the:

a. tibial plateau.

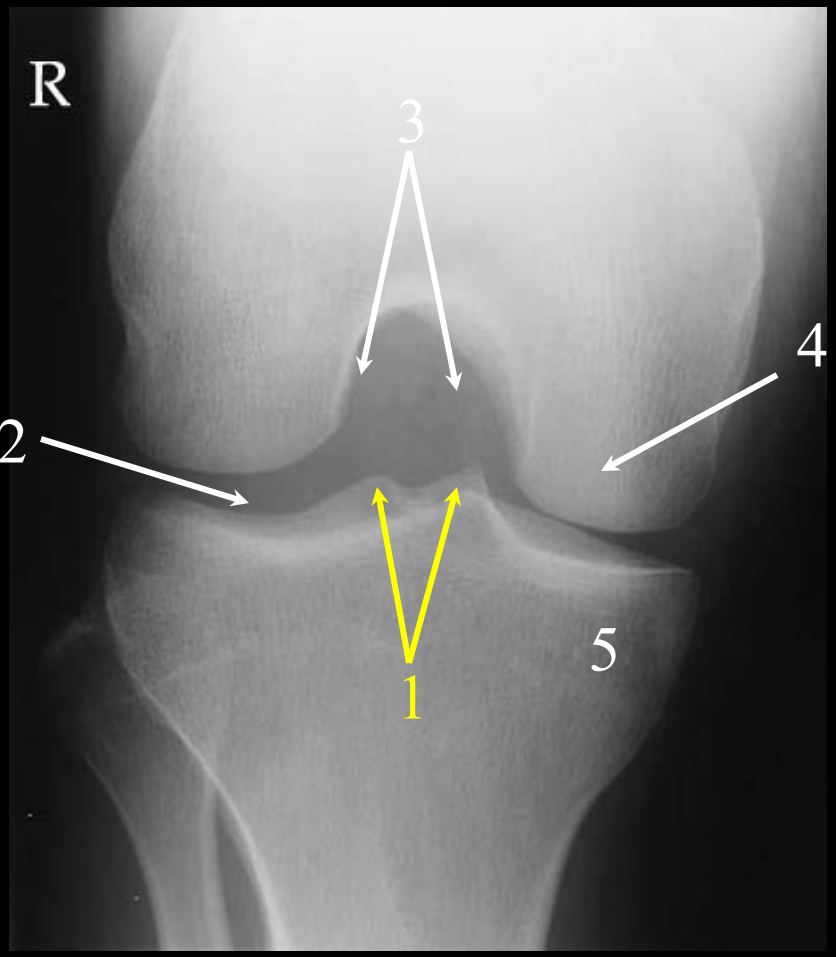
b. intercondylar eminence.

c. tibial tuberosity.

d. intercondylar fossa.

Question #40: Review

1. Intercondylar Eminence
2. Tibial Plateau
3. Intercondylar Fossa
4. Medial Condyle of the Femur
5. Medial Condyle of the Tibia



Intercondyloid Fossa or Tunnel Knee

Question #41:

The overall perversion of the anatomy of interests' true shape on the image receptor is referred to as:

a. magnification.
b. shape distortion.
c. penumbra.
d. size distortion.

Question #41: Review

- Image distortion can be broken down into two categories as follows:
  Size distortion is nothing more that the magnification of anatomy on the image receptor (IR).
  Shape distortion is the overall perversion of the anatomy of interests' true shape.

Question #42:

Which primary technical factor is regarded as the most accurate?

a. mA
b. kVp
c. time
d. focal spot size

Question #42: Review

- What function does the time setting perform?
  This refers to the length of the exposure.
  The unit for exposure time is the millisecond or ms.
- How accurate is the timer?
  Of the three primary technical factors, the time setting is the most accurate.
- Why is time not the primary controlling factor for RE?
  Generally, the exposure time is kept to a minimum in order to reduce the likelihood of motion on the image.
  mA is the factor of choice when adjusting tube output to ensure a proper RE.

Question #43:

Which of the following would not be found in the exit beam?

a. primary beam transmission
b. scattered x-rays
c. secondary x-rays
d. electrons

Question #43: Review

- The exit beam can be broken down into three distinct categories.
- The three portions of the exit beam are as follows:

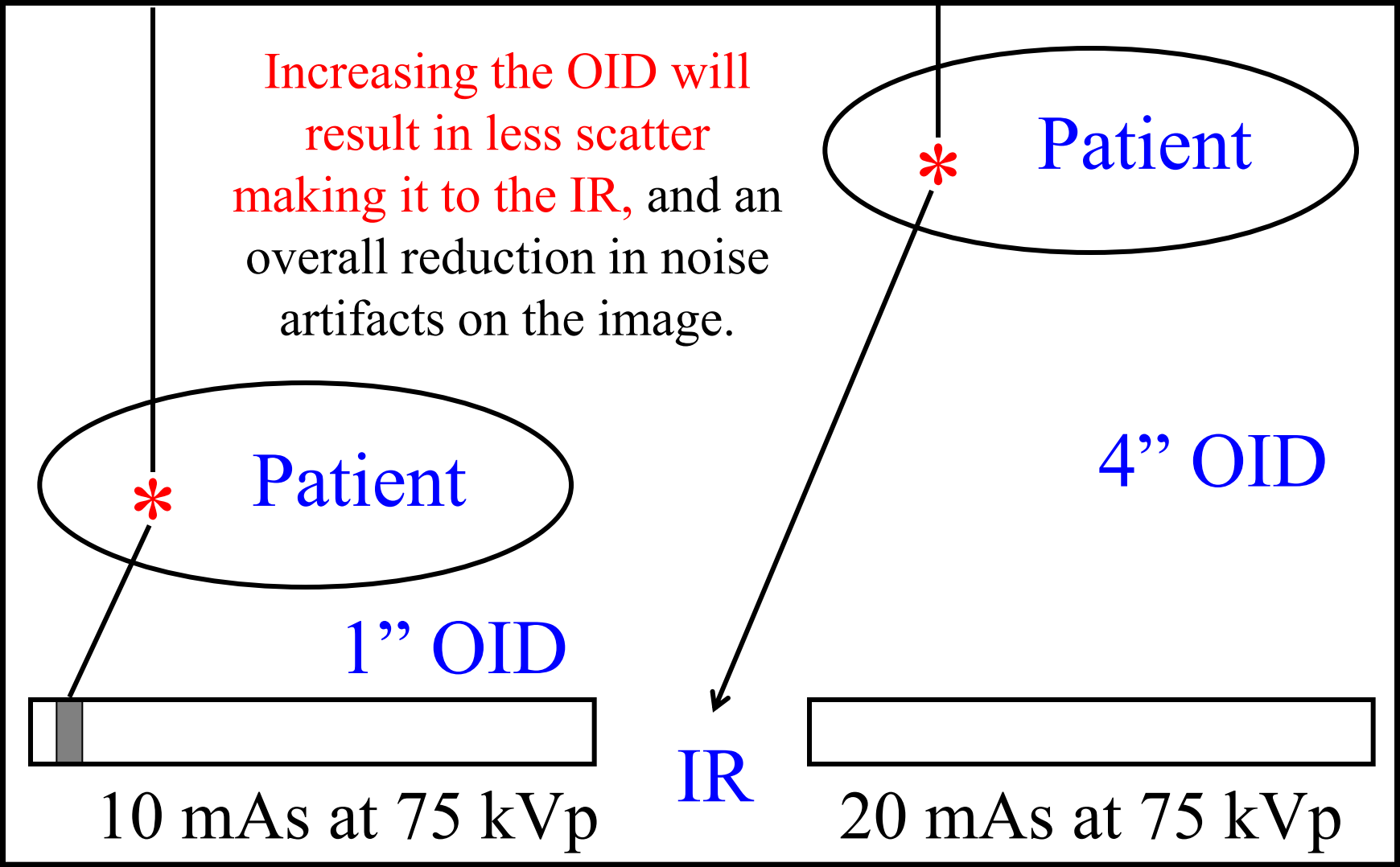
1. Primary Beam Transmission
2. Scatter X-rays
3. Secondary X-rays

Question #44:

Increasing the OID will have what effect on the ability of scatter radiation to expose the image receptor (IR)?

a. increase
b. decrease
c. no effect

Question #44: Review



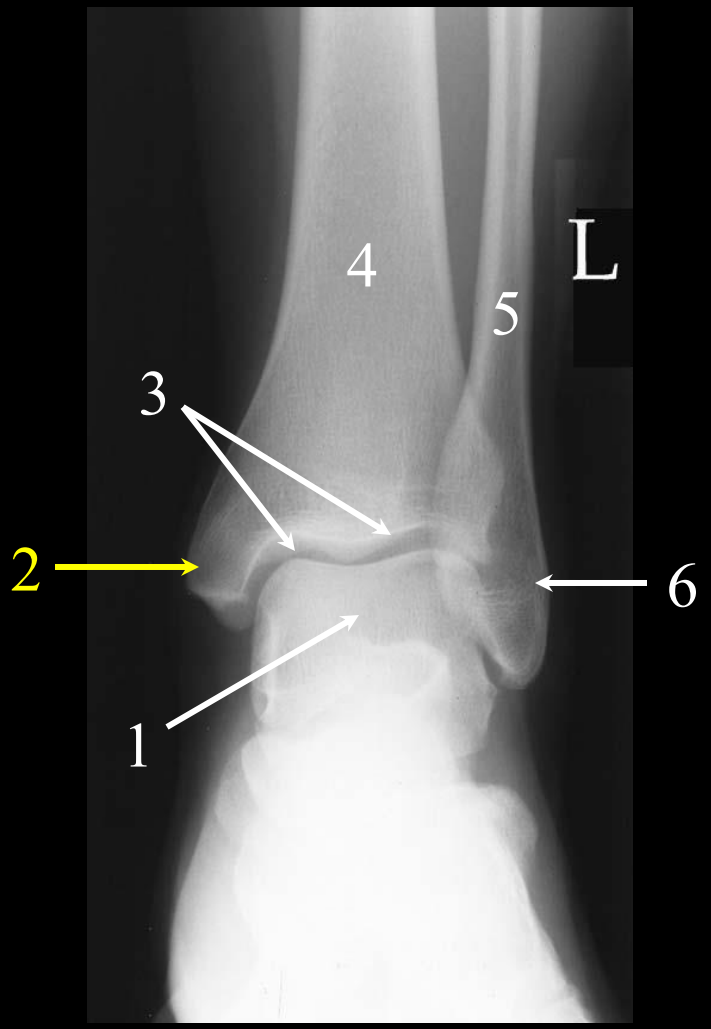
Question #45:

The arrow on this AP projection of the ankle radiograph is pointing to the:

a. lateral malleolus.
b. medial malleolus.
c. talus.
d. none of the above.

Question #45: Review

1. Talus
2. Medial Malleolus
3. Ankle Joint or Mortise
4. Shaft of the Tibia
5. Shaft of the Fibula
6. Lateral Malleolus



AP Ankle

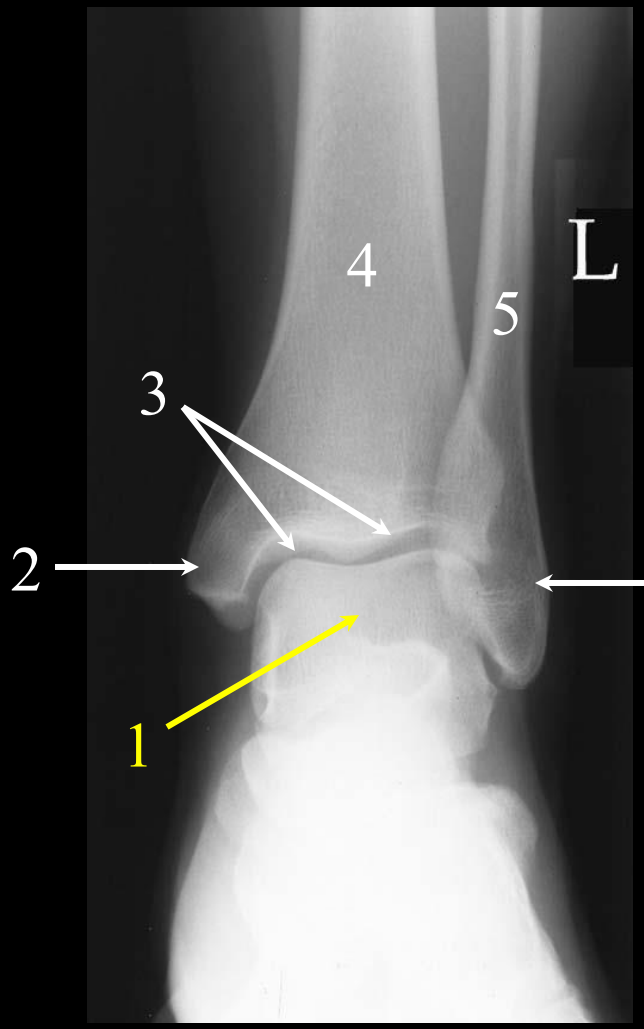
Question #46:

The arrow on this AP projection of the ankle radiograph is pointing to the:

a. talus.
b. navicular.
c. calcaneous.
d. cuboid.

Question #46: Review

1. Talus
2. Medial Malleolus
3. Ankle Joint or Mortise
4. Shaft of the Tibia
5. Shaft of the Fibula
6. Lateral Malleolus

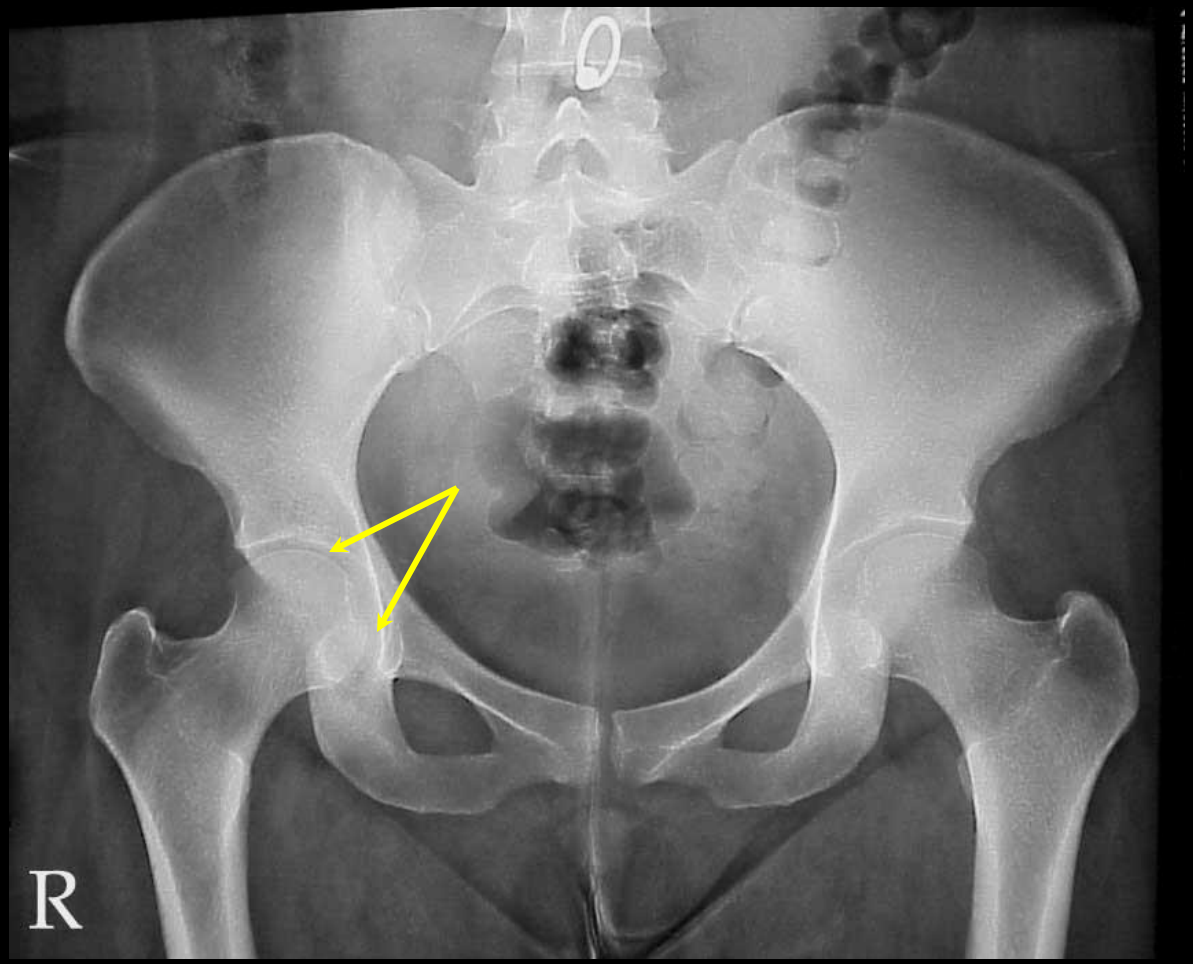


AP Ankle

Question #47:

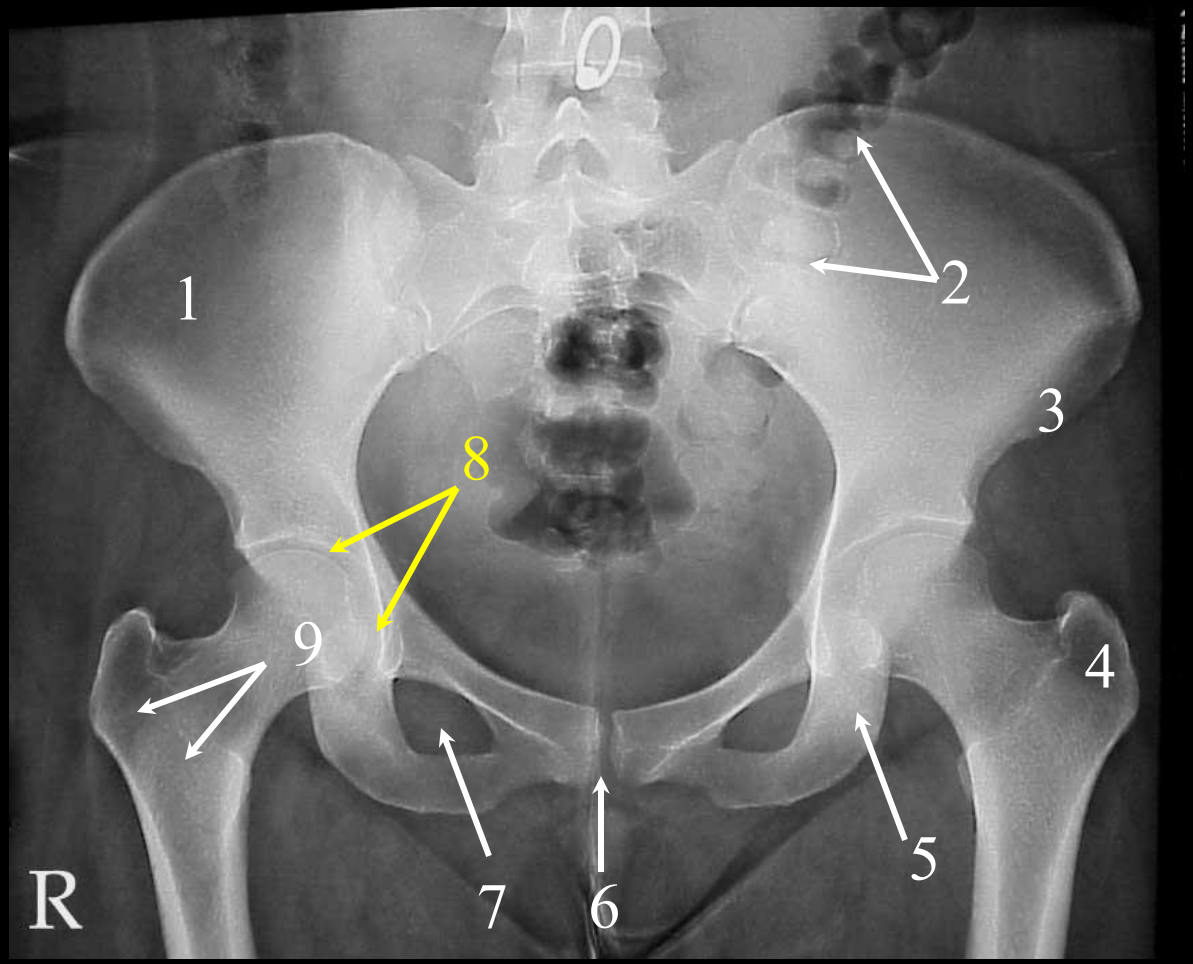
The arrows are pointing to the:

a. ischial tuberosity.
b. ischial spine.
c. glenoid fossa.
d. acetabulum.



Question #47: Review

1. Ala or Wing of the Ilium
2. Air in the Descending Colon
3. ASIS
4. Greater Trochanter
5. Body of the Ischium
6. Symphysis Pubis
7. Obturator Foramen
8. Acetabulum
9. Intertrochanteric Crest

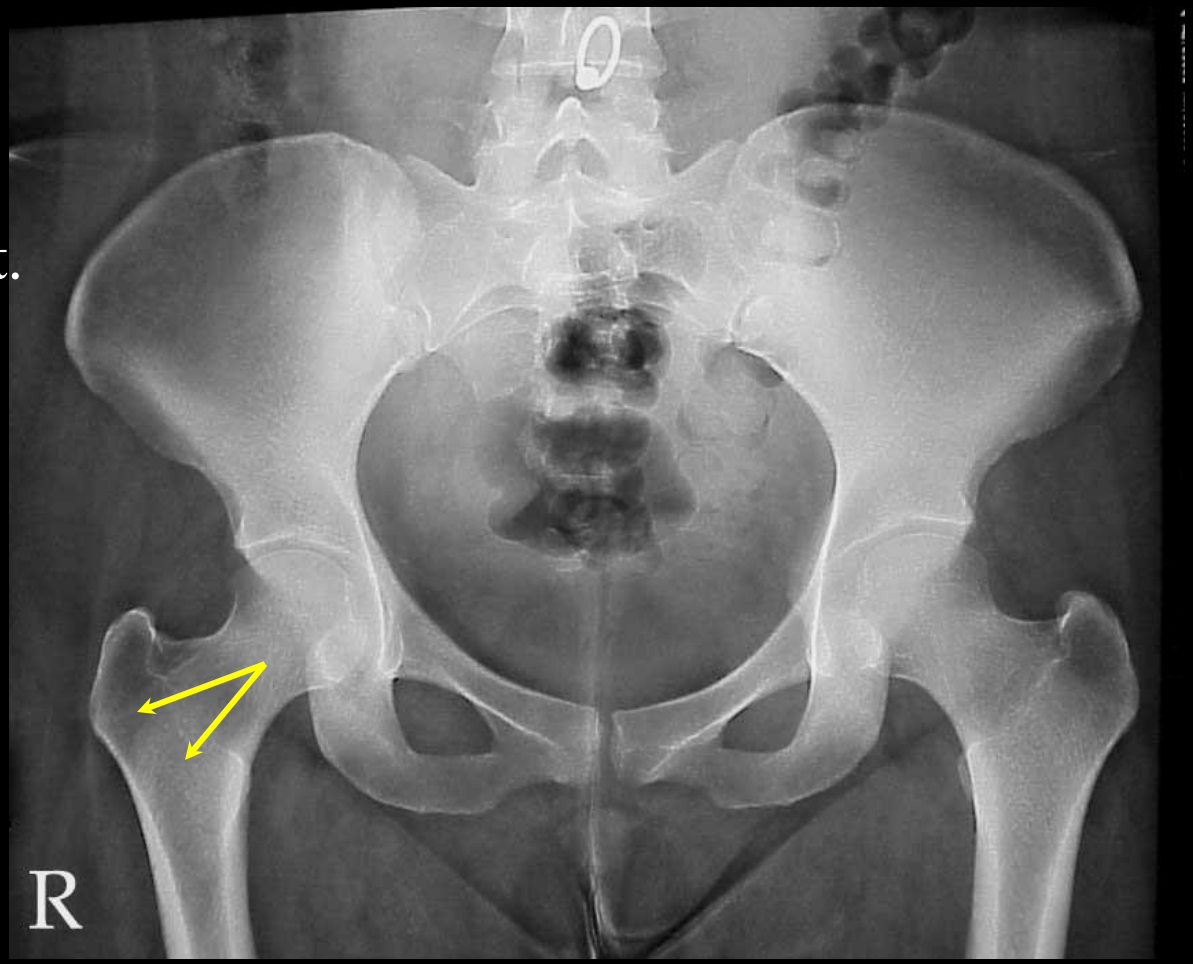


AP Pelvis

Question #48:

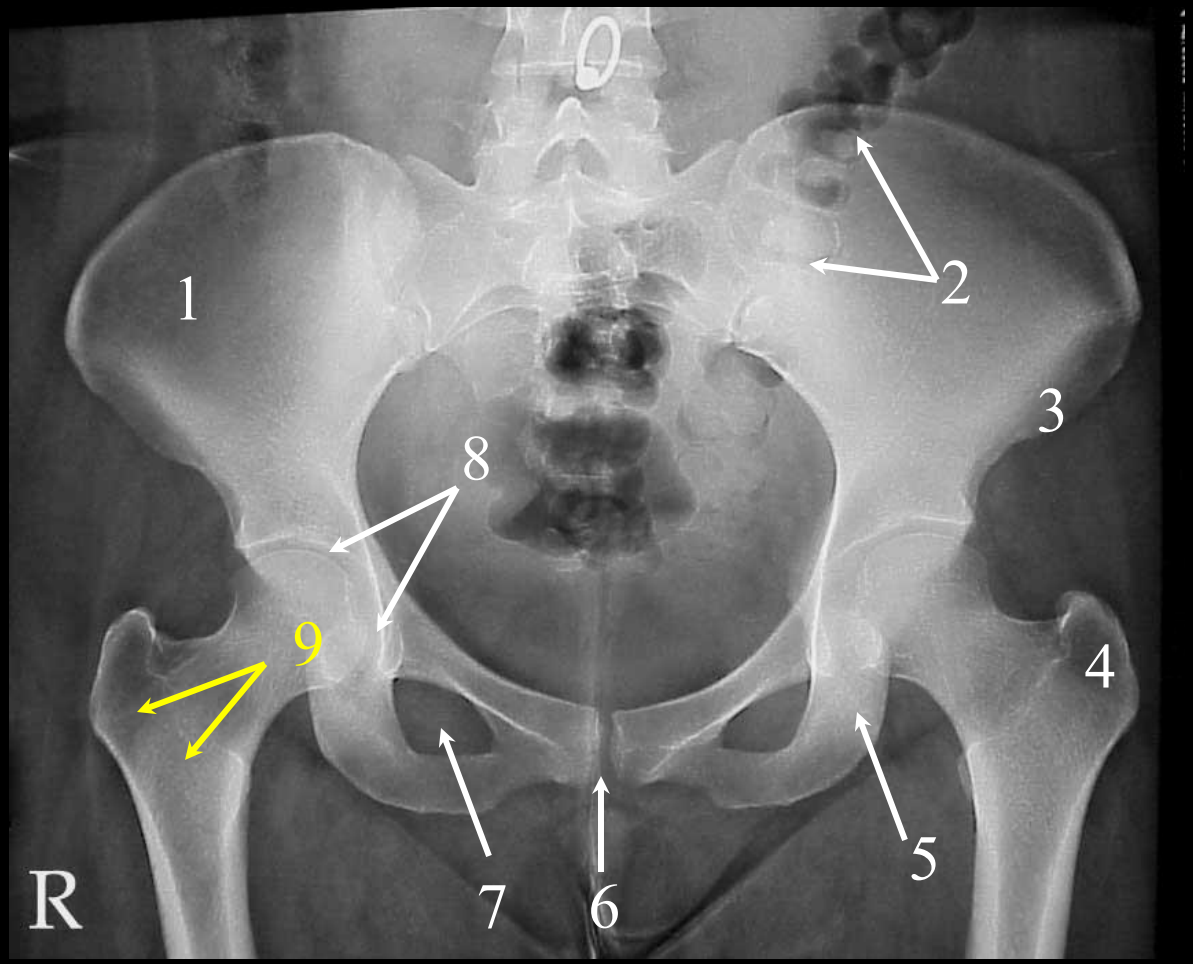
The arrows are pointing to the:

a. intertrochanteric crest.
b. greater trochanter.
c. ischial spine.
d. surgical neck.



Question #48: Review

1. Ala or Wing of the Ilium
2. Air in the Descending Colon
3. ASIS
4. Greater Trochanter
5. Body of the Ischium
6. Symphysis Pubis
7. Obturator Foramen
8. Acetabulum
9. Intertrochanteric Crest



AP Pelvis

Question #49:

The nuclear membrane disappears, and the centrioles separate and migrate to opposite ends of the cell during which of the following stages of mitosis?

a. Interphase
b. Prophase
c. Metaphase
d. Telophase

Question #49: Review

- The following is a description of the phases of somatic cell division or mitosis.

  Interphase consists of the following steps:

  -Gap 1 (resting phase)

  -DNA synthesis

  -Gap 2 (resting phase)

  During prophase, the nuclear membrane dissolves, the centrioles separate and move to opposite ends of the cell and the mitotic spindle fibers appear.

  During metaphase, the centromere of each chromosome attaches to a spindle fiber and align themselves at the equatorial plate of the cell.

  The centromere duplicates and the chromosomes begin to migrate towards opposite ends of the cell during anaphase.

  Telophase is characterized by the following events:

  -A division furrow appears as the cytoplasm and organelles are equally divided between the two daughter cells by a process called cytokinesis.

  -Each daughter cell now contains the required diploid number of 46 chromosomes.

Question #50:

According to the National Council on Radiation Protection and Measurement (NCRP), how much total filtration of the primary beam is required for an x-ray tube that can operate above 70 kVp?

a. 0.5 mm
b. 1.5 mm
c. 2.0 mm
d. 2.5 mm

Question #50: Review

- The NCRP dictates that aluminum filtration must be employed on all x-ray machines.
- Aluminum filtration of the primary beam is employed to remove low energy x-rays before they can exit the x-ray tube housing.

  They do not have any diagnostic value and would normally be absorbed by the patient's skin.
- The amount of aluminum filtration required is dictated by the maximum kVp that the tube can produce.

  Greater than 70 kVp requires 2.5 mm of aluminum filtration.

  50 to 70 kVp requires 1.5 mm of aluminum filtration.

  Less than 50 kVp requires 0.5 mm of aluminum filtration.

Question #51:

The intensity (mR) of the primary beam is inversely proportion to the square of the distance between the source and the image receptor (IR) is the definition of which of the following terms?

a. inverse square law
b. reciprocity law
c. 30% rule
d. 15% rule

Question #51: Review

- According to the inverse square law, the intensity (mR) of the beam is inversely proportional to the square of the distance between the source and the IR.
- This formula is employed to determine changes in beam intensity at a new distance.

$$\frac{I_1}{I_2} = \frac{D_2^2}{D_1^2}$$

I_1 = old mR D_1 = old distance

I_2 = new mR D_2 = new distance

Question #52:

At a minimum, any body part that measures greater than _____ cm will require the use of a grid?

a. 10
b. 12
c. 15
d. 20

Question #52: Review

- Shield patients in the child-bearing years and younger.
  Traditionally, the child-bearing years extend up to and include age 50.
- Employ a small focal spot whenever possible.
- Remove the patient's watch and any rings or bracelets that may obstruct the anatomy of interest.
- A grid should be used on any body part that measures greater than 10 cm.
- For each 5° of tube angle, the SID must be reduced by 1".

Question #53:

This lateral foot is properly positioned.

a. true

b. false

Question #53: Review

1. The Tibia and Fibula should be aligned to ensure that they are directly superimposed.
2. The Metatarsals should also be directly superimposed.

Lateral Foot: (Poorly Positioned)

Question #54:

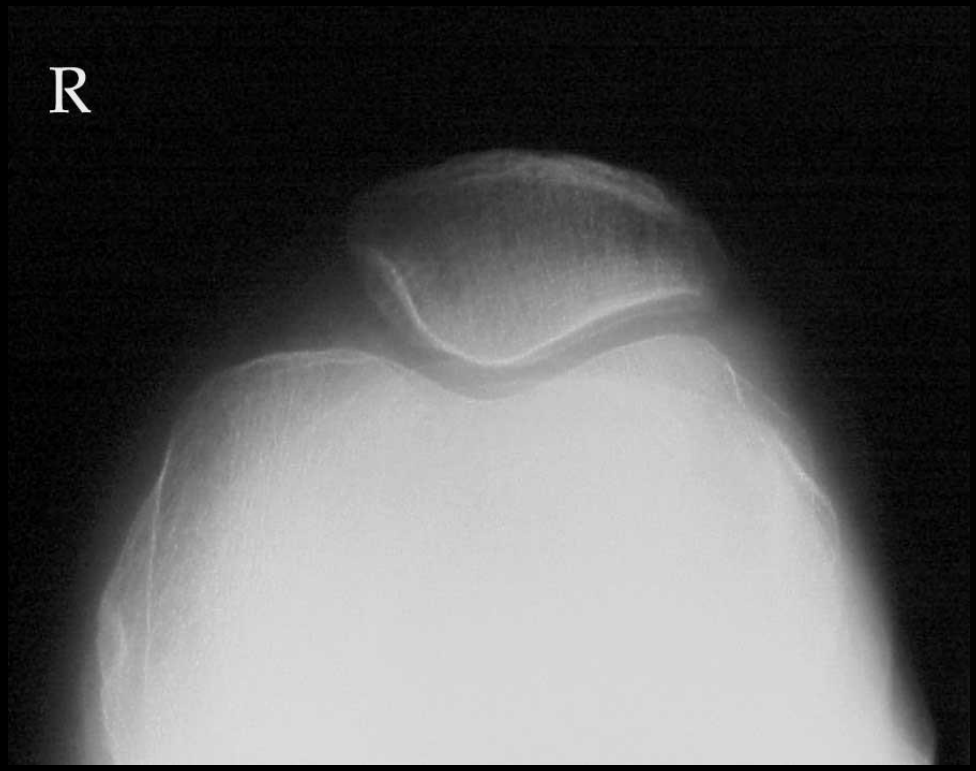
What is the name of this projection?

a. tunnel knee

b. lateral patella

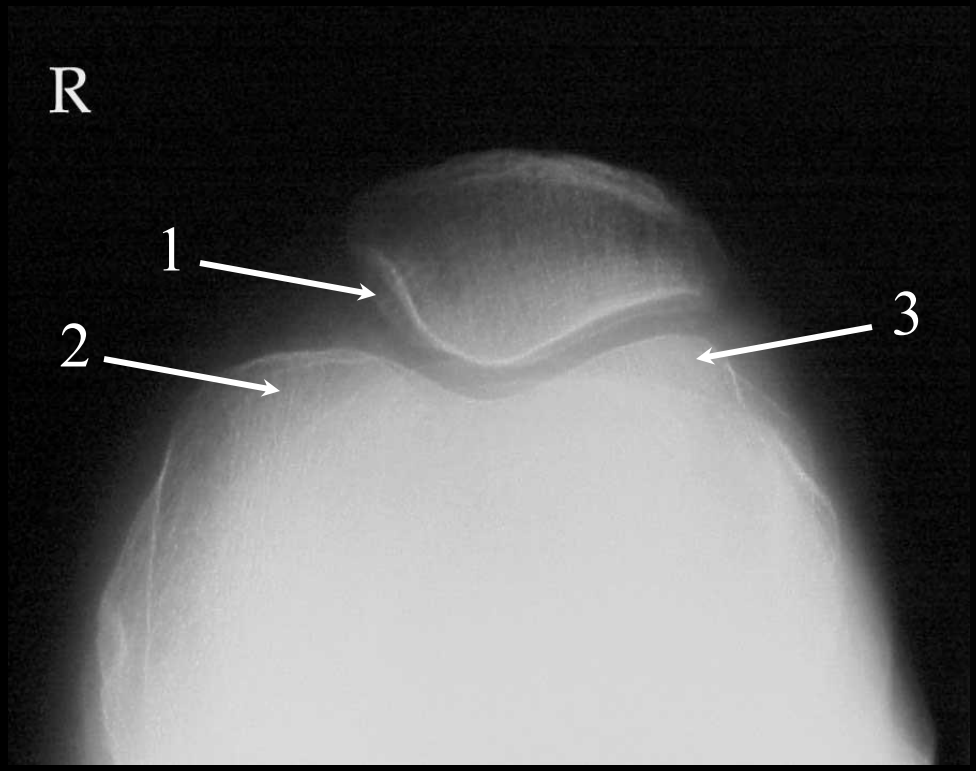
c. tangential patella

d. Holmblad knee



Question #54: Review

1. Medial Articulation Facet
2. Medial Condyle of the Femur
3. Lateral Condyle of the Femur



Tangential Patella

Question #55:

According to the National Council on Radiation Protection and Measurement (NCRP), the bucky slot cover must contain _____ mm of lead or its equivalent.

a. 0.25
b. 0.5
c. 1.0
d. 2.5

Question #55: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during fluoroscopy examinations:

  A cumulative timer set with a 5-minute alarm must be part of every fluoroscopic unit.

  -The idea is to make the radiologist aware of how much fluoroscopic time has elapsed during the procedure.

  A dead-man type of fluoroscopic exposure control must be employed.

  -In other words, radiation will only be emitted when the exposure pedal is depressed

  -A "light switch" type of exposure switch that can be "flipped on" is not permitted.

  The bucky slot is the opening where the bucky moves up and down below the tabletop and it must be covered with a shielding device that is equal to 0.25 mm of lead or its equivalent.

  -The bucky slot is located directly at the reproductive organ level of the radiologist and this is a means to reduce their exposure.

  A protective lead curtain of at least 0.25 mm of lead or its equivalent must be positioned between the image intensifier and the radiologist.

Question #56:

The chromosomes align themselves along the equatorial plate of the cell during which of the following stages of mitosis?

a. Interphase
b. Prophase
c. Metaphase
d. Telophase

Question #56: Review

- The following is a description of the phases of somatic cell division or mitosis.

  Interphase consists of the following steps:

  -Gap 1 (resting phase)

  -DNA synthesis

  -Gap 2 (resting phase)

  During prophase, the nuclear membrane dissolves, the centrioles separate and move to opposite ends of the cell and the mitotic spindle fibers appear.

  During metaphase, the centromere of each chromosome attaches to a spindle fiber and align themselves at the equatorial plate of the cell.

  The centromere duplicates and the chromosomes begin to migrate towards opposite ends of the cell during anaphase.

  Telophase is characterized by the following events:

  -A division furrow appears as the cytoplasm and organelles are equally divided between the two daughter cells by a process called cytokinesis.

  -Each daughter cell now contains the required diploid number of 46 chromosomes.

Question #57:

Which of the following conventional units is used to describe the dose of radiation that an x-ray tube would emit (tube output) during an exposure?

a. rem
b. rad
c. mR
d. Curie

Question #57: Review

- The following is a list of conventional units that are used to describe ionizing radiation and particles.

  The roentgen (R) is used to describe a quantity of radiation intensity in air.

  -The roentgen is used to measure a quantity of ionizations that occur in a volume of dry air after exposure to either x-rays or gamma rays.

  -X-ray tube output is measured in mR (1R = 1000 mR)

  The rad is the unit of absorbed dose.

  -It is defined as 100 ergs of energy being absorbed by 1 gram of absorbing material.

  -The rad is the unit used most often to describe radiation exposure to the patient.

  The unit used to describe a quantity of radioactive material is the Curie.

  The unit for dose equivalence is the rem and it is the unit employed on dosimetry reports.

Question #58:

According to the National Council on Radiation Protection and Measurement (NCRP), what is the annual dose limit (DL) in rem for the lens of the eye for occupationally exposed individuals?

a. 5
b. 15
c. 50
d. 100

Question #58: Review

- The following is a list of dose limits set by the NCRP for occupationally exposed individuals:

  Entire Body: 5 rem /year

  Lens of the Eye: 15 rem/year

  All other individual organs (liver, hands, skin etc.) of the body:

  50 rem/year

- The maximum occupational lifetime dose is determined by multiplying your age in years by 1 rem.

  For example, a 30-year-old radiographer is allowed to have a total lifetime dose of no more than 30 rem (30 years old x 1 rem).

- Pregnant radiographers must keep their dose limits below the following levels:

  0.05 rem/ month

  0.5 rem/year

Question #59:

Which of the following terms is used to describe image unsharpness for spatial resolution?

a. signal-to-noise ratio
b. quantization
c. penumbra
d. umbra

Question #59: Review

- There are two important terms used to describe spatial resolution, and they are as follows:

1. Penumbra

   This is in reference to image unsharpness.

2. Umbra

   This term is used to describe image sharpness.

   It is not as commonly used as penumbra.

Question #60:

Which of the following statements is true regarding organic compounds?

a. Salts, acids and bases are considered organic compounds.
b. Approximately 80% of the body's mass consists of proteins.
c. All organic compounds contain carbon.
d. Lipids are made of different combinations of amino acids.

Question #60: Review

- The following describes organic compounds which are one of the two major categories of molecules found in the human body:

  Macromolecules are nothing more than very large molecules.

  All organic compounds contain carbon, and they also play a very important role in maintaining homeostasis.

  There are four major categories of organic compounds found in the body.

  1. Proteins which make up approximately 15% of the body's mass.

     They are made of different combinations of amino acids that are bound together by peptide bonds.

  2. Carbohydrates which are commonly referred to as sugars and starches.
  3. Nucleic acids which are composed of small structures called nucleotides.

     DNA and RNA are made of nucleic acids and they contain the hereditary information of the organism.

  4. Lipids or fats are a combination of glycerol and fatty acids.

Question #61:

According to the National Council on Radiation Protection and Measurement (NCRP), the protective tube housing must be designed to ensure that tube leakage is kept below ____ mR/hour at a distance of 1 meter.

a. 100
b. 500
c. 1,000
d. 10,000

Question #61: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during general radiographic examinations:

  The protective tube housing must be designed to ensure that tube leakage is kept below 100 mR/hour at a distance of 1 meter.

  The collimator light field must be accurate to within +/- 2% of the SID that is set.

  -For example, at a 40" SID the light field may be off by as much as 0.8" in either direction (40" SID x 2% = 0.8").

  -To avoid missing required anatomy, you should not place body parts of interest within 0.8" of the edge of your light field.

  It is recommended that the central ray alignment must be accurate to within +/- 1 degree of perfect vertical.

  The source to image-receptor distance (SID) indicator or dial must be accurate to within 2% of the SID that is set.

  -This is to ensure that your "tape measure" is accurate.

  The exposure switch cord on mobile units (portable machines) must be at least 2 meters or 6 feet in length.

  -This allows the radiographer to stand a safe distance from the source.

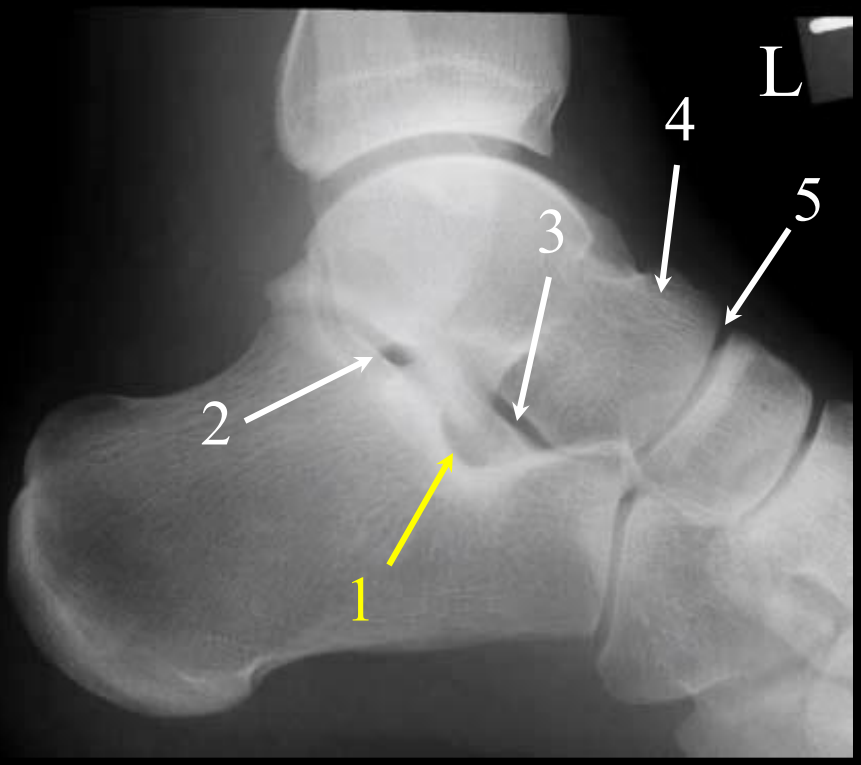
Question #62:

The arrow on this lateral position of the calcaneous radiograph is pointing to the:

a. tarsal sinus.
b. subtalar joint.
c. ankle joint.
d. talocalcaneonavicular joint.

Question #62: Review

1. Tarsal Sinus
2. Subtalar Joint
3. Talocalcaneonavicular Joint
4. Head of the Talus
5. Talonavicular Joint



Lateral Calcaneous

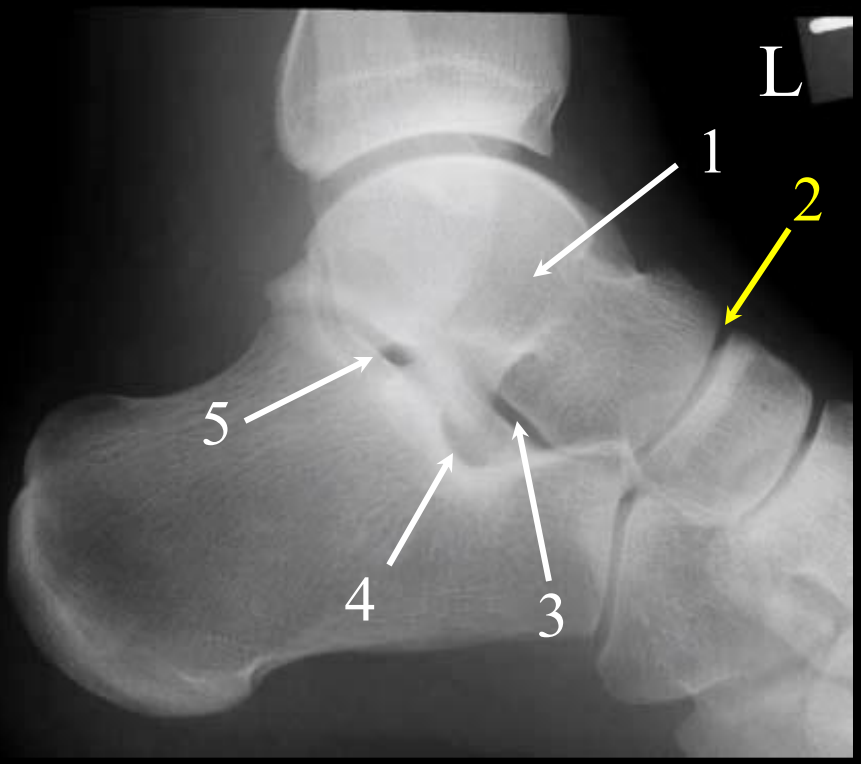
Question #63:

The arrow on this lateral position of the calcaneous radiograph is pointing to the:

a. talocalcaneonavicular joint.
b. tarsal sinus.
c. talonavicular joint.
d. subtalar joint.

Question #63: Review

1. Talus
2. Talonavicular Joint
3. Talocalcaneonavicular Joint
4. Tarsal Sinus
5. Subtalar Joint



Lateral Calcaneous

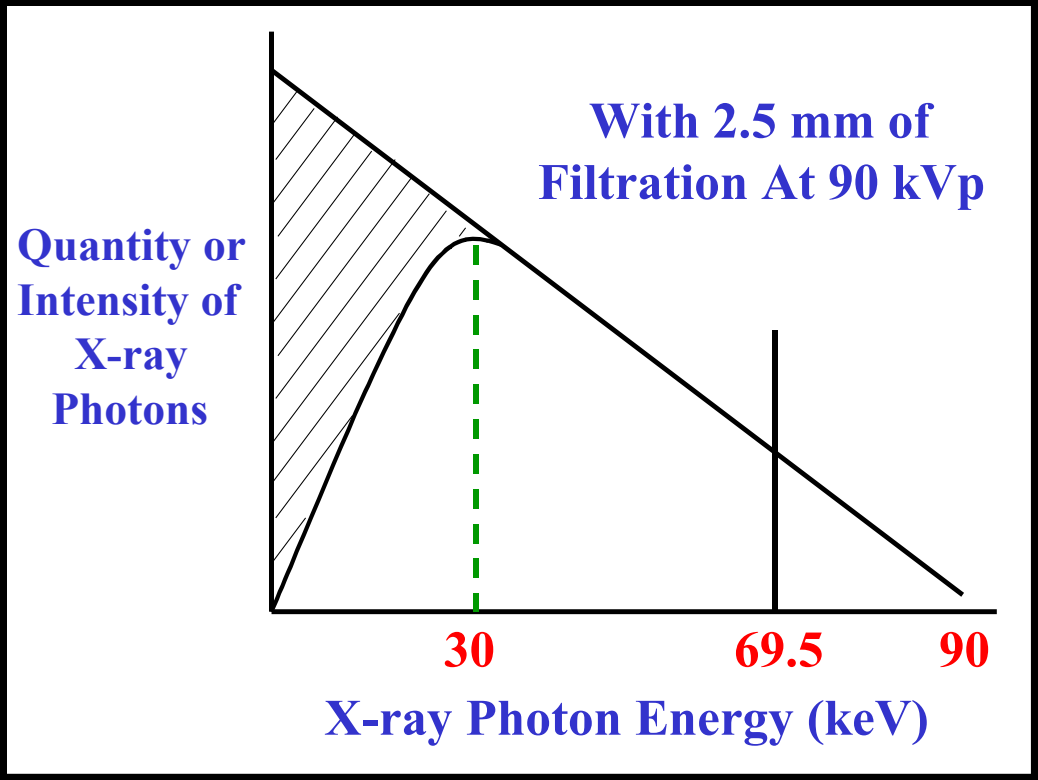
Question #64:

In reference to the impact of added filtration on the x-ray emission spectrum, the average energy of the primary beam will be _____ of the kVp that is set on the console.

a. 1/3
b. 1/2
c. 2/3
d. 3/4

Question #64: Review

The X-ray Emission Spectrum

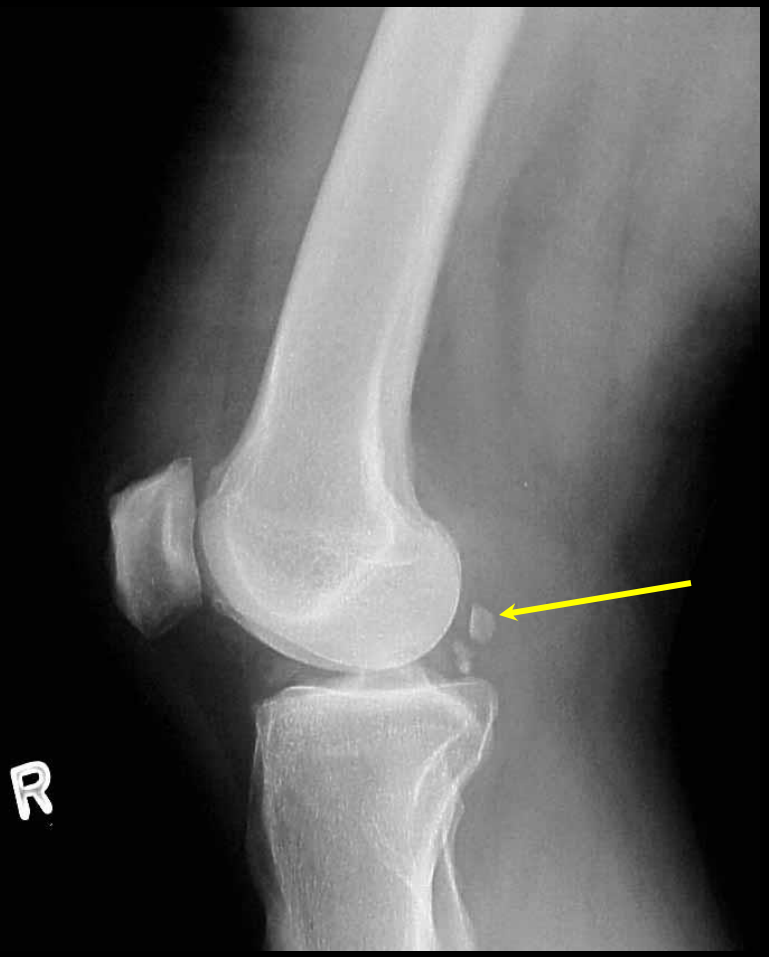


Note how the lower energy x-rays have been removed. The average energy of the primary beam will always be 1/3 of the kVp when filtration is added. At 90 kVp, the average energy is 30 keV.

Question #65:

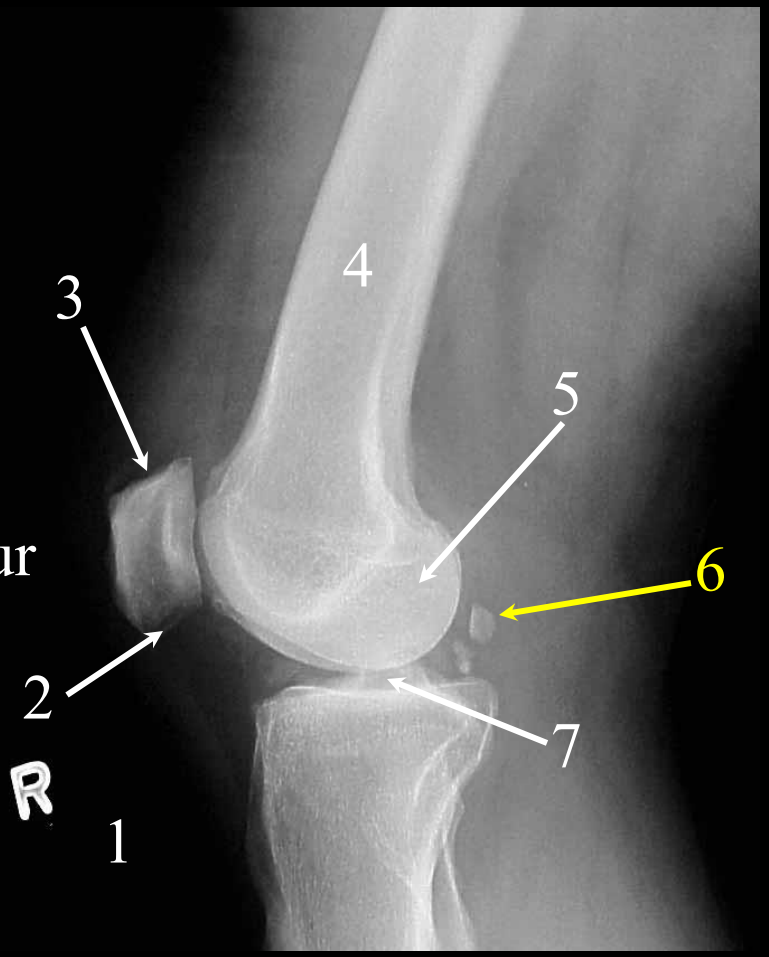
The arrow on this lateral position of the knee radiograph is pointing to:

a. a baker's cyst.
b. a fabella.
c. Ludloff's spot.
d. the lateral condyle of the tibia.



Question #65: Review

1. Tibial Tuberosity
2. Apex of the Patella
3. Base of the Patella
4. Shaft of the Femur
5. Superimposed Condyles of the Femur
6. Fabella (sesamoid bone)
7. Intercondylar Eminence



Lateral Knee: (Properly Positioned)

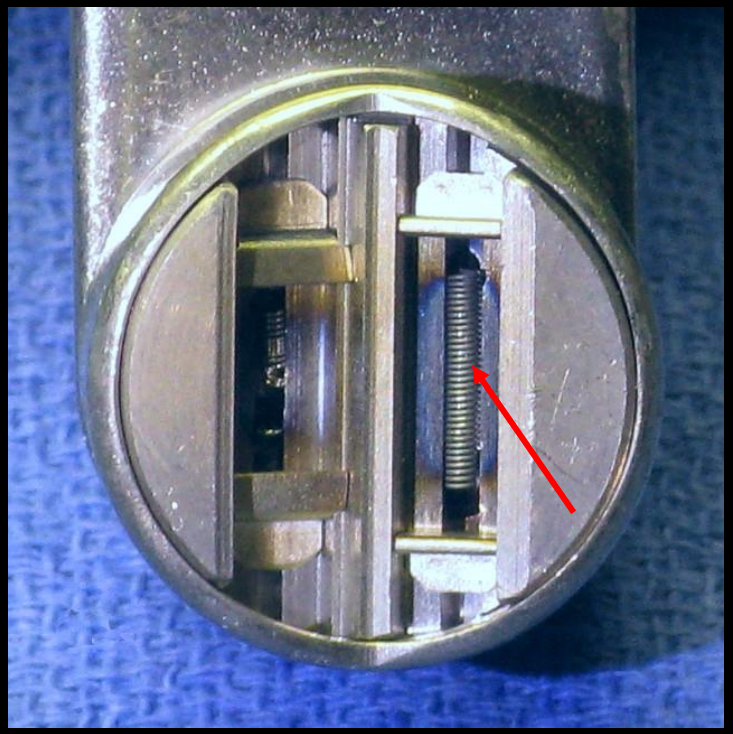
Question #66:

The process of heating the filament of the x-ray tube to incandescence in order to produce electrons is known as:

a. thermionic emission.
b. quantization.
c. photoemission.
d. phosphorescence.

Question #66: Review

The filament (arrow) is heated to incandescence prior to making the exposure.



This heating causes electrons to be produced and results in the formation of an electron cloud around the filament.

The process of producing electrons in this manner is referred to as thermionic emission.

Question #67:

Which of the following organelles is known as the powerhouse of the cell?

a. mitochondria
b. ribosomes
c. lysosomes
d. golgi apparatus

Question #67: Review

- Organelles are small organs that perform specific functions within the cell and the following is a description of some of the more common ones:

  The endoplasmic reticulum (ER) consists of a network of tubes or channels that are closely associated with the nucleus

  -The ER is essentially the transport system from the nucleus to the cytoplasm.

  Ribosomes are small, round structures that are the site of protein synthesis.

  -They are either attached to the ER (often referred to as rough ER) or are loose within the cytoplasm.

  The golgi apparatus consists of a series of tubules that extend from the nucleus to the cell membrane.

  Mitochondria are bean-shaped organelles within the cytoplasm.

  -They are known as the powerhouse of the cell as their function is to produce energy for cell use.

  Lysosomes are small sacs that contain the digestive enzymes of the cell.

Question #68:

Which of the following is the term used to describe the difference in the thickness and atomic numbers of the structures that comprise the body parts of interest?

a. subject contrast
b. radiographic contrast
c. distortion
d. receptor exposure

Question #68: Review

- The magnitude of the signal difference in the remnant beam as a result of the different absorption characteristics of the tissues and structures making up that part.
- In simpler terms, subject contrast is the difference in the thickness and atomic numbers of the structures that comprise the body part of interest.
- kVp is the primary controlling factor for subject contrast.

  This is the basis for optimum kVp.

Question #69:

Any combination of mA and time that results in the same mAs is referred to as the:

a. reciprocity law.
b. 15% rule.
c. 30% rule.
d. inverse square law.

Question #69: Review

- The reciprocity law refers to any combination of mA and time that results in the same mAs as demonstrated below:

mA	Time	mAs	RE
100	200 ms (0.2 s)	20	60 mR
200	100 ms (0.1 s)	20	60 mR
400	50 ms (0.05 s)	20	60 mR

- The exposure made with the shortest exposure time is desired as a means to reduce the likelihood of motion.
- In this example, the exposure made at 50 ms would be optimal.

Question #70:

Which of the following is the primary controlling factor for adjusting receptor exposure (RE) for radiographic images?

a. mA
b. kVp
c. exposure time
d. focal spot size

Question #70: Review

- mA is the primary controlling factor for controlling RE.
- It has a direct and proportional relationship on RE.
- The data below demonstrates how mA affects the dose received by the image receptor:

mA	RE
100	15 mR
200	30 mR
400	60 mR

Question #71:

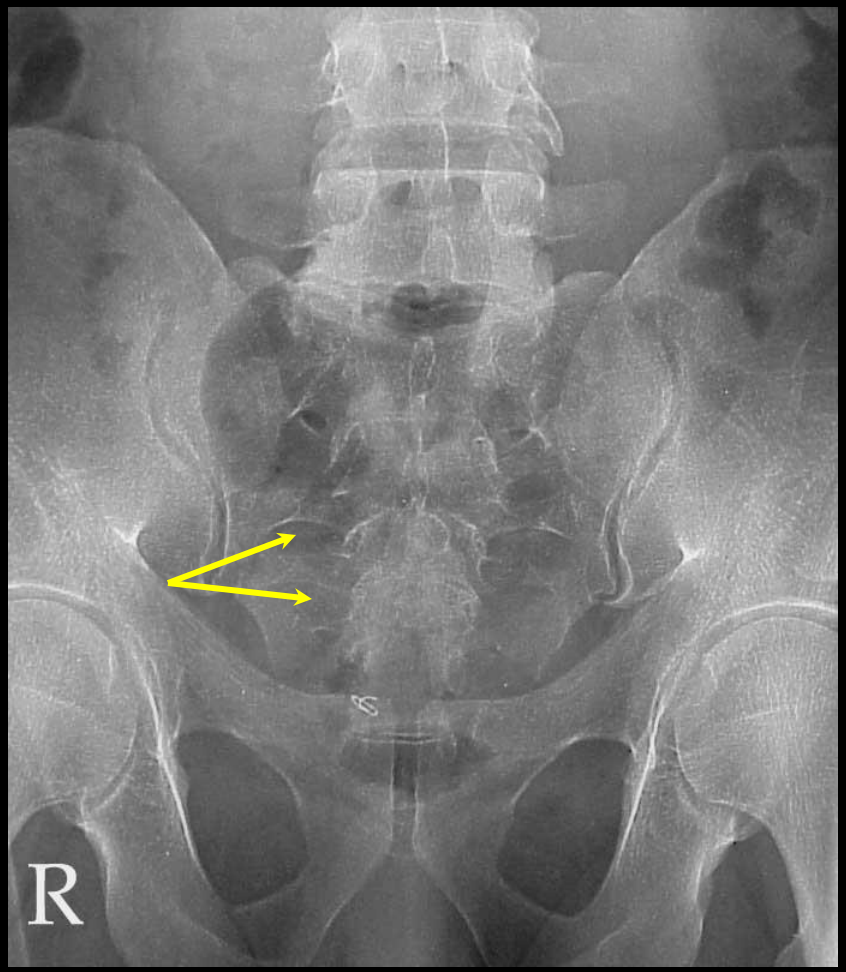
The arrows are pointing to the:

a. sacral canal.

b. anterior sacral foramina.

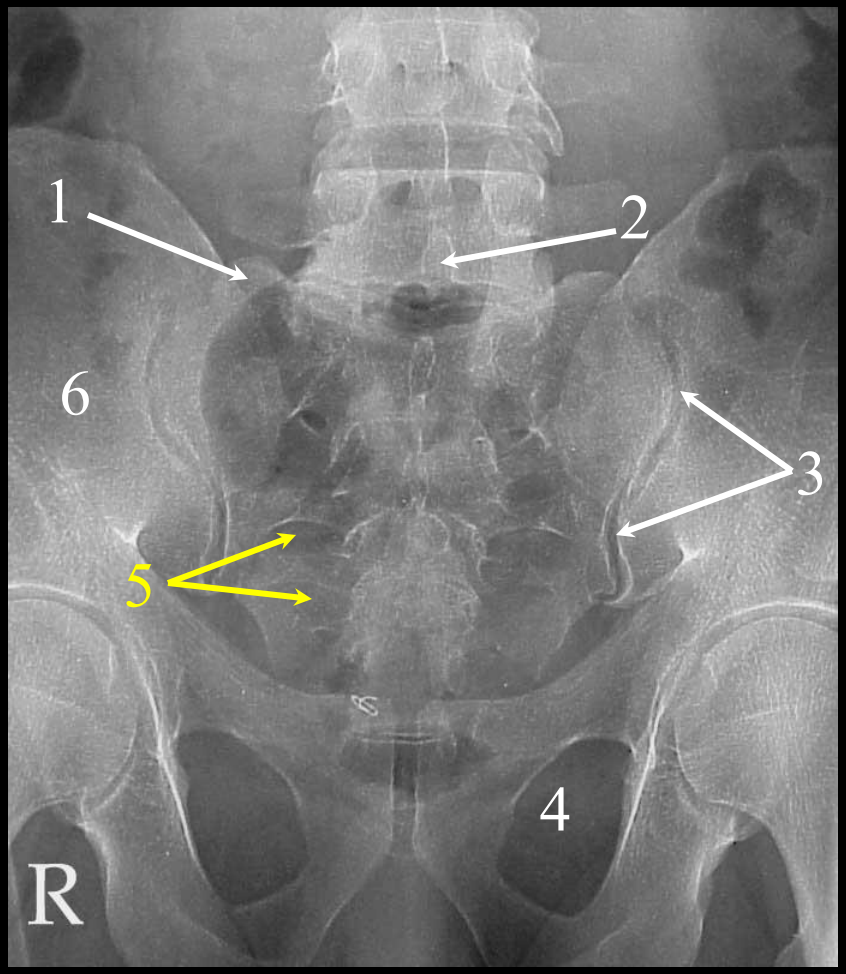
c. sacral promontory.

d. obturator foramen.



Question #71: Review

1. Superior Articular Process of the Sacrum
2. Spinous Process of L5
3. Left S.I. Joint
4. Obturator Foramen
5. Anterior Sacral Foramina
6. Right Ala of the Ilium



Sacroiliac Joints: AP Axial Projection

Question #72:

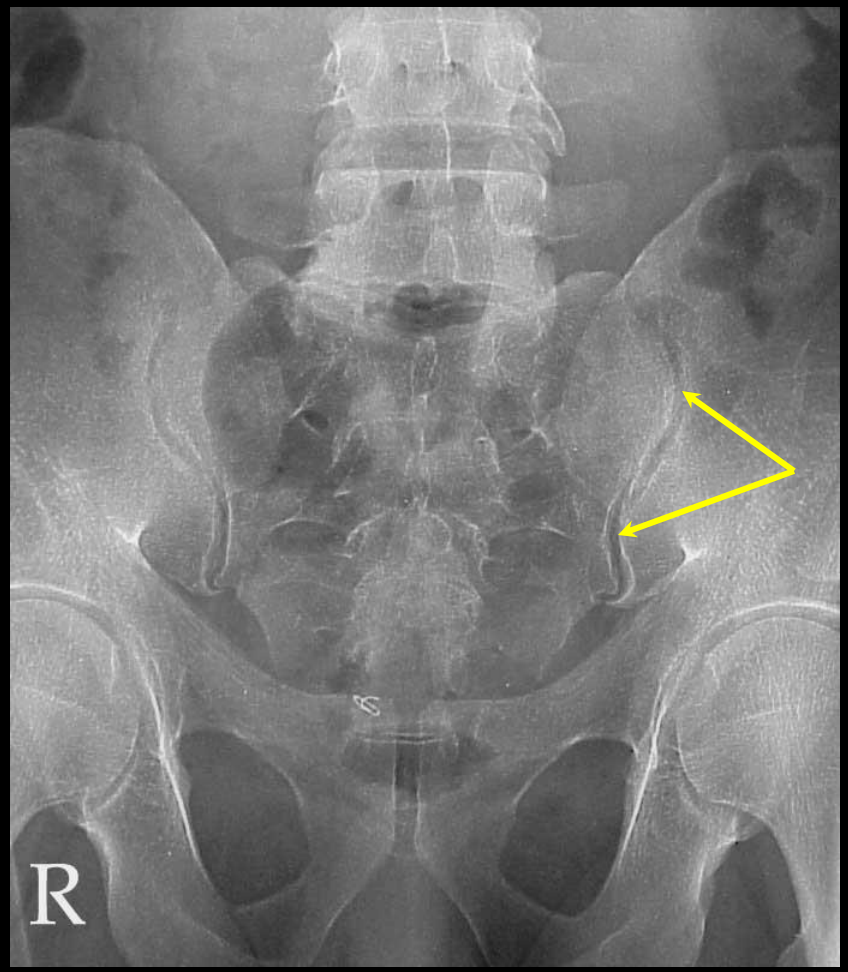
The arrows are pointing to the:

a. sacroiliac (S.I.) joint.

b. sacral canal.

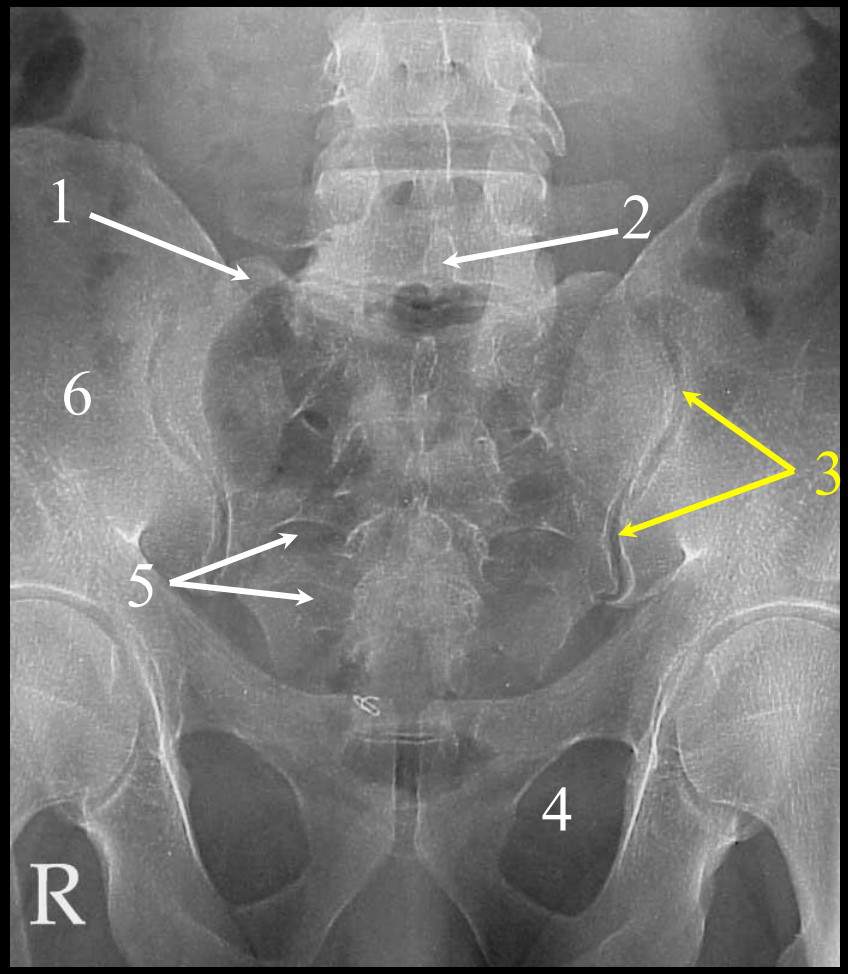
c. zygapophyseal joint.

d. sacral promontory.



Question #72: Review

1. Superior Articular Process of the Sacrum
2. Spinous Process of L5
3. Left S.I. Joint
4. Obturator Foramen
5. Anterior Sacral Foramina
6. Right Ala of the Ilium



Sacroiliac Joints: AP Axial Projection

Question #73:

The genetic cells of the body reproduce by a process know as:

a. DNA synthesis.
b. meiosis.
c. mitosis.
d. cytokinesis.

Question #73: Review

- Somatic cells are all of the cells in the body except the genetic cells, and they divide by a process known as mitosis.

  Somatic cells contain 46 chromosomes which is also known as the diploid number or 2n#.

  The process of mitosis consists of the following five distinct stages:

  Interphase (G1, S, G2)

  Prophase

  Metaphase

  Anaphase

  Telophase

- Genetic cells are the reproductive cells of the body, and they are produced by a process called meiosis.

  This is commonly referred to as a reduction division where a genetic cell starts with the 2n# (46) of chromosomes and goes through two mitotic-like divisions to produce four daughter cells that possess the desired n# (23) of chromosomes.

  The next slide compares the stages of mitosis to meiosis.

Question #74:

According to the National Council on Radiation Protection and Measurement (NCRP), the mA station linearity must not vary more than plus or minus ___ %.

a. 1
b. 2
c. 5
d. 10

Question #74: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during general radiographic examinations:

  The x-ray generator reproducibility refers to the ability of the machine to produce the same beam intensity with repeated exposures.

  -It must not vary more than +/- 5%.

  -For example, if the first exposure produced 100 mR, then the next exposure must produce between 95 to 105 mR to be within the 5% allowable variance.

  mA station linearity refers to ensuring that adjacent mA stations are calibrated properly.

  -They must not vary ore than +/- 10%.

  -For example, if a constant kVp and time station are employed and the 200 mA station produced 100 mR then the 400 mA station should produce 200 mR.

  The most common thickness for protective apparel, such as lead aprons, gloves and thyroid shields, is 0.5 mm of lead and it will absorb 88% of the primary beam at 75 kVp.

  -Protective apparel made of 1.0 mm of lead will absorb approximately 99% of the primary beam at 75 kVp.

Question #75:

The brightness of a radiographic image displayed on a monitor is measured in units of:

a. candella (cd) per square meter.
b. Watts.
c. line pairs per mm.
d. coulombs per kilogram.

Question #75: Review

- Brightness is a measurement of the luminance displayed on a monitor for a radiographic image.

  Brightness is calibrated in units of candela (cd) per square meter.
- Receptor exposure (RE) and computer algorithms work together to produce the brightness level required to display the image.
- This unit will focus on factors that affect the RE.

Question #76:

According to the National Council on Radiation Protection and Measurement (NCRP), the collimator light field must be accurate to within plus or minus _____ % of the SID that is set.

a. 0.5
b. 1
c. 2
d. 5

Question #76: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during general radiographic examinations:

  The protective tube housing must be designed to ensure that tube leakage is kept below 100 mR/hour at a distance of 1 meter.

  The collimator light field must be accurate to within +/- 2% of the SID that is set.

  -For example, at a 40" SID the light field may be off by as much as 0.8" in either direction (40" SID x 2% = 0.8").

  -To avoid missing required anatomy, you should not place body parts of interest within 0.8" of the edge of your light field.

  It is recommended that the central ray alignment must be accurate to within +/- 1 degree of perfect vertical.

  The source to image-receptor distance (SID) indicator or dial must be accurate to within 2% of the SID that is set.

  -This is to ensure that your "tape measure" is accurate.

  The exposure switch cord on mobile units (portable machines) must be at least 2 meters or 6 feet in length.

  -This allows the radiographer to stand a safe distance from the source.

Question #77:

According to the National Council on Radiation Protection and Measurement (NCRP), a protective lead curtain of at least _____ mm of lead or its equivalence must be positioned between the radiologist and the image intensifier during a fluoroscopic examination.

a. 0.25
b. 0.5
c. 1.0
d. 2.5

Question #77: Review

- The following is a list of guidelines that the NCRP recommends in regard to radiation protection during fluoroscopy examinations:

  A cumulative timer set with a 5-minute alarm must be part of every fluoroscopic unit.

  -The idea is to make the radiologist aware of how much fluoroscopic time has elapsed during the procedure.

  A dead-man type of fluoroscopic exposure control must be employed.

  -In other words, radiation will only be emitted when the exposure pedal is depressed

  -A "light switch" type of exposure switch that can be "flipped on" is not permitted.

  The bucky slot is the opening where the bucky moves up and down below the tabletop and it must be covered with a shielding device that is equal to 0.25 mm of lead or its equivalent.

  -The bucky slot is located directly at the reproductive organ level of the radiologist and this is a means to reduce their exposure.

  A protective lead curtain of at least 0.25 mm of lead or its equivalent must be positioned between the image intensifier and the radiologist.

Question #78:

Which of the following terms is used to describe the portion of the x-ray beam that is located between the target and the patient?

a. exit beam
b. image forming beam
c. light beam
d. primary beam

Question #78: Review

- Two portions of an x-ray beam:
  1. Primary Beam

     This is the portion of the x-ray beam that is located between the target of the anode and the patient.
  2. Exit or Image Forming Beam

     This may also be referred to as the remnant beam.
     This portion of the beam is located between the patient and the image receptor (IR).
     The exit beam contains the image which is then transferred to the IR.

Question #79:

The arrow on this lateral position of the foot radiograph is pointing to the:

a. base of the 5th Metatarsal.

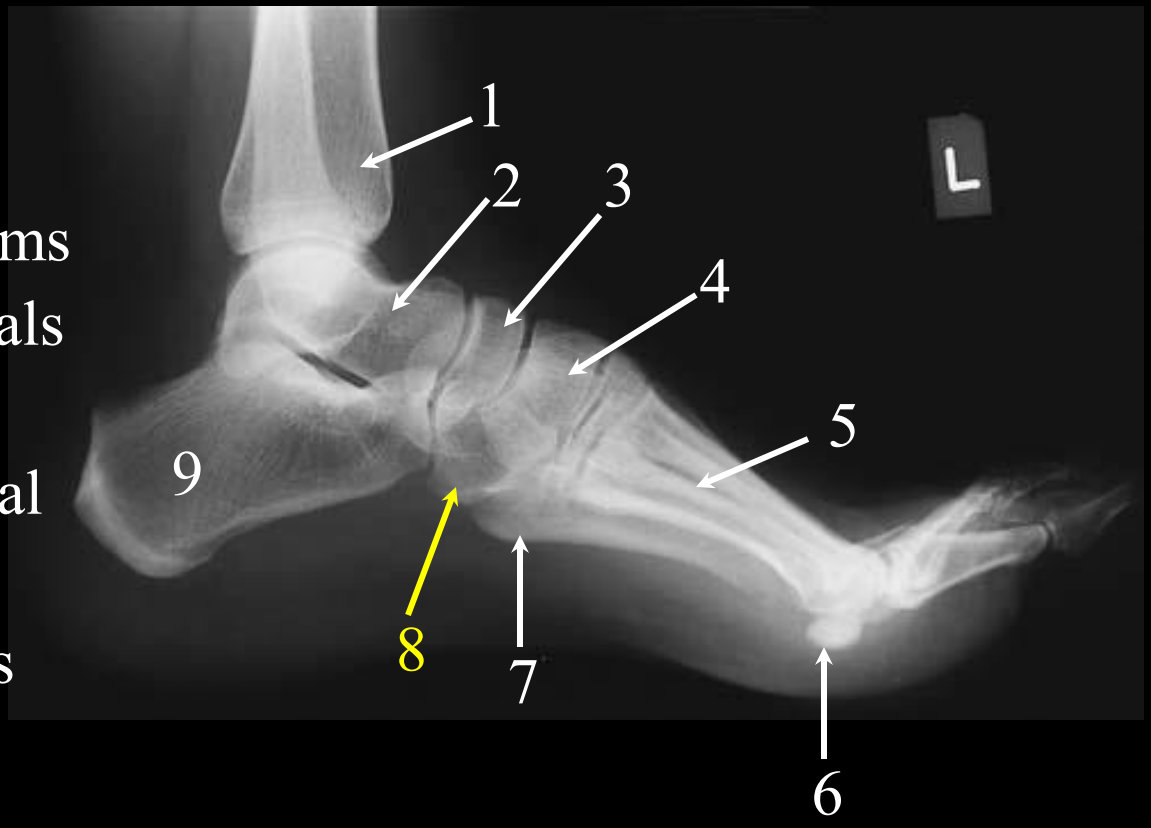
b. cuboid.

c. medial cuneiform.

d. navicular.

Question #79: Review

1. Shaft of the Tibia
2. Talus
3. Navicular
4. Superimposed Cuneiforms
5. Superimposed Metatarsals
6. Sesamoid Bones
7. Base of the 5th Metatarsal
8. Cuboid
9. Calcaneous or Os Calcis



Lateral Foot: (Properly Positioned)

Question #80:

The arrow on this lateral position of the foot radiograph is pointing to the:

a. talus.

b. calcaneous.

c. navicular.

d. lateral malleolus.

Question #80: Review

1. Shaft of the Tibia
2. Talus
3. Navicular
4. Superimposed Cuneiforms
5. Superimposed Metatarsals
6. Sesamoid Bones
7. Base of the 5th Metatarsal
8. Cuboid
9. Calcaneous or Os Calcis

Lateral Foot: (Properly Positioned)

Question #81:

According to the National Council on Radiation Protection and Measurement (NCRP), what is the lifetime dose limit (DL) in rem for a 40-year-old occupationally exposed individual?

a. 10
b. 20
c. 40
d. 80

Question #81: Review

- The following is a list of dose limits set by the NCRP for occupationally exposed individuals:

  Entire Body: 5 rem /year

  Lens of the Eye: 15 rem/year

  All other individual organs (liver, hands, skin etc.) of the body:

  50 rem/year

- The maximum occupational lifetime dose is determined by multiplying your age in years by 1 rem.

  For example, a 40-year-old radiographer is allowed to have a total lifetime dose of no more than 40 rem (40 years old x 1 rem).

- Pregnant radiographers must keep their dose limits below the following levels:

  0.05 rem/ month

  0.5 rem/year

Question #82:

100 ergs of energy absorbed being absorbed by 1 gram of absorbing material is the definition for which of the following radiation units?

a. rad
b. roentgen
c. Curie
d. rem

Question #82: Review

- The following is a list of conventional units that are used to describe ionizing radiation and particles.

  The roentgen (R) is used to describe a quantity of radiation intensity in air.

  -The roentgen is used to measure a quantity of ionizations that occur in a volume of dry air after exposure to either x-rays or gamma rays.

  -X-ray tube output is measured in mR (1R = 1000 mR)

  The rad is the unit of absorbed dose.

  -It is defined as 100 ergs of energy being absorbed by 1 gram of absorbing material.

  -The rad is the unit used most often to describe radiation exposure to the patient.

  The unit used to describe a quantity of radioactive material is the Curie.

  The unit for dose equivalence is the rem and it is the unit employed on dosimetry reports.

Question #83:

Which of the following organelles is commonly referred to as the digestive system of the cell?

a. mitochondria
b. lysosomes
c. ribosomes
d. golgi apparatus

Question #83: Review

- Organelles are small organs that perform specific functions within the cell and the following is a description of some of the more common ones:

  The endoplasmic reticulum (ER) consists of a network of tubes or channels that are closely associated with the nucleus

  -The ER is essentially the transport system from the nucleus to the cytoplasm.

  Ribosomes are small, round structures that are the site of protein synthesis.

  -They are either attached to the ER (often referred to as rough ER) or are loose within the cytoplasm.

  The golgi apparatus consists of a series of tubules that extend from the nucleus to the cell membrane.

  Mitochondria are bean-shaped organelles within the cytoplasm.

  -They are known as the powerhouse of the cell as their function is to produce energy for cell use.

  Lysosomes are small sacs that contain the digestive enzymes of the cell.

Question #84:

DNA is comprised of different combinations of nitrogenous bases. Which of the following nitrogenous base will always pair with adenine?

a. guanine
b. cytosine
c. thymine
d. none of the above are correct

Question #84: Review

- The following describes the salient characteristics of nucleic acids:

  DNA and RNA are made of nucleic acids, and they contain the hereditary information of the cell and organism.

  They are composed of a combination of small structures called nucleotides.

  Nucleotides are made up of a complex combination of deoxyribose (sugar), phosphate and nitrogenous bases.

  The individual components of a nucleotide are held together by hydrogen bonds.

  The four nitrogenous bases are broken down into the following four categories:

Purines	Pyrimadines
adenine……..	..thymine
guanine……..	..cytosine

  Adenine will only combine with thymine and guanine will only combine with cytosine.

  The DNA macromolecule looks like a ladder that has been twisted to form a spiral staircase as demonstrated on the next slide.

Question #85:

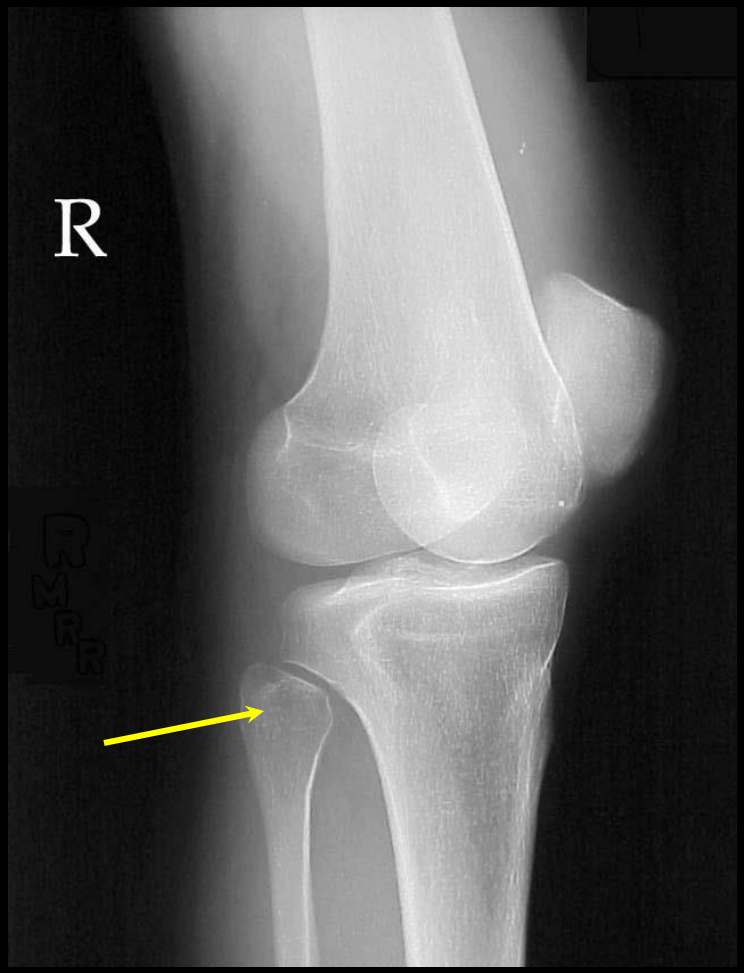
The arrow on this internal oblique position of the knee radiograph is pointing to the:

a. head of the fibula.

b. head of the radius.

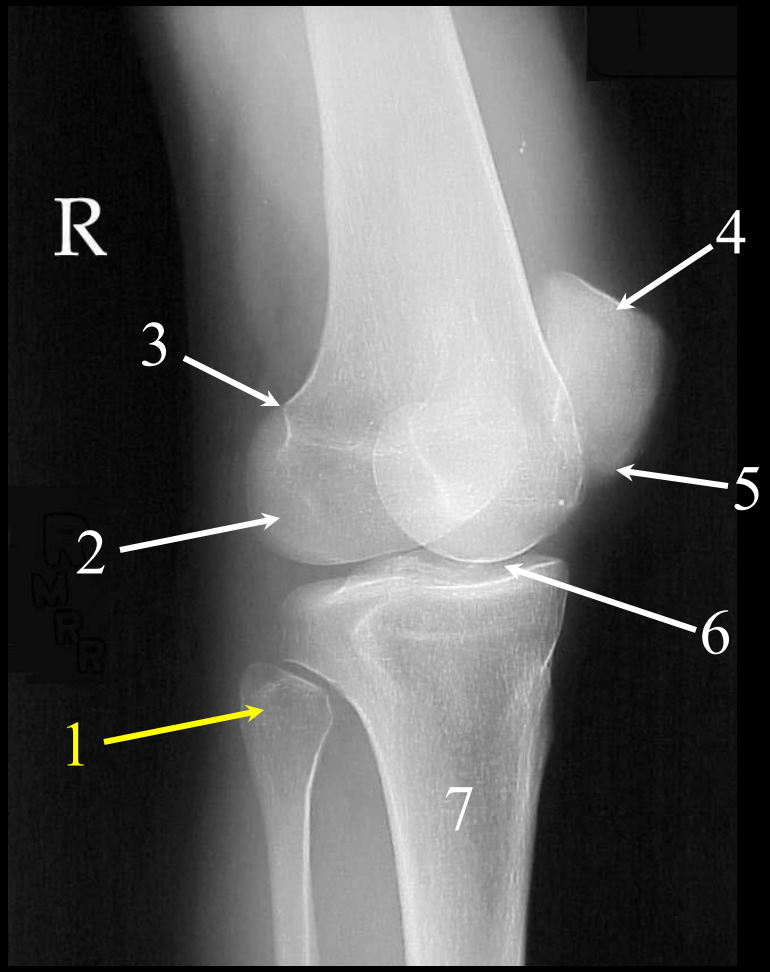
c. tibial tuberosity.

d. lateral malleolus.



Question #85: Review

1. Head of the Fibula
2. Lateral Condyle of the Femur
3. Lateral Epicondyle of the Femur
4. Base of the Patella
5. Apex of the Patella
6. Intercondylar Eminence
7. Shaft of the Tibia



Internal Oblique Knee

Question #86:

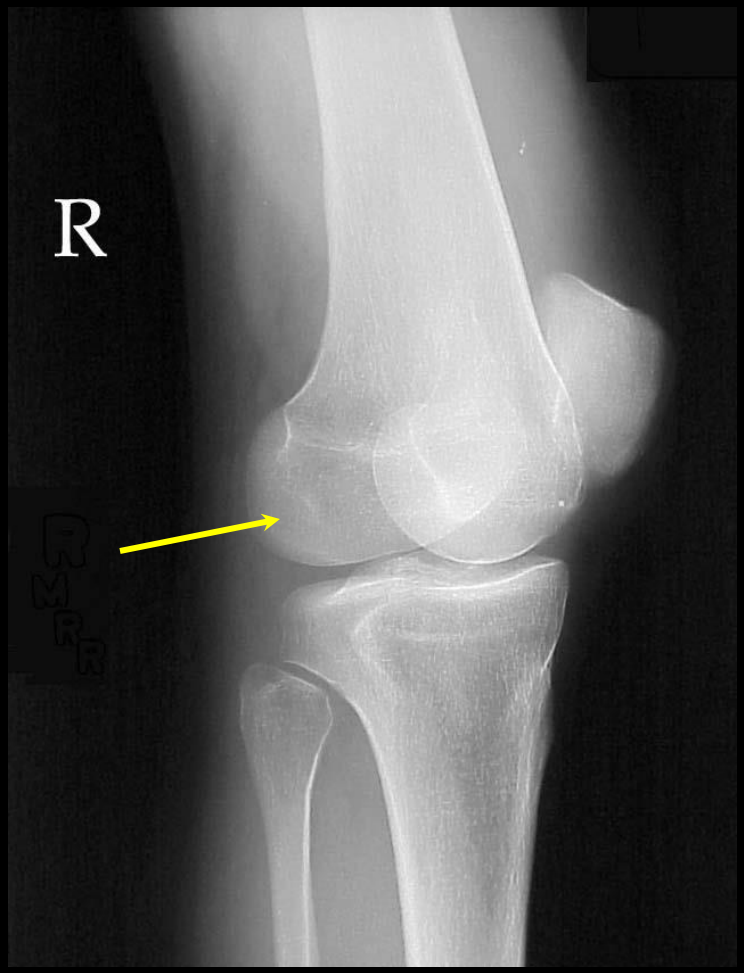
The arrow on this internal oblique position of the knee radiograph is pointing to the:

a. intercondylar fossa.

b. medial condyle of the femur.

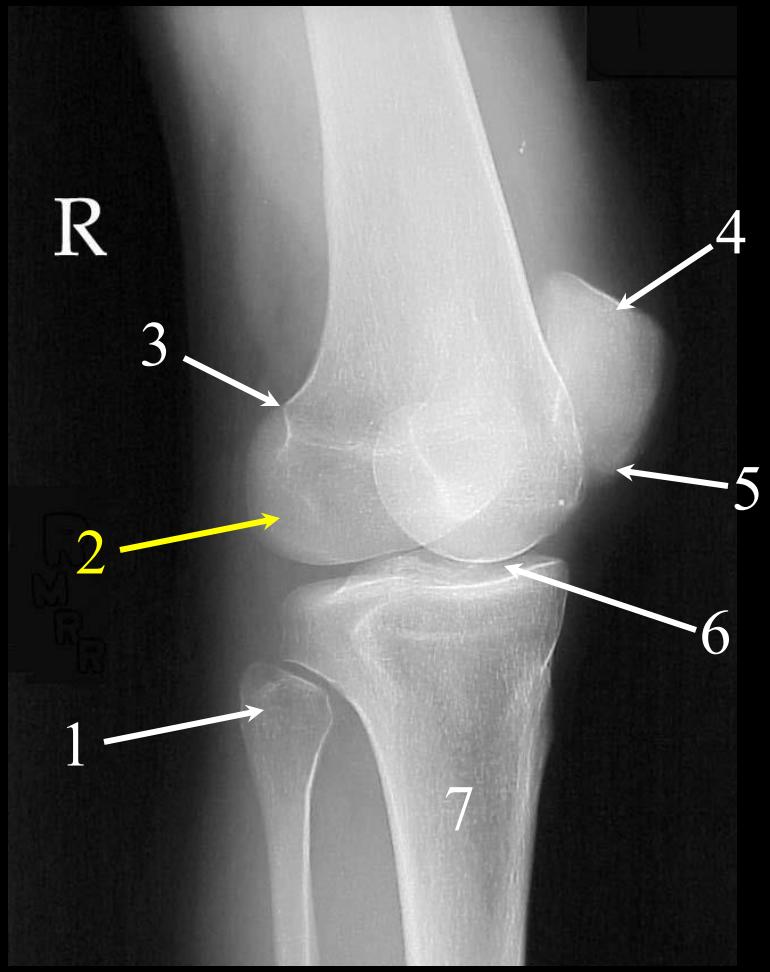
c. lateral condyle of the femur.

d. tibial plateau.



Question #86: Review

1. Head of the Fibula
2. Lateral Condyle of the Femur
3. Lateral Epicondyle of the Femur
4. Base of the Patella
5. Apex of the Patella
6. Intercondylar Eminence
7. Shaft of the Tibia



Internal Oblique Knee

Question #87:

Which of the following organic molecules are made of different combinations of amino acids that are held together by peptide bonds?

a. proteins
b. lipids
c. carbohydrates
d. nucleic acids

Question #87: Review

- The following describes organic compounds which are one of the two major categories of molecules found in the human body:

  Macromolecules are nothing more than very large molecules.

  All organic compounds contain carbon, and they also play a very important role in maintaining homeostasis.

  There are four major categories of organic compounds found in the body.

  1. Proteins which make up approximately 15% of the body's mass.

     They are made of different combinations of amino acids that are bound together by peptide bonds.

  2. Carbohydrates which are commonly referred to as sugars and starches.
  3. Nucleic acids which are composed of small structures called nucleotides.

     DNA and RNA are made of nucleic acids, and they contain the hereditary information of the organism.

  4. Lipids or fats are a combination of glycerol and fatty acids.

Question #88:

The target of the x-ray tube is located:

a. on the anode disc.
b. within the focusing cup.
c. on the cathode side of the tube.
d. within the anode heel.

Question #88: Review

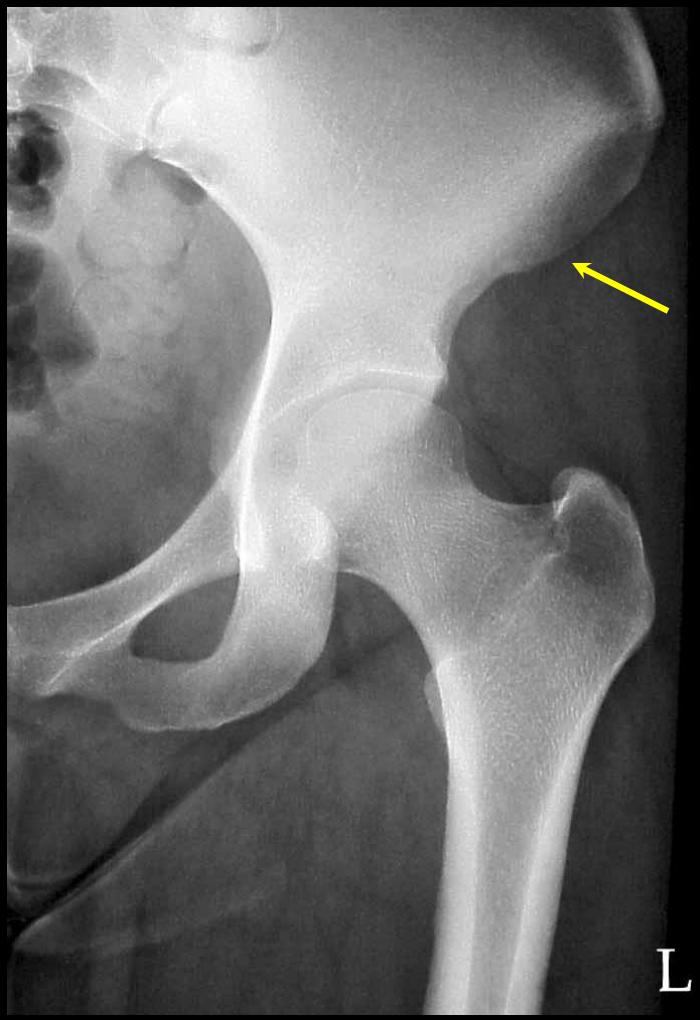
The anode disc is positively charged and thus attracts the electrons produced at the cathode during the exposure.

The anode disc contains the target (arrows) which is where x-rays are produced.

Question #89:

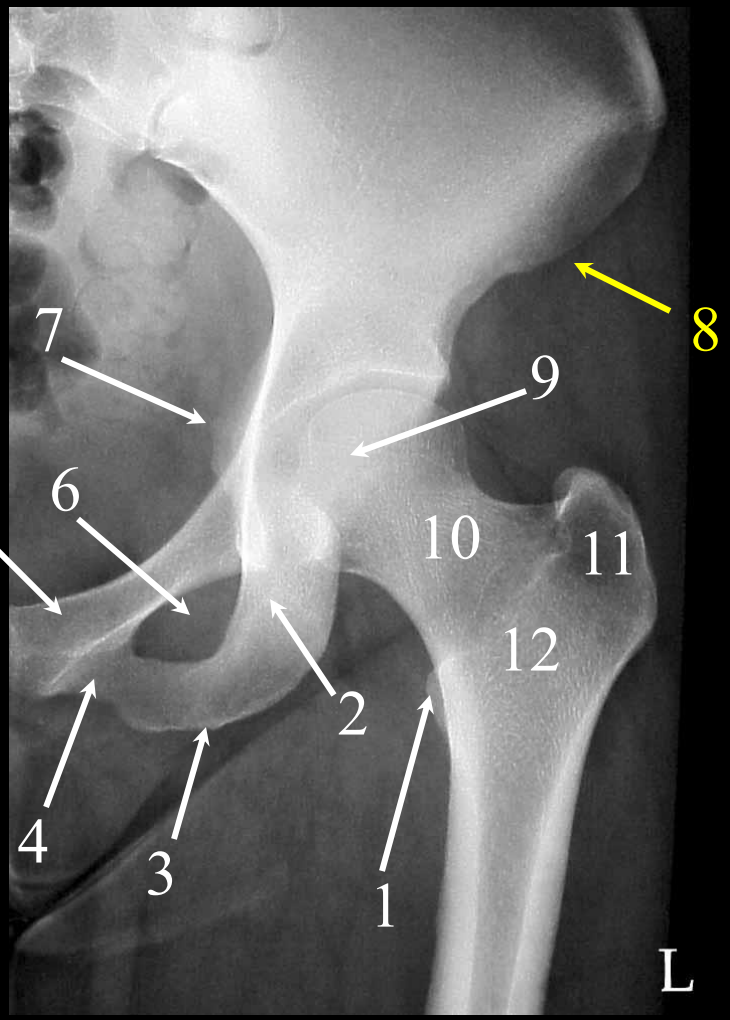
The arrow on this AP projection of the Hip radiograph is pointing to the:

a. ASIS.
b. ischial spine.
c. lesser tubercle.
d. sciatic notch.



Question #89: Review

1. Lesser Trochanter
2. Body of the Ischium
3. Ischial Tuberosity
4. Inferior Ramus of the Pubis
5. Superior Ramus of the Pubis
6. Obturator Foramen
7. Ischial Spine
8. ASIS
9. Head of the Femur
10. Neck of the Femur
11. Greater Trochanter
12. Intertrochanteric Crest



AP Hip

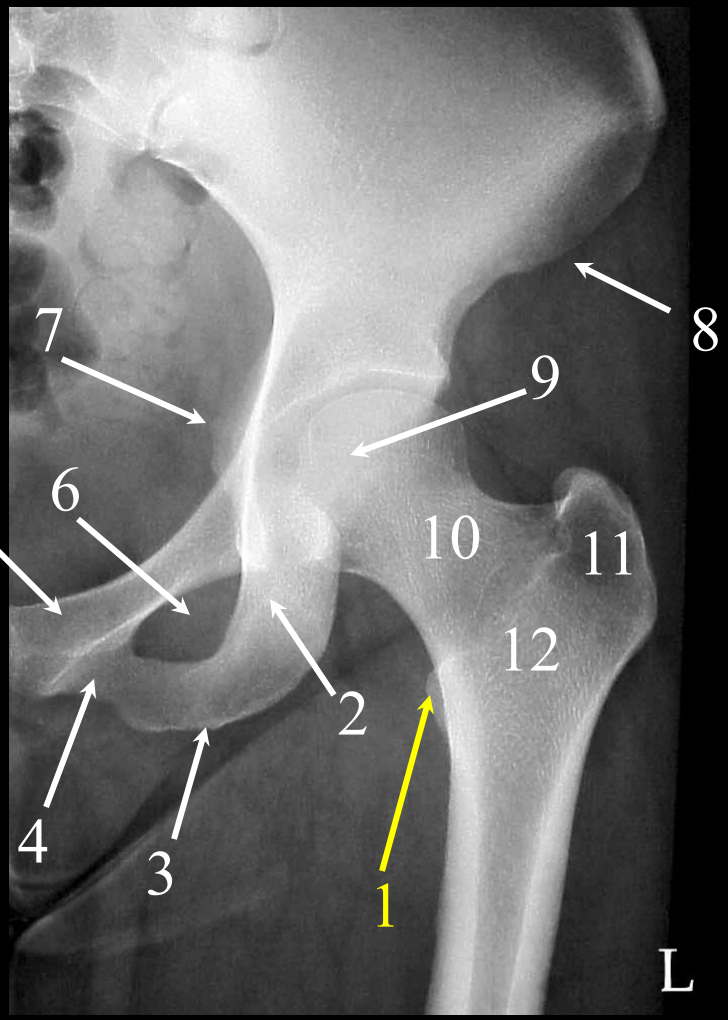
Question #90:

The arrow on this AP projection of the Hip radiograph is pointing to the:

a. ischial spine.
b. lesser trochanter.
c. intertrochanteric crest.
d. surgical neck.

Question #90: Review

1. Lesser Trochanter
2. Body of the Ischium
3. Ischial Tuberosity
4. Inferior Ramus of the Pubis
5. Superior Ramus of the Pubis
6. Obturator Foramen
7. Ischial Spine
8. ASIS
9. Head of the Femur
10. Neck of the Femur
11. Greater Trochanter
12. Intertrochanteric Crest



AP Hip

Question #91:

Approximately what percentage of the body's mass consists of water?

a. 60
b. 70
c. 80
d. 90

Question #91: Review

- Inorganic Compounds:

  Inorganic compounds do not contain carbon, and they are essential in order to maintain homeostasis within the body.

  -Homeostasis refers to the body's ability to maintain a relatively constant state of well-being.

  Water (H_20) is the most abundant inorganic compound and molecule, for that matter, found in the body.

  Approximately 80% of the body's mass consists of water.

  Other inorganic compounds found within cells and in the body include salts (electrolytes), acids and bases.

Question #92:

Which of the following is not a concept that can be employed to reduce the genetically significant dose (GSD) on the general population?

a. 10-day rule

b. ALARA

c. risk vs. benefit concept

d. All of the above could be employed to reduce the GSD.

Question #92: Review

- The following is a list of concepts that are meant to help reduce the exposure of the general population to diagnostic levels of radiation and therefore reduce the GSD:

  The notion of keeping exposures as low as reasonably achievable (ALARA) is endorsed by the NCRP as a strategy to reduce the total GSD.

  -Radiographers achieve the concept of ALARA by using technical factors, positioning methods, and shield techniques based on sound educational methodologies.

  The Risk vs. Benefit Analysis is another import concept regarding the GSD.

  -For every procedure that is ordered, it must be determined that the benefits of helping to restore the patient back to good health outweigh the risks of exposing a patient to the potentially harmful effects of ionizing radiation.

  The 10-Day Rule states that nonemergency radiographic procedures on women in the child-bearing years (ages 11 to 50) should be performed within the first 10 days following the onset of menstruation.

  -It is unlikely that she would be pregnant during this time period.

  Elective booking is a similar concept that states that elective diagnostic examinations of the abdomen on women in the child-bearing years should be scheduled during the first 10 days following the onset of menstruation.

Question #93:

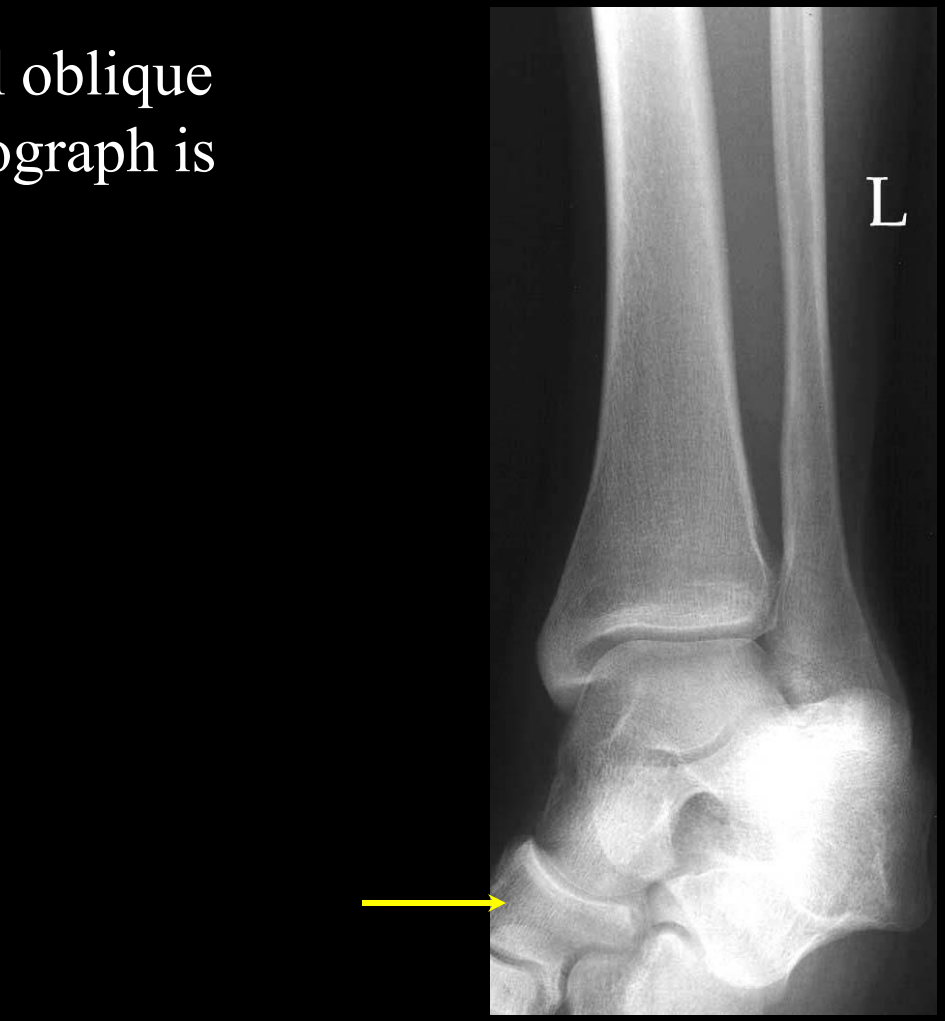
The arrow on this internal oblique position of the ankle radiograph is pointing to the:

a. navicular.

b. calcaneous.

c. cuboid.

d. medical cuneiform.



Question #93: Review

1. Navicular
2. Tarsal Sinus
3. Medial Malleolus
4. Shaft of the Tibia
5. Lateral Malleolus
6. Talus
7. Calcaneous or Os Calcis

Internal Oblique Ankle

Question #94:

The arrow on this internal oblique position of the ankle radiograph is pointing to the:

a. distal tibia.

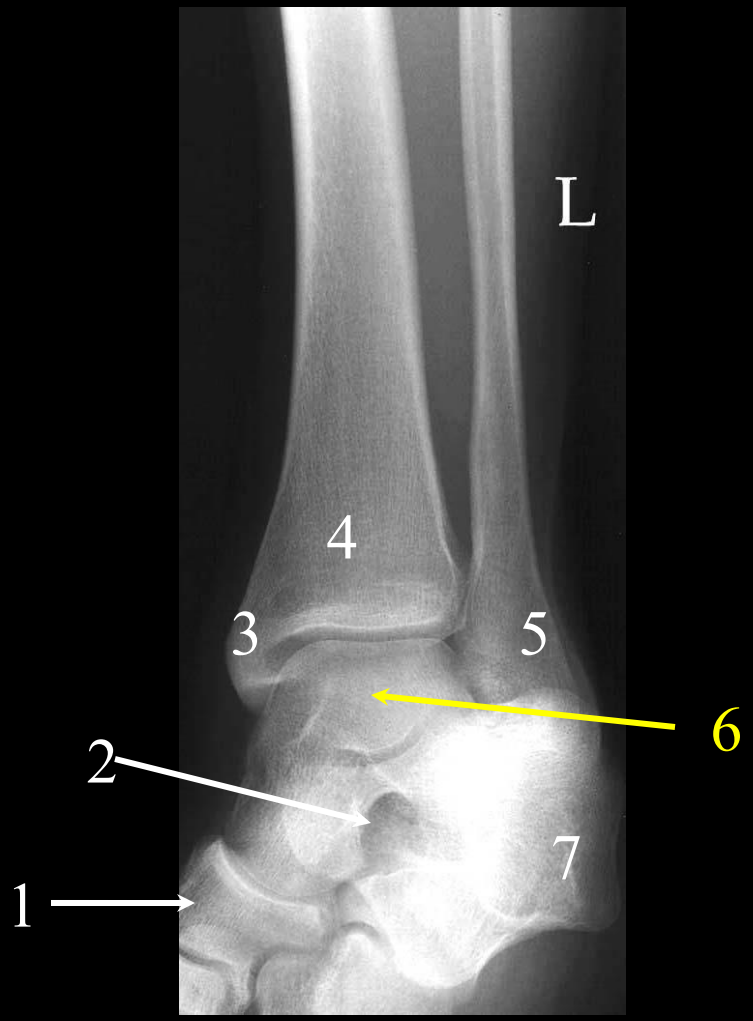
b. cuboid.

c. tarsal sinus.

d. talus.

Question #94: Review

1. Navicular
2. Tarsal Sinus
3. Medial Malleolus
4. Shaft of the Tibia
5. Lateral Malleolus
6. Talus
7. Calcaneous or Os Calcis



Internal Oblique Ankle

Question #95:

The body's ability to maintain a relative constant state of well-being is referred to as homeostasis.

a. true
b. false

Question #95: Review

- Inorganic Compounds:

  Inorganic compounds do not contain carbon, and they are essential in order to maintain homeostasis within the body.

  -Homeostasis refers to the body's ability to maintain a relatively constant state of well-being.

  Water (H_20) is the most abundant inorganic compound and molecule, for that matter, found in the body.

  Approximately 80% of the body's mass consists of water.

  Other inorganic compounds found within cells and in the body include salts (electrolytes), acids and bases.

Question #96:

The conventional unit used to describe a quantity of radioactive material is the:

a. Curie.
b. rad.
c. rem.
d. roentgen.

Question #96: Review

- The following is a list of conventional units that are used to describe ionizing radiation and particles.

  The roentgen (R) is used to describe a quantity of radiation intensity in air.

  -The roentgen is used to measure a quantity of ionizations that occur in a volume of dry air after exposure to either x-rays or gamma rays.

  -X-ray tube output is measured in mR (1R = 1000 mR)

  The rad is the unit of absorbed dose.

  -It is defined as 100 ergs of energy being absorbed by 1 gram of absorbing material.

  -The rad is the unit used most often to describe radiation exposure to the patient.

  The unit used to describe a quantity of radioactive material is the Curie.

  The unit for dose equivalence is the rem and it is the unit employed on dosimetry reports.

Question #97:

According to the National Council on Radiation Protection and Measurement (NCRP), what is the annual dose limit (DL) in rem for for occupationally exposed individuals?

a. 5
b. 10
c. 15
d. 50

Question #97: Review

- The following is a list of dose limits set by the NCRP for occupationally exposed individuals:

  Entire Body: 5 rem /year

  Lens of the Eye: 15 rem/year

  All other individual organs (liver, hands, skin etc.) of the body:

  50 rem/year

- The maximum occupational lifetime dose is determined by multiplying your age in years by 1 rem.

  For example, a 30-year-old radiographer is allowed to have a total lifetime dose of no more than 30 rem (30 years old x 1 rem).

- Pregnant radiographers must keep their dose limits below the following levels:

  0.05 rem/ month

  0.5 rem/year

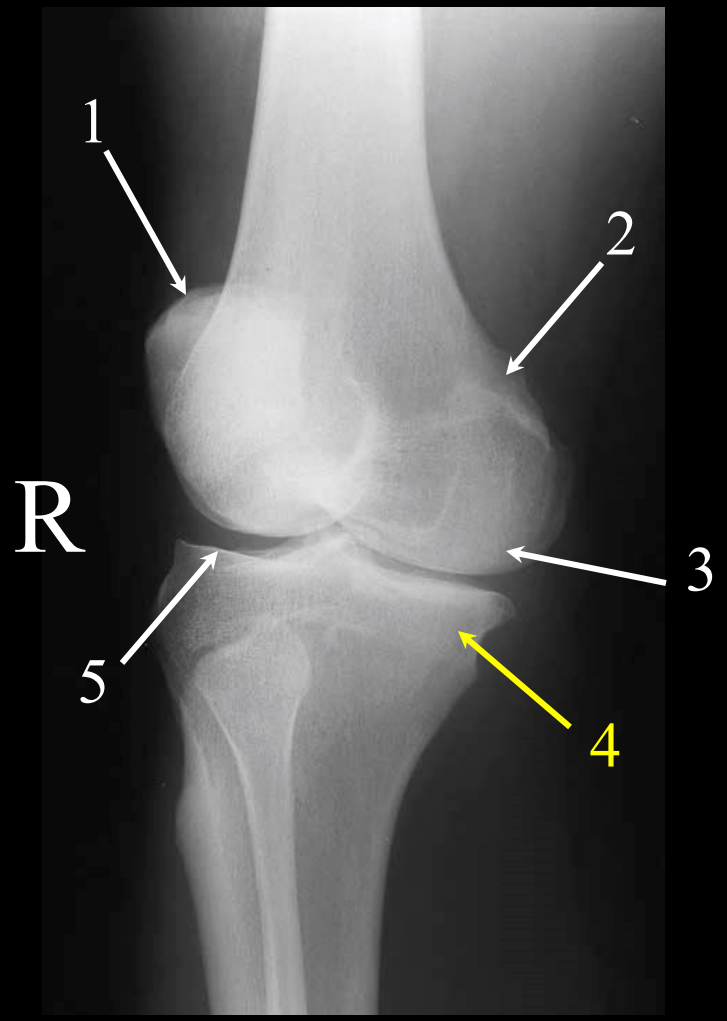
Question #98:

The arrow on this external oblique position of the knee radiograph is pointing to the:

a. tibial tuberosity.
b. tibial plateau.
c. lateral condyle of the tibia.
d. medial condyle of the tibia.

Question #98: Review

1. Base of the Patella
2. Medial Epicondyle of the Femur
3. Medial Condyle of the Femur
4. Medial Condyle of the Tibia
5. Lateral Tibial Plateau



External Oblique Knee

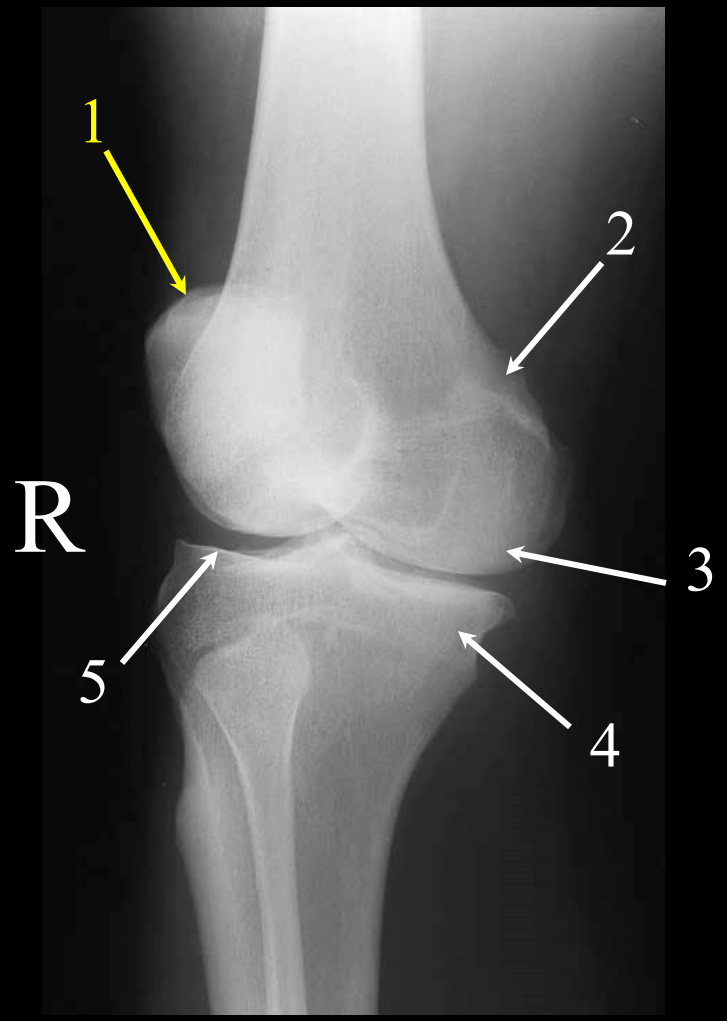
Question #99:

The arrow on this external oblique position of the knee radiograph is pointing to the:

a. lateral epicondyle of the femur.
b. base of the patella.
c. medial epicondyle of the femur.
d. apex of the patella.

Question #99: Review

1. Base of the Patella
2. Medial Epicondyle of the Femur
3. Medial Condyle of the Femur
4. Medial Condyle of the Tibia
5. Lateral Tibial Plateau



External Oblique Knee

Question #100:

The arrows on this tangential projection of the calcaneous radiograph are pointing to the:

a. sustentaculum tali.

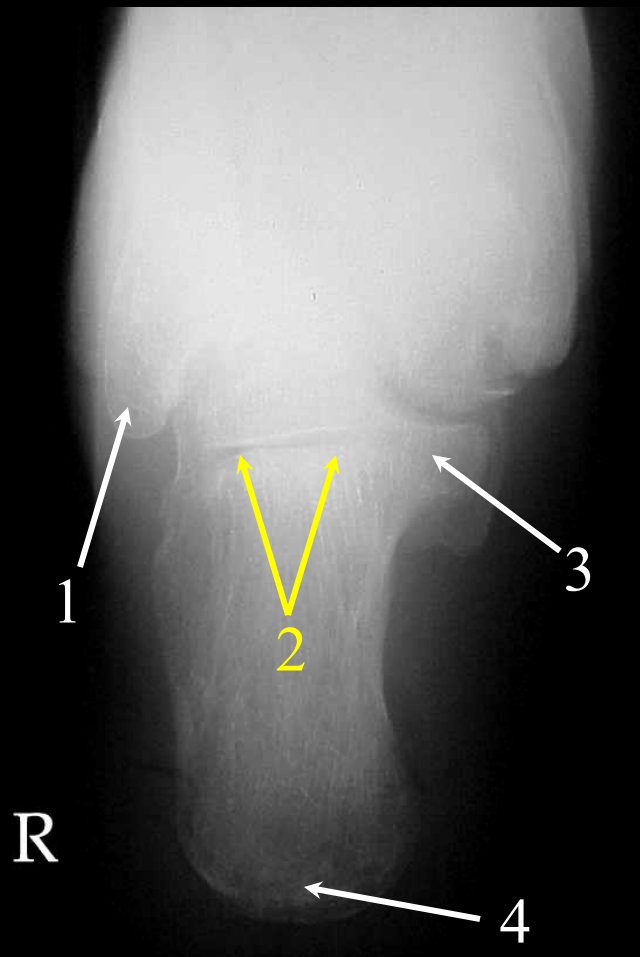
b. tuberosity of the calcaneous.

c. talocalcaneal joint.

d. cuboid.

Question #100: Review

1. Fibula
2. Talocalcaneal Joint
3. Sustentaculum Tali
4. Tuberosity of the Calcaneous



Tangential Calcaneous

Congratulations, you have just completed the Mastery Test!!

Now, just snap a picture of your completed answer sheet and text it to John Fleming at (727) 744-7946. If you score a 75% or higher, your certificate of completion will be emailed back to you within one week of us receiving your completed answer sheet and payment. *You will be allowed no more than three attempts to achieve a passing score on the mastery test.*

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