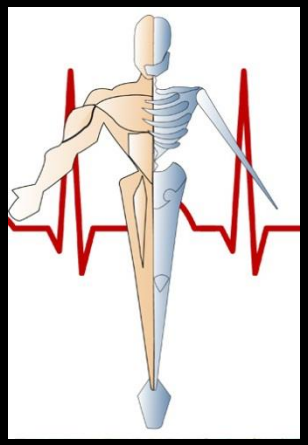
Three Phase CEUs Presents:

Digital Radiography of the Extremities ©

"Mastery Test"

by

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



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Forward:

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Question #1:

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 #1: 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 #2:

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 #2: 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 #3:

For a lateral position of the forearm, the elbow must be bent _____.

a. 15°
b. 45°
c. 60°
d. 90°

Question #3: Review

SID	40”
kVp	55
IR Size & Placement	24 x 30 or 35 x 43 cm; LW.
Tube Angle	None.
CR	Mid Forearm.
Collimation	Include lateral borders of forearm and both joints.
Patient Positioning	Place forearm in a true lateral position; Humerus flat and at level of the table; The elbow must be bent 90°; The thumb is in the up position and the epicondyles are perpendicular to IR.

Lateral Forearm

Question #4:

The CR is directed to the glenohumeral joint space for which of the following projections/methods of the shoulder?

a. Grashey method
b. AP internal rotation
c. AP external rotation
d. inferosuperior axial projection

Question #4: Review

SID	40”
kVp	75 to 80
IR Size & Placement	24 x 30 cm; CW.
Tube Angle	None.
CR	Glenohumeral joint space.
Collimation	Show collimation on all four borders.
Patient Positioning	Rotate the body 35 to 40° towards the affected side; Place the arm in a neutral position.
Breathing Instructions	Suspend.
Additional Comments	Place the marker on the bucky and just lateral to the humerus.

Grashey Method

Question #5:

Cassette-based digital radiography would be used to describe which of the following imaging systems?

a. indirect capture direct radiography
b. direct capture direct radiography
c. film-screen radiography
d. computed radiography

Question #5: Review

- Computed radiography or CR is often referred to as cassette-based digital radiography.
- Fuji introduced the first CR systems in the US in 1983.
- CR did not take off until the 1990s.
- By the 2000s, CR could be found in most hospitals throughout the country.

Question #6:

The exact CR location for an AP thumb is the _____ joint.

a. interphalangeal
b. metacarpophalangeal
c. proximal interphalangeal
d. distal interphalangeal

Question #6: Review

SID	40”
kVp	55
IR Size & Placement	24 x 30 cm; Lengthwise (LW).
Tube Angle	None.
CR	Metacarpophalangeal (MP) Joint.
Collimation	Include the entire first metacarpal.
Patient Positioning	True AP Projections.
Breathing Instructions	None.
Additional Comments	Place the marker at the end of the digit and within the light field.

AP Thumb

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 nor 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.

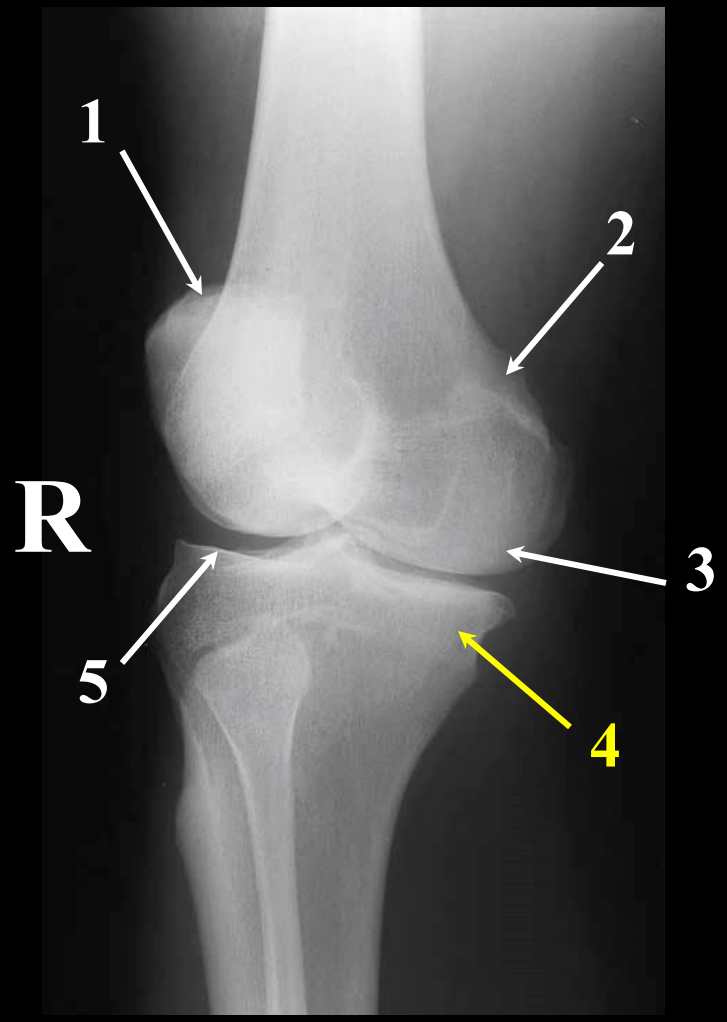
Question #8:

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

a. tibial tuberosity.
b. medial condyle of the femur.
c. medial condyle of the tibia.
d. intercondylar eminence.

Question #8: 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 #9:

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 #9: Review

- Spatial resolution (SR) is also referred to as sharpness of detail
- Spatial resolution refers to the sharpness of the structural edges recorded in the image.

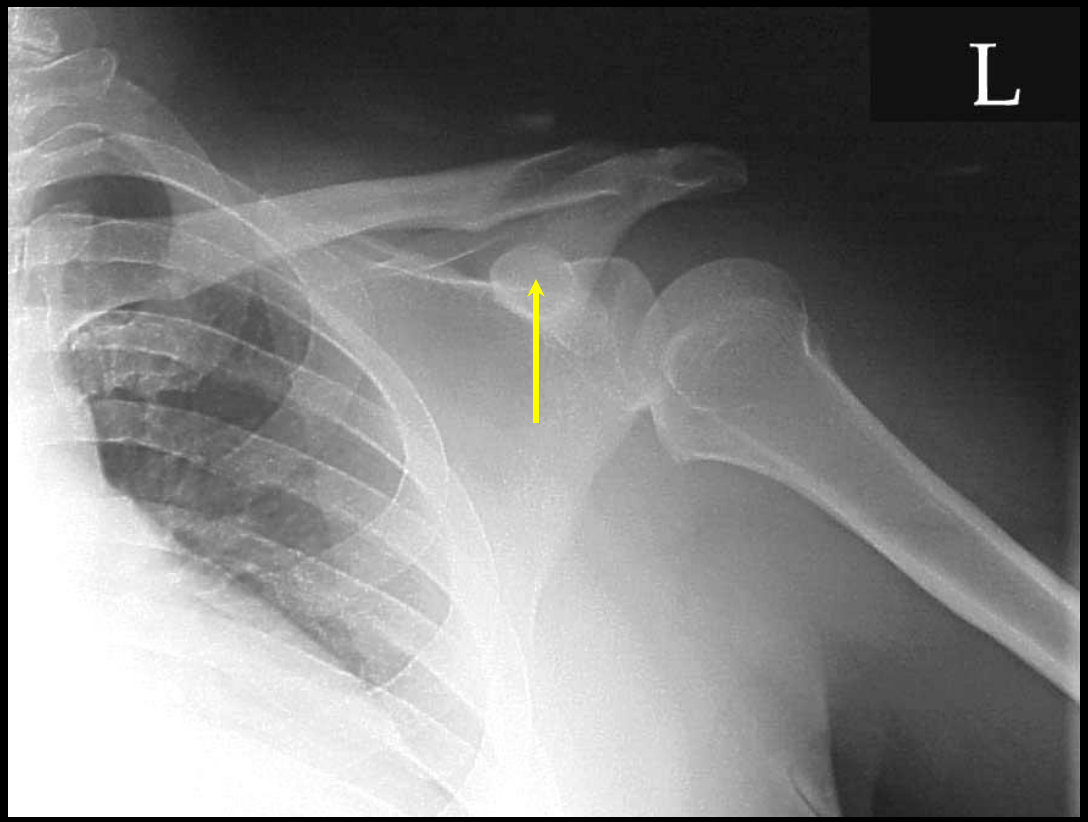
  In other words, it is the ability to visualize sharp lines on a radiographic image.
- SR is measured in mm of unsharpness.

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

Question #10:

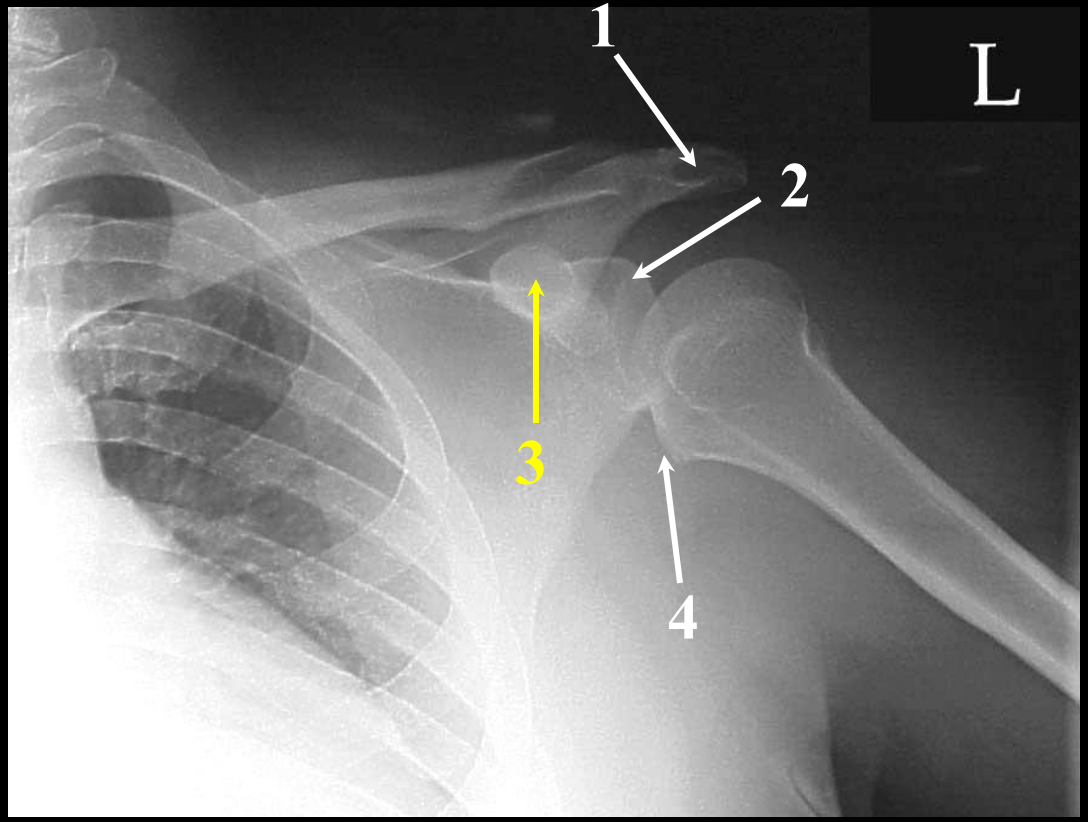
The arrow is pointing to the:

a. coronoid process.
b. coracoid process.
c. acromion process.
d. scapular spine.



Question #10: Review

1. Acromion Process
2. Glenoid Fossa
3. Coracoid Process
4. Lesser Tubercle of the Humerus



Internally Rotated Shoulder

Question #11:

Each component of the diagnostic imaging system contributes to the overall system performance. Which of the following terms refers to a ratio of how accurately the object is produced on the image receptor as a function of spatial frequency?

a. spatial resolution
b. quantization
c. modulation transfer function
d. pixel bit depth

Question #11: Review

- Each component of the imaging system contributes to the overall system performance.
- Modulation transfer function (MTF) is a ratio of how accurately the object is produced on the image as a function of spatial frequency.
- A high MTF will yield the greatest image quality.

Question #12:

The arrow is pointing to the:

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

Question #12: 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 #13:

A tangential projection of the patella will require a tube angle of _____ to the lower leg.

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

Question #13: Review

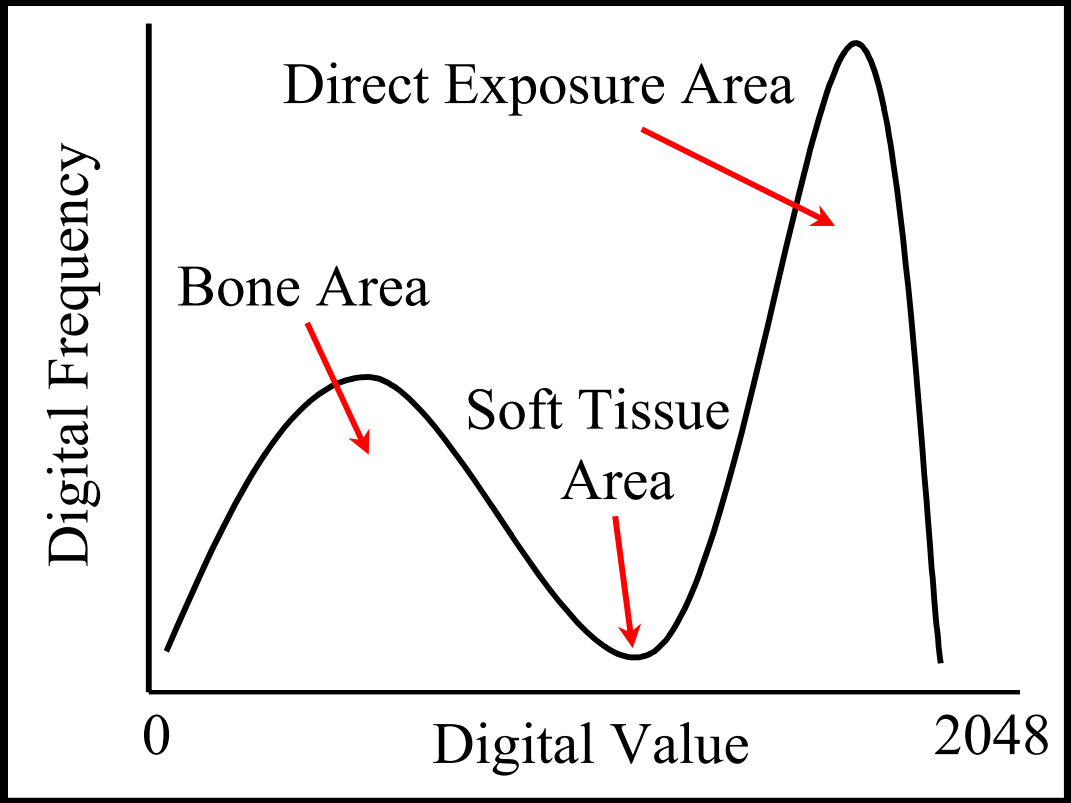
SID	40”.
kVp	65 Non Bucky.
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	15 to 20° to the long axis of the lower leg (tibia) and in an inferosuperior direction.
CR	Mid femoropatellar joint space.
Collimation	Tight collimation to the patella.
Patient Positioning	The patient is supine with the knee flexed 40 to 45°.
Breathing Instructions	Suspend Respirations.
Additional Comments	Mark the lateral aspect of the knee.

Tangential Patella: Reverse Hughston

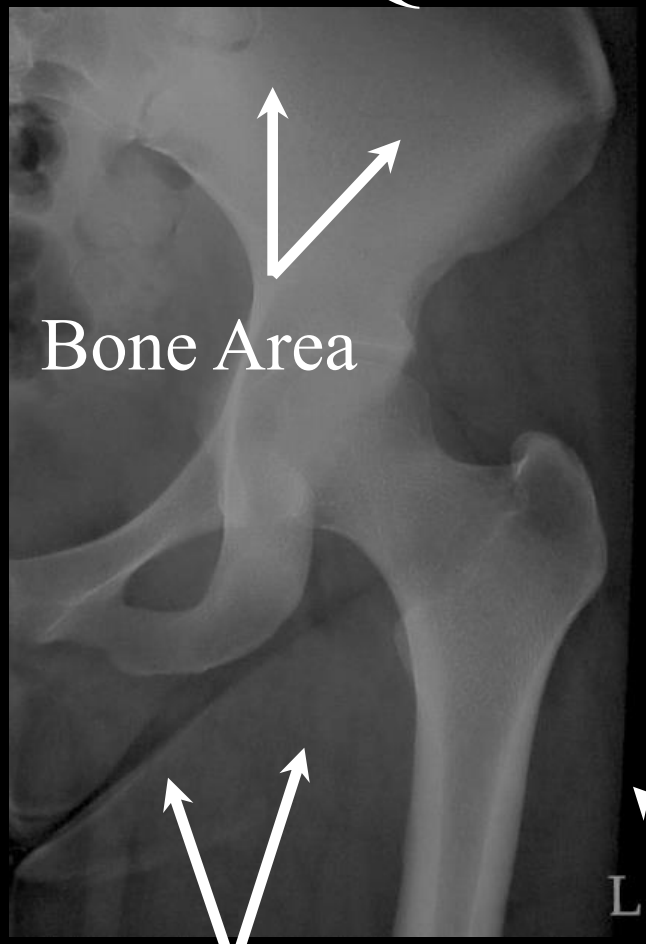
Question #14:

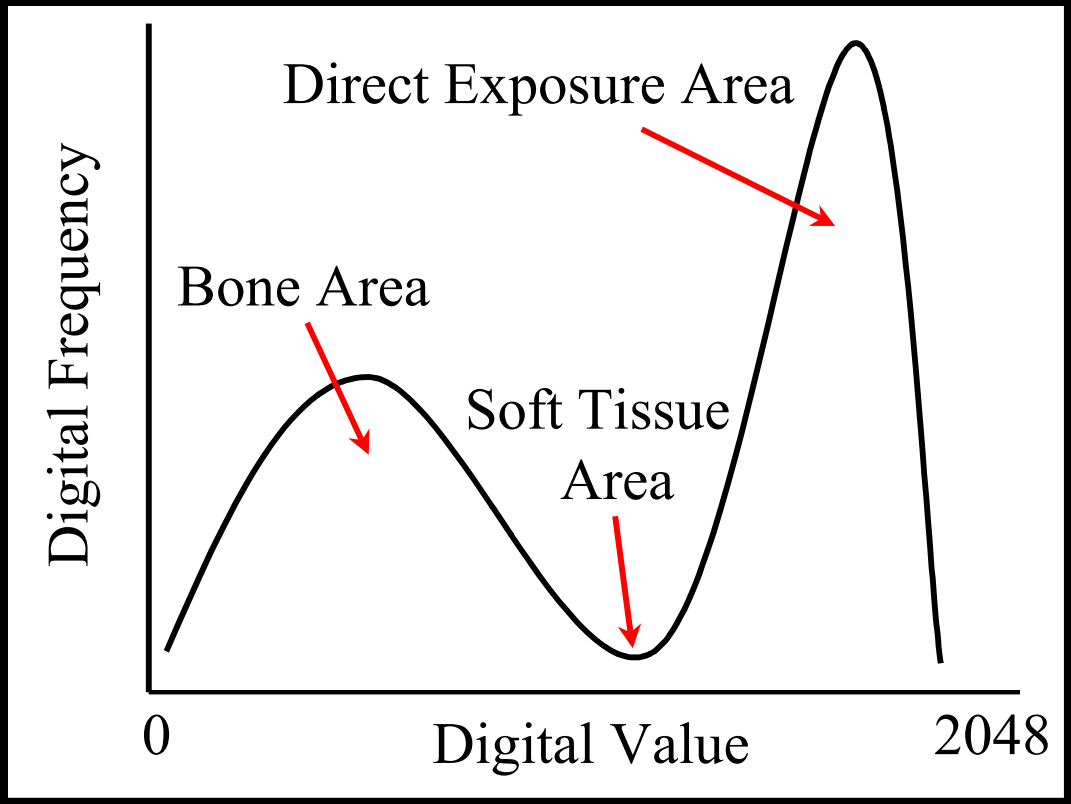
This graph is used to help create digital images. What is the name of this graph?

a. look-up table
b. x-ray emission spectrum
c. histogram
d. dose-response curve



Question #14: Review





Soft Tissue Area

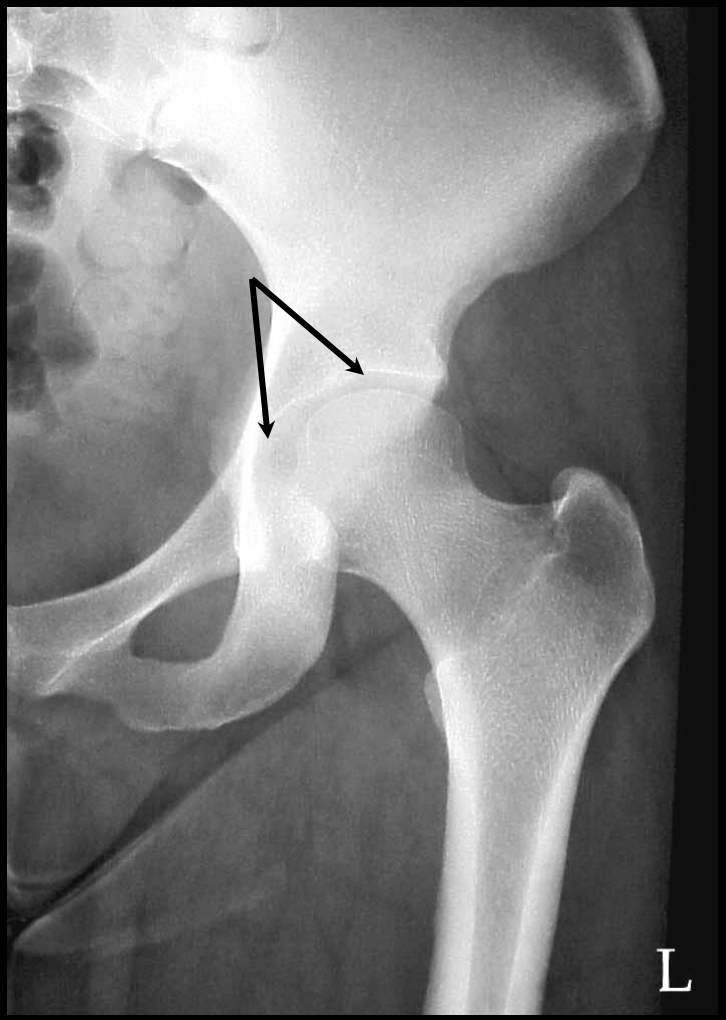
Direct Exposure Area

Histogram

Question #15:

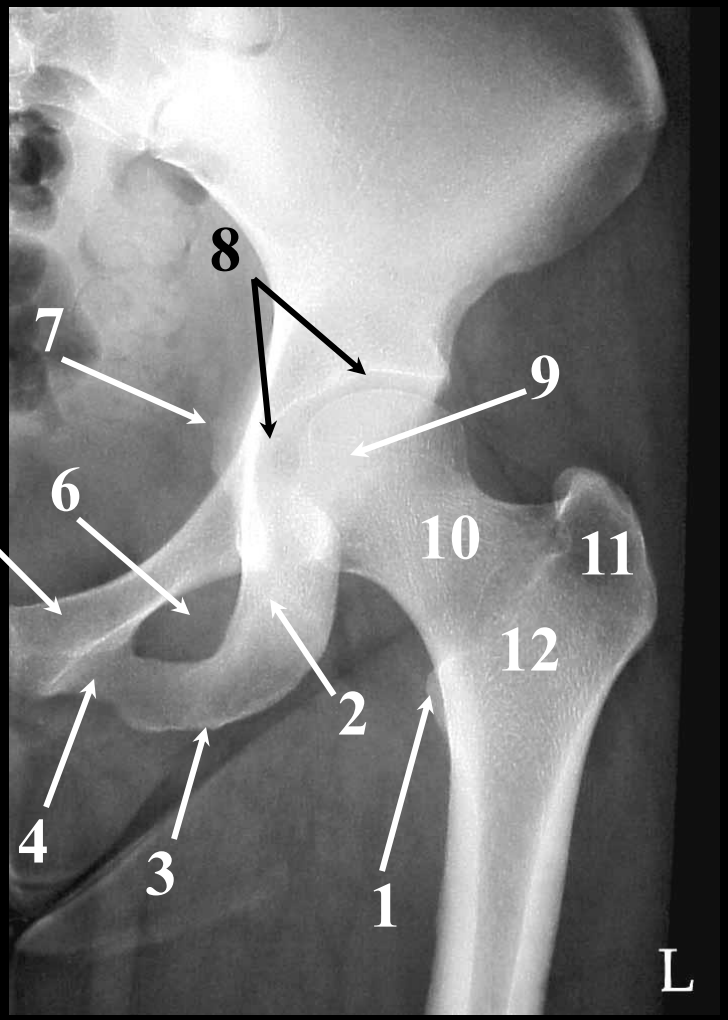
The arrows are pointing to the:

a. acetabulum.
b. intertrochanteric crest.
c. ischial spine.
d. fovea capitus.



Question #15: 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 #16:

The exact CR location for a lateral position of the hand is the _____ joint.

a. 3rd interphalangeal
b. 2nd interphalangeal
c. 3rd metacarpophalangeal
d. 2nd metacarpophalangeal

Question #16: Review

SID	40”
kVp	55
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	None.
CR	2nd Metacarpophalangeal Joint.
Collimation	Include the entire hand, wrist, and distal forearm.
Patient Positioning	Lateromedial Projection; Fan Fingers.
Breathing Instructions	None.
Additional Comments	Place the marker next to the radius and within the light field.

Lateral Hand

Question #17:

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 #17: 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)

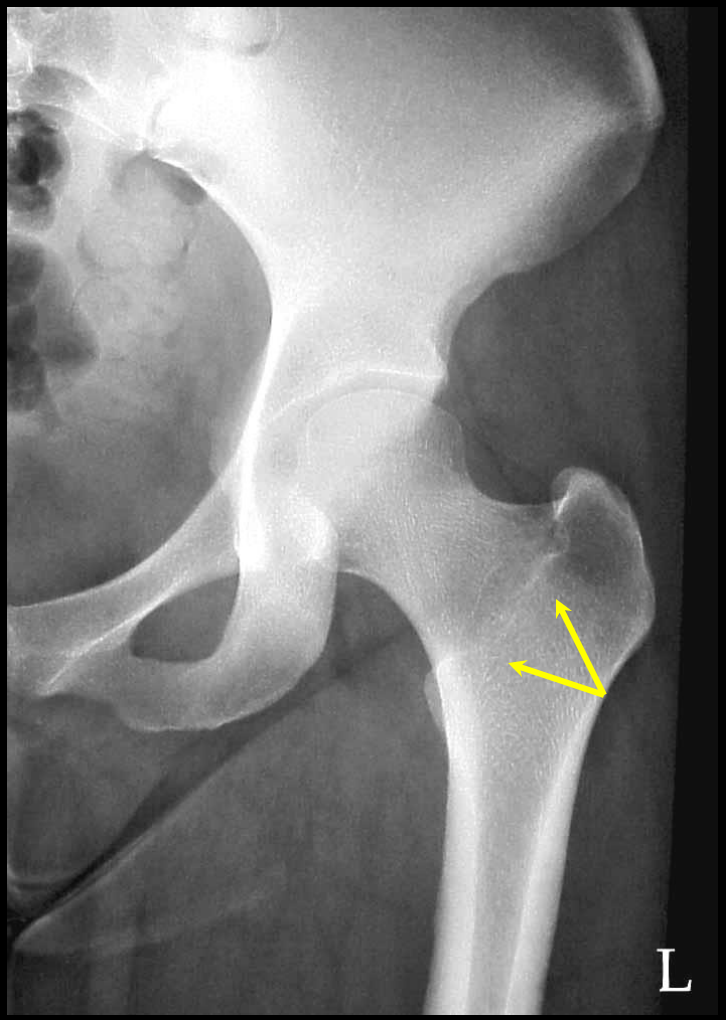
2048 x 2560 = 5 mp (often used in mammography)

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

Question #18:

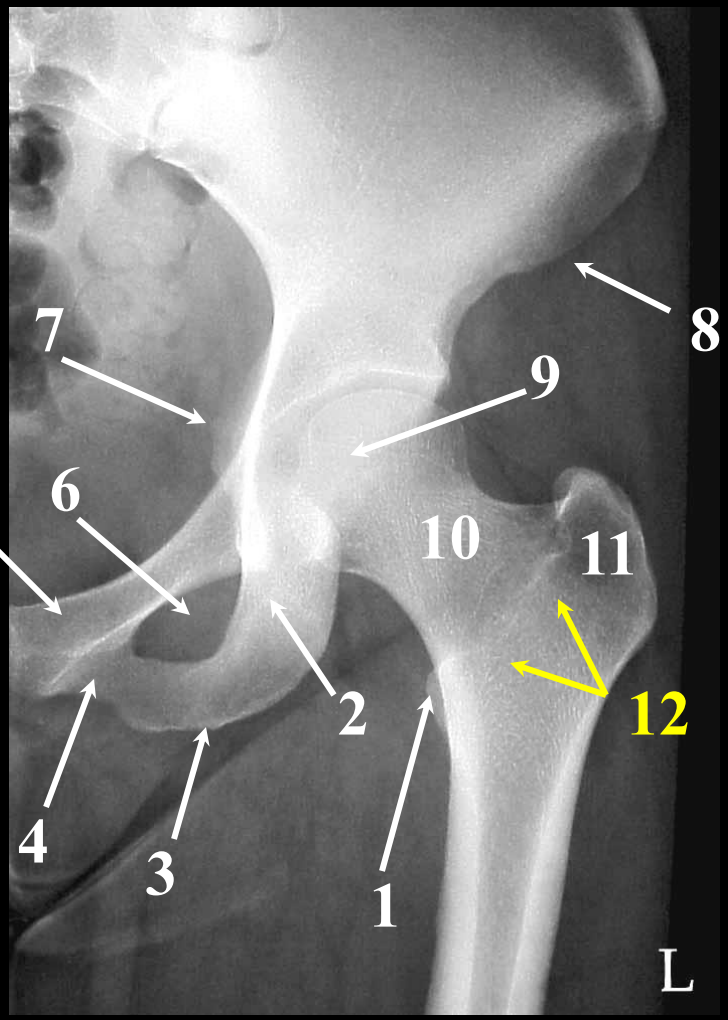
The arrows are pointing to the:

a. linea aspera.
b. greater trochanter.
c. neck of the femur.
d. intertrochanteric crest.



Question #18: 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 #19:

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

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

Question #19: 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.

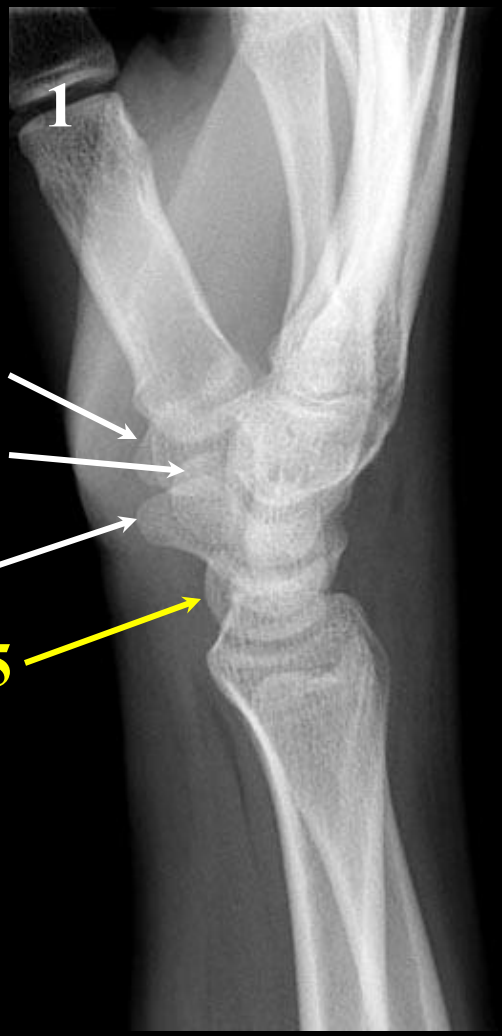
Question #20:

The arrow is pointing to the:

a. lunate.
b. trapezoid.
c. pisiform.
d. capitate.

Question #20: Review

1. 1st Metacarpophalangeal Joint (MP)
2. Greater Multangular or Trapezium
3. Pisiform
4. Navicular or Scaphoid
5. Lunate or Semilunar



Lateral Wrist

Question #21:

Which of the following wrist projections/positions would best demonstrate the navicular/scaphoid free from bony superimposition?

a. PA
b. ulnar deviation
c. PA oblique
d. lateral

Question #21: Review

This method is primarily done to demonstrate the navicular/scaphoid bone (arrow) free from bony superimposition. It requires an ulnar deviation of the wrist combined with a 10 to 15-degree cephalic angle of the tube in order to accomplish this task.

Ulnar Deviation or Stetcher Wrist

Question #22:

The intermalleolar line will be parallel to the IR for which of the following ankle projections/positions?

a. AP
b. oblique
c. lateral
d. AP mortise

Question #22: Review

SID	40”
kVp	60
IR Size & Placement	24 x 30 or 35 x 43 cm; LW.
Tube Angle	None.
CR	Center to a point midway between the medial and lateral malleoli.
Collimation	Include the proximal half of the metatarsals and the distal tibia/fibula.
Patient Positioning	Patient is supine with their leg internally rotated 15 to 20° from AP; The intermalleolar line will be parallel to the IR.

AP Mortise Ankle

Question #23:

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 #23: 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.

Question #24:

The body is upright with the arms at the side and the palms of the hands facing forward. This describes which of the following?

a. recumbent
b. oblique
c. anatomical position
d. decubitus

Question #24: Review

- The term position is used to describe the how the patient's body has been physically placed.
- The following is a list of terms that are examples of a position.

Anatomical Position

- The body is upright with the arms at the side and the hands facing forward.

Recumbent

- This term is used to describe the body anytime it is lying down.

Lateral

- When the body has been turned on its side.

Decubitus

- Refers to when the patient is recumbent and a horizontal x-ray tube is employed.

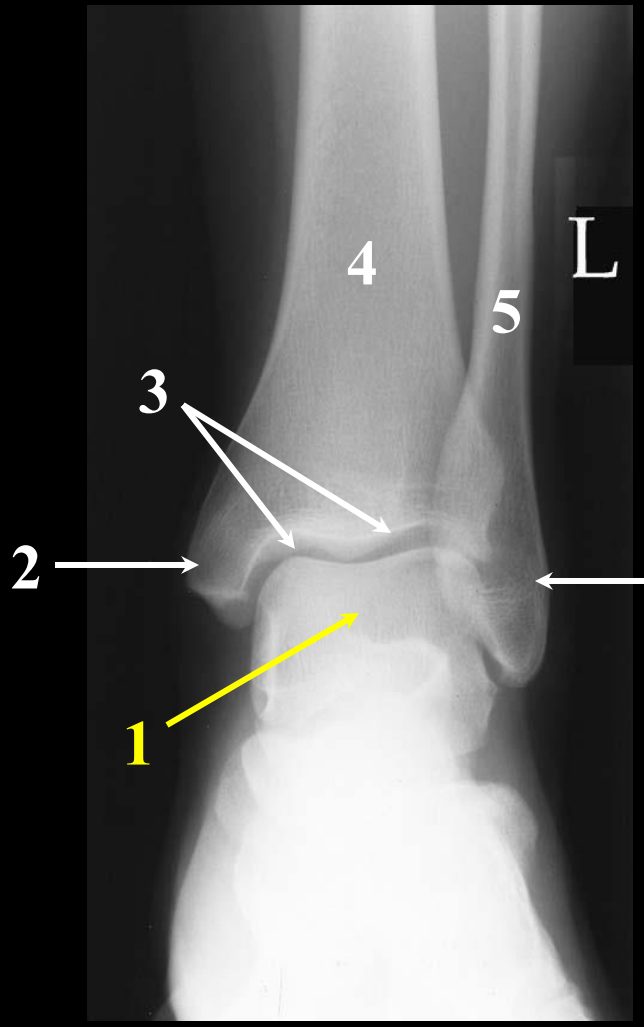
Question #25:

The arrow is pointing to the:

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

Question #25: 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 #26:

The carpal canal method of the wrist requires that the tube be angled _____ along the long axis of the forearm and towards the elbow.

a. 20 to 25°
b. 25 to 30°
c. 30 to 35°
d. 35 to 40°

Question #26: Review

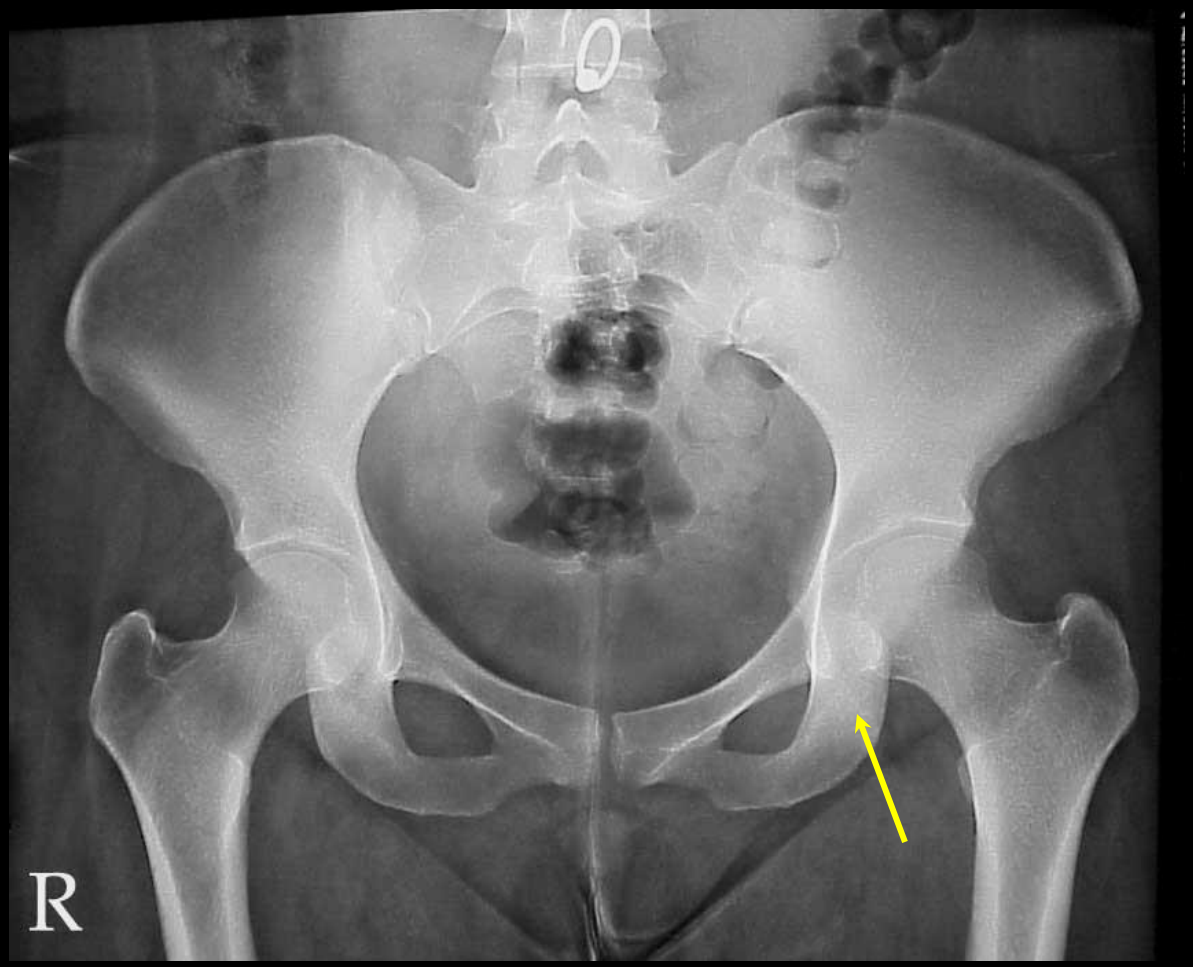
SID	40”
kVp	55
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	25 to 30° along the long axis of the forearm and towards the elbow.
CR	Center 1” distal to the base of the third metacarpal.
Collimation	Tight collimation to the carpal area.
Patient Positioning	Extend the forearm in PA projection and hyperextend the hand.

Carpal Canal or Gaynor-Hart Wrist

Question #27:

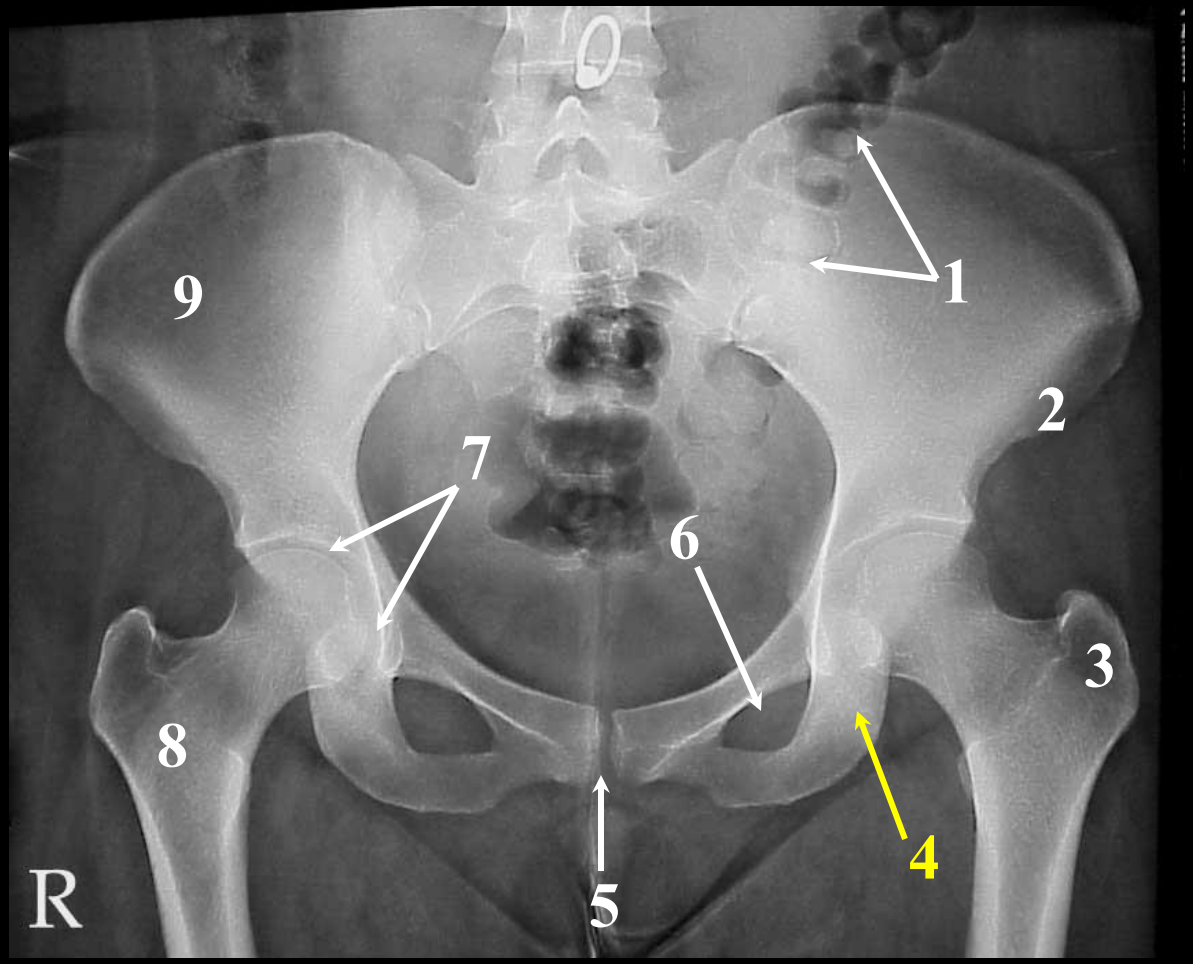
The arrow is pointing to the:

a. ischial tuberosity.
b. body of the ischium.
c. ischial spine.
d. inferior ramus.



Question #27: Review

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



AP Pelvis

Question #28:

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 #28: 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 #29:

The correct CR location for a transthoracic lateral position of the shoulder is the _____ of the humerus.

a. head
b. greater tuberosity
c. surgical neck
d. anatomical neck

Question #29: Review

SID	40”
kVp	80
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	None.
CR	Center to the surgical neck of the humerus.
Collimation	Show collimation on all four borders.
Patient Positioning	Place the patient in a lateral position with affected side against bucky; Place unaffected arm over their head; Drop affected shoulder.

Transthoracic Lateral Shoulder

Question #30:

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 #30: 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 #31:

This lateral foot is properly positioned.

a. true
b. false

Question #31: 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

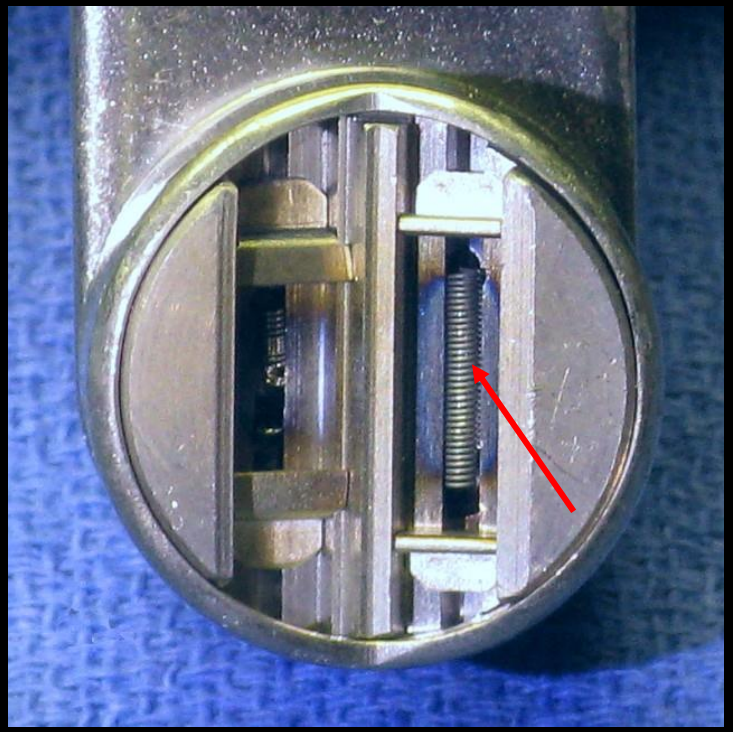
Question #32:

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 #32: Review

The filament (arrow) of the cathode 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 #33:

Which of the following is the correct CR location for a frog-leg lateral position of the hip?

a. neck of the femur
b. greater trochanter
c. lesser trochanter
d. head of the femur

Question #33: Review

SID	40”
kVp	85
IR Size & Placement	24 x 30 cm; CW.
Tube Angle	None.
CR	Mid Femoral Neck.
Collimation	Tight collimation to the hip.
Patient Positioning	Instruct the patient to bend their knee and then abduct their femur 45°.
Breathing Instructions	Suspend respirations.
Additional Comments	Place a marker within the light field & along the lateral margin of the hip.

Frog-Leg Lateral Hip

Question #34:

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 #34: Review

- Grid Ratio (GR)

  This 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 #35:

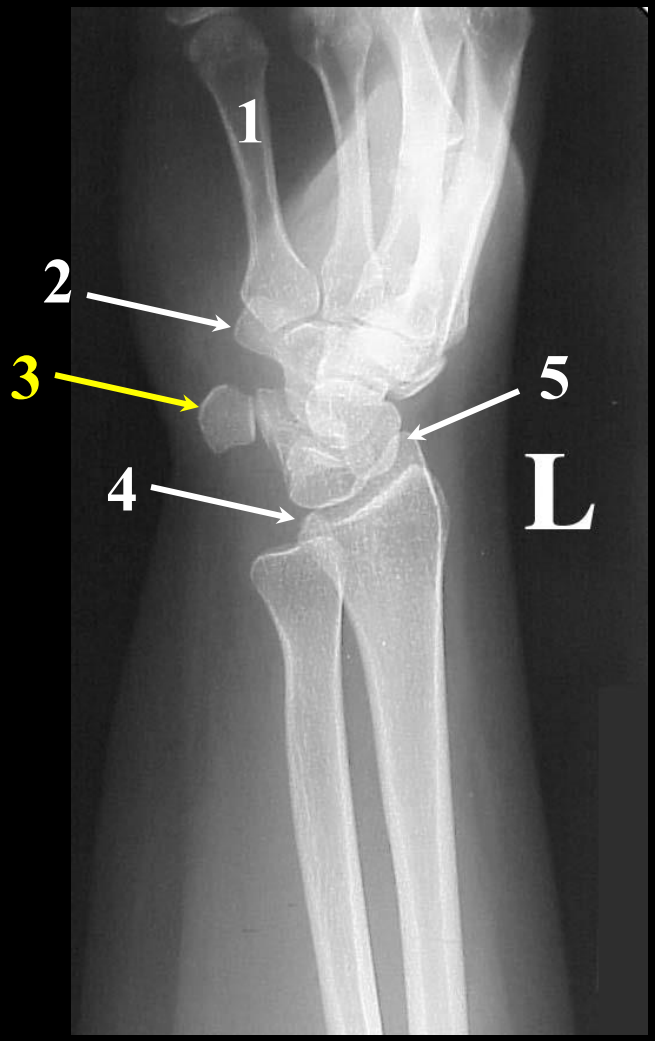
The arrow is pointing to the:

a. trapezoid.
b. navicular.
c. hamate.
d. pisiform.

Question #35: Review

This position best demonstrates the pisiform free from bony superimposition.

1. Shaft of the 5th Metacarpal
2. Hamulus of Hamate (Unciform)
3. Pisiform
4. Styloid Process of the Ulna
5. Styloid Process of the Radius



AP Oblique Wrist

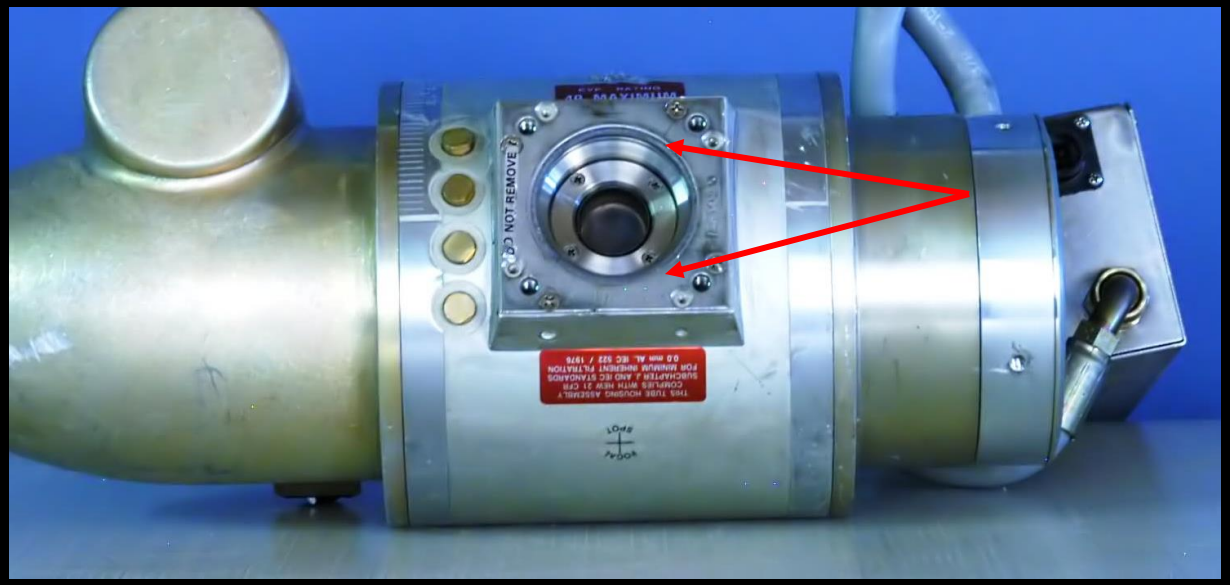
Question #36:

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 #36: Review

This sheets of aluminum (left) are added to the port (arrows) of the x-ray tube.



Low energy x-rays are removed from the primary beam to reduce the patient's skin dose. This will also reduce the overall RE.

Question #37:

A red laser beam is used to produce digital radiographic images for which of the following image receptors (IRs)?

a. indirect capture direct radiography
b. direct capture direct radiography
c. film-screen radiography
d. computed radiography

Question #37: Review

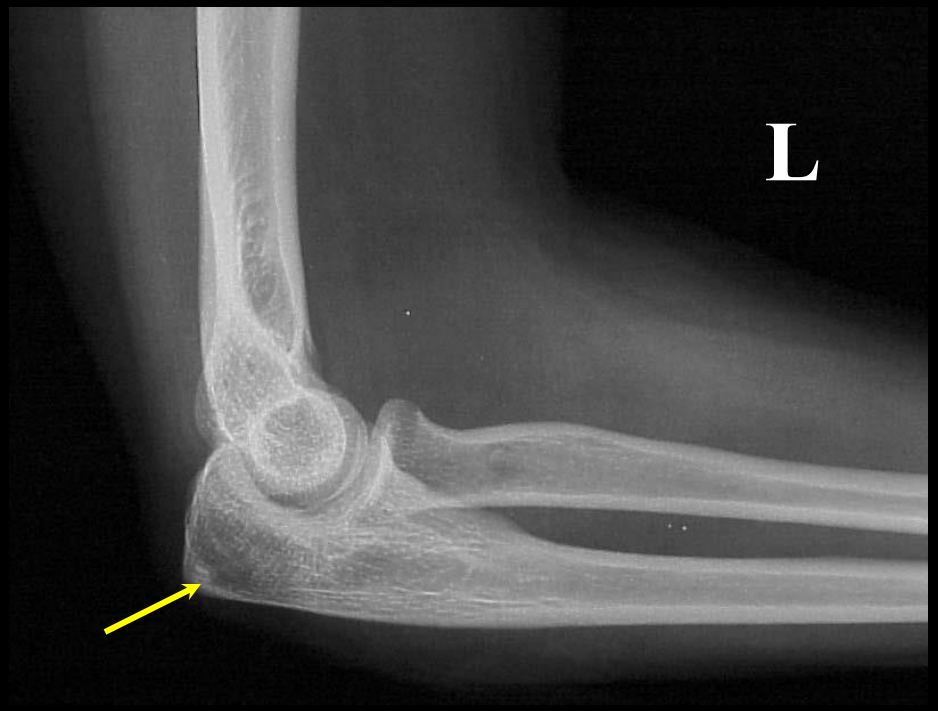
- Once the cassette has been sent into the computed radiography (CR) reader, it is then scanned by a high-intensity laser beam (red light).
- The laser stimulates the movement of some of the trapped electrons within the europium to return to their original position within the barium fluorohalide crystal
- As this occurs, there is an emission of a blue-green light from the CR plate.

    This process is called light-stimulated phosphorescence.
    The red laser (light-stimulated) fuels the release of the blue-green light (phosphorescence) from the plate.

Question #38:

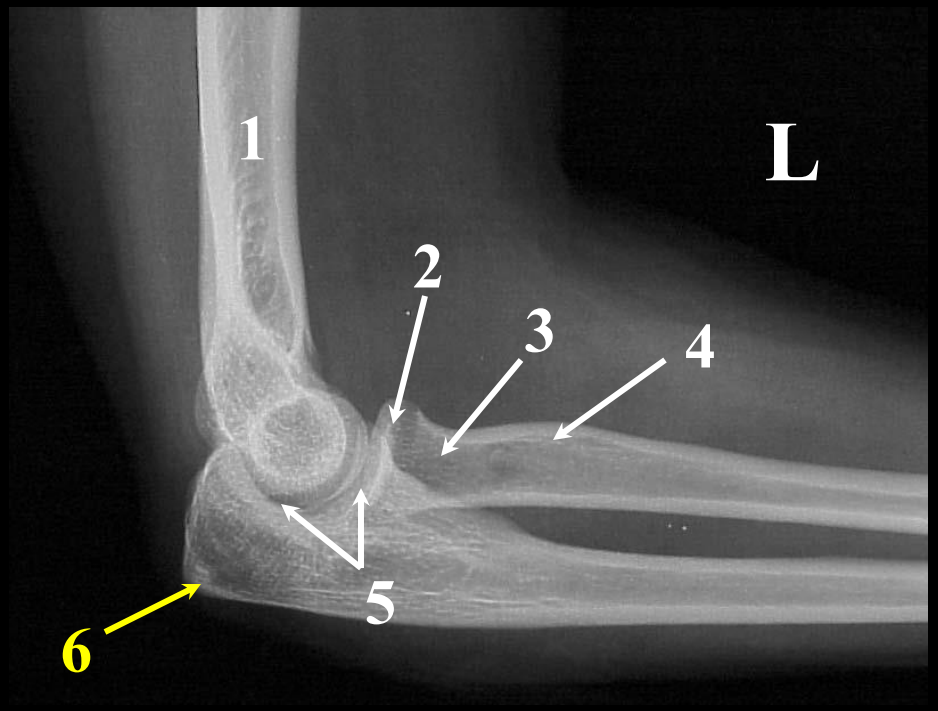
The arrow is pointing to the:

a. coronoid process.
b. olecranon process.
c. trochlea.
d. coracoid process.



Question #38: Review

1. Shaft of the Humerus
2. Head of the Radius
3. Neck of the Radius
4. Radial Tuberosity
5. Trochlear or Semilunar Notch
6. Olecranon Process



Lateral Elbow

Question #39:

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

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

Question #39: 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.

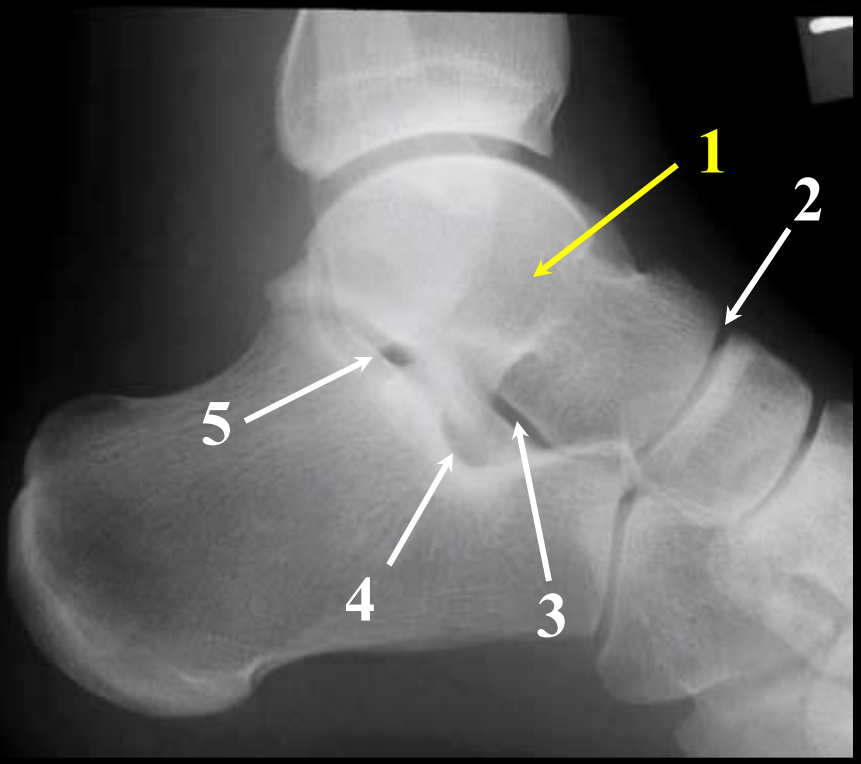
Question #40:

The arrow is pointing to the:

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

Question #40: Review

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



Lateral Calcaneous

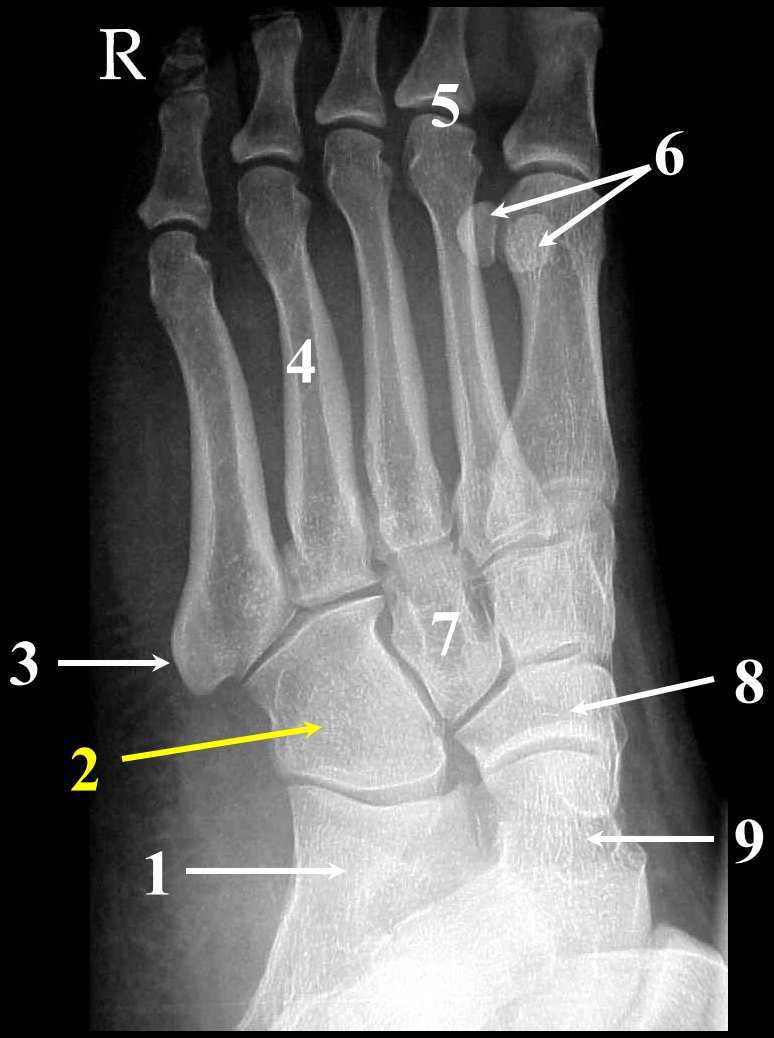
Question #41:

The arrow is pointing to the:

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

Question #41: 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

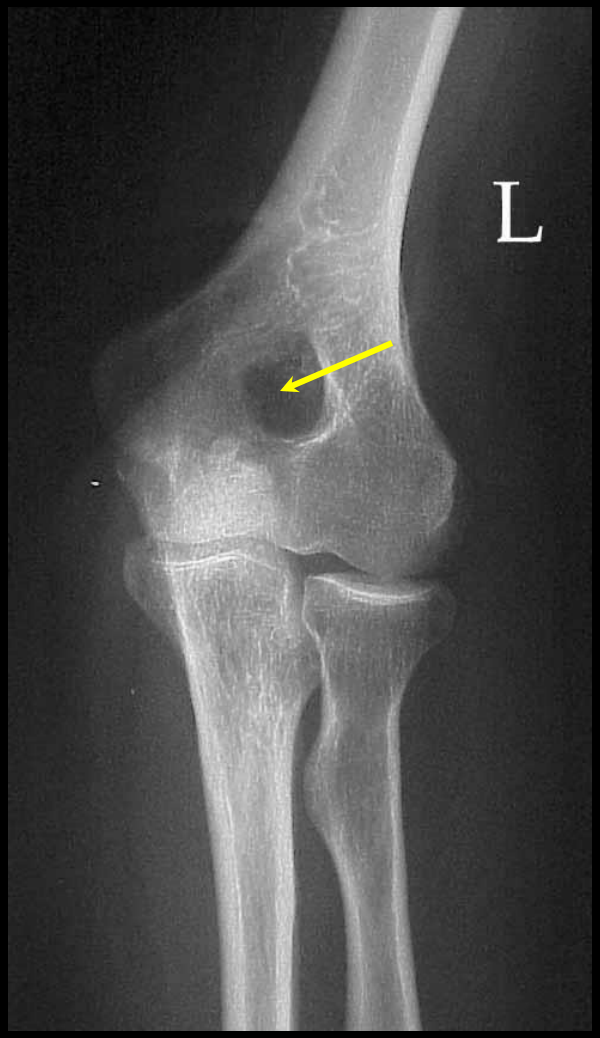


Internal Oblique Foot: Magnified

Question #42:

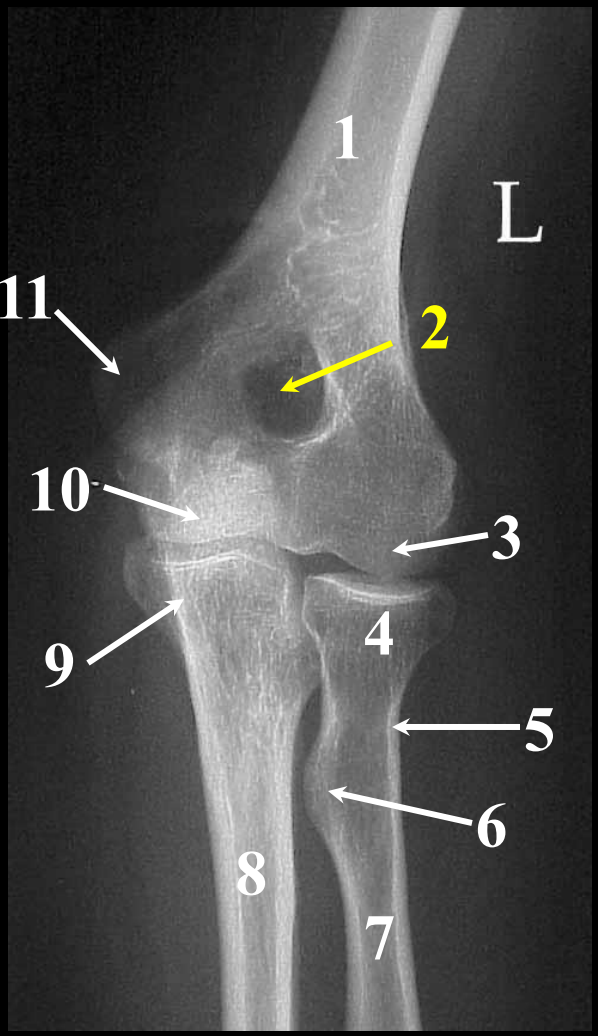
The arrow is pointing to the:

a. olecrenon fossa.
b. olecrenon process.
c. coronoid process.
d. trochlea.



Question #42: Review

1. Shaft of the Humerus
2. Olecranon Fossa
3. Capitulum
4. Head of the Radius
5. Neck of the Radius
6. Radial Tuberosity
7. Shaft of the Radius
8. Shaft of the Ulna
9. Coronoid Process
10. Trochlea
11. Epicondyle

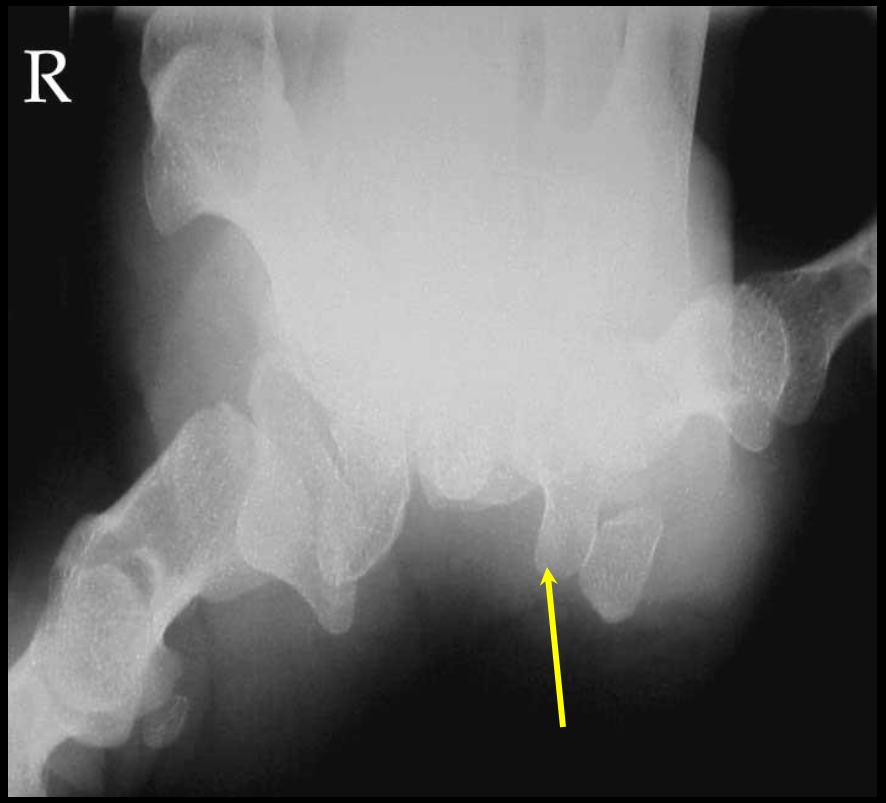


AP Elbow

Question #43:

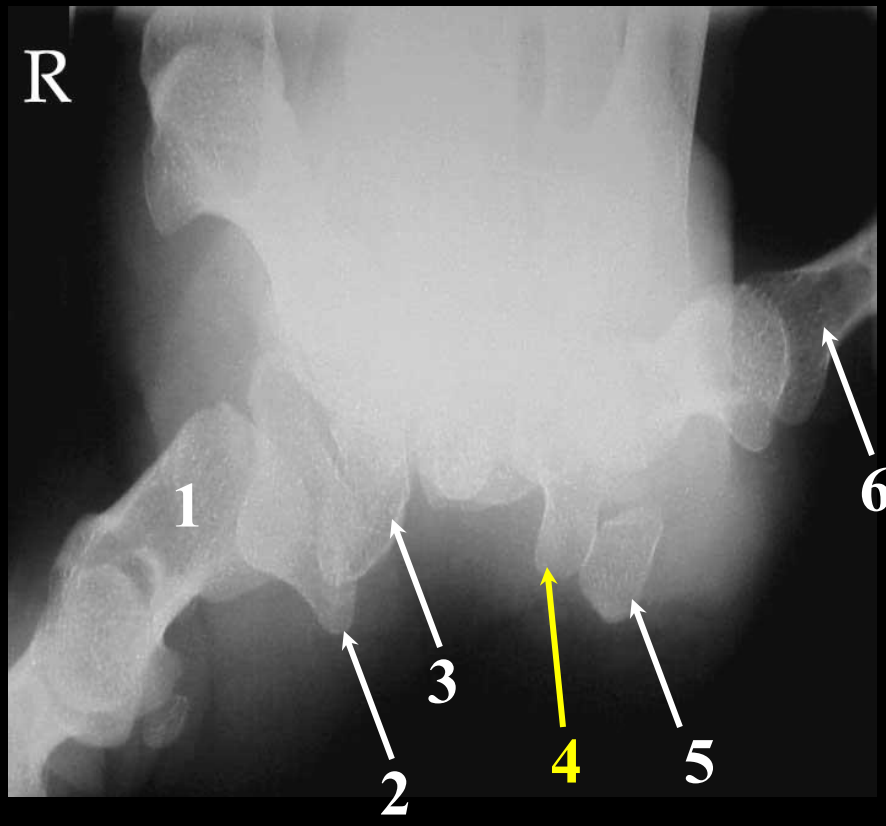
The arrow is pointing to the:

a. carpal sulcus.
b. navicular.
c. hamulus of the hamate.
d. pisiform.



Question #43: Review

1. 1st Metacarpal
2. Greater Multangular or Trapezium
3. Navicular or Scaphoid
4. Hamulus of Hamate
5. Pisiform
6. 5th Metacarpal

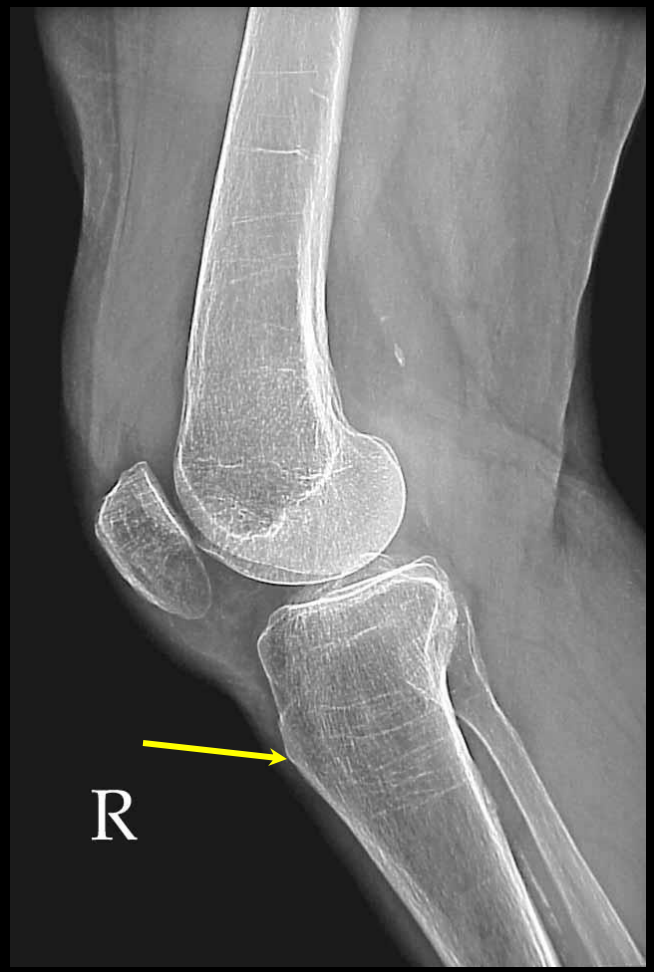


Carpal Canal (Gaynor-Hart) Wrist

Question #44:

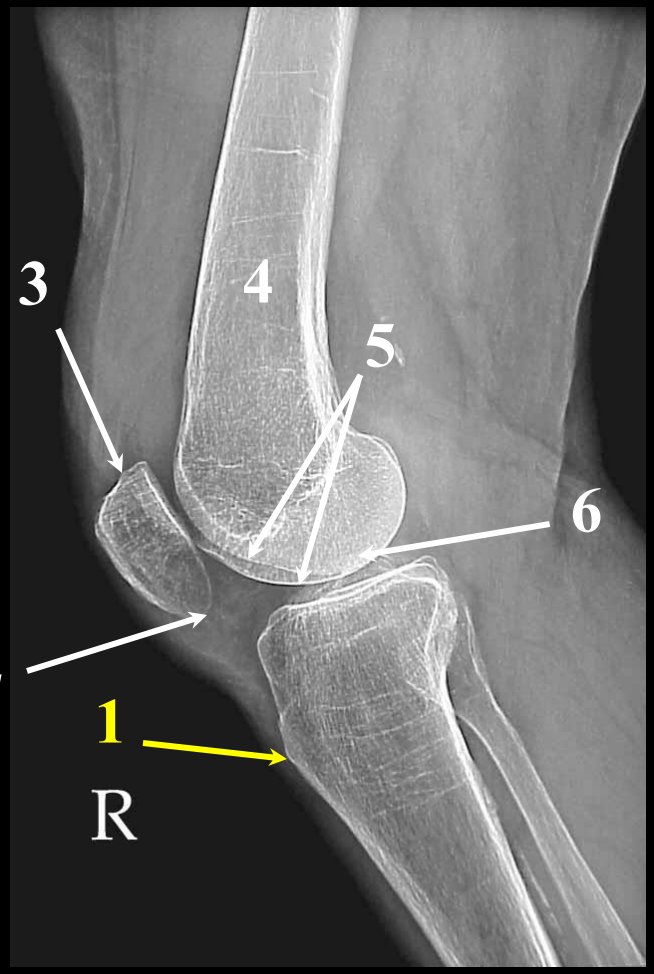
The arrow is pointing to the:

a. medial condyle of the tibia.
b. tibial tuberosity.
c. lateral condyle of the tibia.
d. Ludloff's spot.



Question #44: 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. Intercondylar Eminence



Lateral Knee

Question #45:

For a lateral position of the lower leg, the patient's leg must be flexed:

a. 15°.
b. 30°.
c. 45°.
d. 60°.

Question #45: Review

SID	40 to 48”
kVp	65
IR Size & Placement	35 x 43 cm; LW or Diagonal.
Tube Angle	None.
CR	Mid Lower Leg.
Collimation	Four sides and to area of interest.
Patient Positioning	Place the patient’s lower leg into a true lateral position with knee flexed 45°; Dorsiflex the foot.
Breathing Instructions	None.
Additional Comments	Place a maker within the light field.

Lateral Lower Leg

Question #46:

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

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

Question #46: Review

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

Question #47:

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 #47: 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 #48:

Which of the following exams would be completed in the upright position, using a 72” SID, and with the use of weights for at least one image?

a. shoulder
b. AC joints
c. scapula
d. clavicle

Question #48: Review

SID	72”
kVp	70
IR Size & Placement	Two 24 x 30 cm; CW; One 35 x 43 cm; CW.
Tube Angle	None.
CR	Perpendicular and to mid clavicle.
Collimation	Tight collimation to the AC joints.
Patient Positioning	The patient is standing & holding a 5-pound weight in each hand.
Breathing Instructions	Suspend.
Additional Comments	Place the marker on the bucky and just lateral to the humerus.

Weight-bearing AC Joints

Question #49:

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 #49: 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 #50:

Which primary technical factor is regarded as the most accurate?

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

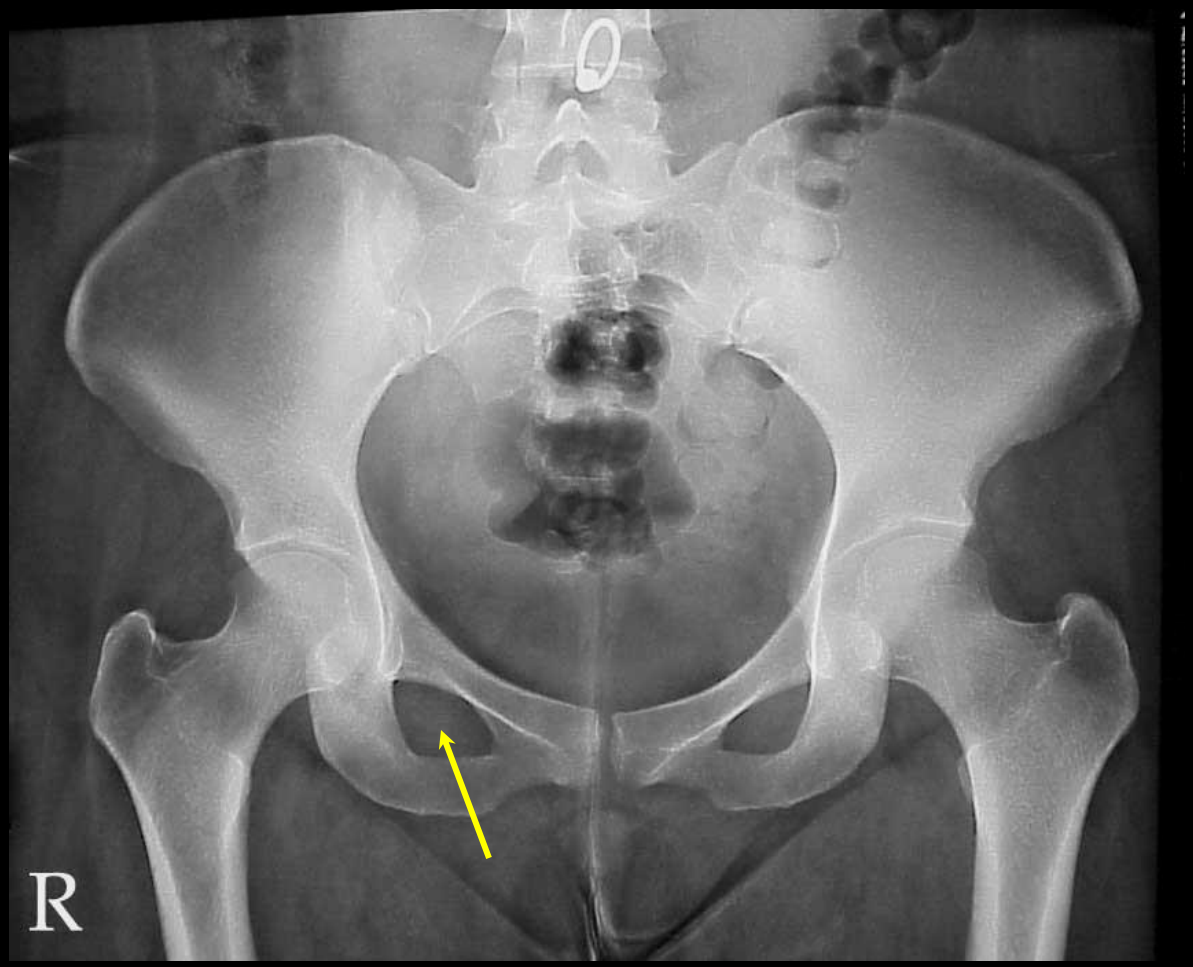
Question #50: Review

- 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 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 #51:

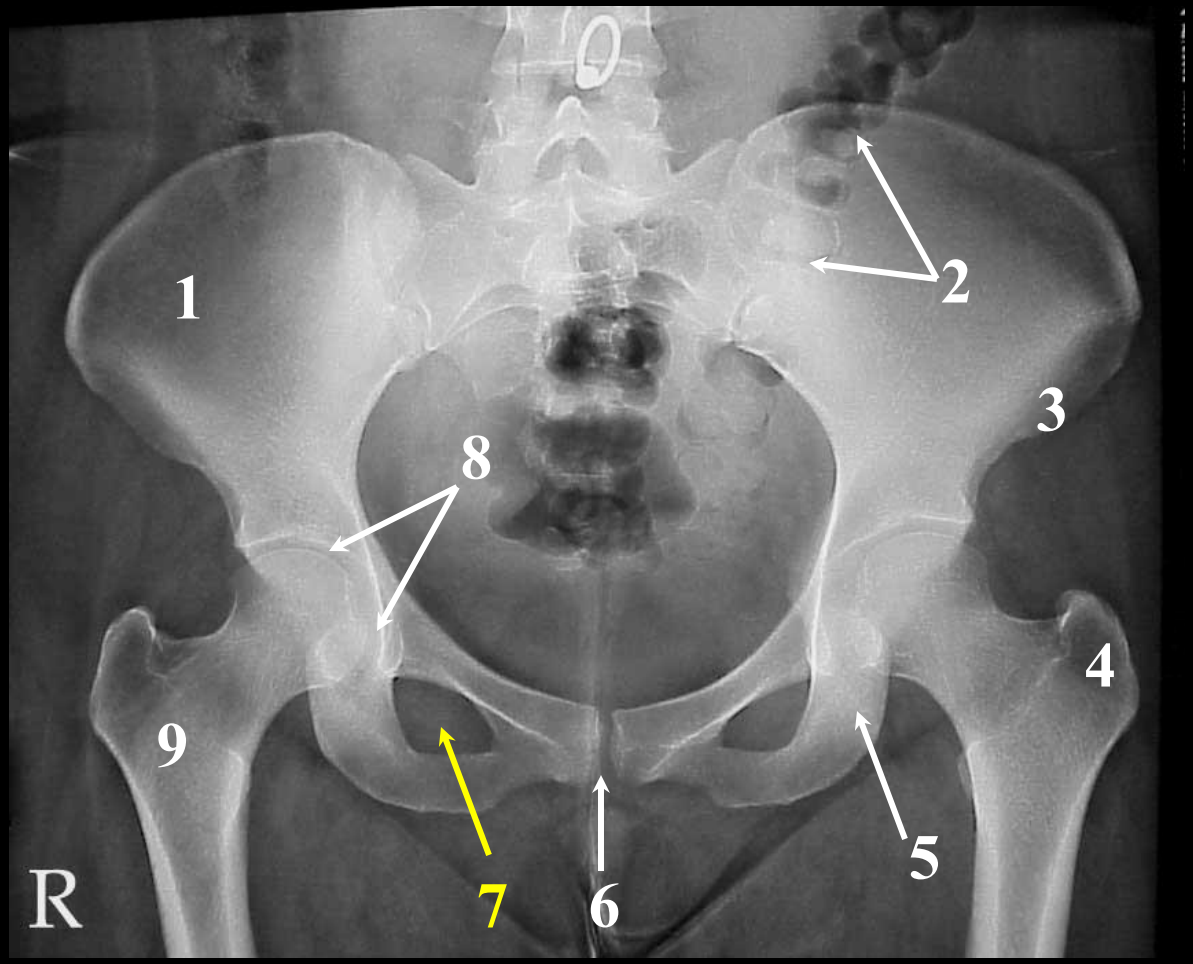
The arrow is pointing to the:

a. foramen magnum.
b. inferior ramus.
c. obturator foramen.
d. ischial spine.



Question #51: 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 #52:

The plantodorsal (axial) projection of the calcaneous requires a _____ cephalic tube angle.

a. 25°
b. 30°
c. 40°
d. 60°

Question #52: Review

SID	40”
kVp	60
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	40° Cephalic.
CR	Third MP Joint.
Collimation	Tight collimation to the calcaneous.
Patient Positioning	The patient is supine or seated on the table with their leg fully extended; Their foot must be dorisiflexed.
Breathing Instructions	None.
Additional Comments	Place the marker on the lateral aspect of the calcaneous.

Plantodorsal or Axial Projection

Question #53:

A computed radiography (CR) imaging plate should be erased after how many hours of nonuse?

a. 8
b. 12
c. 24
d. 48

Question #53: Review

- CR imaging plates are very sensitive to both background radiation and scatter radiation.
- As a result, CR imaging plates should be cleared (erased) after 48 hours of nonuse.

Question #54:

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 #54: Review

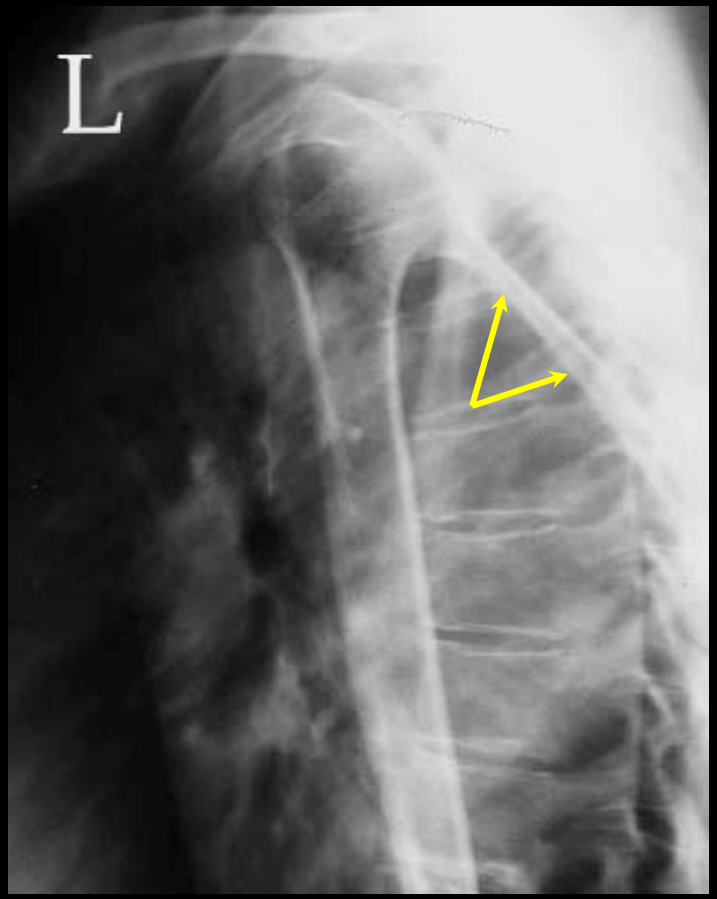
- The exit beam can be broken down into three distinct categories.
- The three portions of the exit beam are as follows:

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

Question #55:

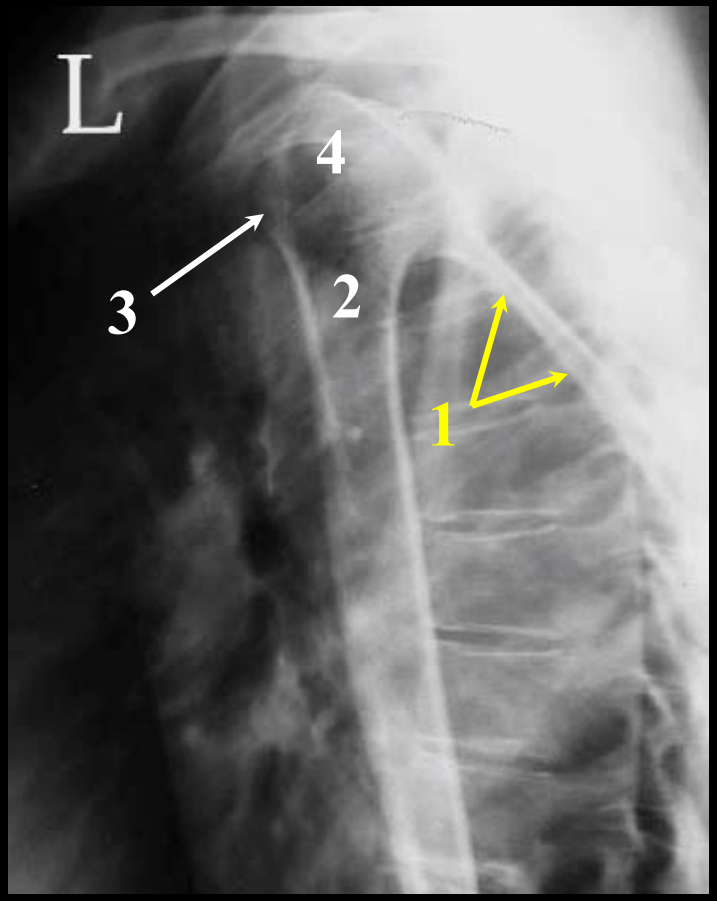
The arrows are pointing to the:

a. trachea.
b. scapula.
c. esophagus.
d. calcified blood vessel.



Question #55: Review

1. Scapula
2. Surgical Neck of the Humerus
3. Greater Tubercle of the Humerus
4. Head of the Humerus



Transthoracic Shoulder

Question #56:

The epicondyles are parallel to the IR for which of the following elbow projections/positions?

a. AP
b. internal oblique
c. external oblique
d. lateral

Question #56: Review

SID	40”
kVp	60
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	None.
CR	Mid Elbow.
Collimation	Four sides and to area of interest.
Patient Positioning	Place forearm in a true AP projection; Humerus flat and at level of the table; Ensure epicondyles are parallel to IR.
Breathing Instructions	None.
Additional Comments	Mark the lateral aspect of the elbow.

AP Elbow

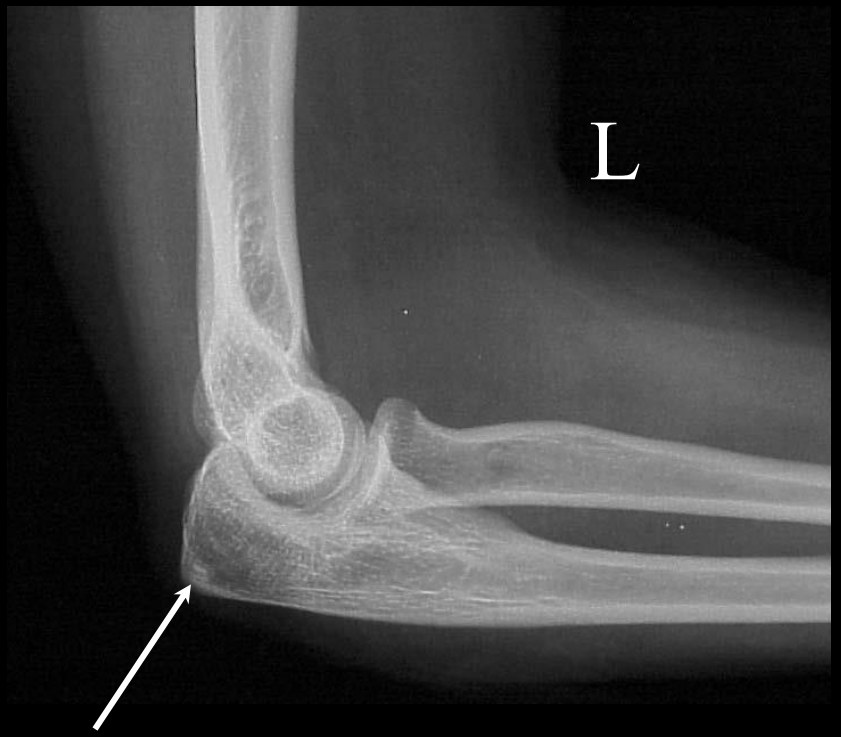
Question #57:

Which of the following elbow projections/positions will best demonstrate the olecrenon process in profile?

a. AP
b. internal oblique
c. lateral
d. external oblique

Question #57: Review

The lateral position of an elbow will best demonstrate the olecrenon process (arrow) in profile.



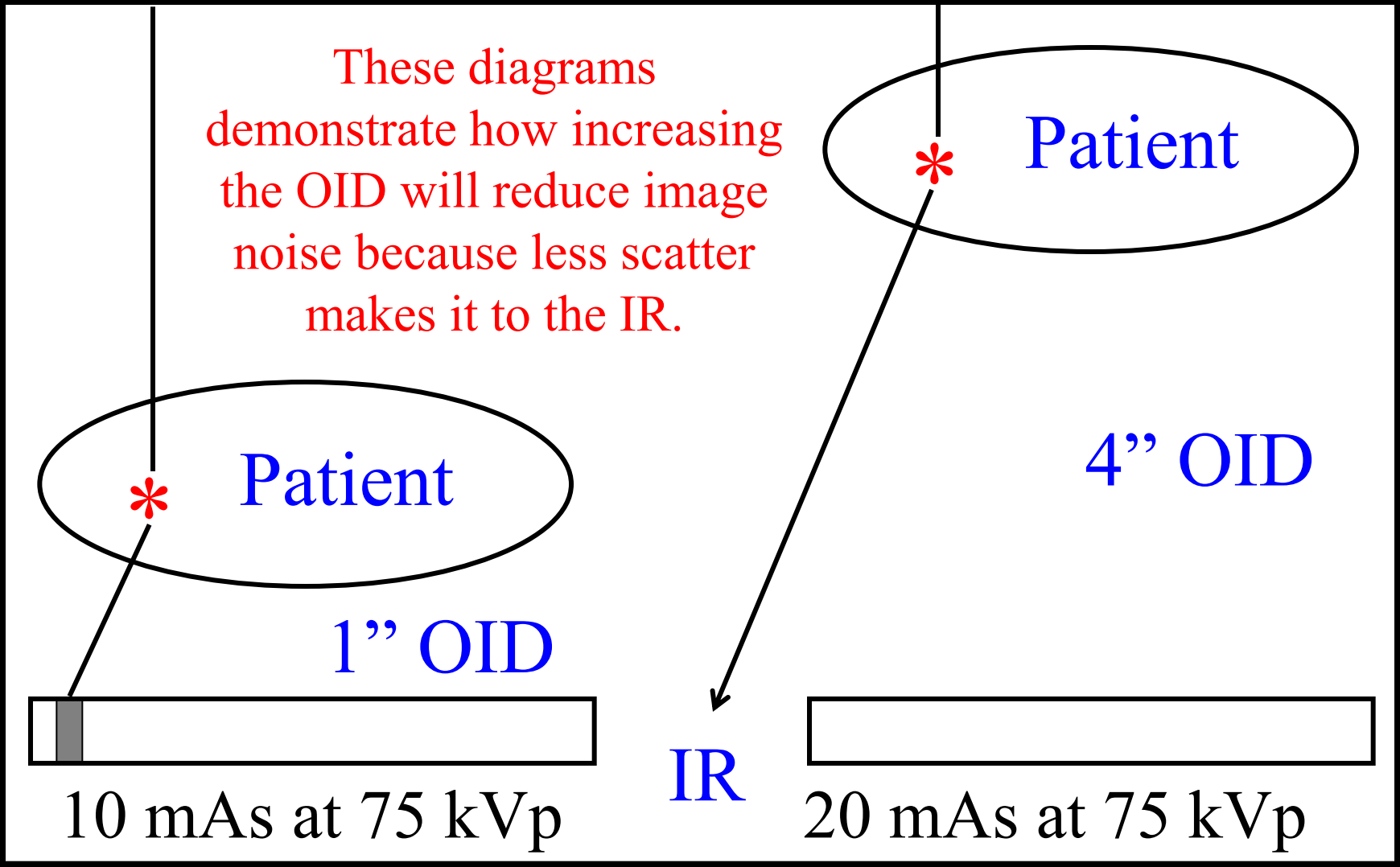
Lateral Elbow

Question #58:

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 #58: Review



Object Image-receptor Distance

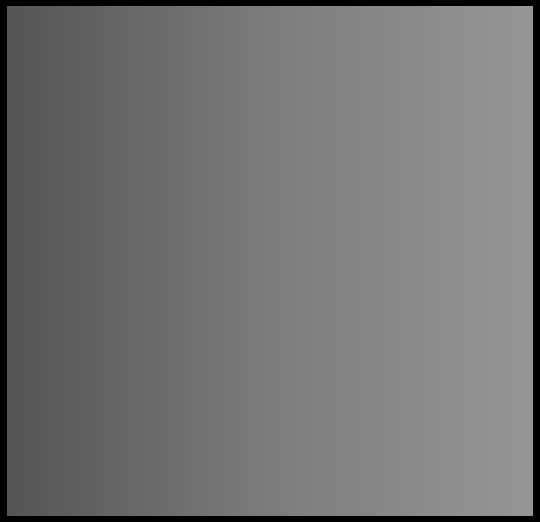
Question #59:

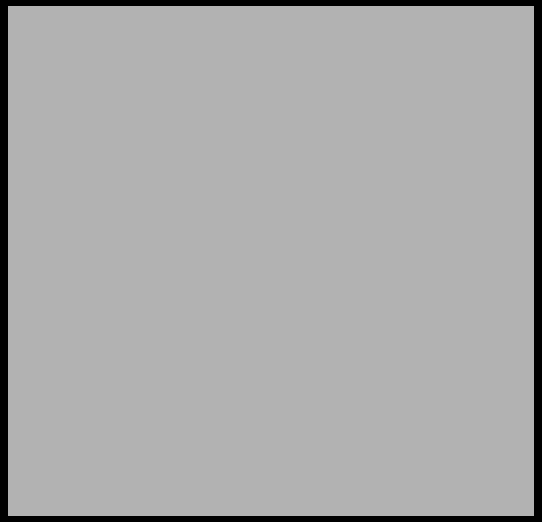
Which of the following terms is a type of preprocessing image manipulation technique that removes noise which manifests in a fixed and foreseeable pattern?

a. edge enhancement
b. pixel interpolation
c. dead pixel correction
d. flat-fielding

Question #59: Review

- Some image artifacts produce noise that manifests in a fixed, foreseeable pattern.
- Flat-fielding is a set of algorithms that are employed to remove these artifacts prior to the image appearing on the workstation monitor.
- A very good example of flat-fielding would be the removal of the anode heel effect artifact from an image.
- The image on the left below contains the anode heel effect.





- In this example, an algorithm has been applied to remove the anode heel effect as demonstrated on the right image above.

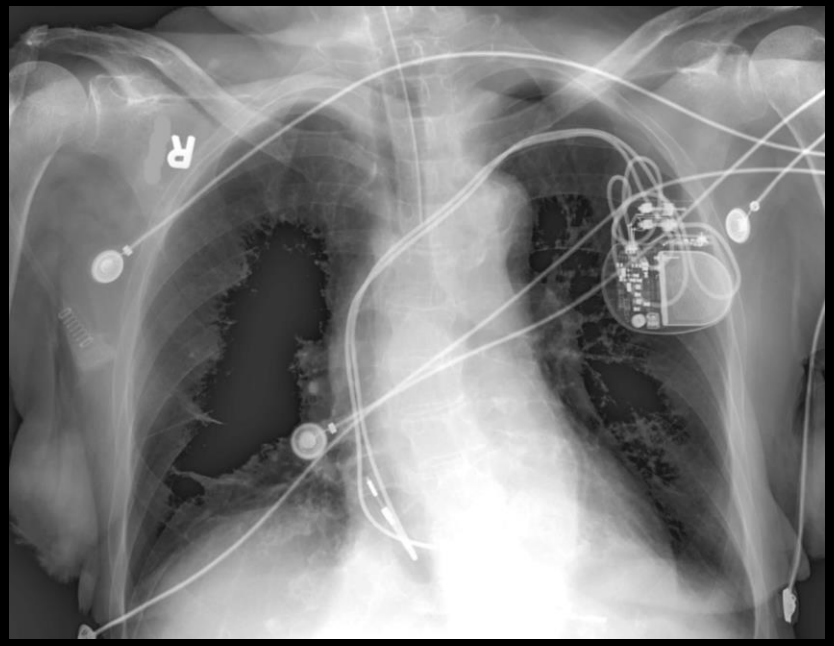
Question #60:

Very high techniques can lead to an artifact referred to as:

a. flat-fielding.
b. detective quantum efficiency.
c. quantum noise.
d. saturation.

Question #60: Review

- Very high techniques can lead to an artifact referred to as saturation.
  In this case, the IR is receiving too much dose to produce a diagnostic quality image.
  The image will possess excessive areas that are completely black.



The areas on this PA chest that are completely black are saturated due to excessive dose (mR).

- Saturation takes 8-10 times the normal exposure and produces flat, black areas on the image.

Question #61:

Which of the following elbow projections/positions would best demonstrate the coronoid process in profile?

a. AP
b. internal oblique
c. external oblique
d. lateral

Question #61: Review

An internal oblique position of an elbow is used to best demonstrate the coronoid process (arrow) in profile.

Internal Oblique Elbow

Question #62:

Which of the following terms refers to the range of exposures which produce quality images at an appropriate patient dose?

a. contrast resolution
b. receptor contrast
c. dynamic range
d. exposure latitude

Question #62: Review

- Exposure latitude is the range of exposures which produce quality images at an appropriate patient dose.
- It refers to dose (mR) from the perspective of the radiographer.
- Another way to look at this is that exposure latitude is the range of exposures at the radiographer's disposal that can produce a quality radiographic image.
- A wide exposure latitude is very desirable.

Question #63:

The Grashey method of the shoulder requires that the patient be rotated _____ towards the affected side.

a. 25 to 30°
b. 30 to 35°
c. 35 to 40°
d. 40 to 45°

Question #63: Review

SID	40”
kVp	75 to 80
IR Size & Placement	24 x 30 cm; CW.
Tube Angle	None.
CR	Glenohumeral joint space.
Collimation	Show collimation on all four borders.
Patient Positioning	Rotate the body 35 to 40° towards the affected side; Place the arm in a neutral position.
Breathing Instructions	Suspend.
Additional Comments	Place the marker on the bucky and just lateral to the humerus.

Grashey Method

Question #64:

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 #64: 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.

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

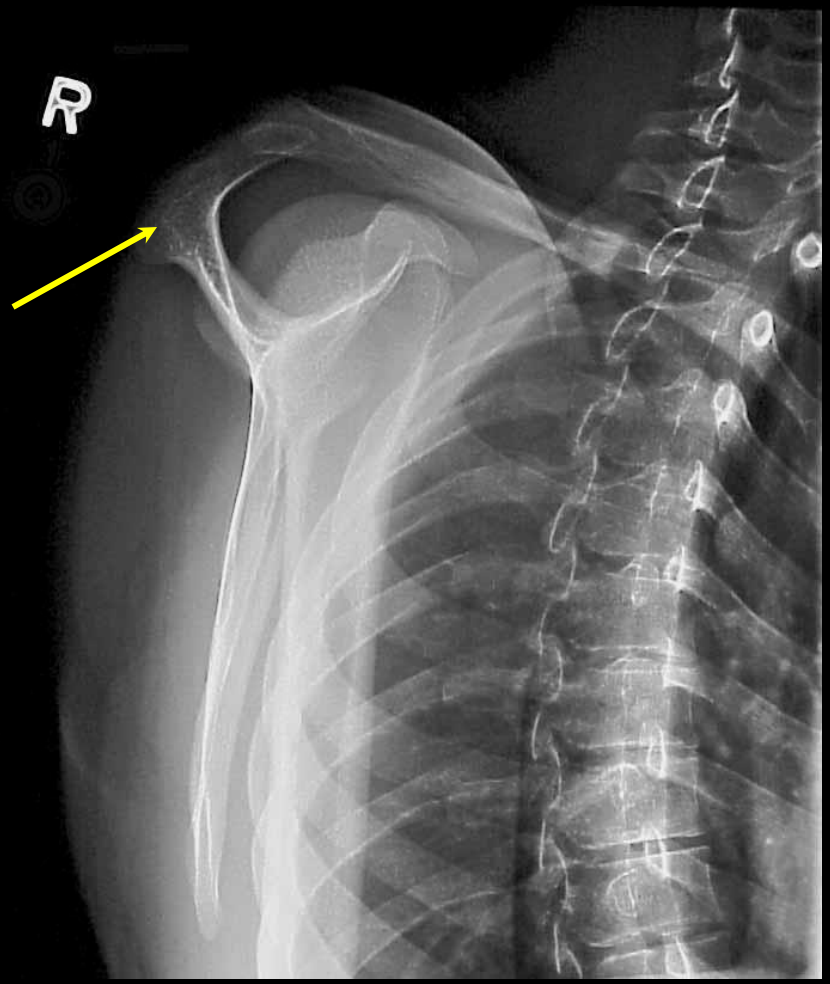
I_1 = old mR D_1 = old distance

I_2 = new mR D_2 = new distance

Question #65:

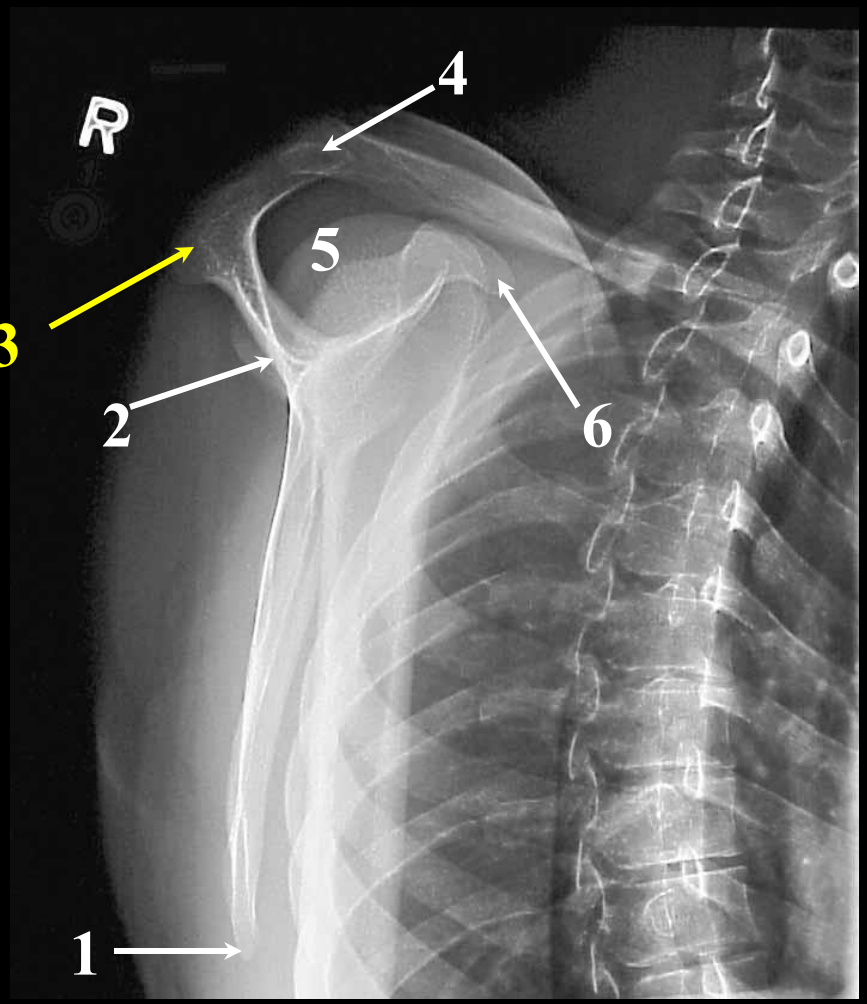
The arrow is pointing to the:

a. scapular spine.
b. AC joint.
c. coracoid process.
d. acromion process.



Question #65: Review

1. Inferior Angle of the Scapula
2. Spine of the Scapula
3. Acromion Process
4. AC Joint
5. Head of the Humerus
6. Coracoid Process



"Y" View of the Shoulder/Scapula

Question #66:

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 #66: Review

- The following should be considered when completing any extremity work:
  - 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 #67:

Computed radiography (CR) imaging plates are exposed to a bright white light to clear any residual energy that may appear on the subsequent image.

a. true
b. false

Question #67: Review

- During CR imaging plate processing, exposure of the plate to the laser beam will not "reset" all the electrons from the europium back to their original position on the plate.
- To completely clear the imaging plate, it must be exposed to a bright white light to remove any residual energy prior to returning it to the cassette.
- If this does not occur, a ghost image will remain on the CR plate, and this can cause an artifact to appear on the subsequent image.

Question #68:

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

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

Question #68: Review

- There are two important terms that are used to describe spatial resolution (SR), 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.

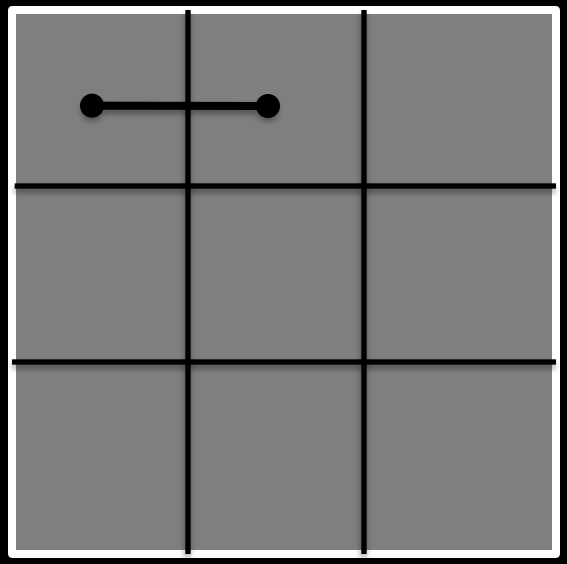
Question #69:

As the size of the matrix is increased, the pixel size and pixel pitch will both _____ thereby increasing the overall image spatial resolution.

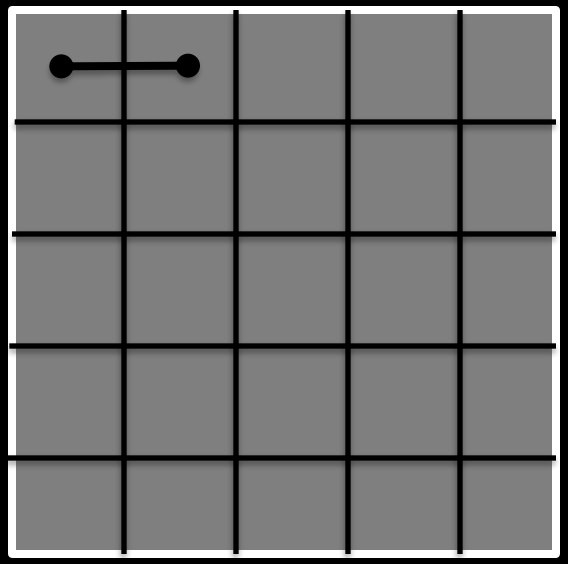
a. increase
b. decrease
c. have no effect

Question #69: Review

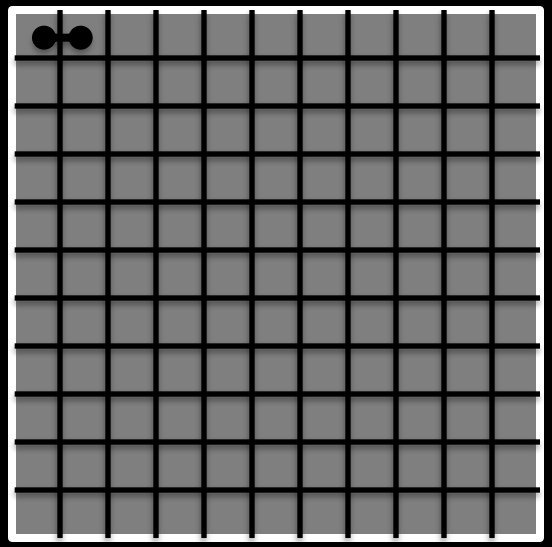
Large



Medium



Small

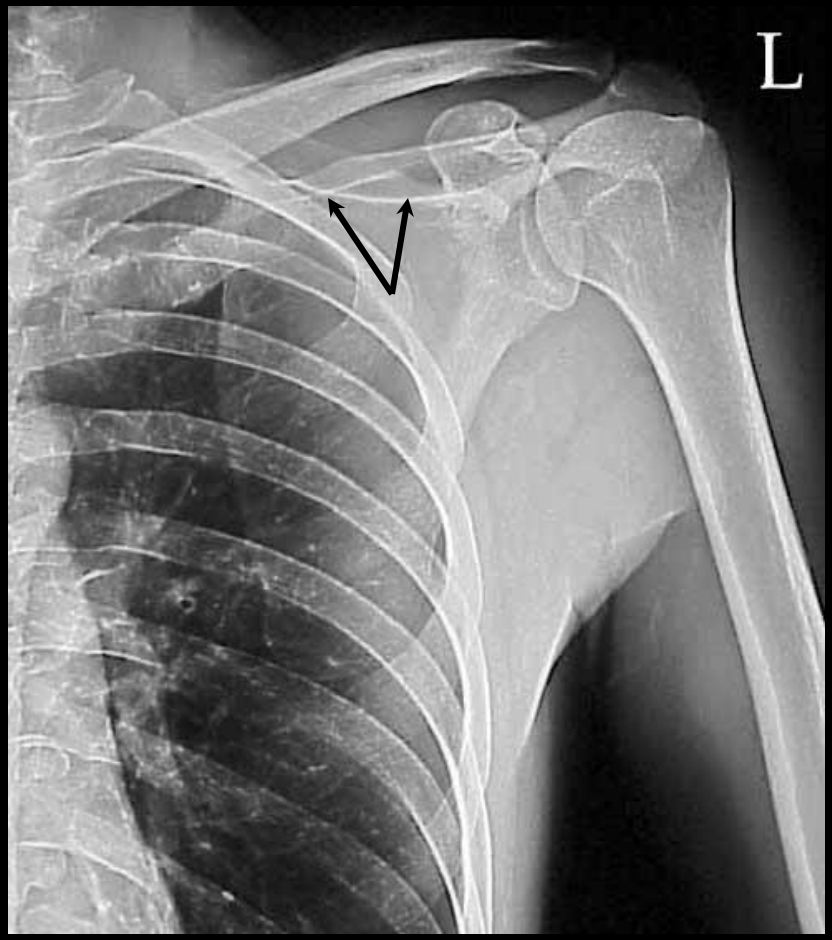


As the size of the matrix is increased, the pixel size & pixel pitch will both decrease thereby increasing the overall image spatial resolution.

Question #70:

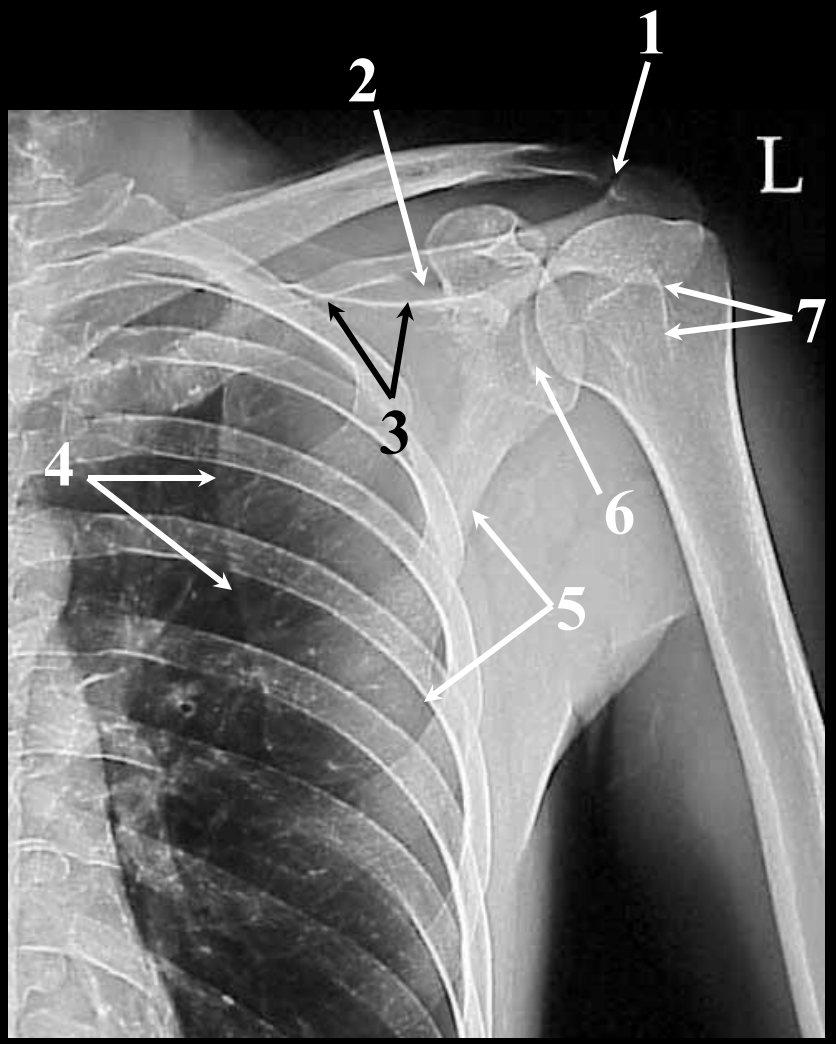
The arrows are pointing to the:

a. spine of the scapula.
b. scapular notch.
c. body of the scapula.
d. superior border of the scapula.



Question #70: Review

1. AC Joint
2. Scapular Notch
3. Spine of the Scapula
4. Medial or Vertebral Border
5. Lateral or Axillary Border
6. Glenoid Fossa
7. Intertubercular Groove
   (bicipital groove)



AP Scapula

Question #71:

For any tunnel view of the knee, the CR must be perpendicular to what structure?

a. patella
b. femur
c. lower leg
d. none of the above

Question #71: Review

SID	40”
kVp	75
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	40 to 50° Caudal.
CR	Perpendicular to the lower leg (tibia).
Collimation	Tight collimation to the knee.
Patient Positioning	The patient is prone with their femur flat and their knee flexed 40 to 50°; Place a support under their ankle.
Breathing Instructions	Suspend Respirations.
Additional Comments	Mark the lateral aspect of the knee.

Tunnel Knee: Camp Coventry

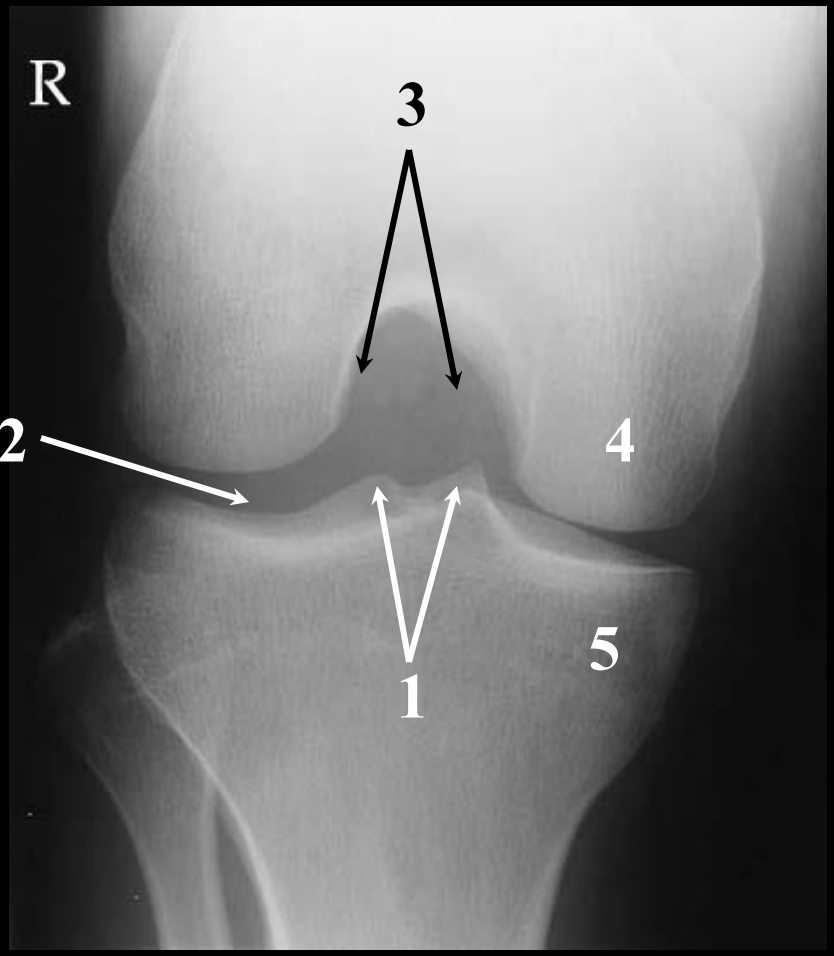
Question #72:

The arrows are pointing to the:

a. tibial plateau.
b. glenoid fossa.
c. intercondylar eminence.
d. intercondylar fossa.

Question #72: 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

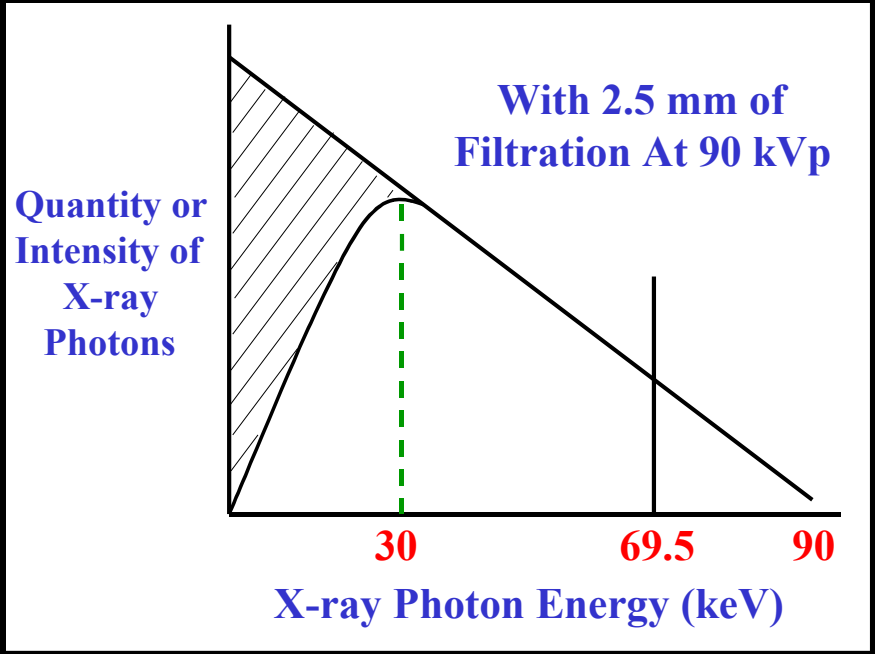
Question #73:

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 #73: Review

The X-ray Emission Spectrum



- With the addition of filtration, note how the lower energy x-rays have been removed.
- The result of adding this filtration is that the average energy of the primary beam will always be 1/3 of the kVp when filtration is added.
- In this example, at 90 kVp, the average engery is 30 keV.

Question #74:

The centering point for an AP pelvis is located at the midline of the body and halfway between the _____ and the symphysis pubis.

a. ASIS
b. top of the iliac crest
c. greater trochanter
d. belly button

Question #74: Review

SID	40”
kVp	85
IR Size & Placement	35 x 43 cm; Crosswise (CW).
Tube Angle	None.
CR	Midline and halfway between the ASIS and the symphysis pubis.
Collimation	Tight collimation to the pelvis.
Patient Positioning	The patient is supine with their legs internally rotated 15 to 20°.
Breathing Instructions	Suspend respirations.
Additional Comments	Place a marker within the light field & along the lateral margin of the pelvis.

AP Pelvis

Question #75:

The arrow is pointing to the:

a. tarsal sinus.
b. navicular.
c. talus.
d. cuboid.

Question #75: 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

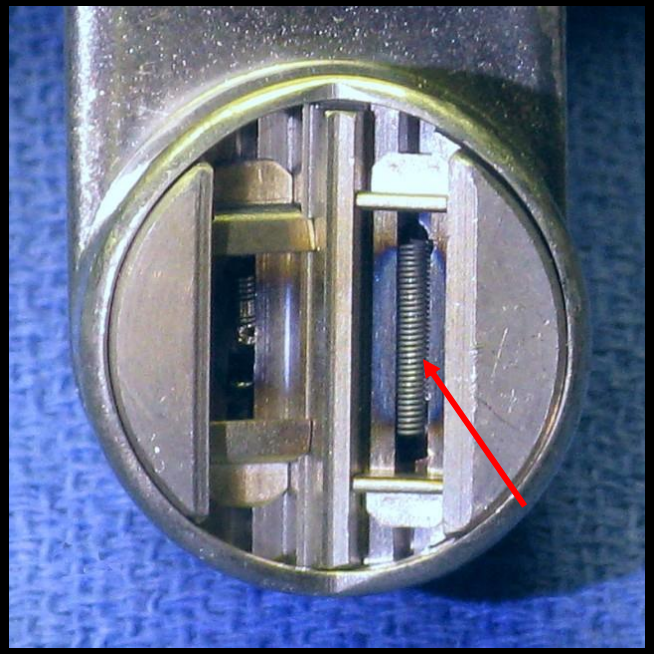
Question #76:

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

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

Question #76: Review

- The filament of the cathode (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 #77:

Which of the following will best demonstrate the longitudinal arches of the foot?

a. AP foot
b. oblique foot
c. lateral weight-bearing foot
d. lateral foot

Question #77: Review

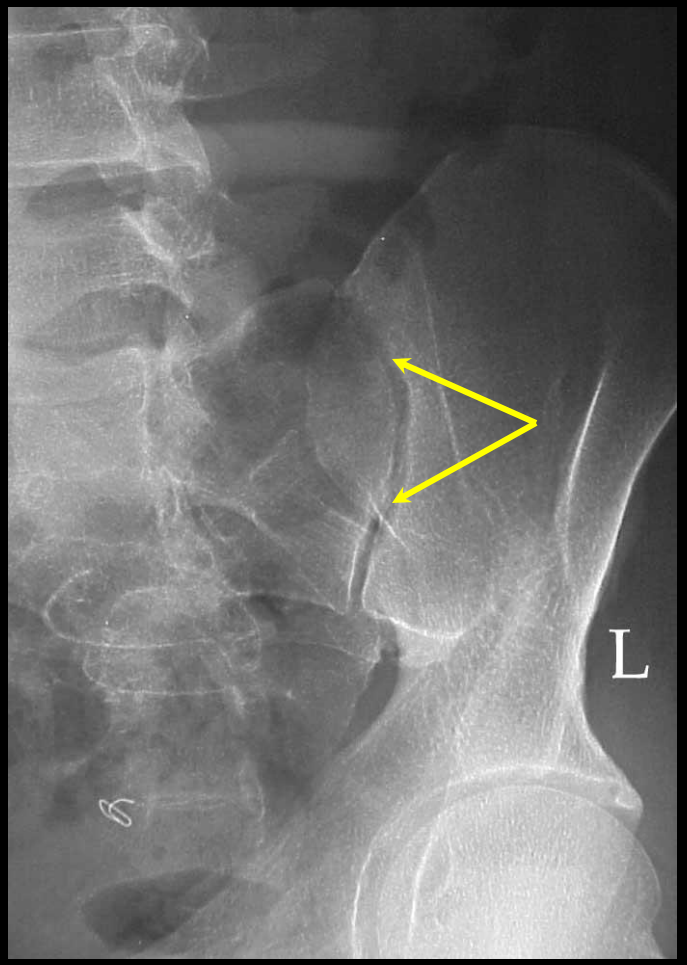
SID	40”
kVp	60
IR Size & Placement	24 x 30 cm; Crosswise (CW).
Tube Angle	None.
CR	Mid Carpal Area.
Collimation	Tight collimation to the outer margin of the foot.
Patient Positioning	The patient is standing on a radiolucent bolster with a horizontal tube.
Breathing Instructions	None.
Additional Comments	Place the marker within the light field; Demonstrates the longitudinal arches.

Lateral Weight-bearing Foot

Question #78:

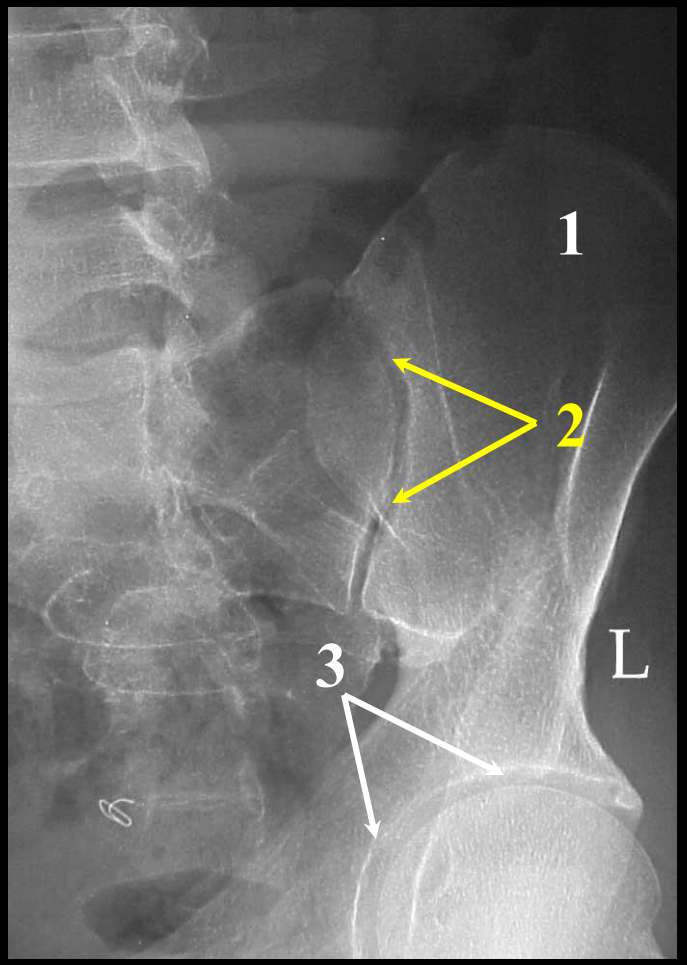
The arrows are pointing to the:

a. SI joint.
b. zygapophyseal joint.
c. sacral canal.
d. sacral foramen.



Question #78: Review

1. Left Ala of the Ilium
2. Left S.I. Joint
3. Left Acetabulum



RPO Sacroiliac Joints

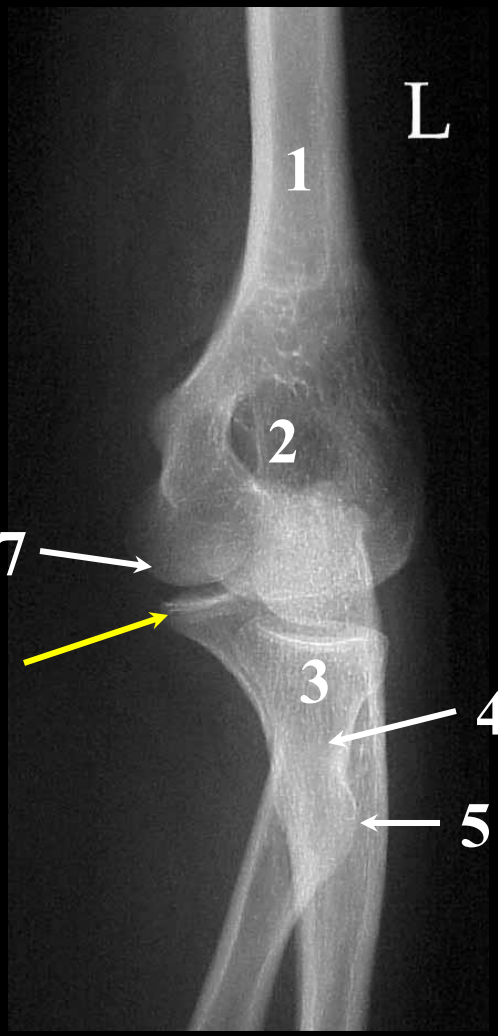
Question #79:

The arrow is pointing to the:

a. coronoid process.
b. coracoid process.
c. trochlea.
d. capitulum.

Question #79: Review

1. Shaft of the Humerus
2. Olecranon Fossa
3. Head of the Radius
4. Neck of the Radius
5. Radial Tuberosity
6. Coronoid Process
7. Trochlea



Internal Oblique Elbow

Question #80:

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 #80: Review

- Subject contrast refers to 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 #81:

Which of the following image receptors employs the use of photostimulable phosphors to produce digital radiographic images?

a. indirect capture direct radiography
b. direct capture direct radiography
c. film-screen radiography
d. computed radiography

Question #81: Review

- Computed Radiography or CR is a marketing term for photostimulable phosphor (PSP) detector systems.
    - An analog signal (data) is created and interpreted by analog and digital devices.
- As the exit beam from the patient strikes these phosphors, some light is emitted but most of the energy is trapped in the PSP screen.
    - PSP screens are sometimes called storage phosphors or imaging plates.

Question #82:

The arm is abducted 90° from the thorax for which of the following?

a. AP internal shoulder
b. Grashy method of the shoulder
c. tangential clavicle
d. AP scapula

Question #82: Review

SID	40”
kVp	75 to 80
IR Size & Placement	24 x 30 cm; CW.
Tube Angle	None.
CR	Mid scapula which is located 2” below the coracoid process.
Collimation	Show collimation on all four borders.
Patient Positioning	Abduct arm 90° from the thorax.
Breathing Instructions	Use a breathing technique, if possible; otherwise, suspend respirations.
Additional Comments	Place the marker on the bucky and just lateral to the torso.

AP Scapula

Question #83:

Which of the following terms refers to the process of assigning a luminance value to each pixel as a means to represent patient anatomy?

a. spatial resolution
b. pixel bit depth
c. quantization
d. grayscale

Question #83: Review

- Quantization refers to the process of assigning a luminance value to each pixel as a means to represent patient anatomy.
- Luminance values are dependent upon the number of bits per pixel or the pixel bit depth.

  Pixel bit depth is the total number of shades of gray that each pixel is capable of producing.
- The pixel bit depth is determined by the analog-to-digital converter (ADC) employed by the manufacturer.
- This is the foundation for producing the wide range of gray shades that can be generated in digital radiography.
- The range of grays that can be produced is referred to as the grayscale.

Question #84:

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 #84: 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.

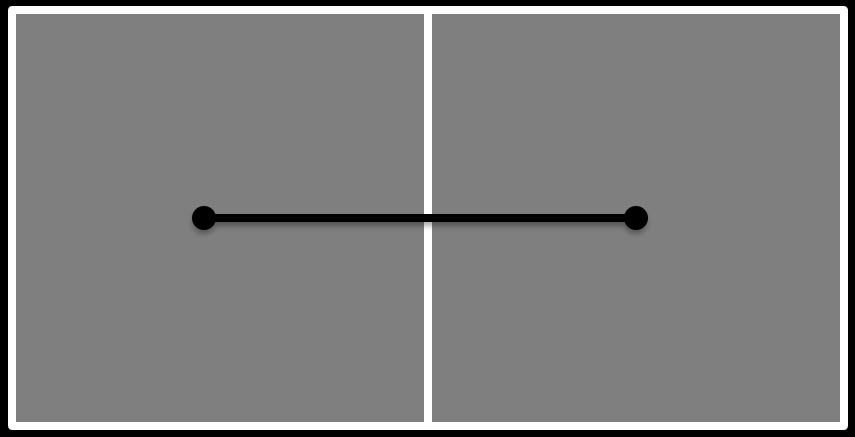
Question #85:

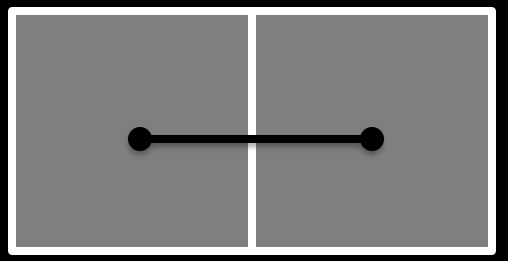
A shorter pixel pitch will have what effect on digital radiographic image spatial resolution?

a. decrease
b. increase
c. no effect

Question #85: Review

- Pixel pitch refers to the distance between the center point of adjacent pixels, as demonstrated below.





- A shorter pixel pitch is the result of smaller pixels, and this will produce a higher spatial resolution.
- Therefore, the pixel pair on the right above will produce an image with a higher level of spatial resolution than the pixel pair on the left.

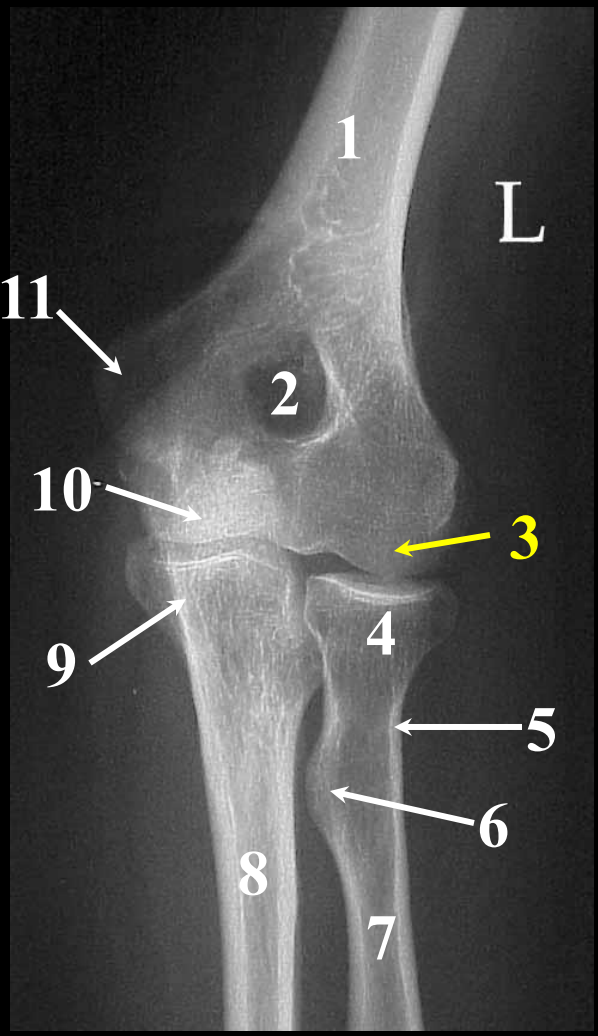
Question #86:

The arrow is pointing to the:

a. coronoid process.
b. trochlea.
c. capitullum.
d. medial epicondyle.

Question #86: Review

1. Shaft of the Humerus
2. Olecranon Fossa
3. Capitulum
4. Head of the Radius
5. Neck of the Radius
6. Radial Tuberosity
7. Shaft of the Radius
8. Shaft of the Ulna
9. Coronoid Process
10. Trochlea
11. Epicondyle



AP Elbow

Question #87:

An AP projection of the foot requires a _____ cephalic tube angle.

a. 5°
b. 10°
c. 20°
d. 30°

Question #87: Review

SID	40”
kVp	60
IR Size & Placement	24 x 30 cm; LW.
Tube Angle	10° towards the calcaneous (cephalic).
CR	Center to the base of the 3rd metatarsal.
Collimation	Tight collimation to the outer margin of the foot.
Patient Positioning	Flex knee and place the plantar surface of the foot in the IR.
Breathing Instructions	None.
Additional Comments	Place the marker on the lateral aspect of the foot.

AP Foot

Question #88:

An AP tangential projection of the clavicle requires a tube angle of:

a. 15 to 30 ° cephalic.
b. 15 to 30° caudal.
c. 25 to 35° cephalic.
d. 25 to 35° caudal.

Question #88: Review

SID	40”
kVp	75 to 80
IR Size & Placement	24 x 30 cm; CW.
Tube Angle	AP: 15 to 30° cephalic; PA: 15 to 30° caudal.
CR	Perpendicular to mid clavicle.
Collimation	Tight collimation to clavicle.
Patient Positioning	Place the arms in a neutral position and raise chin out of the light field.
Breathing Instructions	Suspend.
Additional Comments	Place the marker on the bucky and just lateral to the humerus.

Tangential Clavicle

Question #89:

A flat panel image receptor is used with which of the following imaging systems?

a. film-screen radiography
b. computed radiography
c. direct radiography
d. none of the above

Question #89: Review

- Direct Radiography (DR) employs the use of a flat panel image receptor (IR), that is about the size of a CR cassette, to create digital images.
- There are two categories of flat panel IRs, and they are as follows:
    1. Indirect Capture
    2. Direct Capture

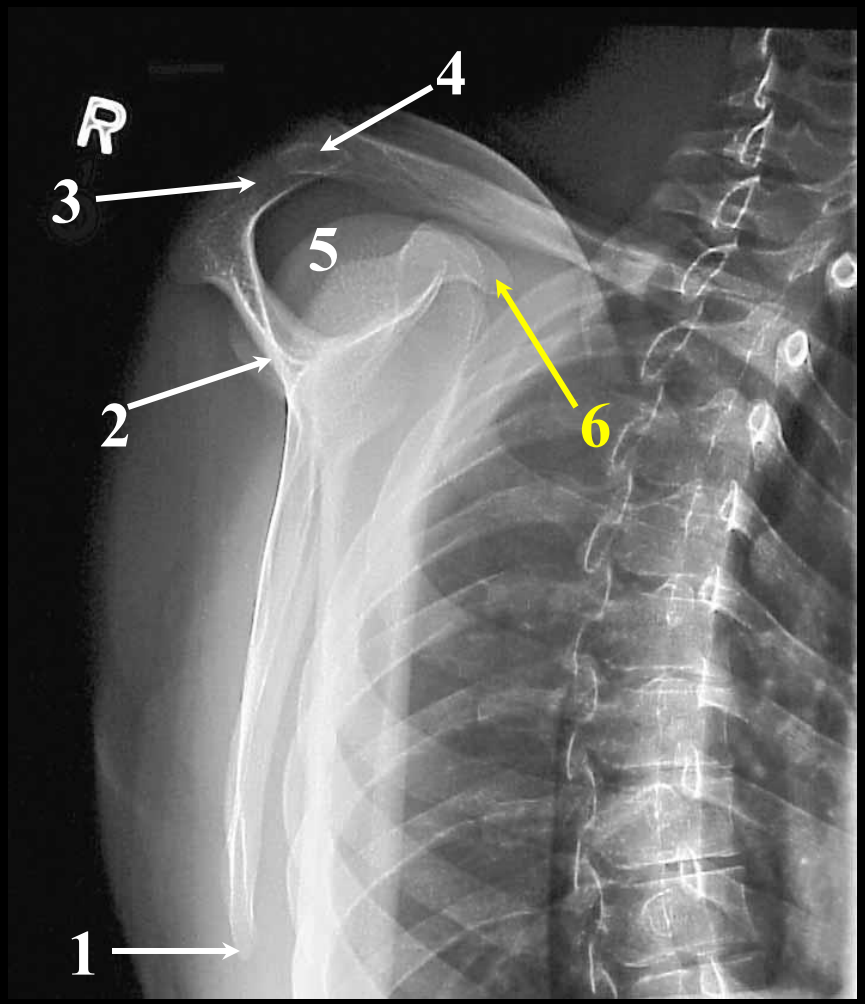
Question #90:

The arrow is pointing to the:

a. coronoid process.
b. coracoid process.
c. scapular spine.
d. AC Joint.

Question #90: Review

1. Inferior Angle of the Scapula
2. Spine of the Scapula
3. Acromion Process
4. AC Joint
5. Head of the Humerus
6. Coracoid Process



"Y" View of the Shoulder/Scapula

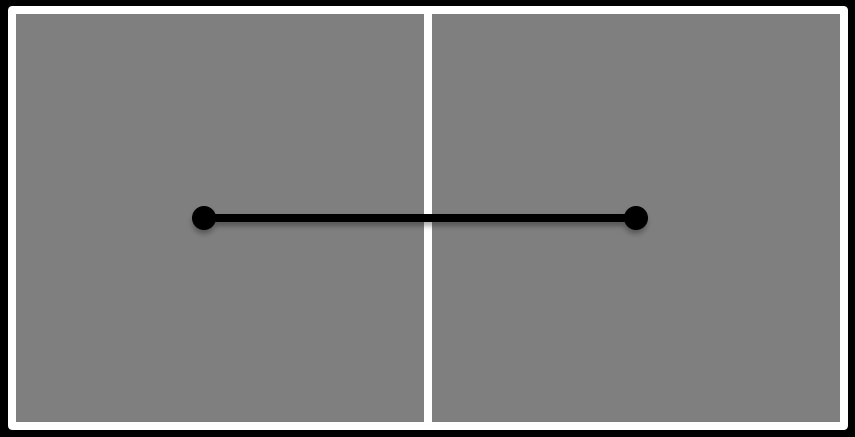
Question #91:

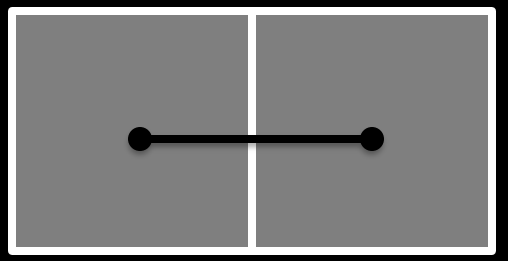
Which of the following terms refers to the distance between the center point of adjacent pixels?

a. matrix
b. luminance value
c. pixel pitch
d. field of view

Question #91: Review

- Pixel pitch refers to the distance between the center point of adjacent pixels, as demonstrated below.





- A shorter pixel pitch is the result of smaller pixels, and this will produce a higher spatial resolution.
- Therefore, the pixel pair on the right above will produce an image with a higher level of spatial resolution than the pixel pair on the left.

Question #92:

An AP projection of the pelvis will require that the legs be internally rotated _____.

a. 10 to 15°
b. 15 to 20°
c. 25 to 30°
d. 30 to 35°

Question #92: Review

SID	40”
kVp	85
IR Size & Placement	35 x 43 cm; Crosswise (CW).
Tube Angle	None.
CR	Midline and halfway between the ASIS and the symphysis pubis.
Collimation	Tight collimation to the pelvis.
Patient Positioning	The patient is supine with their legs internally rotated 15 to 20°.
Breathing Instructions	Suspend respirations.
Additional Comments	Place a marker within the light field & along the lateral margin of the pelvis.

Routine AP Pelvis

Question #93:

It is traditionally accepted within the industry that the child-bearing years extend up to a maximum of and include age _____.

a. 50
b. 55
c. 60
d. 65

Question #93: Review

- The following should be considered when completing any extremity work:
  - 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 #94:

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 #94: Review

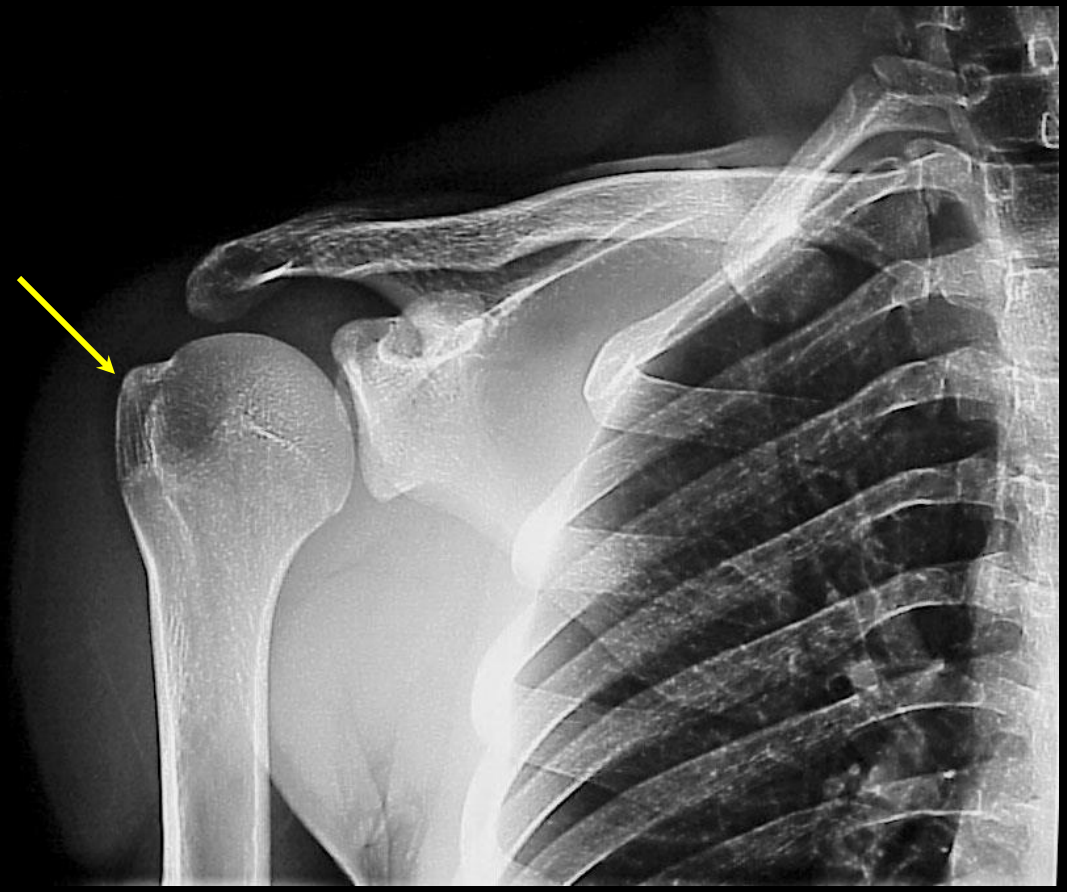
- mA is the primary controlling factor for controlling RE.
- It has a direct and proportional relationship on RE.
- The data below demonstrates how mA affects the dose received by the image receptor:

mA	RE
100	15 mR
200	30 mR
400	60 mR

Question #95:

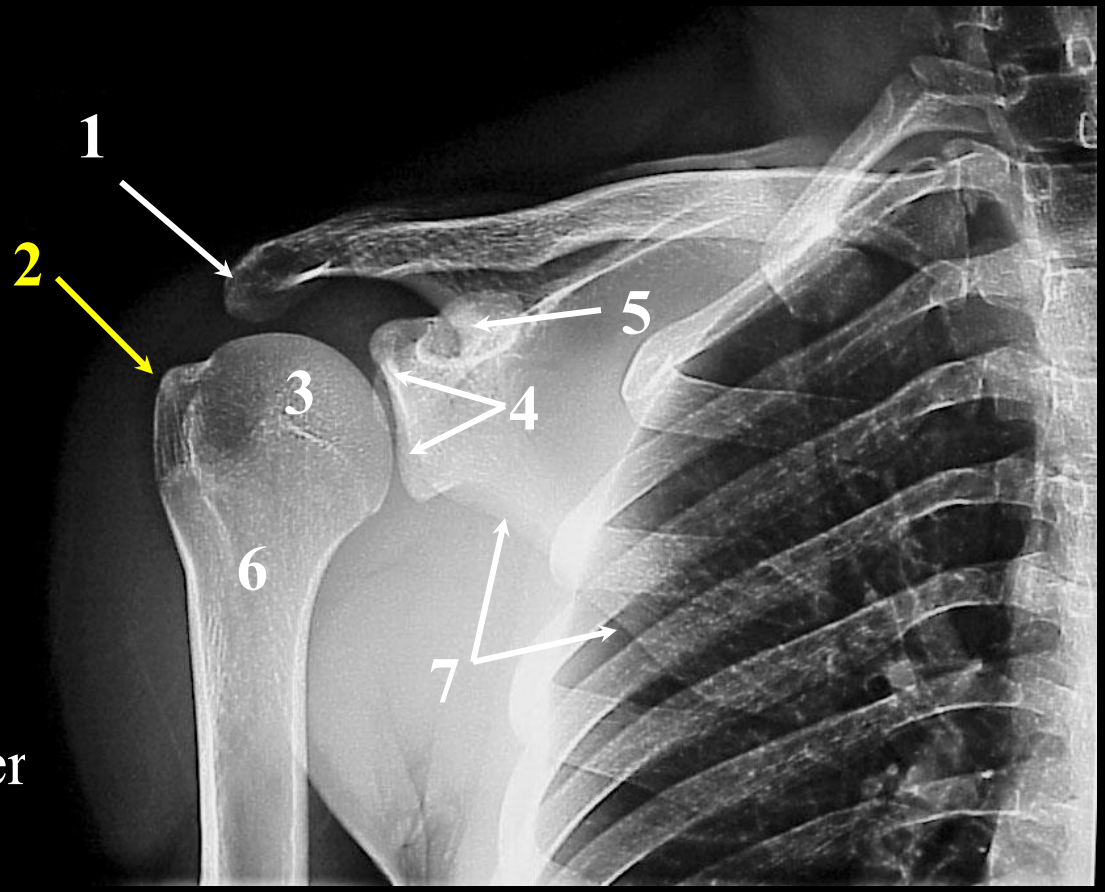
The arrow is pointing to the:

a. anatomical neck.
b. intertubercular groove.
c. greater tubercle.
d. lesser tubercle.



Question #95: Review

1. Acromion Process
2. Greater Tubercle of the Humerus
3. Head of the Humerus
4. Glenoid Fossa
5. Coracoid Process
6. Surgical Neck of the Humerus
7. Lateral or Axillary Border of the Scapula



Externally Rotated Shoulder

Question #96:

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 #96: Review

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

  Brightness is measured 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.

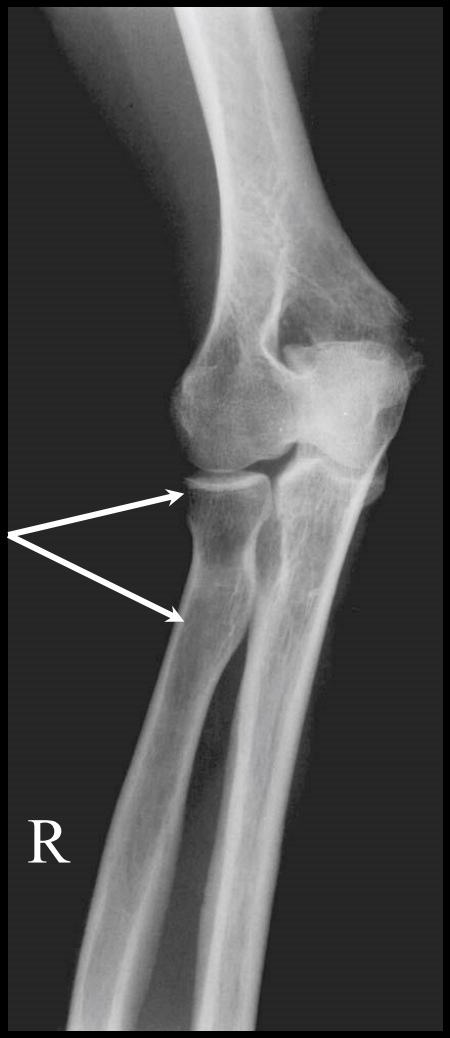
Question #97:

Which of the following elbow projections/positions would best demonstrate the radial head, neck, and tuberosity in profile?

a. AP
b. external oblique
c. internal oblique
d. lateral

Question #97: Review

This position is used to demonstrate the radial head, neck, and tuberosity (arrows) free from bony superimposition.



External Oblique Elbow

Question #98:

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 #98: Review

- The two portions of the x-ray beam include the following:
  - Primary Beam
    - This is the portion of the x-ray beam that is located between the target of the anode and the patient.
  - 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 #99:

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 #99: 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), and this is where x-rays are produced.

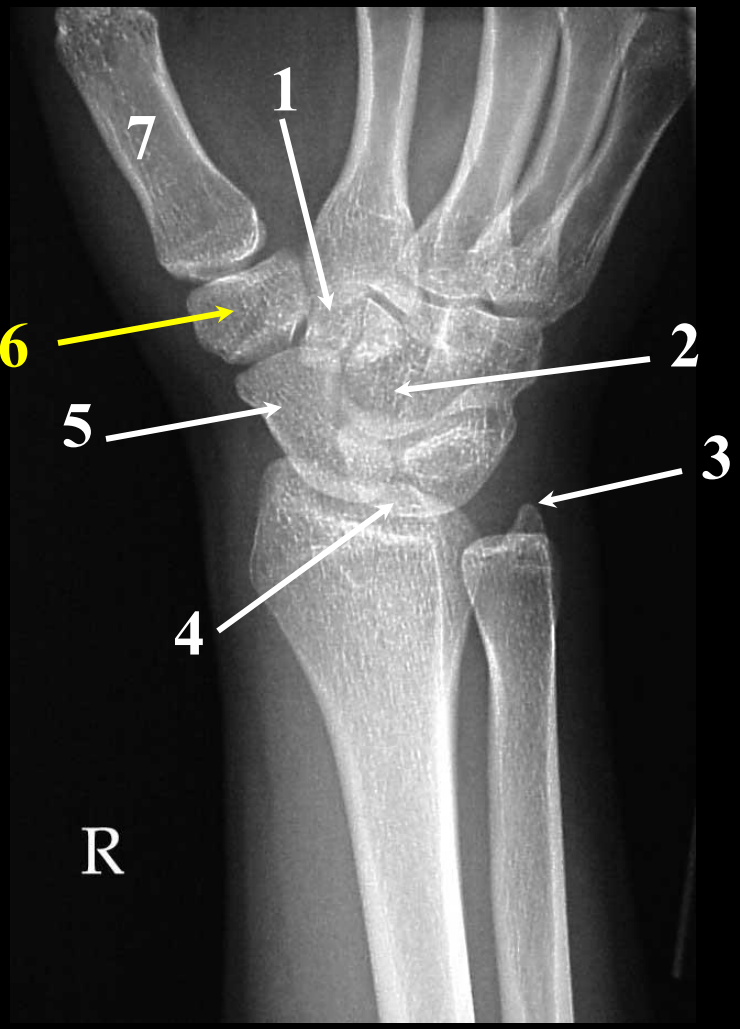
Question #100:

The arrow is pointing to the:

a. trapezoid.
b. capitate.
c. navicular.
d. trapezium.

Question #100: Review

1. Lesser Multangular or Trapezoid
2. Capitate or Os Magnum
3. Styloid Process of the Ulna
4. Lunate or Semilunar
5. Navicular or Scaphoid
6. Greater Multangular or Trapezium
7. Shaft of the 1st Metacarpal



PA Oblique Wrist

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Cell Phone:	(727) 744-7946 (please send a text)
Website:	http://www.ceuarmy.com/
Email:	threephaseceus@tampabay.rr.com

About the Author:

John Fleming graduated from the St. Petersburg College (SPC) Radiography Program in Pinellas Park, Florida in December of 1985. He has been employed by SPC since May of 1987 and is currently the Radiography Program Director.

John completed a Master of Education Degree from the University of South Florida in December of 1998, and he has passed the American Registry of Radiologic Technology's Computed Tomography and Magnetic Resonance Imaging certification examinations.

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