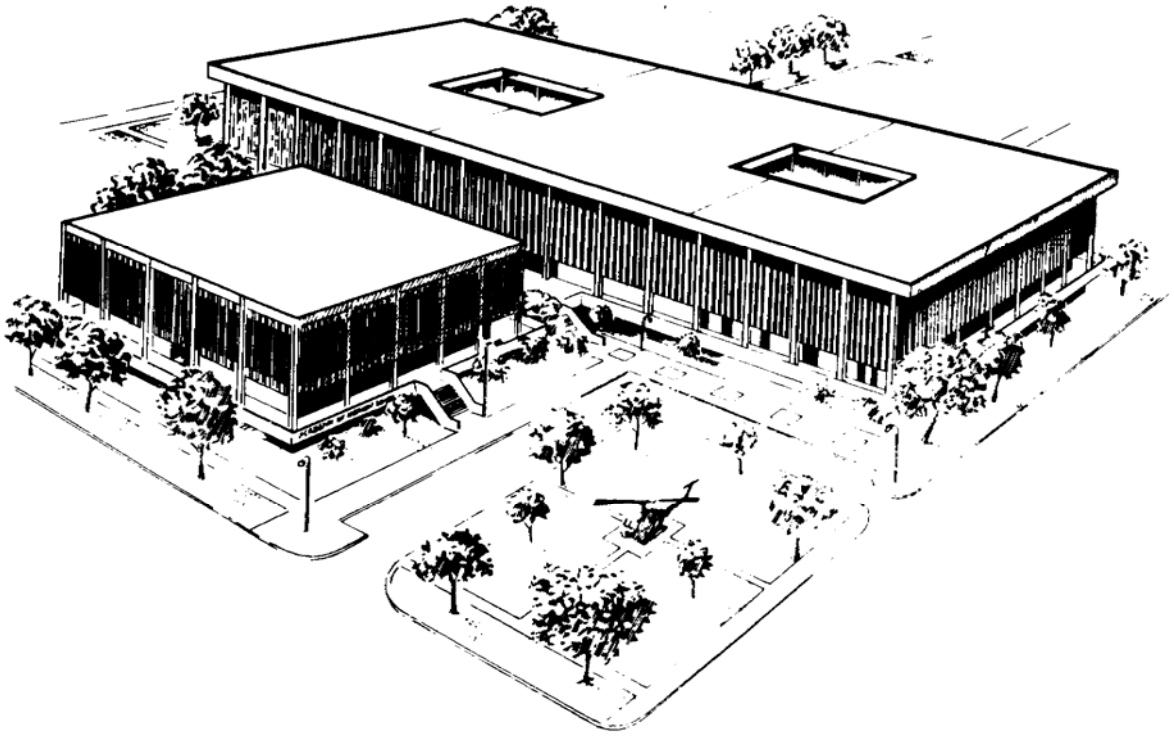
U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
FORT SAM HOUSTON, TEXAS 78234-6100



STANDARD POSITIONING TECHNIQUES II

SUBCOURSE MD0962 EDITION 200

DEVELOPMENT

This subcourse is approved for resident and correspondence course instruction. It reflects the current thought of the Academy of Health Sciences and conforms to printed Department of the Army doctrine as closely as currently possible. Development and progress render such doctrine continuously subject to change.

ADMINISTRATION

Students who desire credit hours for this correspondence subcourse must enroll in the subcourse. Application for enrollment should be made at the Internet website: http://www.atrrs.army.mil. You can access the course catalog in the upper right corner. Enter School Code 555 for medical correspondence courses. Copy down the course number and title. To apply for enrollment, return to the main ATRRS screen and scroll down the right side for ATRRS Channels. Click on SELF DEVELOPMENT to open the application; then follow the on-screen instructions.

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CLARIFICATION OF TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" 'are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

USE OF PROPRIETARY NAMES

The initial letters of the names of some products may be capitalized in this subcourse. Such names are proprietary names, that is, brand names or trademarks. Proprietary names have been used in this subcourse only to make it a more effective learning aid. The use of any name, proprietary or otherwise, should not be interpreted as endorsement, deprecation, or criticism of a product; nor should such use be considered to interpret the validity of proprietary rights in a name, whether it is registered or not.

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CORRESPONDENCE COURSE OF
THE U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL

SUBCOURSE MD0962

STANDARD POSITIONING TECHNIQUES II

INTRODUCTION

As an X-ray technologist, positioning the patient is one of the most routine, yet critical aspects of your job. You may have to position up to fifty patients in the course of a given day. Though you may come close to knowing the steps for positioning a patient, almost without thinking, you should never let positioning procedures become mindless or automatic part of your job. Failure to position a patient correctly could cause harm to the patient. It could also involve the hospital and/or health care team in needless litigation. If you fail to position the patient correctly for a particular study, the radiologist could end up with an incomplete study and, consequently, inadequate or inaccurate information to formulate a valid diagnosis. The patient might be unnecessarily subject to further pain or discomfort.

If you fail to take proper precautions in handling, moving, and/or positioning the patient, you may inadvertently be contributing to a slip-and-fall injury or a radiation therapy injury, two of the four principal categories of patient injuries and the cause of malpractice suits in the radiology department. Therefore, though you may position many patients, you must always stay alert, and never let the steps of positioning become routine. You must focus all your attention into what you are doing at all times.

Subcourse Components:

The subcourse instructional material consists of six lessons and a glossary as follows:

Lesson 1, Positioning for Exams of the Lower Extremities.
Lesson 2, Positioning for Exams of the Pelvic Area.
Lesson 3, Positioning for Exams of the Trunk.
Lesson 4, Positioning for Exams of the Spine.
Lesson 5, Positioning for Exams of the Cranium, Sinuses, and Mandible.
Lesson 6, Positioning for Additional Skull Procedures.
Appendix, Glossary of Terms.

Here are some suggestions that may be helpful to you in completing this subcourse:

--Read and study each lesson carefully.

--Complete the subcourse lesson by lesson. After completing each lesson, work the exercises at the end of the lesson, marking your answers in this booklet.

--After completing each set of lesson exercises, compare your answers with those on the solution sheet that follows the exercises. If you have answered an exercise incorrectly, check the reference cited after the answer on the solution sheet to determine why your response was not the correct one.

Credit Awarded:

Upon successful completion of the examination for this subcourse, you will be awarded 12 credit hours.

To receive credit hours, you must be officially enrolled and complete an examination furnished by the Nonresident Instruction Branch at Fort Sam Houston, Texas.

You can enroll by going to the web site http://atrrs.army.mil and enrolling under "Self Development" (School Code 555).

A listing of correspondence courses and subcourses available through the Nonresident Instruction Section is found in Chapter 4 of DA Pamphlet 350-59, Army Correspondence Course Program Catalog. The DA PAM is available at the following website: http://www.usapa.army.mil/pdffiles/p350-59.pdf.

LESSON ASSIGNMENT

LESSON 1 Positioning for Exams of the Lower Extremities.

LESSON ASSIGNMENT Paragraphs 1-1 through 1-24.

LESSON OBJECTIVES After completing this lesson, you should be able to:

1-1. Identify specifications for proper placement of the anatomical structures of the lower extremities listed below:

Foot, anterior posterior (AP).
Foot, oblique.
Foot, lateral.

Ankle. AP
Ankle. lateral.
Ankle. mortise.

Calcaneus, plantodorsal.
Calcaneus, lateral.

Leg, AP.
Leg, lateral.

Knee, AP.
Knee, lateral.
Knee, tunnel.
Knee, sunrise.

Femur, AP distal.
Femur, AP proximal.
Femur, lateral distal.
Femur, lateral proximal.

SUGGESTION After reading and studying the assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

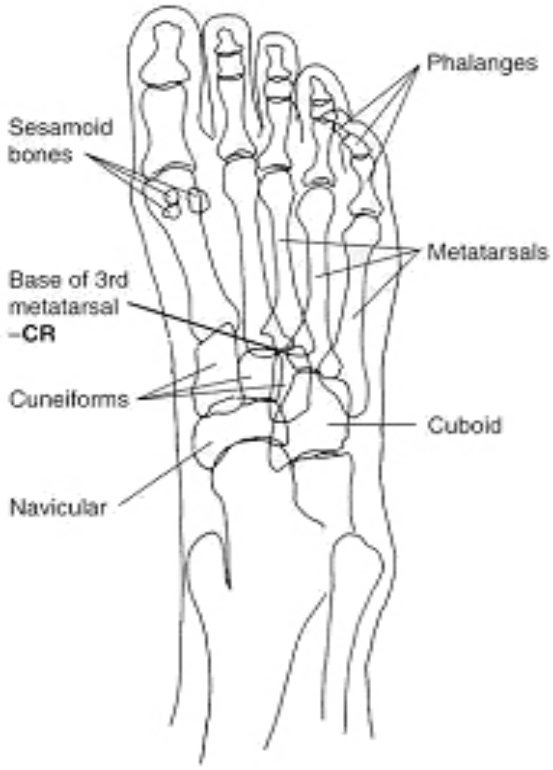
LESSON 1

POSITIONING FOR EXAMS OF THE LOWER EXTREMITIES

Section I. INTRODUCTION

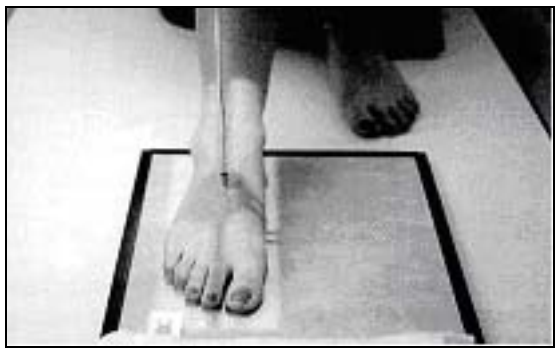
1-1. INTRODUCTION

a. **Labeled Anatomical Graphic.** In this lesson, a group of related projections for the lower extremities is presented. For each projection, three figures are provided. The first of the three figures shows the body part that is of clinical interest, with labels naming the parts of the anatomical structure to be demonstrated. (A line drawing rather than a photo of a radiograph was selected to ensure clarity of depiction.

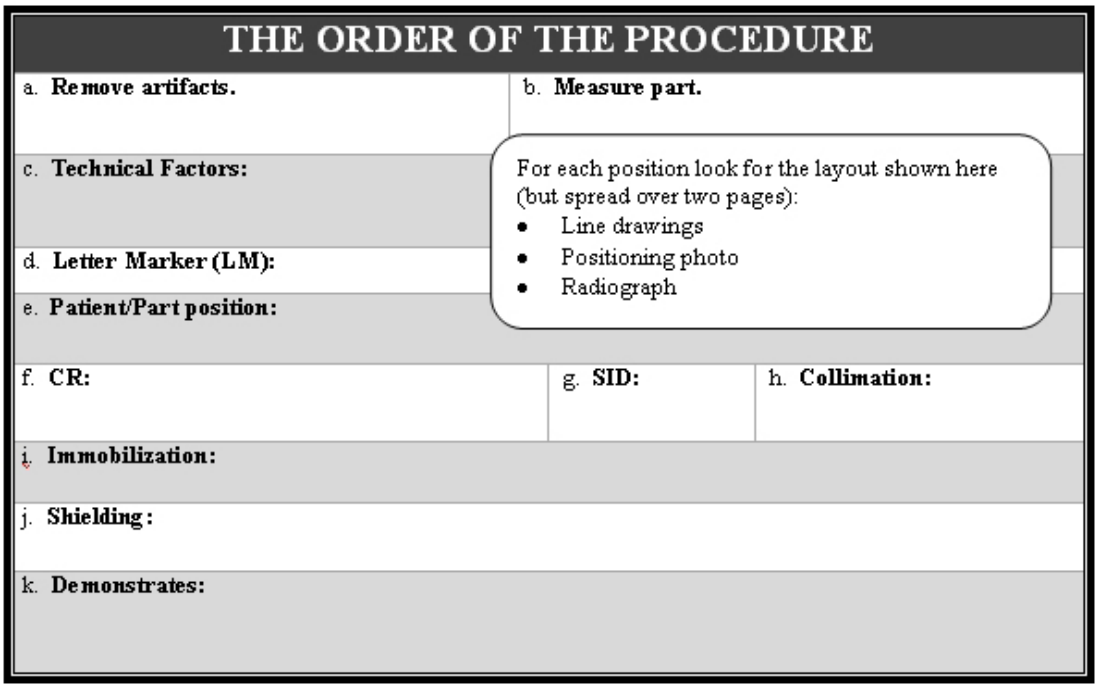


b. **Radiographic Image.** The radiographic image displays the correct anatomical structures of a properly positioned body part.

c. **The Patient Positioning Photograph.** This image depicts proper positioning of the patient, in this case positioning for an AP foot.



d. **The Order of Procedure Chart.** The information generally included in the order of procedure chart is explained in the next two figures. Note that items a, b, and c are the same for all positions, that is, no position specific or unique information is provided for these entries. They will depend on the anatomy that needs to be demonstrated. Figure 1-1 explains the order of procedure chart.



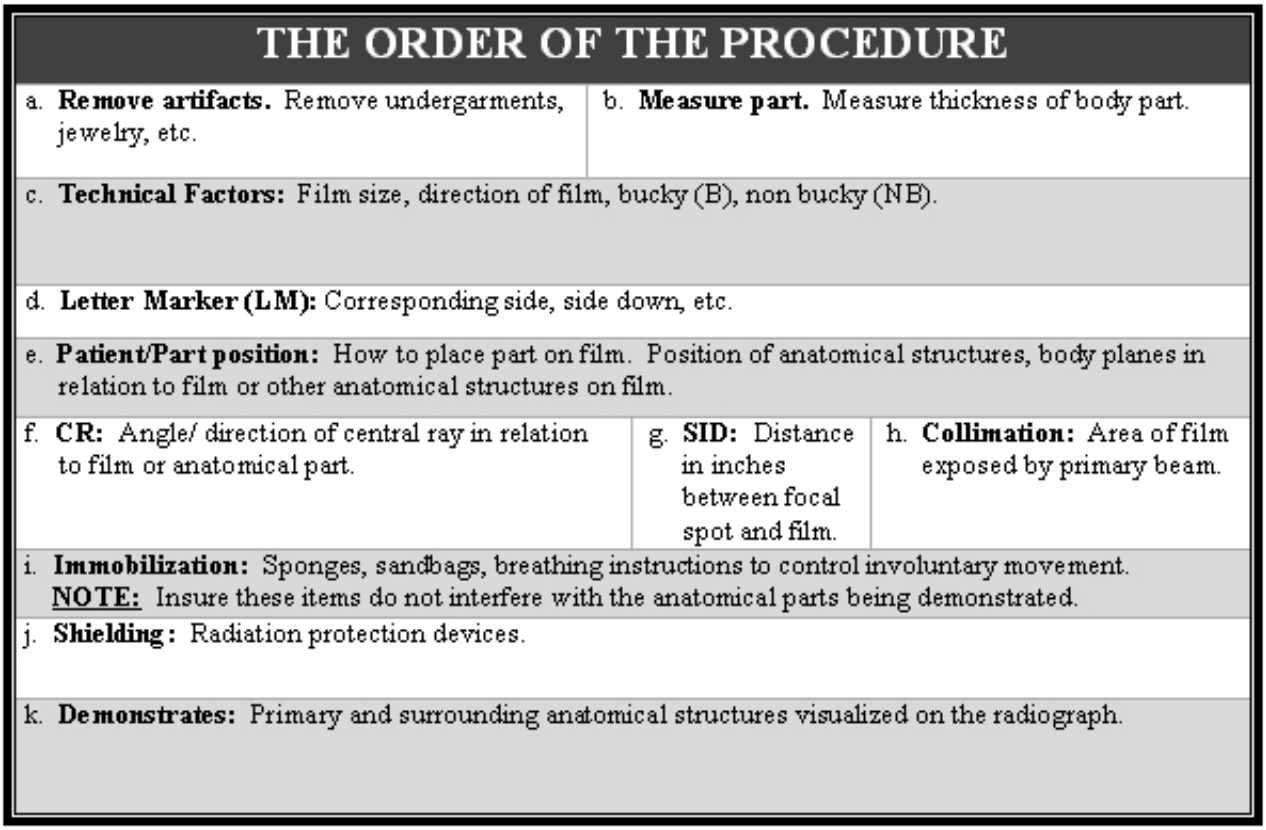


Figure 1-1. Information categories for the "order of procedure" are explained.

e. **Common Information.** Some information common to the projections is presented at the beginning of the subcourse instead of being included in the position-specific order of procedure charts. For example, guidelines pertaining to the removal of patient's dress will be presented in Lesson 1. This common information should be kept in mind as you proceed to read about each position. (See paragraphs 1-2 through 1-4 for common *information.)*

f. **How to Use The Material Presented in this Text.** Over 100 positions are presented in this subcourse. Many of the specifications for different projections will seem exceedingly similar to one another. To succeed, you need to zero in on the critical *distinguishing* features of each position. Otherwise, the information can easily become muddled in your mind. Accept the fact that you will not be able to memorize all the facts about these positions. What you *can* do is learn the critical differences among positions. Don't let yourself feel overwhelmed. Instead, take one position at a time. (Forget about all the other positions as you concentrate on one position at a time.)

g. **Study Strategies.** Look over the graphics, noting general features of the position and the anatomical structure. Next, go over the list of specifications carefully. Approach it as you would a shopping list, ticking off the items in your mind as you proceed down the list. If you have studied the material before, skip over what you already know. After reading over the list a few times, cover the list, look at the illustrations, and ask yourself questions like, *"What is the part position for an AP foot?*

h. **Realistic Expectations.** For the majority of students, this subcourse will serve to sustain expertise gained in the resident course. It is presumed that you have already had the actual hands-on practice positioning patients so critical to mastery of positioning during the 91P10 resident course. A picture is worth a thousand words, however, and that is why this manual contains over 150 graphics--to facilitate your study. (But actual practice is, admittedly, even more invaluable.) This manual can serve another purpose--as a useful job performance aid and reference once you are on the job.

i. **Limitations of Lesson Exercises.** The lesson exercises cannot begin to comprehensively cover the some 12 discrete facts outlined per position in each order of procedure chart. (There are two to five positions covered per section.) You cannot assume that you know all there is to know about the positions in a given section simply by having done the section exercises correctly. You need to do additional review of the section on your own before proceeding to the next section if you are serious about this subcourse.

j. **More Study Strategies.** Now go back to the graphics and try to link up the visual information in the drawings with the descriptive information in the order of procedure chart. Begin by zeroing in on the three key elements of every position: (e) the patient and part position and (f) the central ray (CR). Review these three key points several times. Once these are fixed in your memory, the other details will fall into place more easily.

k. **Standard Positions.** Standard positions are those positions commonly taken on average, cooperative patients. These standard positions are often referred to as routine exams. Departmental standards for routine exams are fairly consistent throughout the United States (US). A survey was completed to determine the national norms for standard and optional (additional) operating procedures. The routines in this subcourse are based on that survey.

l. **Subcourse Parameters.** This text is designed to provide a general overview of basic radiographic positions and is not intended to make you a radiologic technologist. Further training and practical clinical experience are necessary for you to become proficient in this health care profession.

1-2. PATIENT DRESS, ARTIFACTS, AND IMMOBILIZATION

a. **Guidance on Dress/Artifact Removal.** Removal of clothing and artifacts is not always desirable or possible. The guidance on the removal of the patient's clothing and the removal of any artifacts that might get in the way of obtaining a good clear, unobstructed exposure is covered in figure 1-2. In the order of procedure charts specific to the various projections, this issue of patient dress and artifacts is addressed in the most cursory fashion with the stock statement: remove artifacts. Remember to refer back to figure 1-2 as you go through the various positions if you have some doubts as to correct procedure for clothing and artifact removal.

	Patient:
HAND	Removes wristwatch.
	Removes bracelets.
	Removes rings.
WRIST & FORARM	Removes wristwatch and bracelets.
	Rolls up sleeves.
HUMERUS	Strips to the waist and puts on gown..
CHEST	Removes outer garments.
	Removes undergarments (shoulder to waist).
	Removes necklaces and pendants.
	Dons gown.
ABDOMEN & PELVIS	Removes outer clothing.
	Removes undergarments (girdles).
	Dons gown.
KNEE & FEMUR	Removes pants.
	Removes panty hose.
	Dons gown.

Figure 1-2. Guidelines for removal of artifacts and clothing by body part.

b. **When Removal Is Undesirable.** As stated earlier, in some cases it may not be desirable or possible to remove artifacts. If you received a trauma patient wearing a cervical collar, for example, you would not be able to remove a necklace. Removing the artifact, in such a case, might cause even further injury to the patient.

c. **When Removal is Unfeasible.** Some artifacts simply *cannot* be removed. If you are doing a skull series on a patient with a glass eye or an ear implant, for example, the artifact *cannot* be removed. The same would apply in the case of a patient with a hip prosthesis. In such situations, you simply have to work around the potential obstacle. You will still have to position the patient so that an unobstructed view may still be obtained, despite the presence of the artifact. This is where your skill and ingenuity as a health care professional come into play.

d. **Immobilization.** The only position for which we really immobilize is the *calcaneus plantodorsal.* Immobilization may be used in other instances as long as it doesn't interfere with the part being examined. Immobilization is often helpful in stabilizing the patient.

1-3. MEASURE BODY PART

Refer back to the order of procedure chart (figure 1-1). Measuring the part is a matter of measuring the thickness of the body part. This measurement is important because it is the basis for selecting technique factors. When you measure the thickness of the body part, you take the measurement from the point at which the CR will enter the body up through the exit site of the central ray. For an anterior posterior (AP) foot, for example, you would measure the thickness of the patient's foot from the anterior surface to the posterior surface through the base of the third metatarsal.

MEASURING THE PART

Measure body part thickness:

From the entry point of the CR.
To the exit point of the CR.

1-4. TECHNICAL FACTORS

Referring, again to the order of procedure chart, you will note that entry "c" simply says: technical factors. This refers to the film size and its placement to the part being radiographed, lengthwise (LW) or crosswise (CW). It also informs you if a Bucky system is to be used, Bucky (B) or non-Bucky (NB). Ensure the correct exposure factors are set: kilovoltage peak (kVp) and the milliamperage (mA) and the time (s). (Milliamperage and time, measured in seconds, are usually combined into the mAs [milliamperage and seconds]). See the Appendix (glossary) for these and other terms.

1-5. MEASURING THE SOURCE-TO-IMAGE RECEPTOR DISTANCE

Set the source-to-image receptor distance (SID) as indicated in item *g* of the *order of procedure chart*. As indicated in the chart that follows, the SID is measured either to the tabletop or to the Bucky (Potter-Bucky diaphragm) tray. (See the glossary at the back of this text for definitions of terms such as SID and Bucky tray.)

THE SID IS MEASURED:

To the tabletop
OR
Bucky tray.

NOTE: This concludes the introductory portion of the lesson that is relevant to all of the positions covered in this text. The remainder of this lesson is devoted to actual positioning for specific projections of the lower extremities.

Section II. PROJECTIONS OF THE FOOT

1-6. THE FOOT

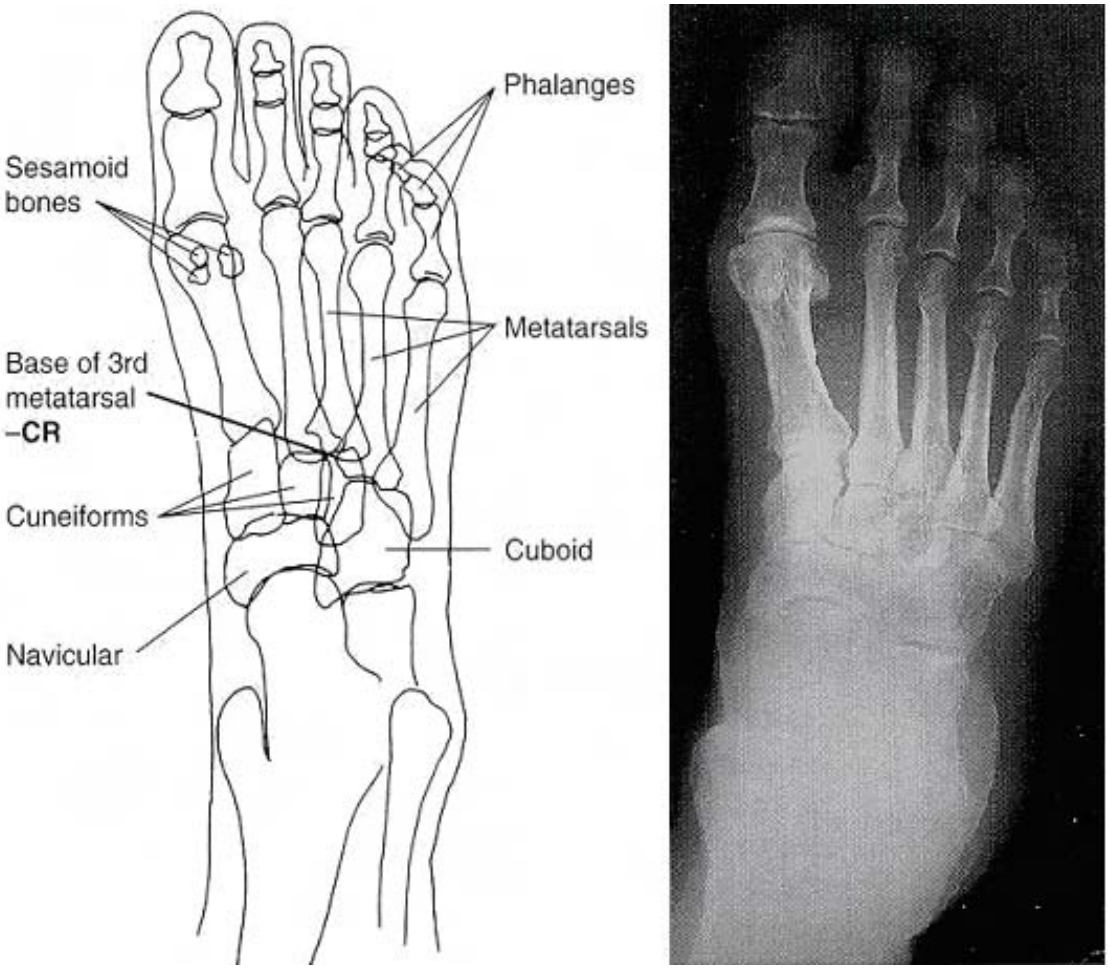
a. **General.** The foot is a common site of injury for soldiers. Injury to the foot can result from dropping something on the foot, jogging, jumping, or disease. The way in which the foot is constructed requires that special considerations must be made when radiographing it to properly demonstrate the bones of the foot.

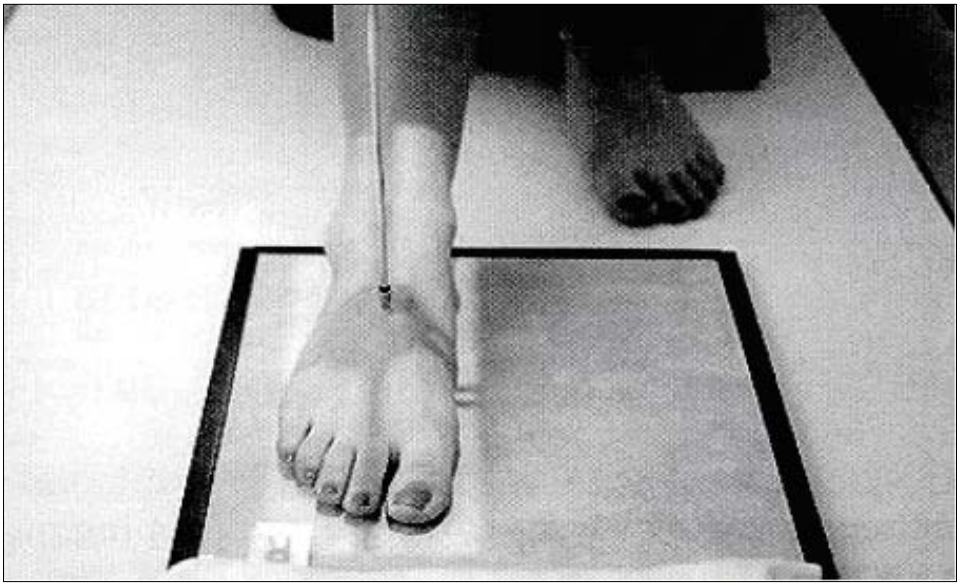
b. **The Bones of the Foot.** As you review the anatomical drawings of the foot on the next few pages, take note of the 7 tarsal bones, the 5 metatarsals, and the 14 phalanges. Note that the phalanges are arranged in three rows, known as the proximal, middle, and distal rows.

THE TARSAL. BONES

1. **Talus.**
2. **Os calcis (calcaneus).**
3. **Navicular.**
4. **First cuneiform**
5. **Second cuneiform.**
6. **Third cuneiform.**
7. **Cuboid.**

1-7. THE ANTERIOR POSTERIOR FOOT



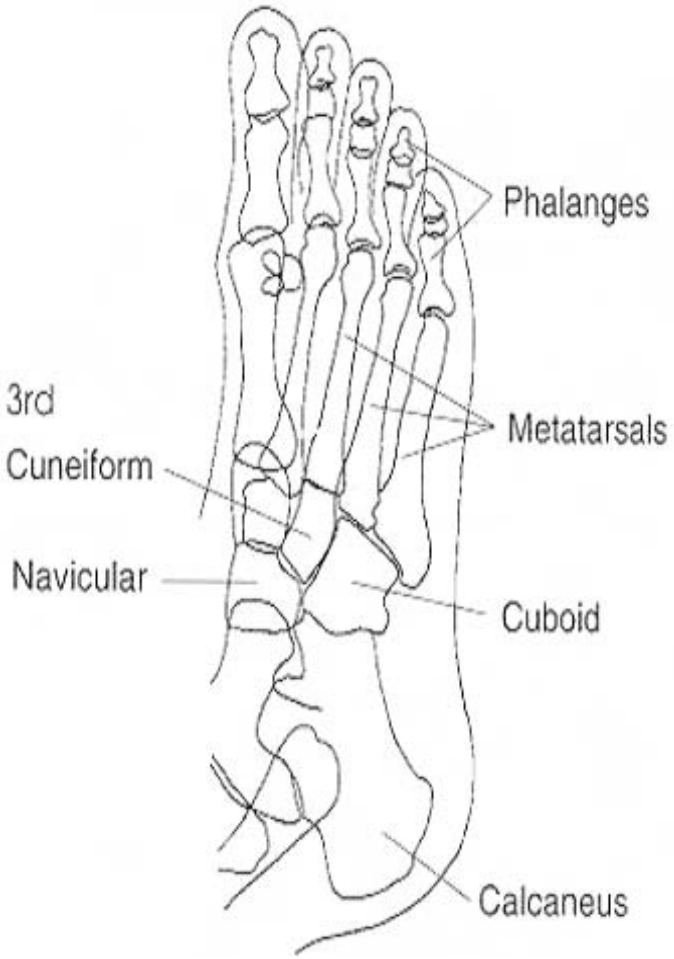


THE ORDER OF PROCEDURE
AP FOOT

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Mid-foot in AP position.	
c. **Technical Factors:** ½ 10 x 12 (LW) table top.		
d. **LM:** Corresponding extremity		
e. **Patient/Part position:** 1. Patient supine or seated; knee flexed. 2. Sole of foot (planter surface) firmly on cassette. 3. Foot centered to appropriate portion of film.		
f. **CR:** Angled 10 degrees towards the heel, directed to the base of the 3rd metatarsal.	g. **SID:** 40"	h. **Collimation:** collimate to outer margins of skin.
i. **Immobilization:** Patient holds knee to aid in immobilization. Film holder is braced at toe end to prevent slipping. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Distal tarsals, metatarsals, and phalanges.		

"March Fracture"
A stress fracture of the shaft of the second and third metatarsals with no history of stress.

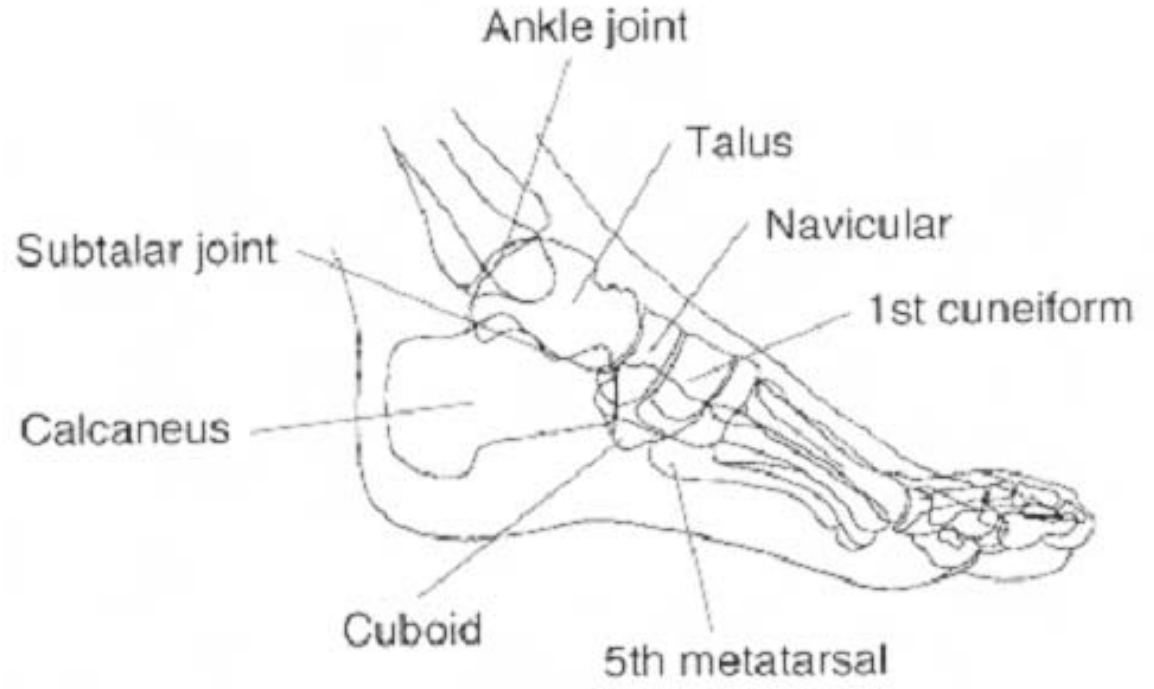
1-8. THE OBLIQUE FOOT

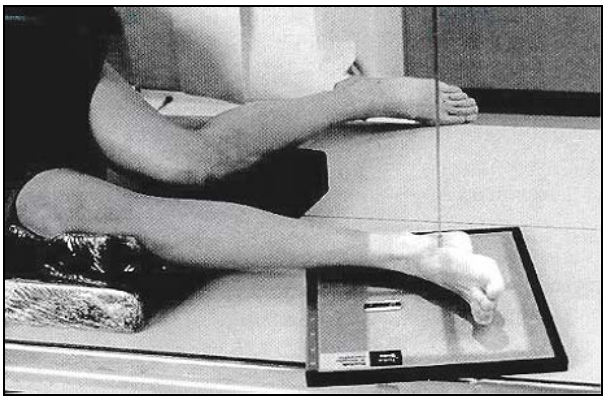


THE ORDER OF THE PROCEDURE
OBLIQUE FOOT

a. **Remove artifacts.** Shoes and socks removed, pant leg rolled up. Remove jewelry in part of interest.	b. **Measure part.** Mid-foot in oblique position.	
c. **Technical Factors:** ½ 10 x 12 (LW) foot and leg extended off the lateral border.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine or seated; knee flexed. 2. Plantar surface of foot centered to unused portion of film. 3. Foot rotated medially, planter surface 45 degrees to plane of film.		
f. **CR:** vertical perpendicular to film, directed to to the base of 3rd metatarsal.	g. **SID:** 40 in. to table.	h. **Collimation:** Collimate to outer margins of skin.
i. **Immobilization:** If needed, 45 degree sponge placed against planter surface of foot.		
j. **Shielding:** Lead shield across patient's lap to protect gonads.		
k. **Demonstrates:** Phalanges, metatarsals, cuboid, 3rd cuneiform, navicular and distal calcaneus with associated intertarsal spaces.		

1-9. THE LATERAL FOOT





THE ORDER OF THE PROCEDURE LATERAL FOOT		
a. **Remove artifacts.** Shoes and socks removed, pant leg rolled up. Remove jewelry in part of interest.	b. **Measure part.** Mid-foot in lateral position.	
c. **Technical Factors:** ½ 10 x 12 (LW) table top.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient lateral recumbent with affected side down. 2. Flex knee of effected limb about 45 degrees, opposite leg behind injured limb. 3. Foot dorsiflexed for a true lateral foot and ankle. 4. Plantar surface perpendicular to film.		
f. **CR:** Vertical perpendicular to film, directed to the first (medial) cuneiform (mid-arch) to center film.	g. **SID:** 40 in. to table.	h. **Collimation:** Collimate to outer margins of skin.
i. **Immobilization:** Support placed under the leg and knee, as needed, so that plantar surface is perpendicular to film. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Lead shield across patient's lap to protect gonads.		
k. **Demonstrates:** Tarsals partially superimposed, ankle joint and subtalar joint partially superimposed, metatarsals and phalanges superimposed.		

NOTE 1: **For a lateral view of the lower extremity,** the patient is laterally recumbent with the lateral side of the affected extremity next to the film. The knee of the affected side is flexed 45 degrees.

NOTE 2: **Variation weight-bearing laterals of the foot may also be viewed** to determine the condition of the longitudinal arch. The patient is standing with body weight equally distributed on both feet. The CR is horizontal perpendicular (HP).

Continue with Exercises

EXERCISES: LESSON 1, SECTIONS I & II

MATCHING: For exercises 1 through 3, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1. _____ AP foot.
2. _____ Oblique foot
3. _____ Lateral foot

a. Talus, navicular, second cuneiform, first^{t} cuneiform.

b. Distal tarsals, metatarsal and phalanges.

c. Tarsals, partially superimposed; ankle joint and subtalar joint partially superimposed; metatarsals and phalanges superimposed.

d. Phalanges, metatarsals, cuboid, third cuneiform, navicular and distal calcaneus with associated intertarsal spaces.

MULTIPLE- CHOICE. For exercises 4-9, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

4. The CR for an AP foot is:

   a. Angled 5 degrees to the 3rd metatarsal.

   b. Angled 10 degrees to the base of the 3rd metatarsal.

   c. Angled 10 degrees to the head of the 3rd metatarsal.

   d. Angled 20 degrees to the base of the 3rd metatarsal.

5. A foot routine (AP, lateral, and oblique) is useful in demonstrating a _____ fracture.

   a. Pott's.

   b. Greenstick.

   c. Sully.

   d. March.

6. The proper patient and part position for an oblique foot is:

   a. Patient supine with arm abducted from body, arm in full extension with epicondyles parallel to tabletop.

   b. Patient supine or seated, sole of foot in contact with film holder, part centered.

   c. Patient supine, knee flexed, plantar surface on table, foot centered to unused portion of film, foot rotated medially, plantar surface 45 degrees.

   d. Patient lateral recumbent with affected side down, foot dorsiflexed, foot and ankle form 90 degree angle.

7. The technical factors for an AP and a oblique foot is:

   a. ½ 10 x 12 LW B.

   b. ½ 10 X 12 LW NB.

   c. ½ 8 X 10 LW NB.

   d. ½ 8 X 10 LW B.

8. The CR for a lateral foot is:

   a. Perpendicular to the film, directed to the first lateral cuneiform.

   b. Perpendicular to the film, directed to the first medial cuneiform.

   c. Angled 10 degrees, directed to the first medial cuneiform.

   d. Perpendicular to the film, directed to the 3rd metatarsal.

9. The SID for all the positions discussed in this section is:

   a. 72” to the table.

   b. 72” to the Bucky.

   c. 40” to the table.

   d. 40” to the Bucky.

Check Your Answers on Next Page

SOLUTIONS, LESSON 1, SECTIONS I & II

1. b (para 1-7)
2. d (para 1-8)
3. c (para 1-9)
4. b (para 1-7)
5. d (para 1-7)
6. c (para 1-8)
7. b (para 1-8)
8. b (para 1-9)
9. c (para 1-7 to 1-9)

Section III. PROJECTIONS OF THE ANKLE

1-10. THE ANTERIOR POSTERIOR ANKLE

a. **Introduction.** The ankle is probably the most frequently injured site of the lower extremity. Fortunately it is usually just sprained or strained severely, not actually fractured. Even so, a great deal of pain and discomfort are associated with an ankle injury. Since the ankle is a joint with various anatomical structures, correct positioning and exposure techniques are essential to properly demonstrate the structures and joint space.

b. **Anatomical Structures Demonstrated.** The distal leg view demonstrates the tibia and the fibula.

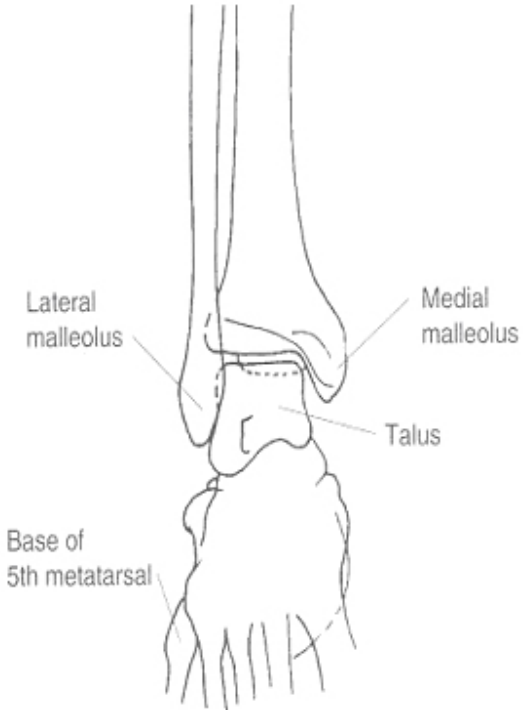
c. **The Tarsal Bones.** The three bones that make u p the ankle joint are the talus, tibia, and fibula.

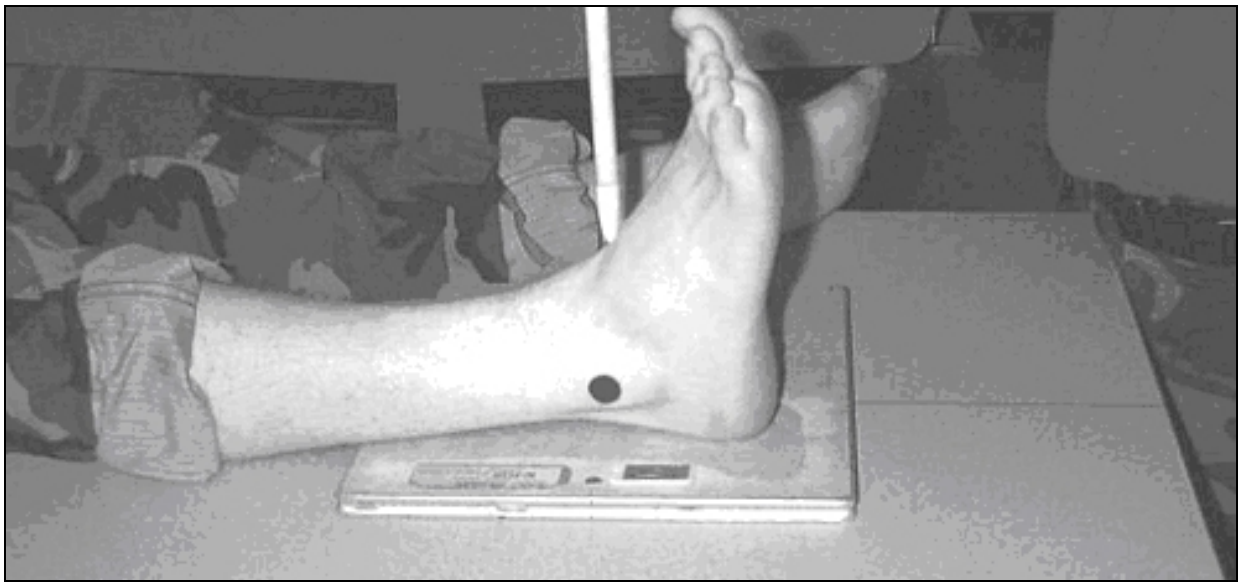
d. **The Three Articulations of the Ankle.**

(1) Ankle mortise--arch-like structure formed by the medial malleolus, lateral malleolus and the superior articular surface of the talus.

(2) Tibio-fibular articulation.

(3) Talo-tibial articulation.

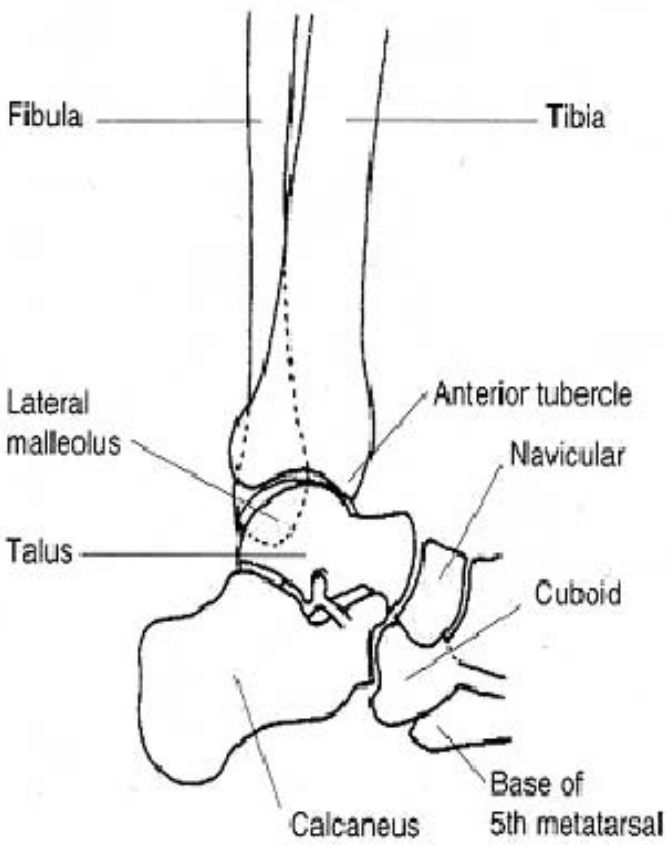


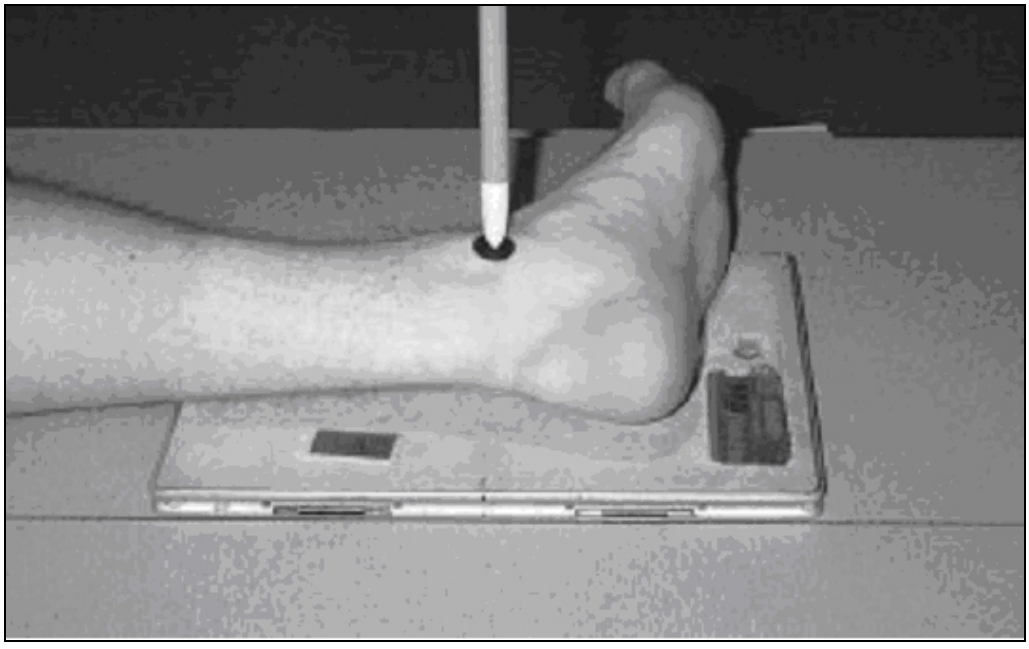


THE ORDER OF THE PROCEDURE
AP ANKLE

a. **Remove artifacts.** Shoes and socks removed, pant leg rolled up. Remove jewelry in part of interest.	b. **Measure part.** Measure at the level of the ankle.	
c. **Technical Factors:** ½ 10 x 12 crosswise (CW) table top.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part:** 1. Patient supine or seated with legs fully extended. 2. Center ankle joint to unmasked portion of cassette. 3. Dorsiflex foot so planter surface is near perpendicular to film. 4. Epicondyles parallel to film.		
f. **CR:** Perpendicular, directed to a point midway between the malleoli.	g. **SID:** 40 in. to table.	h. **Collimation:** Collimate to lateral skin margins.
i. **immobilization:** as needed. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Lead shield across patient's lap to protect gonads.		
k. **Demonstrates:** Frontal view of ankle joint, distal tibia and fibula, and proximal talus.		

1-11. LATERAL ANKLE

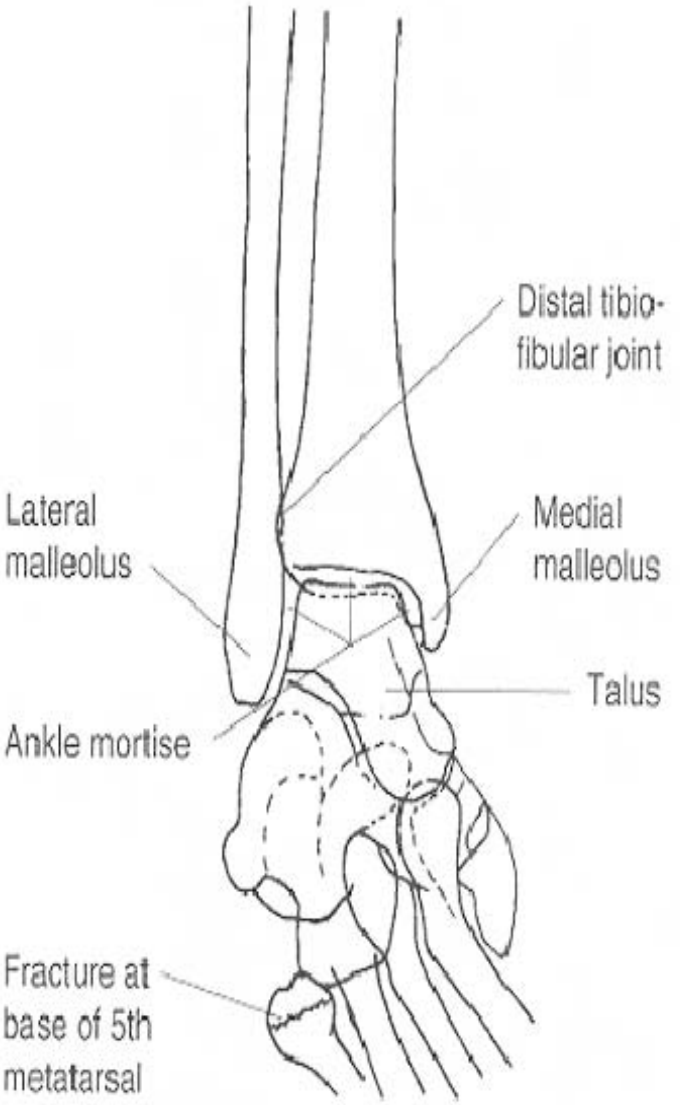


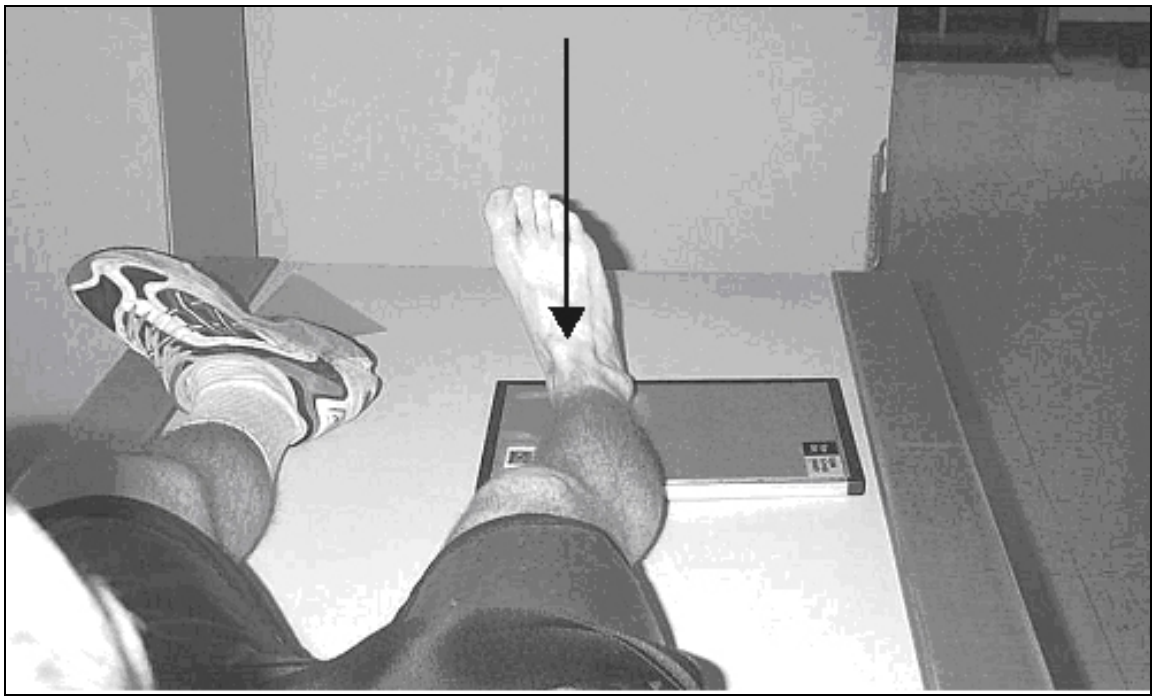


ORDER OF THE PROCEDURE
LATERAL ANKLE

a. **Remove artifacts.** Shoes and socks removed, pant leg rolled up. Remove jewelry in part of interest.	b. **Measure part.** Measure at the ankle joint in the lateral position.	
c. **Technical Factors:** 8 x 10 (LW) table top.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient laterally recumbent with affected side down. 2. Knee flexed about 45 degrees. 3. Center ankle joint to cassette. 4. Epicondyles perpendicular to film. 5. Foot and leg positioned to form 90 degree angle.		
f. **CR:** Perpendicular, medial malleolus to center of film.	g. **SID:** 40 in. to table.	h. **Collimation:** Collimate to skin margins to include distal tibia and fibula and to mid-metatarsal area.
i. **Immobilization:** A sandbag against the ball of the foot, if needed, to hold the position. **Pre-exposure command**: "Don't move."		
j. **Shielding:** Lead shield across patient's lap to protect gonads.		
k. **Demonstrates:** Lateral view of distal tibia and fibula, ankle joint, talus and calcaneus.		

1-12. MORTISE ANKLE





THE ORDER OF PROCEDURE MORTISE ANKLE		
a. **Remove artifacts.** Shoes and socks removed, pant leg rolled up. Remove jewelry in part of interest.	b. **Measure part.** Measure at the level of the ankle joint (mid-malleoli).	
c. **Technical Factors:** ½ 10 x 12 (CW) table top.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient in supine position or seated with leg fully extended. 2. Ankle joint centered to the film. 3. Plantar surface perpendicular to film. 4. Foot and leg rotated internally 15 to 20 degrees with the intermalliolar line parallel to the film .		
f. **CR:** VP to film directed to a point midway between malleoli.	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of skin.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Frontal view of entire ankle mortise.		

Continue with Exercises

EXERCISES: LESSON 1, SECTION III

MATCHING: For exercises 1 through 3, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.

1. _____ AP ankle.
2. _____ Lateral ankle
3. _____ Mortise ankle

a. Distal tibia and fibula, ankle joint, talus, and calcaneus.

b. Ankle joint, distal tibia and fibula, and proximal talus.

c. Entire mortise ankle.

d. Phalanges, metatarsals, cuboid, 3rd cuniform, navicular and distal calcaneus with associated intertarsal spaces.

MULTIPLE- CHOICE. For exercises 4-7, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

4. The CR for a AP ankle is the:

   a. Medial malleolus to the center of the film.

   b. Perpendicular, directed to a part midway between the malleoli.

   c. Lateral malleolus to the center of the film.

   d. Head of the second metacarpal is centered to the film.

5. The technical factors for the mortise ankle are:

   a. 8 X 10 LW NB.

   b. 10 X 12 CW NB.

   c. ½ 10 X 12 CW NB.

   d. ½ 14 X 17 LW diagonal NB.

6. The patient and part position for a mortise ankle is:

   a. Patient supine with leg fully extended; ankle joint centered to the film; plantar surface perpendicular to film; foot and leg rotated internally 15 to 20 degrees with the intermalliolar line parallel to the film.

   b. Patient supine or seated, sole of foot in contact with film holder, part centered.

   c. Patient laterally recumbent with affected side down; knee flexed about 45 degrees and centered to film.

   d. Mid-malleoli to the center of the film.

7. The CR for a lateral ankle is:

   a. Perpendicular to film, directed to lateral malleolus.

   b. Perpendicular to film, directed, to medial malleolus.

   c. Perpendicular to film, centered ¾ inch distal to medial malleolus.

   d. Centered between the malleolli.

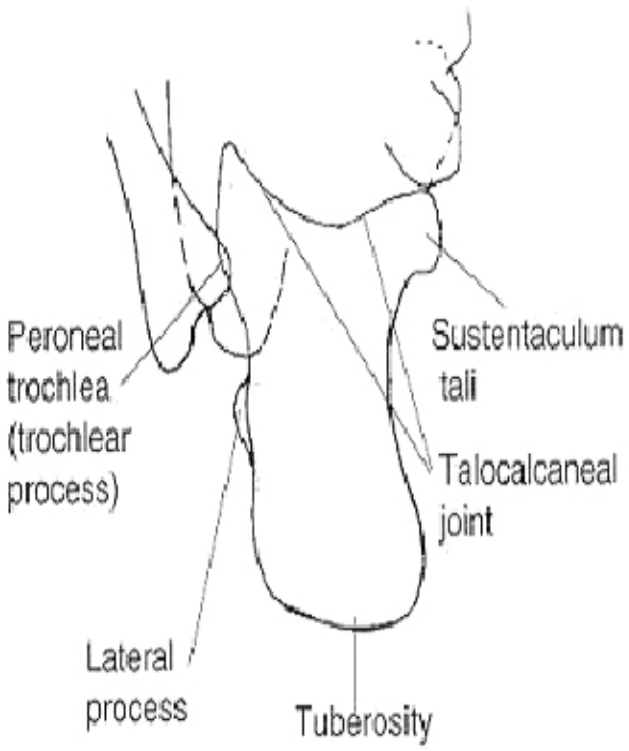
Check Your Answers on Next Page

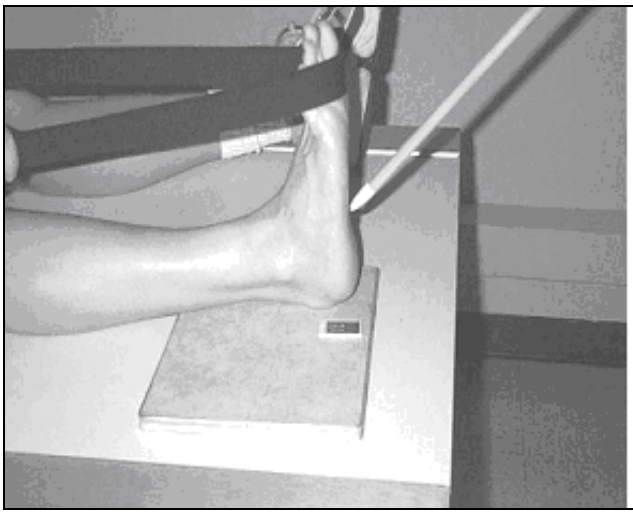
SOLUTIONS, LESSON 1, SECTION III

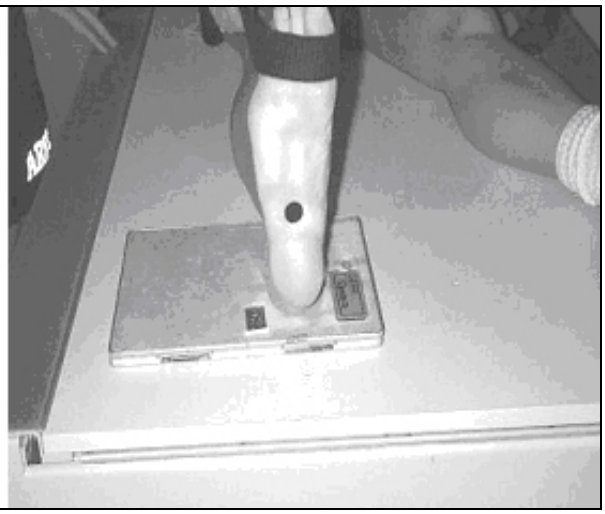
1. b (para 1-10)
2. a (para 1-11)
3. c (para 1-12)
4. b (para 1-10)
5. c (para 1-12)
6. a (para 1-12)
7. d (para 1-11)

Section IV: PROJECTIONS OF THE CALCANEUS

1-13. THE PLANTODORSAL



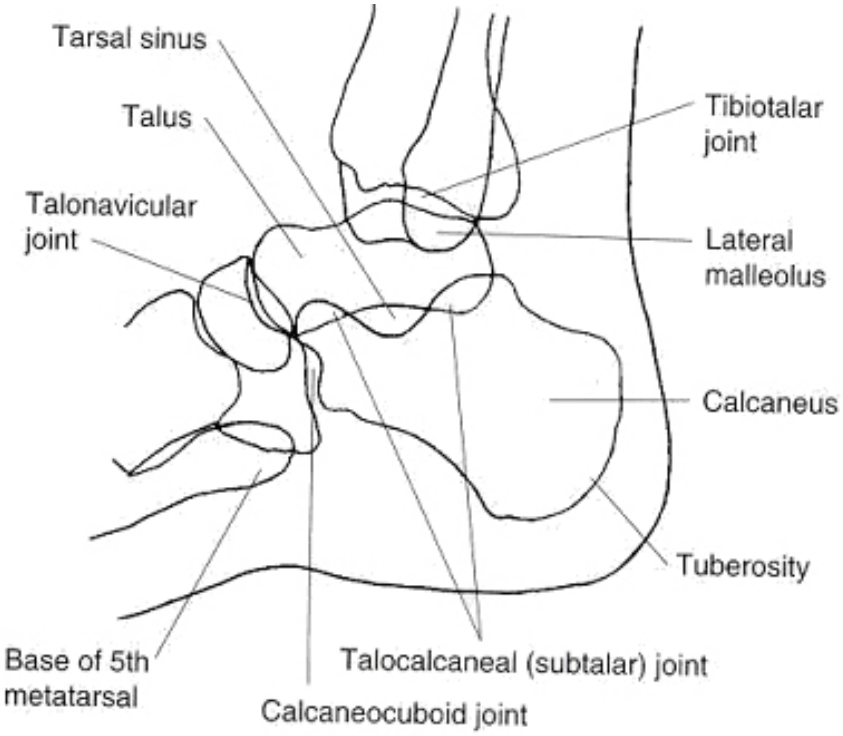


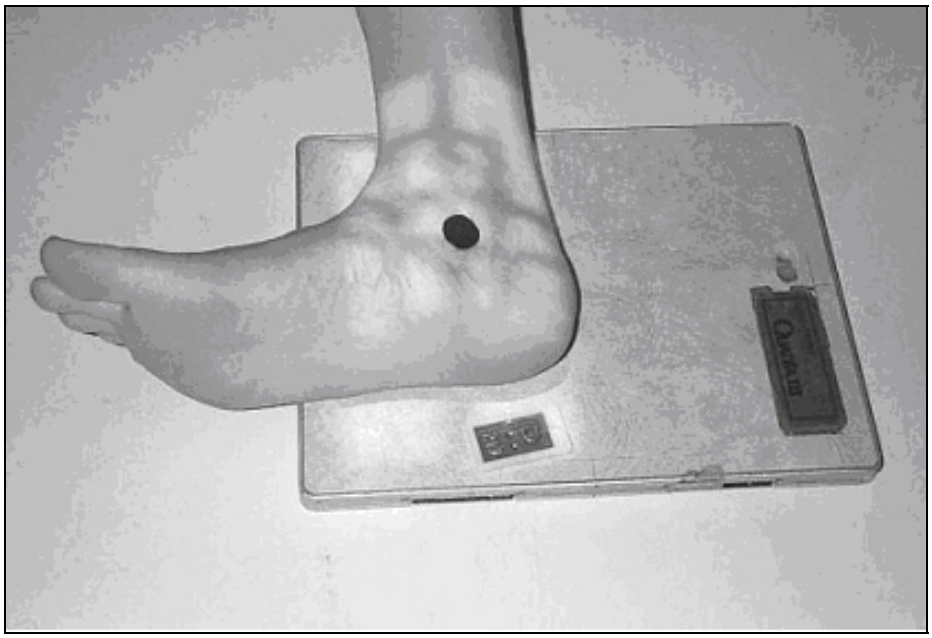


THE ORDER OF PROCEDURE
PLANTODORSAL CALCANEUS

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure through the arch to underneath the ankle at the base of the 3rd metatarsal.	
c. **Technical Factors:** ½ 8 X 10 (CW) NB.		
d. **LM:** Corresponding extremity		
e. **Patient/Part position:** 1. Patient supine or seated on table. 2. Leg fully extended. 3. Center ankle joint to unmasked portion of cassette, with long axis of leg to long axis of unmarked film. 4. Dorsiflex foot so that plantar surface is near perpendicular to film. 5. Loop gauze around foot and ask patient to pull gently but firmly and hold the plantar surface of the foot as near perpendicular to film as possible.		
f. **CR:** Angle CR 40 degrees cephalic from long axis of the foot and directed to the base of the 3rd metatarsal.	g. **SID:** 40"	h. **Collimation:** Collimate to area of calcaneus.
i. **Immobilization:** Belt-type traction on the affected foot. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Place gonadal shielding over pelvic area to shield gonads.		
k. **Demonstrates:** Calcaneus (ox calsis).		

1-14. THE LATERAL CALCANEUS





THE ORDER OF PROCEDURE LATERAL CALCANEUS		
a. **Remove artifacts.** Potential artifacts removed.	c. **Measure part.** Measure through the calcaneus in a lateral position.	
c. **Technical Factors:** ½ 8 X 10 (CW) NB.		
d. **LM:** Corresponding extremity		
e. **Patient/Part position:** 1. The patient is in a lateral recumbent position or is seated with the affected side down. 2. Flex knee of affected limb about 45 degrees, place opposite leg behind the injured limb. 3. Place support under knee and leg as needed to place plantar surface perpendicular to film. 4. Position ankle and foot for a true lateral, which places the lateral malleolus, about 15-20 degrees posterior to the medial malleolus.		
f. **CR:** Cr perpendicular to film, directed to a point 1 ½ in. inferior to medial malleolus.	g. **SID:** 40"	i. **Collimation:** Collimate to outer skin margins to include 1 in. proximal to ankle joint.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Place gonadal shielding over pelvic area to shield gonads.		
k. **Demonstrates:** Calcaneus, talus and talocalcaneal joint.		

Continue with Exercises

EXERCISES: LESSON 1, SECTION IV

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.

1. _____ Plantodorsal calcaneus.

2._____ Lateral calcaneus.

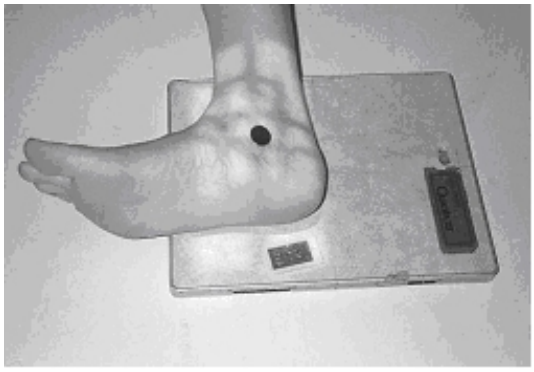
a. Calcaneus, talus, and talocalcaneal joint.

b. Distal tarsals, metatarsals, and phalanges.

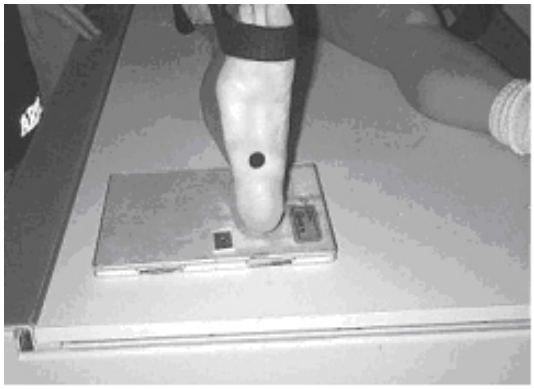
c. Calcaneus (ox calsis).

INDENTIFICATION. Drawings 3 and 4 , depict the proper alignment for a particular position. Write the name of the position in the space provided.

3._____



4._____



MULTIPLE- CHOICE. For exercises 5-8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. The CR for the plantodorsal calcaneus is:

   a. The great toe placed 2” below the upper film border.

   b. The base of the third metatarsal centered to the film.

   c. The midpoint between the apex of the calcaneus and the third metacarpal to film center.

   d. The midpoint of the malleoli centered to the portion of the film in use.

6. The technical factors for a plantodorsal calcaneus is:

   a. ½ 8 X 10 NB.

   b. ½ 8 X 10 CW NB.

   c. ½ 8 X 10 CW B.

   d. ½ 8 X 10 LW NB.

7. The proper part position for the plantodorsal calcaneus is:

   a. Patient supine with arm abducted from body, arm in full extension with epicondyles parallel to the tale top.

   b. Patient supine or seated, sole of foot in contact with film holder, part centered.

   c. The part centered with the epicondyles perpendicular to the film.

   d. The part fully extended. Ankle joint centered to unmasked portion of cassette. Foot dorsiflexed so that plantar surface is near perpendicular to film

8. The CR for the lateral calcaneus is:

   a. The great toe placed 2” below the upper film border.

   b. Horizontal perpendicular to a point 1 ½ inch inferior to medial malleolus.

   c. Vertical perpendicular to a point 1 ½ inch inferior to the medial malleolus.

   d. Vertical perpendicular to a point 1 ½ inch superior to the medial malleolus.

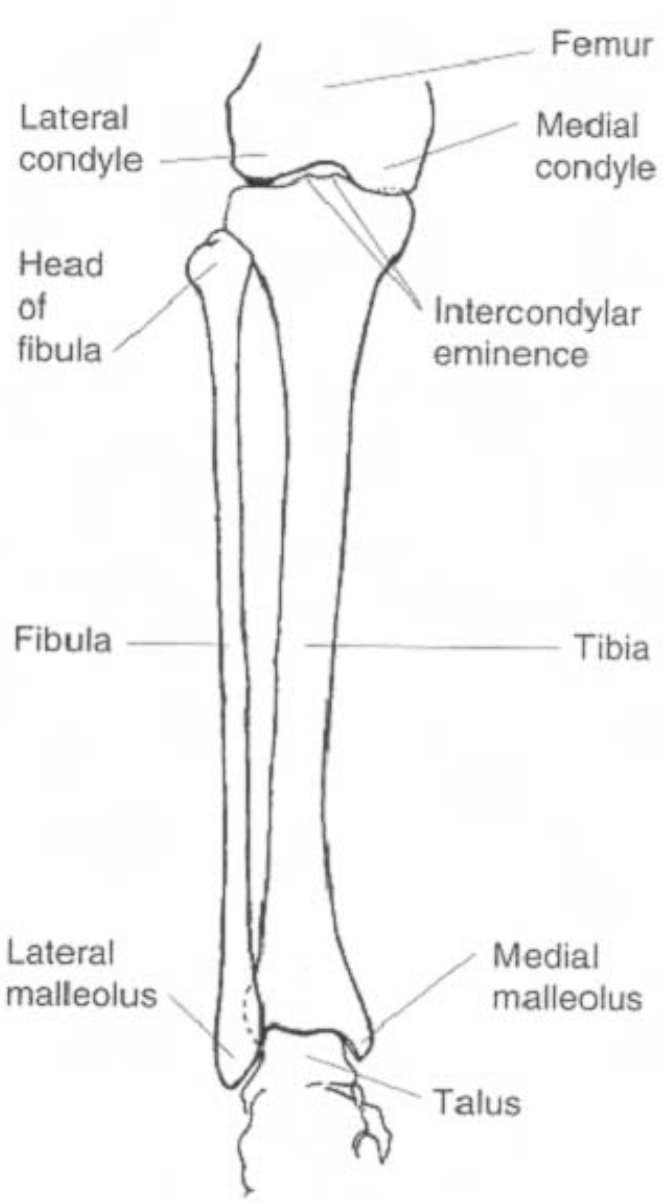
Check Your Answers on Next Page

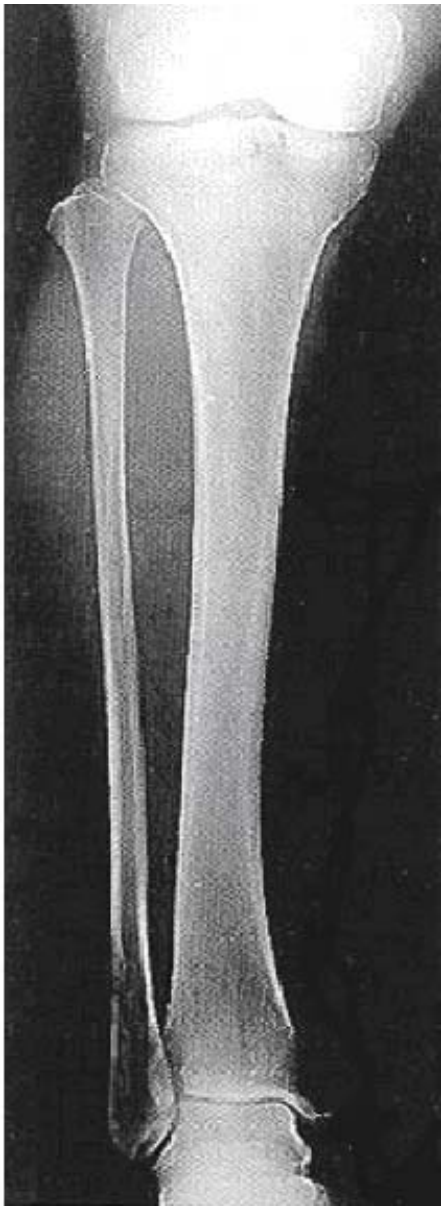
SOLUTIONS, LESSON 1, SECTION IV

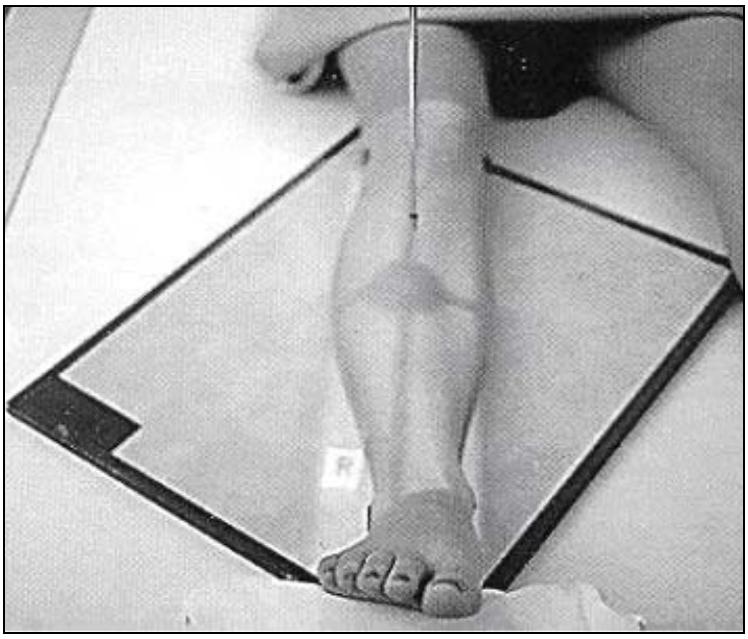
1. c (para 1-13)
2. a (para 1-14)
3. Lateral calcaneus (para 1-14)
4. Plantodorsal calcaneus (para 1-13)
5. b (para 1-13)
6. b (para 1-13)
7. d (para 1-13)
8. c (para 1-14)

Section V. PROJECTIONS OF THE LEG

1-15. ANTERIOR POSTERIOR LEG





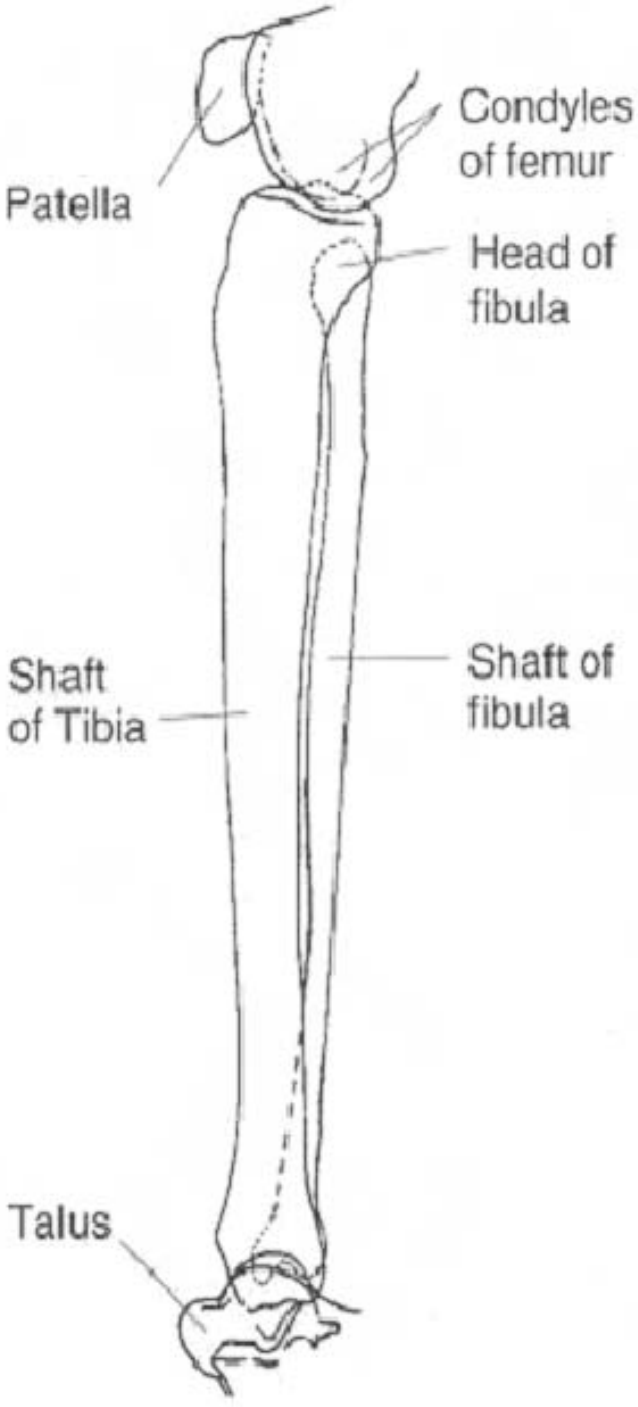


THE ORDER OF PROCEDURE
AP LEG

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at mid-shaft in AP position.	
c. **Technical Factors:** ½ 14 X 17 lengthwise (LW) or diagonal non-Bucky (NB) with full film.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine or seated with leg fully extended. 2. Adjust pelvis, knee and leg into a true AP with no rotation, (epicondyles parallel). 3. Center and align mid line of unmasked portion of cassette to long axis of leg. 4. Insure both ankle and knee joints are equal distance from ends of film. 5. If necessary, place leg diagonally (corner to corner) on 14 X 17 film to insure both joints are included.		
f. **CR:** Perpendicular to film, directed to mid point film.	g. **SID:** 40"	h. **Collimation:** Collimate on both sides to skin margins, with full collimation at ends of film borders.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Tibia and fibula and knee and/or ankle joints.		

Pott's Fracture-Fracture of Lower part of the fibula with serious injury of the lower tibial articulation, usually chipping off of a portion of the medial malleolus or rupture of the medial ligament.

1-16. LATERAL LEG



THE ORDER OF PROCEDURE
LATERAL LEG

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at mid-shaft lateral position.	
c. **Technical Factors:** ½ 14 X 17 lengthwise (LW) or diagonal non-Bucky (NB) with full film.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient lateral recumbent position, injured side down. 2. Place opposite leg behind the affected leg. 3. Flex knee about 45 degrees and insure that leg is in a true lateral position with foot and leg forming a 90 degree angle. (Epicondyles perpendicular). 4. Insure both ankle and knee joints are equal distance from ends of film. 5. If necessary, place leg diagonally (corner to corner) on 14 X 17 film to insure both joints are included.		
f. **CR:** Perpendicular to film, directed to mid point film.	g. **SID:** 40"	h. **Collimation:** Collimate on both sides to skin margins, with full collimation at ends of film borders.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Tibia and fibula and knee and/or ankle joints.		

Continue with Exercises

EXERCISES: LESSON 1, SECTION V

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.

1. _____ AP Leg.
2. _____ Lateral Leg.

a. Tibia, fibula, knee, ankle joints, Pott's Fracture.

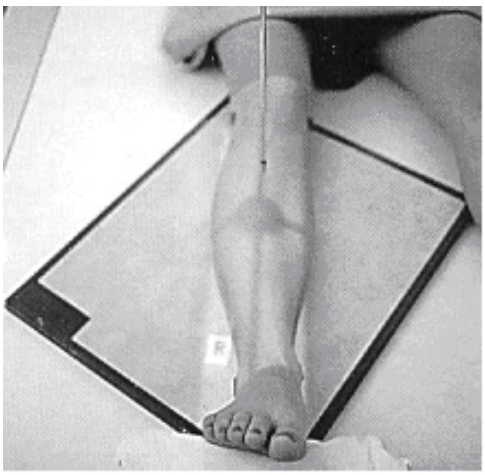
b. Distal tarsals, metatarsals and phalanges.

c. Tibia, fibula, knee and ankle joints.

INDENTIFICATION. Drawings 3 and 4 depict the proper alignment for a particular position. Write the name of the position in the space provided.

3. _____

4. _____



MULTIPLE- CHOICE. For exercises 5-8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. The part position for an AP leg is the:

   a. Great toe is placed two inches below the upper film border.

   b. Ankle and knee joints are equidistant from their respective film borders. (The leg may be placed diagonally on one 14 X 17 film.)

   c. Ankle joint is centered to the film.

   d. Head of the second metacarpal is centered to the film.

6. An AP leg demonstrates a Pott's fracture, which is a fracture of the:

   a. Lower part of the fibula with serious injury of the lower tibial articulation, usually chipping off of a portion of the medial malleolus or rupture of the medial ligament.

   b. Bone in two places.

   c. Base of the first metacarpal bone.

   d. Heads of the second and third metatarsals.

7. The proper patient and part position for a lateral leg is with the patient:

   a. Supine or seated; sole of foot in contact with the film holder; part centered.

   b. Supine; leg fully extended; pelvis, knee, and leg adjusted into a true AP with no rotation; part centered to film.

   c. Laterally recumbent; injured side down; knee flexed about 45 degrees to the film; leg in true lateral position.

   d. Laterally recumbent; affected side down; foot dorsiflexed; foot and ankle forming a 90 degree angle; plantar surface perpendicular to film.

8. For both the AP and lateral leg part position, the ankle and knee joints should be equidistance from the ends of the film so that:

   a. The leg is adequately immobilized.

   b. Both joints are included.

   c. The ankle and knee are in more or less the same plane.

   d. Physicians can diagnose fractures of the joints.

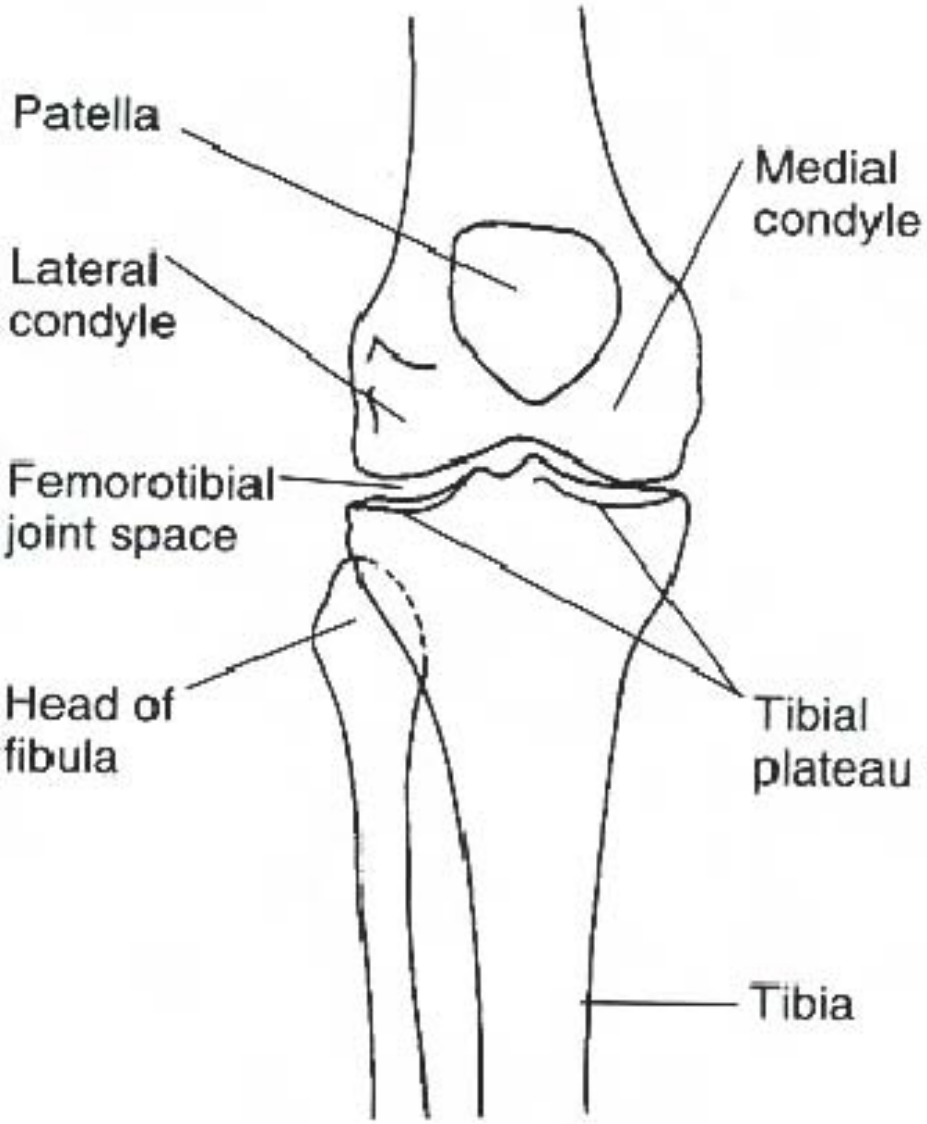
Check Your Answers on Next Page

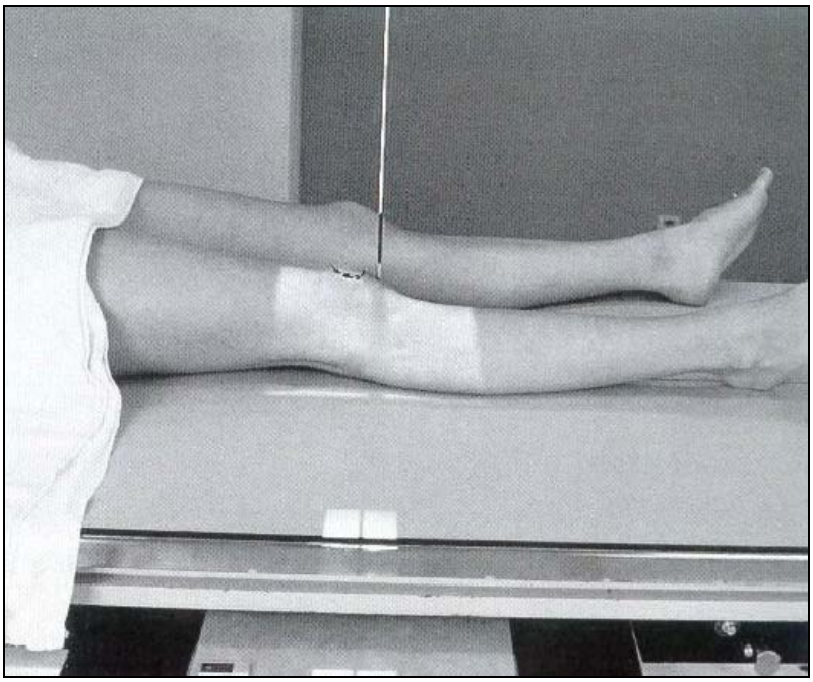
SOLUTIONS, LESSON 1, SECTION V

1. a (para 1-15)
2. c (para 1-16)
3. Lateral leg (para 1-16)
4. AP leg (para 1-15)
5. b (para 1-15)
6. a (para 1-15)
7. c (para 1-16)
8. b (para 1-15 and 1-16)

Section VI. PROJECTIONS OF THE KNEE

1-17. ANTERIOR POSTERIOR KNEE

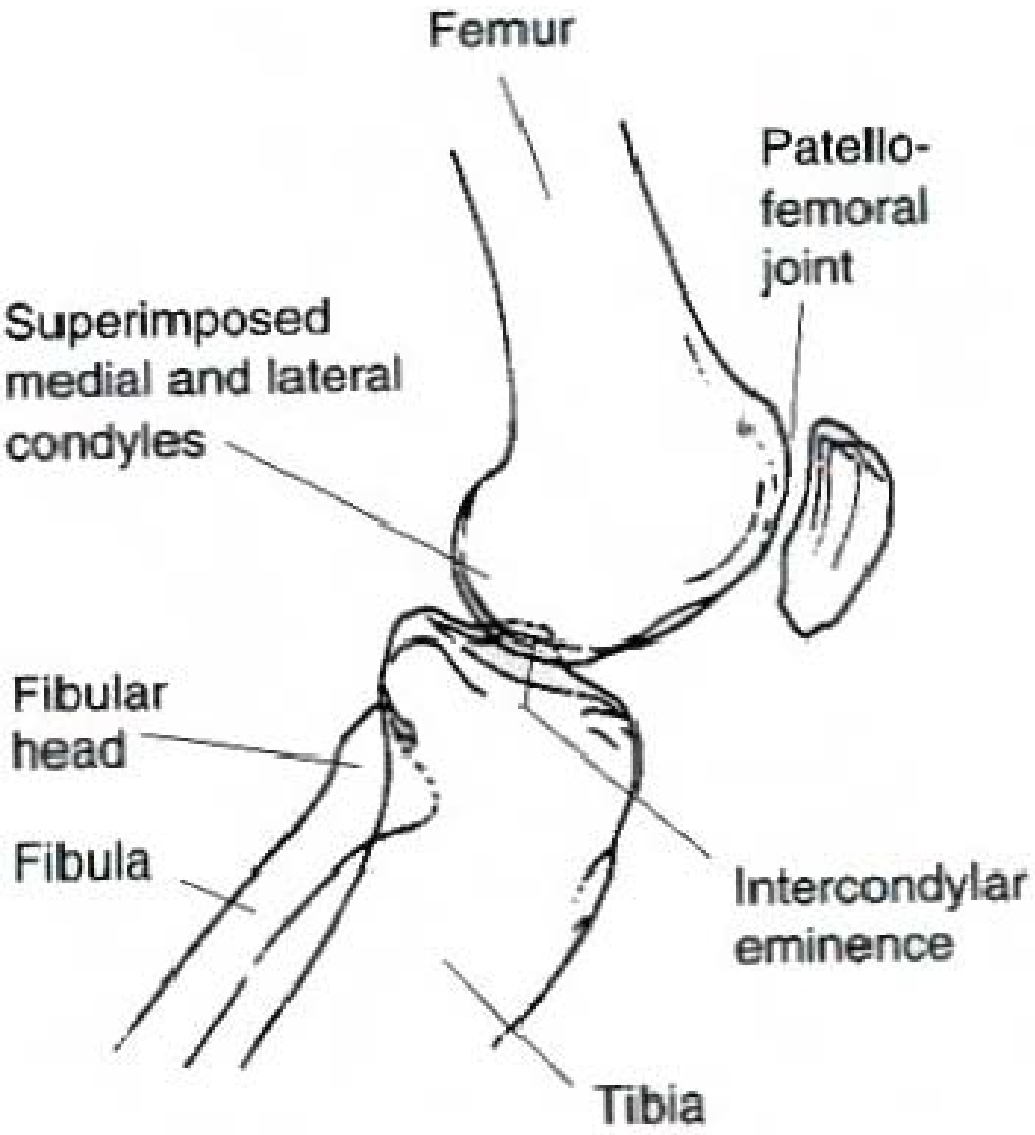




THE ORDER OF PROCEDURE
AP KNEE

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at the level of the knee joint.	
c. **Technical Factors:** 8 X 10 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine with no rotation of pelvis, pillow for head. 2. Leg fully extended. 3. Align and center long axis of femur and knee to midline of table or cassette. 4. Rotate leg internally about 5 degrees for a true AP (inter-epicondylar line parallel to film).		
f. **CR:** Perpendicular to film, to a point ¾ in. distal to the apex of the patella.	g. **SID:** 40"	h. **Collimation:** Collimate on both sides to skin margins, with full collimation at ends of film borders.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Distal femur, proximal tibia and fibula, patella and knee joint.		

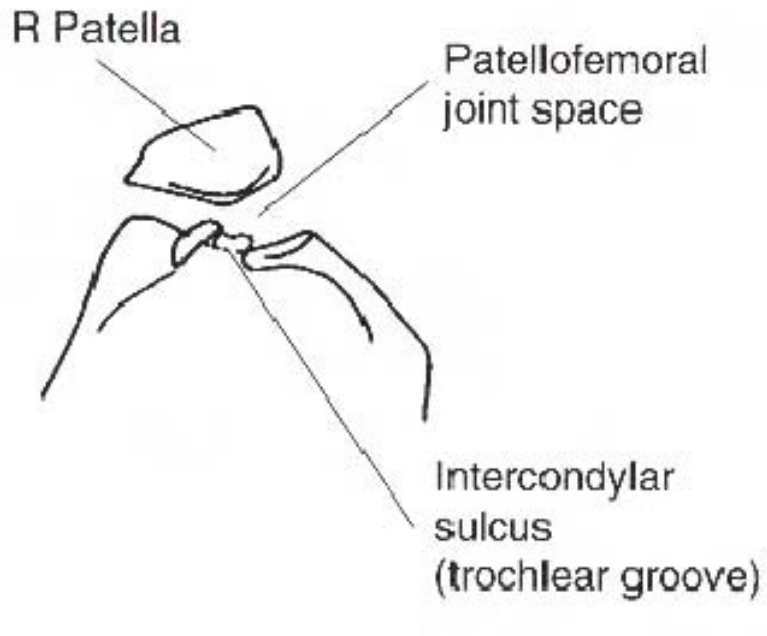
1-18. LATERAL KNEE



THE ORDER OF PROCEDURE
LATERAL KNEE

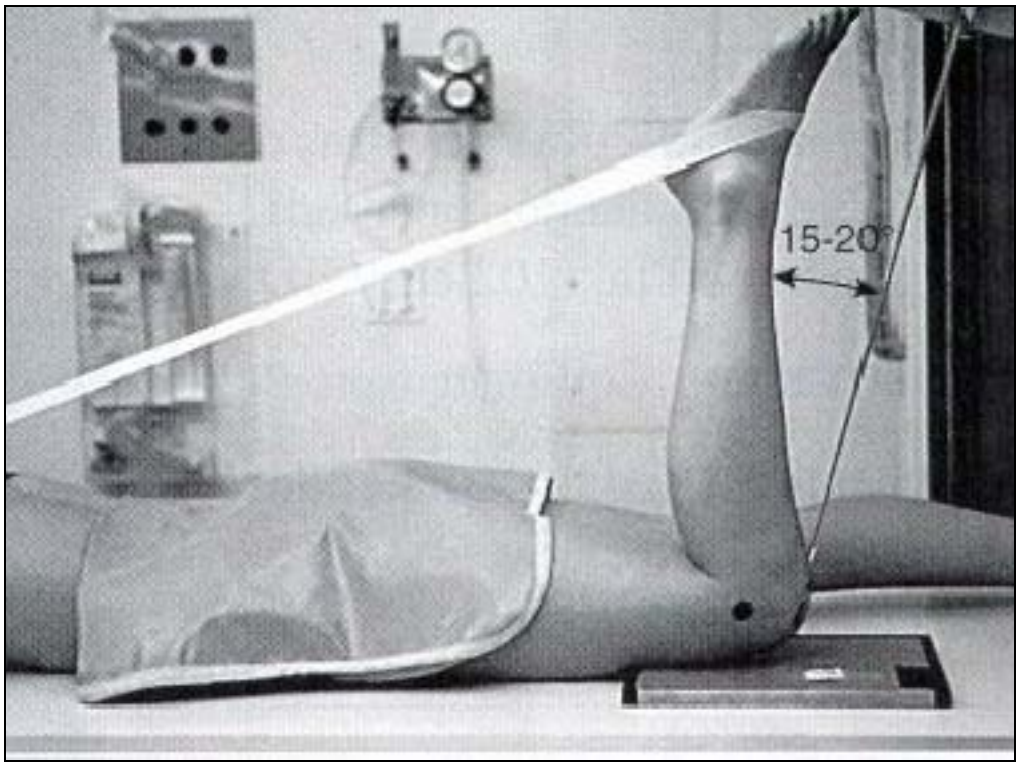
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at the level of the knee joint.	
c. **Technical Factors:** 8 X 10 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient in lateral recumbent position, affected side down. 2. Adjust rotation of body and leg until knee is in a true lateral position (femoral epicondyles directly superimposed and plane of patella perpendicular to plane of film). 3. Flex knee 15-20 degrees. 4. Align and center long axis of femur and knee to midline of table or cassette.		
f. **CR:** Angled 5 to 10 degrees cephalad. Directed to a point ¾ inch. distal to medial epicondyle.	g. **SID:** 40"	h. **Collimation:** Collimate on both sides to skin margins, with full collimation at ends of film borders.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Distal femur, proximal tibia, fibula, patella, tibiofemoral joint and patellofemoral joint.		

1-19. TANGENTIAL (AXIAL) PROJECTION (SUNRISE)



a. **The Sunrise Knee.** This position is frequently referred to as the sunrise position, as the patella of the knee can be thought to resemble a sun hovering at the line of horizon at sunrise.

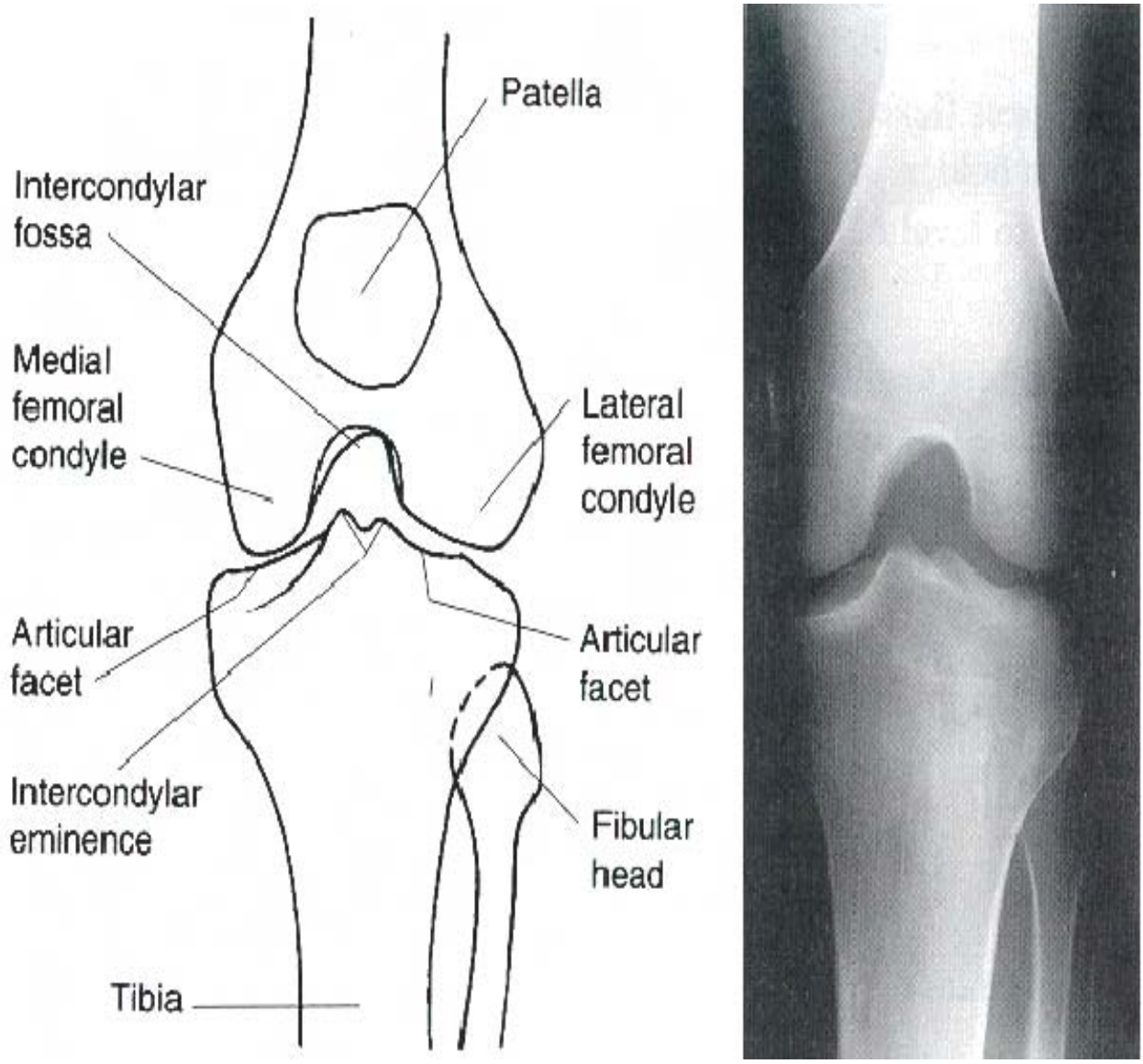
b. **Bilateral or Unilateral.** The tangential (axial) projection may be done on one knee (unilaterally) or on both knees (bilaterally). The picture above depicts a unilateral tangential (axial) projection.

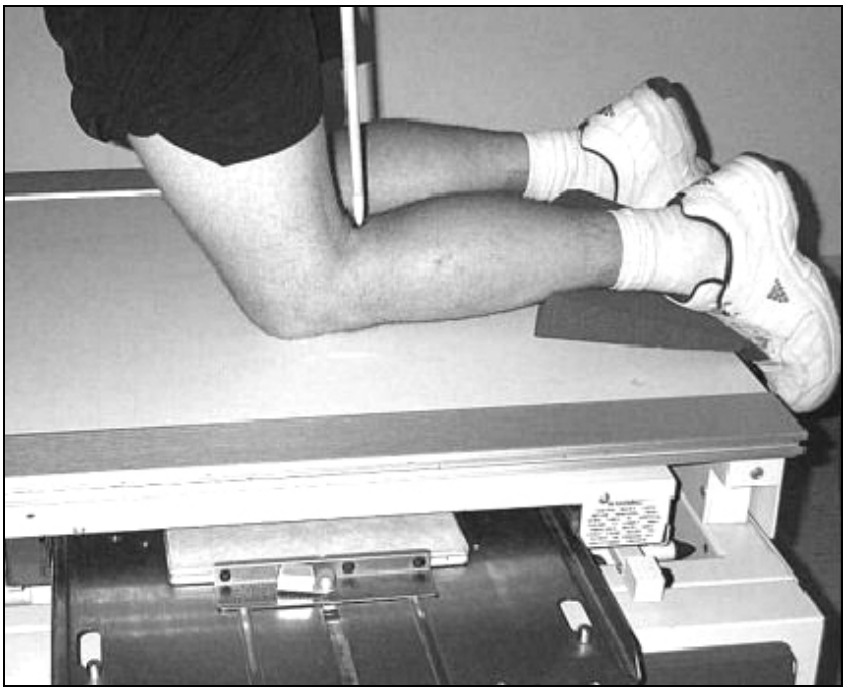


THE ORDER OF PROCEDURE
TANGENTIAL (AXIAL) PROJECTION, SUNRISE KNEE

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at the level of the apex and the base of the patella	
c. **Technical Factors:** 8 X 10 (LW) table top.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient prone with cassette under knee. Slowly flex knee to a minimum of 90 degrees. 2. Patellofemoral joint space to center of film (apex to the center).		
f. **CR:** Perpendicular to patellofemoral joint space. 15-20 degrees from the long axis of the leg.	g. **SID:** 40"	h. **Collimation:** Collimate tightly on all sides to area of patella.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Axial view of the patella, intercondylar sulcus, and patellofemoral joint with quadriceps femoris muscle in a relaxed state.		

1-20. POSTEROANTERIOA AXIAL (TUNNEL)





THE ORDER OF PROCEDURE
PA AXIAL (TUNNEL)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at the level of the popiteal crease to the anterior part of the patella.	
c. **Technical Factors:** 8 X 10 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient kneeling on x-ray table. 2. Popliteal crease centered to film. 3. Have patient lean forward 20-30 degrees, and hold position. (Results in 60-70 degree knee flexion.) 4. Ask patient to support body weight primarily on opposite knee.		
f. **CR:** Perpendicular to film and directed to mid-popliteal crease.	g. **SID:** 40"	h. **Collimation:** Collimate on four sides to knee joint area.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Intercondyloid fossa shown in profile, femoral and tibial condyles, intercondyloid eminence and articular facets of tibia.		

Continue with Exercises

EXERCISES: LESSON 1, SECTION VI

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____ AP knee.
2. _____ Lateral knee
3. _____ Tangential axial projection (Settegast method)
4. _____ PA axial projection (Holmblad method).

a. Distal femur, proximal tibia, fibula, patella, tibiofemoral joint and patellofemoral joint..

b. Distal femur, proximal tibia and fibula, patella and knee joint.

c. Axial view of the patella, intercondylar sulcus, and patellofemoral joint, with the quadriceps femoris muscle in a relaxed state.

d. Intercondyloid fossa shown in profile, femoral and tibial condyles, intercondyloid eminence, and articular facets of the tibia.

MULTIPLE- CHOICE. For exercises 5-8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. Another name for the sunrise knee is the:

   a. Tangential (axial) projection.

   b. PA axial projection.

   c. PA projection (Caldwell method).

   d. Modified parietoacanthial projection (Modified Waters method).

6. Another name for a tunnel knee is:

   a. Tangential (axial) projection.

   b. PA axial projection.

   c. PA projection (Caldwell method).

   d. Coyle trauma method.

7. The CR for a lateral knee is:

   a. A point ¾ inch distal to the apex of the patella to the center of the film.

   b. A point ¾ inch distal to the medial epicondyle to the center of the film.

   c. Patellofemoral joint space to the center of the film.

   d. Mid-malleoli to the center of the film.

8. Three of the four knee positions studied here share the same technical factors. Which position has a different technical factor (NB) than the other positions?

   a. Tangential (axial) knee (Settegast method).

   b. Anterior Posterior lateral knee.

   c. PA axial knee (Holmblad method).

   d. Lateral knee.

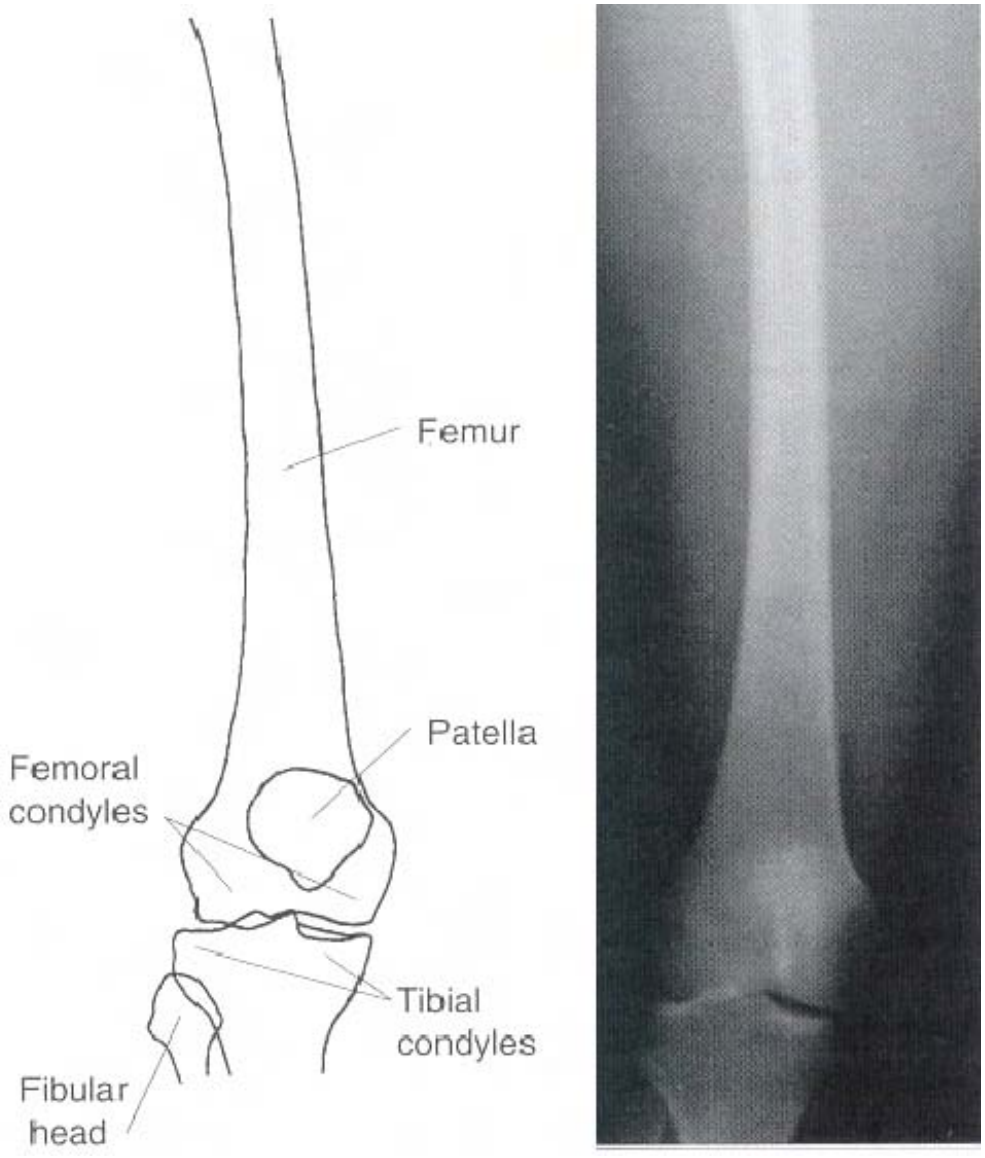
Check Your Answers on Next Page

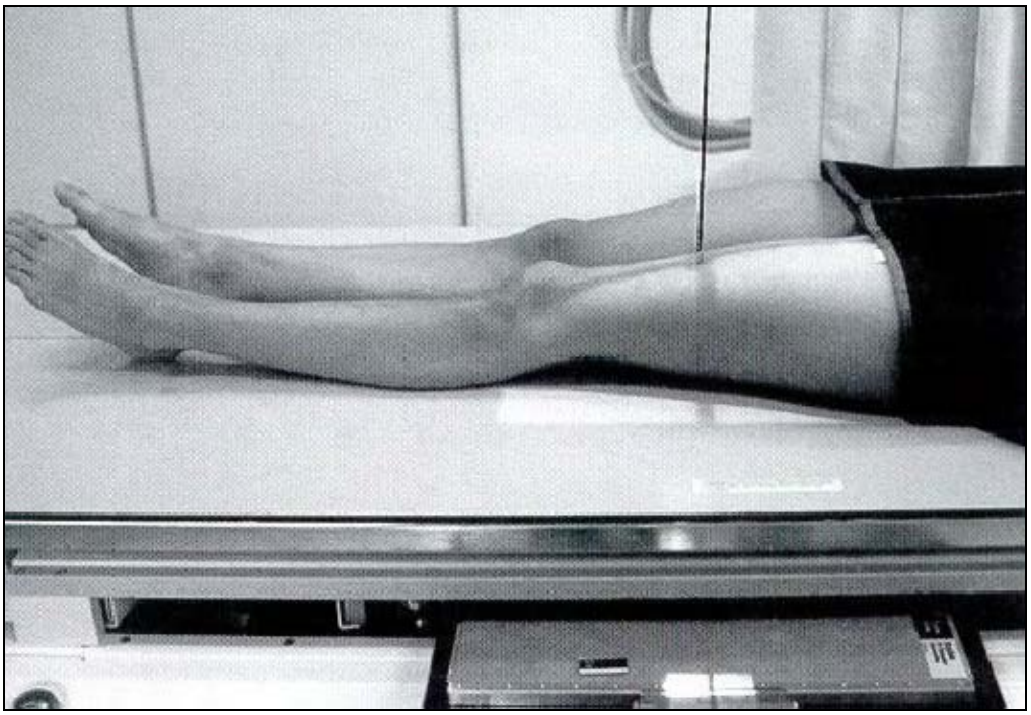
SOLUTIONS, LESSON 1, SECTION VI

1. b (para 1-18)
2. a (para 1-17)
3. c (para 1-19)
4. d (para 1-20)
5. a (para 1-19)
6. b (para 1-20)
7. b (para 1-18)
8. a (para 1-19)

Section VII: PROJECTIONS OF THE FEMUR

1-21. ANTERIOR POSTERIOR (MID AND DISTAL) FEMUR

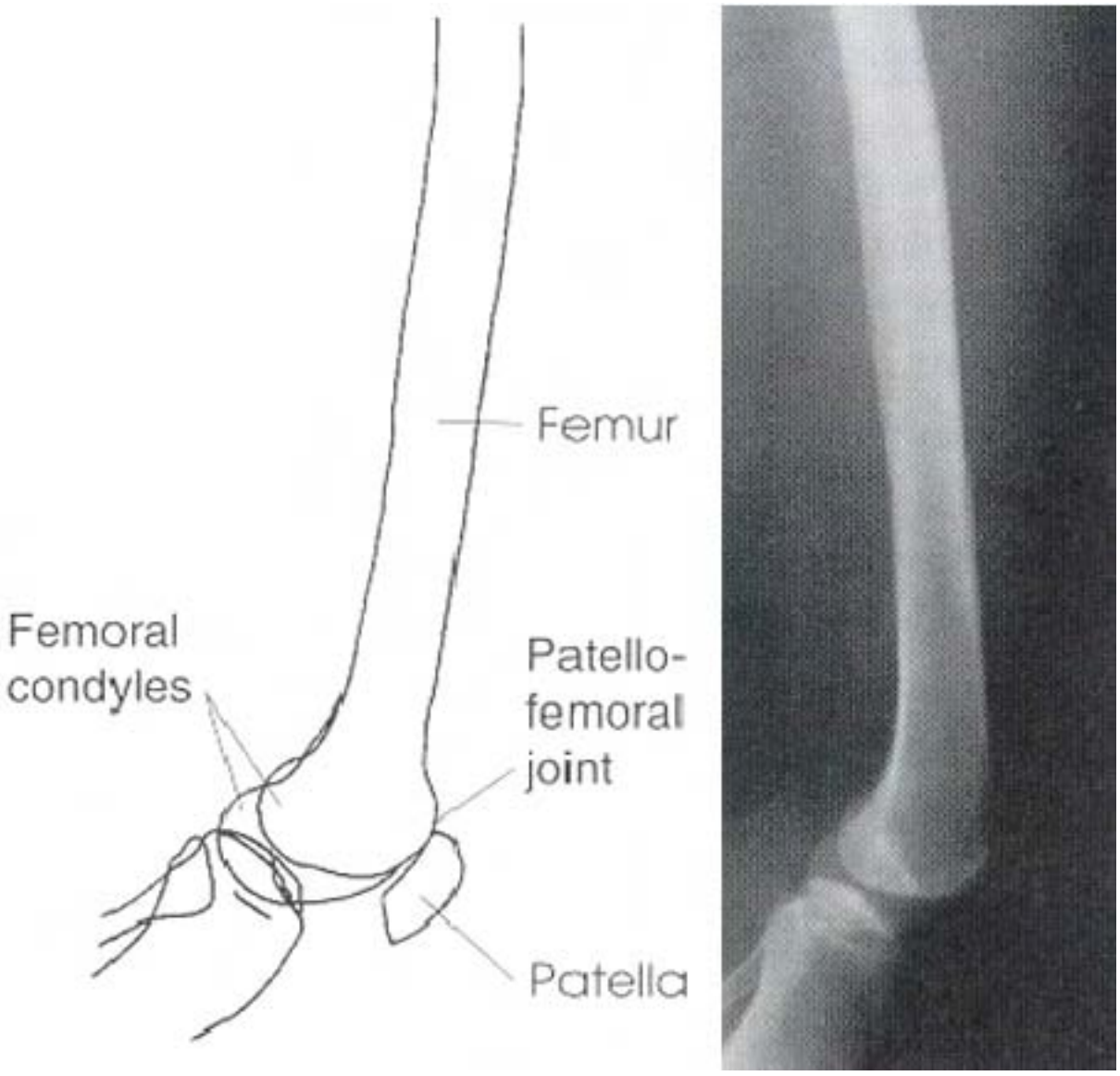


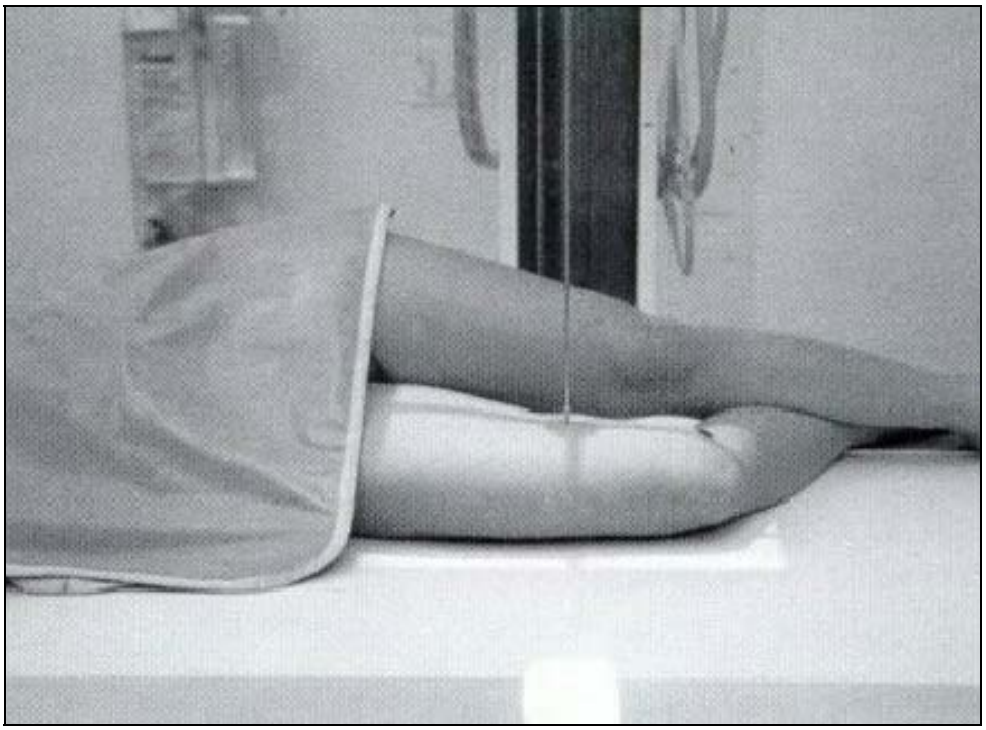


THE ORDER OF PROCEDURE
AP FEMUR (mid and distal)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at mid-femur in AP position.	
c. **Technical Factors:** 14 X 17 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine, femur centered to midline of table pillow for head. 2. Asis and mid epicondyles over center line of table/film. 3. Rotate leg internally about 5 degrees (epicondyles parallel). Ensure knee joint is on the film. 4. Epicondyles 2" above lower film border.		
f. **CR:** Perpendicular to film.	g. **SID:** 40"	h. **Collimation:** Collimate the width to the part.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Mid and distal femur including knee joint.		

1-22. LATERAL (MID AND DISTAL) FEMUR

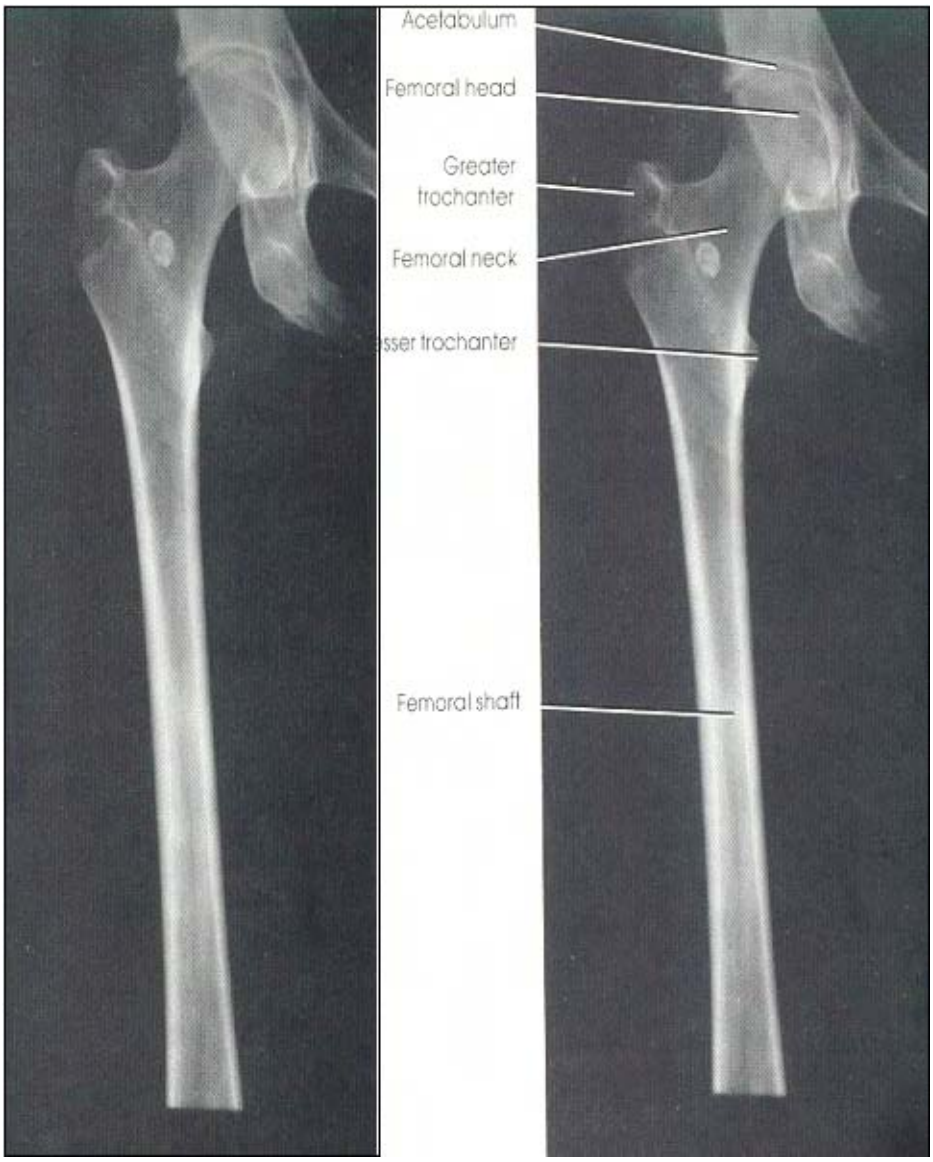


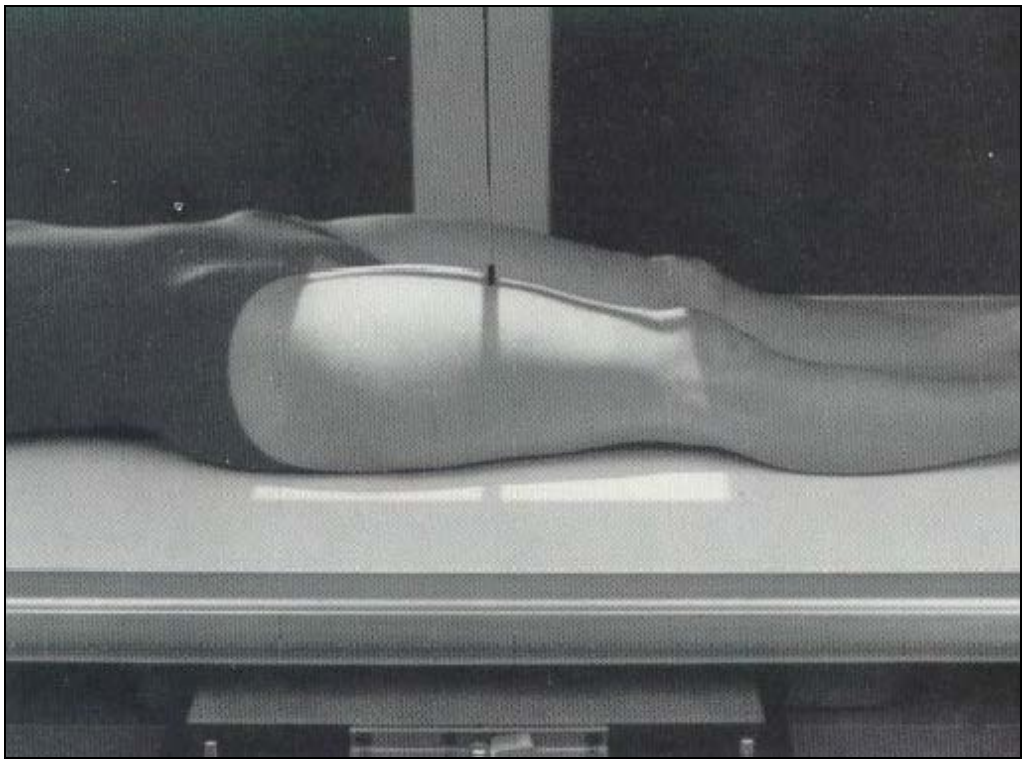


THE ORDER OF PROCEDURE
LATERAL (MID AND DISTAL) FEMUR

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at mid-femur in lateral position.	
c. **Technical Factors:** 14 X 17 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient laterally recumbent (affected side down). 2. Flex knee about 45 degrees and center femur on film (trochanter and mid-epicondyle over center). 3. Place unaffected leg back or forward and out of the way. 4. Epicondyles 2" above lower film border.		
f. **CR:** Perpendicular to film.	g. **SID:** 40"	h. **Collimation:** Collimate the width to the part.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Mid and distal femur including knee joint in lateral projection.		

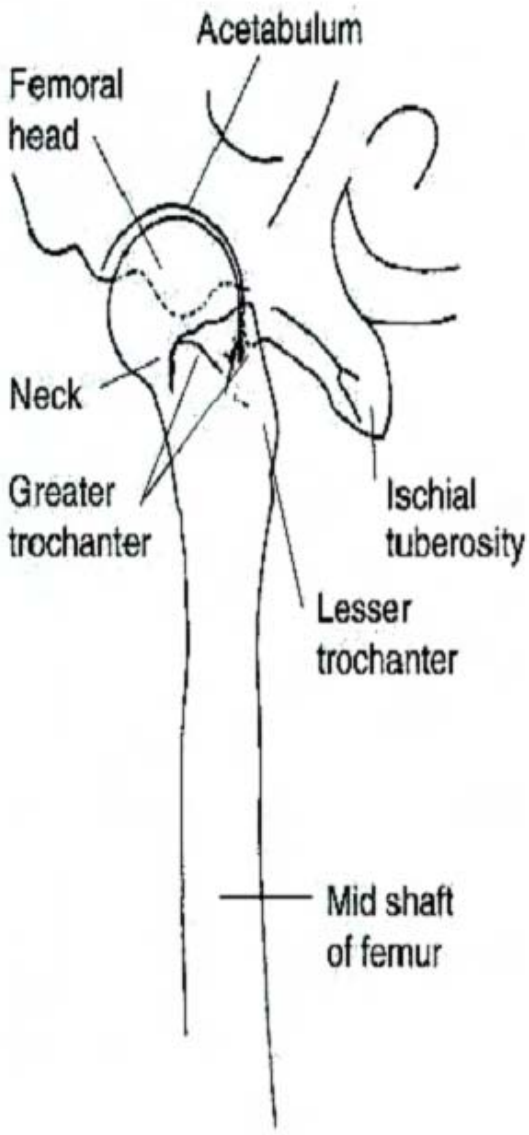
1-23. ANTERIOR POSTERIOR (MID AND PROXIMAL) FEMUR

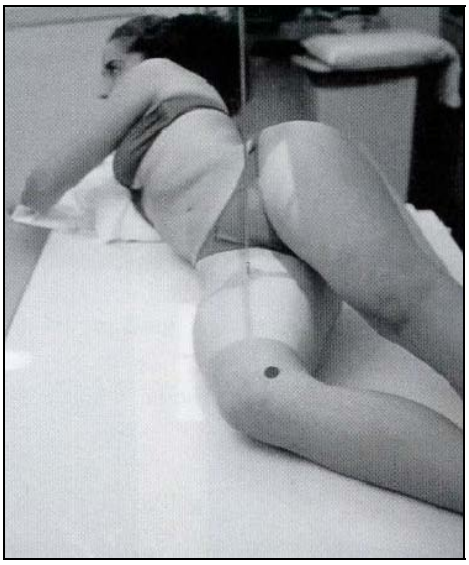




THE ORDER OF PROCEDURE AP (MID AND PROXIMAL) FEMUR		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at mid-femur in lateral position.	
c. **Technical Factors:** 14 X 17 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine, femur centered to midline of table, pillow for head. 2. Asis and epicondyles over centerline of table/film. 3. Rotate leg internally 15-20 degrees (to get femur head and neck parallel to film). 4. Place ASIS even with the upper film border.		
f. **CR:** Perpendicular to film.	g. **SID:** 40"	h. **Collimation:** Collimate the width to the part.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** A lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Mid and proximal femur to include the hip joint.		

1-24. LATERAL (MID AND PROXIMAL) FEMUR





THE ORDER OF PROCEDURE LATERAL (MID AND PROXIMAL) FEMUR		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Measure at mid-femur in lateral position.	
c. **Technical Factors:** 14 X 17 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient is laterally recumbent with affected side down. 2. Flex knee about 45 degrees and align femur to midline of film (greater trochanter and medial epicondyles over center of film). 3. Place unaffected leg back and have patient roll back to prevent superimposition of proximal femur and hip. Ensure hip joint is on film. 4. Place ASIS even with the upper film border.		
f. **CR:** Perpendicular to film.	g. **SID:** 40"	h. **Collimation:** Collimate the width to the part.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Lead shield across the patient's lap to protect gonads.		
k. **Demonstrates:** Mid and proximal femur to include the hip joint in a lateral projection.		

Continue with Exercises

EXERCISES: LESSON 1, SECTION VII

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____ AP (mid/distal) femur.	a. Distal femur, proximal tibia, fibula, patella, tibiofemoral joint, and patellofemoral joints.
2. _____ Lateral distal femur.	b. Mid and proximal femur, including the lateral hip.
3. _____ AP (mid/proximal) femur.	c. Mid and proximal femur to include the hip joint.
4. _____ Lateral (mid/proximal) femur.	d. Mid and distal femur, including knee joint.

MULTIPLE- CHOICE. For exercises 5-11, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. The part position for the AP (mid and distal) femur is the:

   a. Anterior Superior Illiac Spine even with the upper film border.

   b. Epicondyles 2 inches above the lower film border.

   c. Mid-malleoli to the center of the film

   d. Palletofemoral joint space to the center of the film (apex to center).

6. The part position for both the AP and lateral (mid and proximal) femur is the:

   a. Anterior Superior Illiac Spine even with the upper film border.

   b. Epicondyles 2 inches above the lower film border.

   c. Mid-malleoli to the center of the film

   d. Palletofemoral joint space to the center of the film (apex to center).

7. The patient and part position for the AP (mid and distal) femur is:

    a. Patient laterally recumbent on affected side; knee flexed about 45 degrees and femur aligned to midline of film; unaffected leg back and patient rolled back to prevent superimposition of proximal femur and hip; hip joint on the film.

    b. Patient supine with femur (ASIS and mid-epicondyles) over center line of table; leg rotated internally 15 to 20 degrees and hip joint on the film.

    c. Patient supine with femur over center line of table (ASIS and mid epicondyles to center of film); epicondyles parallel; knee joint on the film.

    d. Patient laterally recumbent on affected side; knee flexed about 45 degrees and femur centered on table; unaffected leg out of the way; knee joint on the film.

8. The hip joint must be on the film for the:

    a. AP (mid and distal) femur and the lateral (mid and distal femur).

    b. AP (mid and proximal) femur and the lateral (mid and proximal) femur.

    c. Lateral (mid and distal) femur.

    d. AP (mid and distal) femur.

9. The knee joint must be on the film for the:

    a. AP (mid and distal) femur and the lateral (mid and distal femur).

    b. AP (mid and proximal) femur and the lateral (mid and proximal) femur.

    c. Lateral (proximal) femur.

    d. AP (proximal) femur.

10. The patient and part position for a lateral (mid and proximal) femur is the:

    a. Patient laterally recumbent of affected side; knee flexed about 45 degrees and femur aligned to midline of film; unaffected leg back and patient rolled back to prevent superimposition of proximal femur and hip; hip joint on the film.

    b. Patient supine with femur over center line of the table (ASIS and mid-epicondyles over center line of the table); leg rotated internally 15-20 degrees, hip joint on the film.

    c. Patient supine with femur over center line of table (ASIS and mid epicondyles to center line of tale); leg rotated internally about 5 degrees (epicondyles parallel); knee joint on the film.

    d. Patient laterally recumbent on affected side; knee flexed about 45 degrees and femur centered on table; unaffected leg out of the way; knee joint on the film.

11. What is the technical factor for all four femur positions in this section?

    a. 14 X17 EW NB.

    b. 4 X 17 CW B.

    c. 14 X 17 LW NB

    d. 14 X 17 LW B.

Check Your Answers on Next Page

SOLUTIONS, LESSON 1, SECTION VII

1. d (para 1-21)
2. d (para 1-22)
3. c (para 1-23)
4. b (para 1-24)
5. b (para 1-21)
6. a (para 1-23 and 1-24)
7. c (para 1-21)
8. b (para 1-23 and 1-24)
9. a (para 1-21 and 1-22)
10. a (para 1-24)
11. d (para 1-21 and 1-24)

End of Lesson 1

LESSON ASSIGNMENT

LESSON 2 Positioning for Exams of the Pelvic Area.

LESSON ASSIGNMENT Paragraphs 2-1 through 2-9.

LESSON OBJECTIVES After completing this lesson, you should be able to:

2-1. Identify specifications for proper placement of the anatomical structures of the pelvic area listed below:

Pelvis, AP.

Hip, lateral (frog-leg).

Hip, AP

Hip, sxiolateral (trauma).

Sacrum, AP.

Sacrum, AP.

Sacrum, lateral.

Coccyx, AP.

Coccyx, lateral.

SUGGESTION After reading and studying the assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

LESSON 2

POSITIONING FOR EXAMS OF THE PELVIC AREA

Section I. PROJECTIONS OF THE HIP

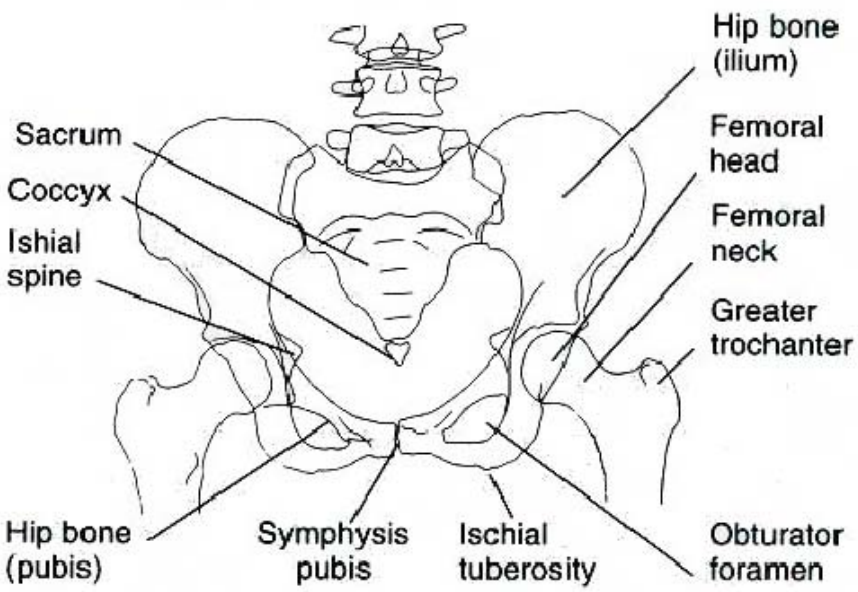
2-1. ANTERIOR POSTERIOR PELVIS

a. **Pelvic/Hip Injury.** Prior to the advent of modern medicine, a fracture of the pelvis or hip meant either spending months in recuperation or suffering a total disability. Today, with modern techniques and materials, an orthopedic surgeon can reconstruct a shattered hip, thus enabling the patient to lead an active life in a comparatively short time. It all begins with a proper diagnosis, and that is done by means of X-rays. Be sure to handle the patient carefully in any suspected pelvic or hip injury. Take your exposures correctly the first time since the patient will probably be in great pain.

b. **A Hip Routine.** A hip routine consist of two views: an AP pelvis and a lateral frog-leg hip. Additional views, such as the AP hip and the axiolateral hip (trauma), may also be required.

c. **The Anterior Posterior Pelvis.** The AP pelvis is included as part of the hip routine so that a comparison can be made between the affected side and the unaffected side. It should be noted that the AP pelvis and the AP hip are essentially the same position. There is, however, a difference in the film dimensions for the two positions. For the AP pelvis, the film used is 14 x 17, so that both sides of the pelvis may be viewed on the film simultaneously.

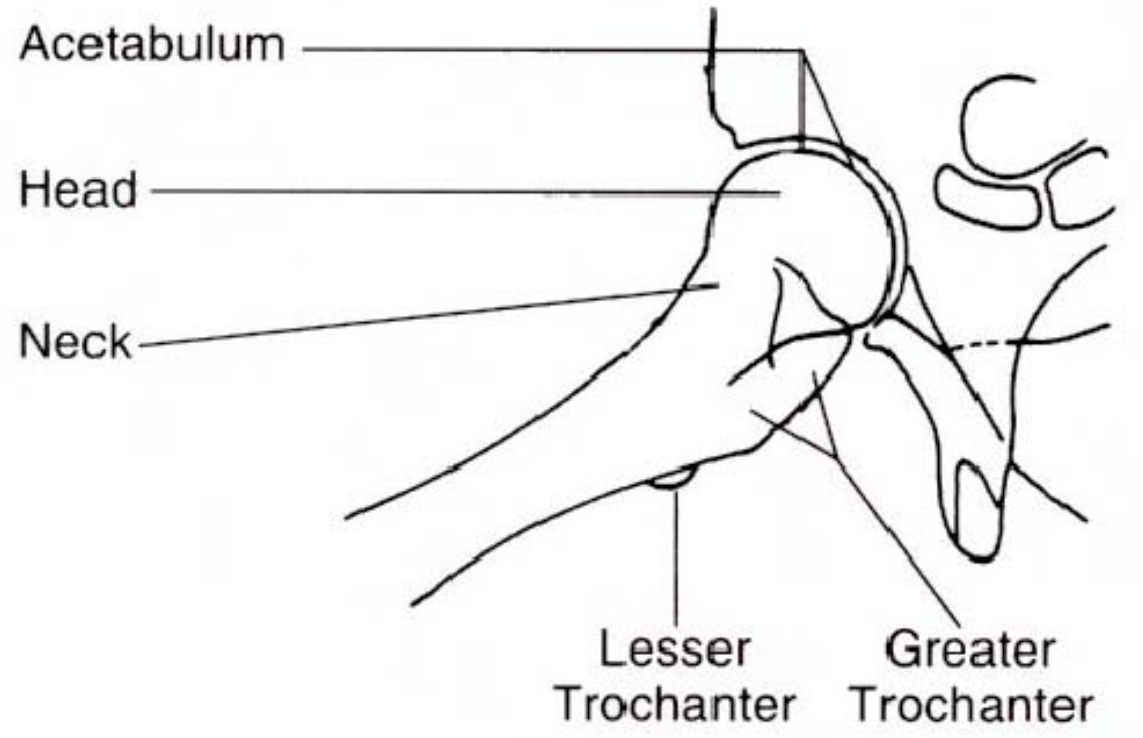
d. **The Anterior Posterior Hip.** For the AP hip, a 10 x 12 film is exposed to demonstrate only one side of the pelvis.

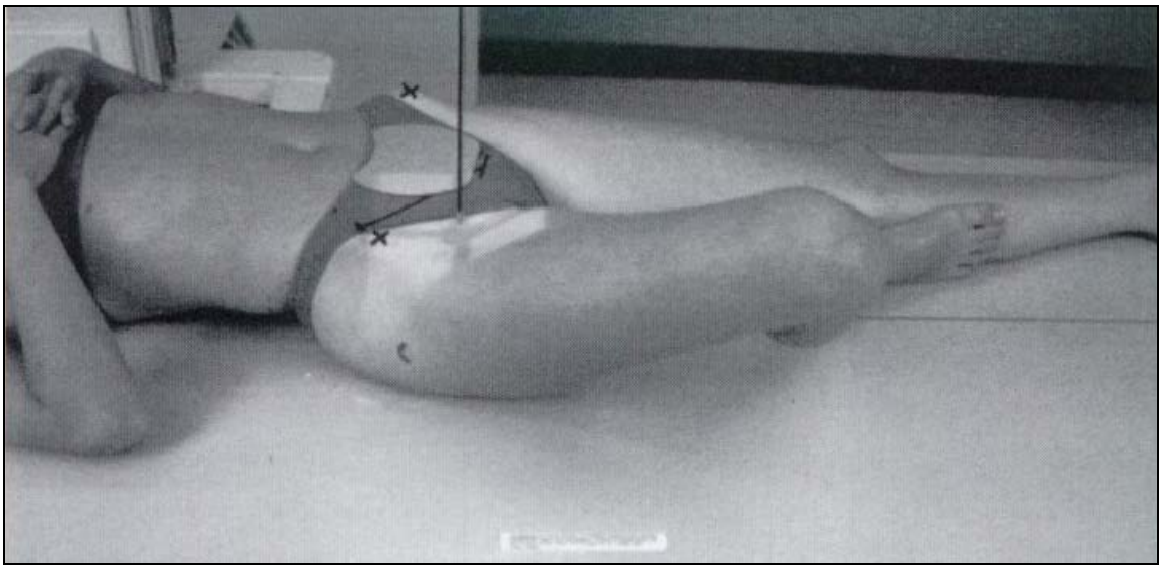


THE ORDER OF PROCEDURE
AP PELVIS

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the ASIS in AP position.	
c. **Technical Factors:** 14 X 17 (CW) bucky.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient supine, arms at sides or across upper chest provide pillow for head and support under the knees. 2. Align midsaggital plane of patient to center line of table and/or cassette. 3. Insure that pelvis is not rotated. 4. Separate legs and feet, then internally rotate long axis of feet and lower limbs 15 to 20 degrees. 5. Center cassette to entire pelvis by aligning CR and midline of cassette to a point midway between the level of the level of the ASIS and the superior border of the greater trochanter.		
f. **CR:** Perpendicular to film.	g. **SID:** 40"	h. **Collimation:** Collimate to film borders.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Gonadal shielding should be done on all males of reproductive age. Ovarian shielding on females however is generally not possible without obscuring essential pelvic anatomy.		
k. **Demonstrates:** Pelvic girdle, L5, sacrum and coccyx, femoral heads, necks and greater trochanters.		

2-2. LATERAL FROG-LEG HIP

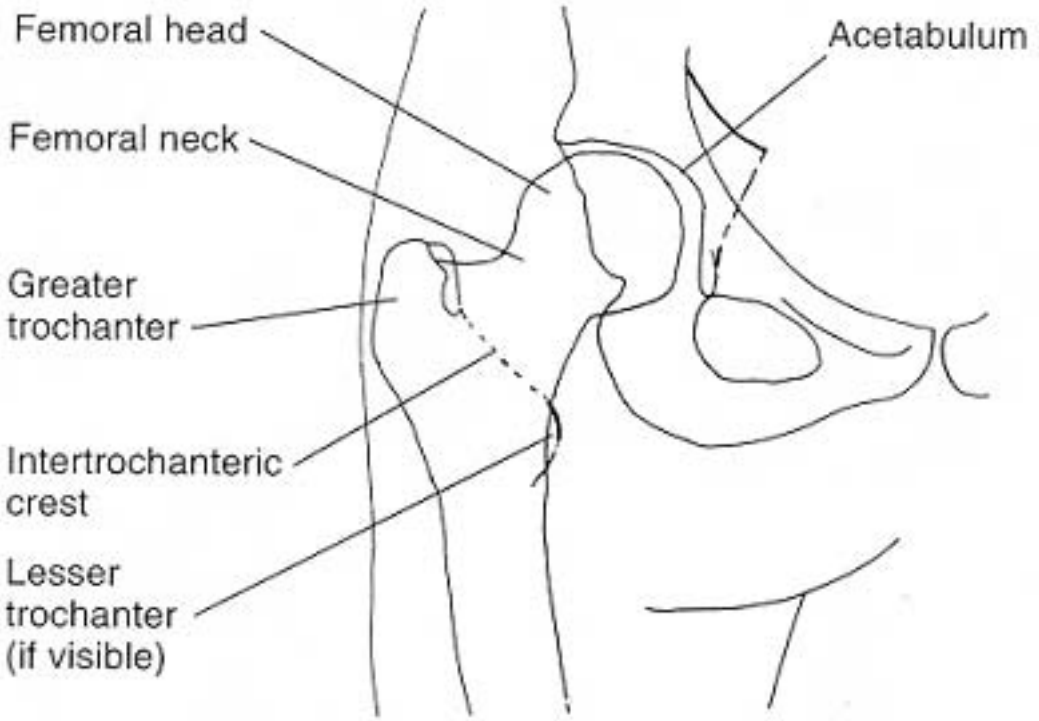


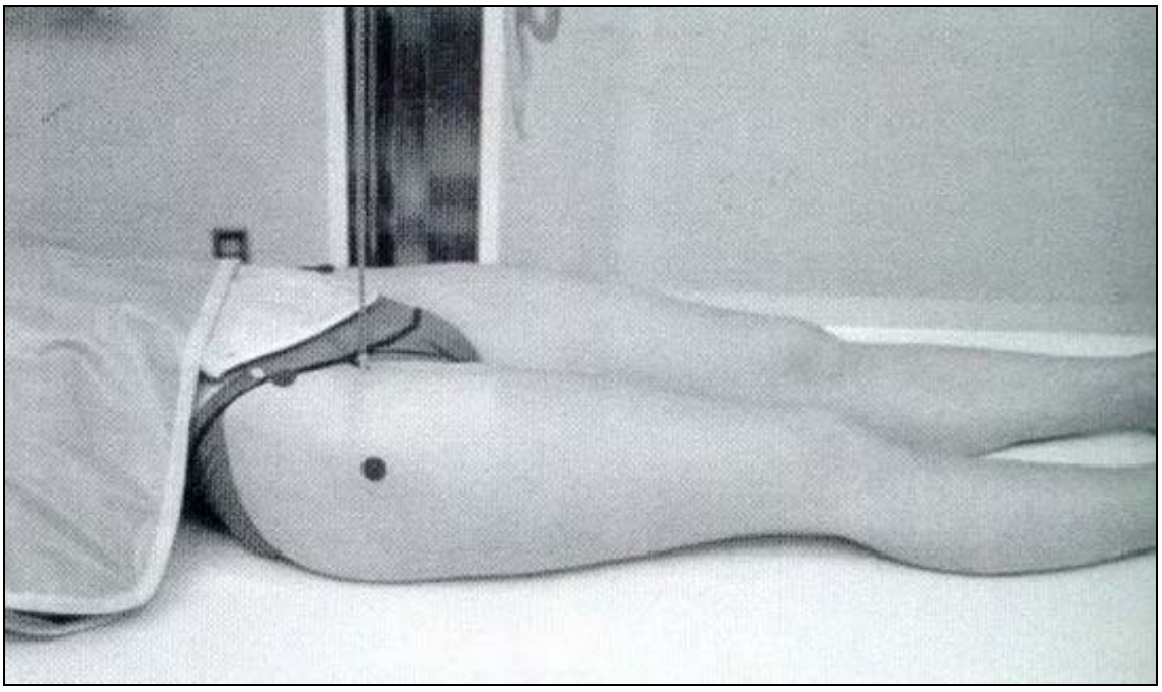


THE ORDER OF PROCEDURE
LATERAL HIP (UNILATERAL FROG LEG)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the greater trochanter with the leg in lateral position.	
c. **Technical Factors:** 10 X 12 (CW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine, arms at sides or across chest. 2. Place patient partially oblique towards affected side and abduct thigh and rotate to bring in contact with table. 3. Unaffected side supported with foam under knee. 4. Flex knee of affected side to draw thigh to approximately 45 degrees and parallel to table. 5. Mid femoral neck to center of film.		
f. **CR:** CR is perpendicular to film and directed 2" medial to ASIS at the level of the greater trochanter	g. **SID:** 40"	h. **Collimation:** Collimate to film borders.
i. **Immobilization:** None. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Shield gonads while not covering affected hip.		
k. **Demonstrates:** Acetabulum, femoral head, neck and greater trochanter.		

2-3. ANTERIOR POSTERIOR HIP

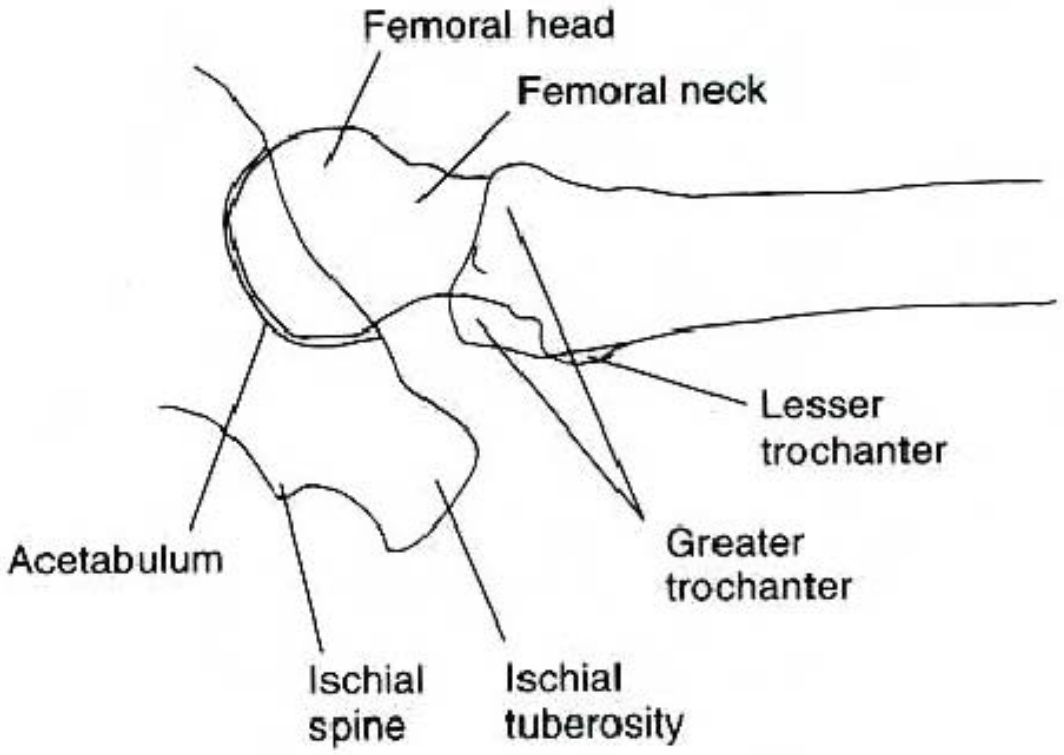


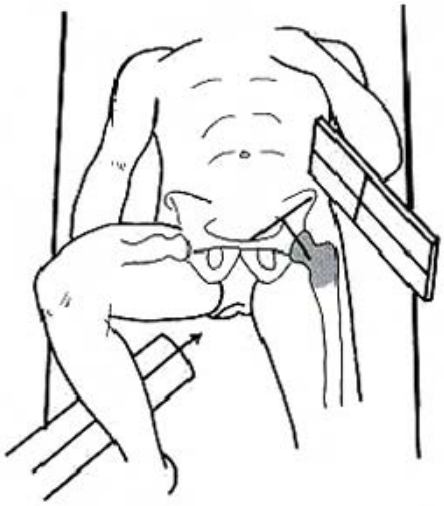


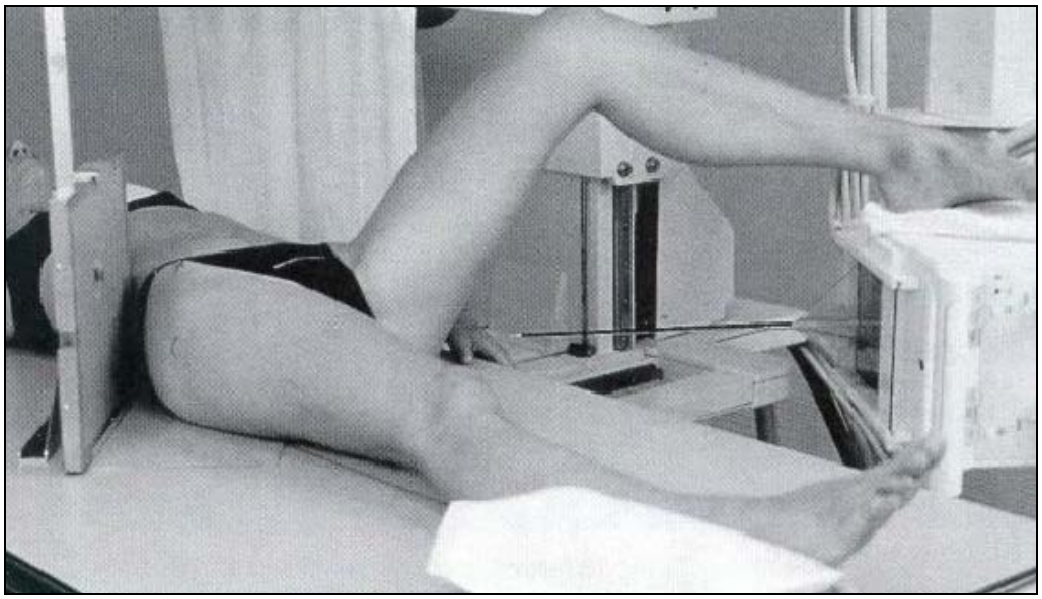
THE ORDER OF PROCEDURE
AP HIP

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the greater trochanter with the leg in AP position.	
c. **Technical Factors:** 10 X 12 (LW) bucky.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine, arms at sides or across chest. 2. Median plane perpendicular to film. 3. Extended lower extremities full, with both feet and legs rotated 15 degrees internally. 4. Place the sagittal plane 2" medial to ASIS, at its intersection with the transverse plane through greater trochanter, to center of film.		
f. **CR:** CR perpendicular to film .	g. **SID:** 40"	h. **Collimation:** Collimate to film borders.
i. **Immobilization:** As needed. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Shield gonads while not covering affected hip.		
k. **Demonstrates:** Acetabulum, femoral head, neck and greater trochanter.		

2-4. AXIOLATERAL HIP (TRAUMA)







THE ORDER OF PROCEDURE
AXIOLATERAL HIP (TRAUMA)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** From the greater trochanter to the midsagittal plane of the body.	
c. **Technical Factors:** 10 X 12 (LW) grid cassette. **Note:** For cassette to be parallel to the femoral neck there should be an angle of approximately 55 degrees between the cassette and the lateral aspect of the thigh.		
d. **LM:** Corresponding extremity.		
e. **Patient/Part position:** 1. Patient supine, elevate pelvis 2" if possible 2. Flex and elevate unaffected leg to place thigh nearly vertical (ensure pelvis is not rotated). 3. Place cassette in crease above the iliac crest and adjust parallel to femoral neck. 4. Internally rotate affected leg 15-20. **Do not** rotate if possibility of fracture or pathology exist.		
f. **CR:** CR horizontal perpendicular to film and centered.	g. **SID:** 40"	h. **Collimation:** Collimate to film borders.
i. **Immobilization:** As needed. **Pre-exposure command:** "Don't breath, and don't move."		
j. **Shielding:** Shield without obscuring the part.		
k. **Demonstrates:** lateral view of acetabulum and femoral head, neck and trochanter area.		

Continue with Exercises

EXERCISES: LESSON 2, SECTION I

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (One of the alternative will be selected twice.)

1. _____ AP pelvis.
2. _____ Lateral frog-leg hip.
3. _____ AP hip.
4. _____ Axiolateral hip (trauma) or inferosuperior hip.

a. The acetabulum, femoral head, neck and greater trochanter.

b. The pelvic girdle, L-5, sacrum and coccyx, femoral heads, neck, and greater trochanter.

c. Lateral view of the acetabulum and the femoral head, neck, and trochanter area.

MULTIPLE- CHOICE. For exercises 5-8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. The central ray (CR) for a lateral frog-leg hip is:

   a. Along the midsagittal plane at a point between the ASIS and the greater trochanter.

   b. The mid-femoral neck to the center of the film.

   c. The femoral neck to the center of the film.

   d. A point 2 inches medial and ASIS at a level of the greater trochanter.

6. The technical factor for an AP pelvis is:

   a. 8 x 10 LW grid cassette

   b. 10 x 12 CE B.

   c. 10 x 12 LW B.

   d. 14 x 17 CW B.

7. The technical factor for an AP hip is:

   a. 8 x 10 LW grid cassette

   b. 10 x 12 CE B.

   c. 10 x 12 LW B.

   d. 14 x 17 CW B.

8. The patient and part position for an axiolateral hip (trauma) is the:

   a. Patient partially obliqued toward the affected side, thigh abducted and rotated to make contact with the table; unaffected side supported with foam under the knee; knee of affected side to draw thigh to about 45 degrees and parallel to the table.

   b. Patient supine, unaffected leg flexed and elevated to make contact with table; pelvis not rotated; cassette placed in crease above iliac crest and adjusted parallel to the femoral neck.

   c. Patient in supine position; median plane perpendicular to the film; lower extremeites extended fully with both feet and legs rotated 15 degrees internally.

   d. Patient in supine position; arms at sides or across upper chest; midsagittal plane of patient to center line of film; long axis of feet and lower limb rotated internally 15 to 20 degrees.

9. The CR for an axiolateral hip (trauma) is:

   a. Horizontal perpendicular.

   b. Verticle perpendicular.

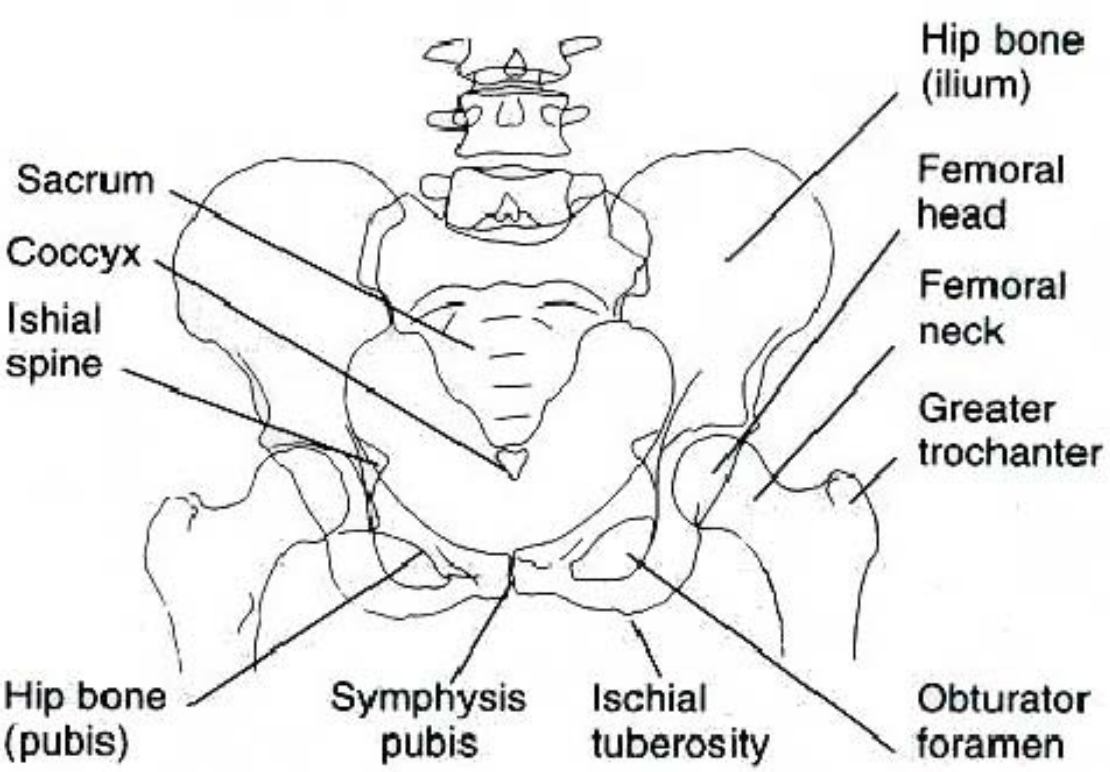
Check Your Answers on Next Page

SOLUTIONS, LESSON 2, SECTION I

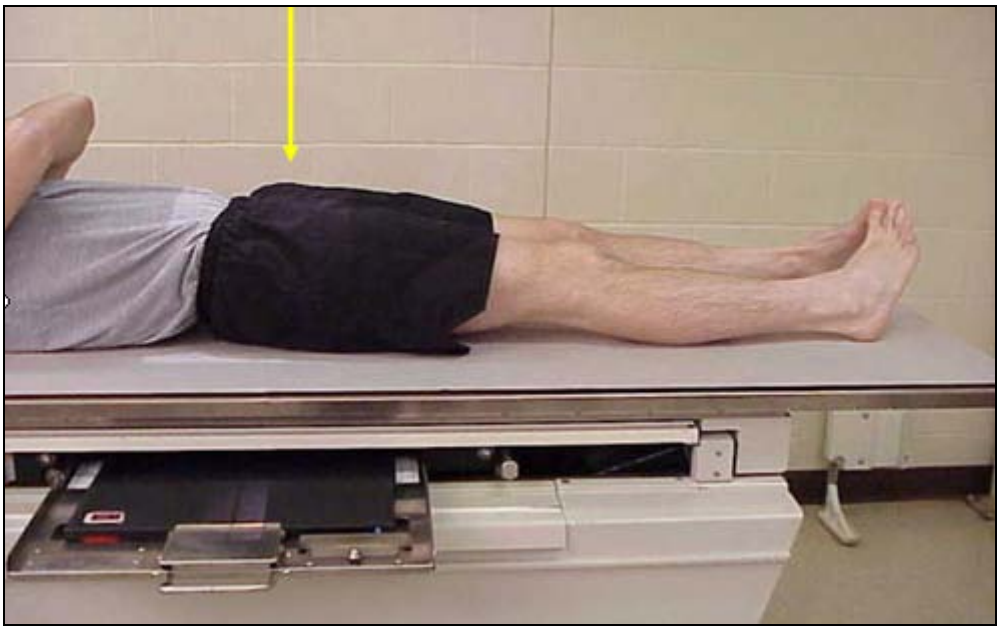
1. b (para 2-1)
2. a (para 2-2)
3. a (para 2-3)
4. c (para 2-4)
5. d (para 2-2)
6. d (para 2-1)
7. c (para 2-3)
8. b (para 2-4)
9. a (para 2-4)

Section II. PROJECTIONS OF THE PELVIS

2-5. ANTERIOR POSTERIOR PELVIS



NOTE: The AP pelvis was covered earlier. It is again repeated here because it may be included as part of either a hip or pelvic routine.



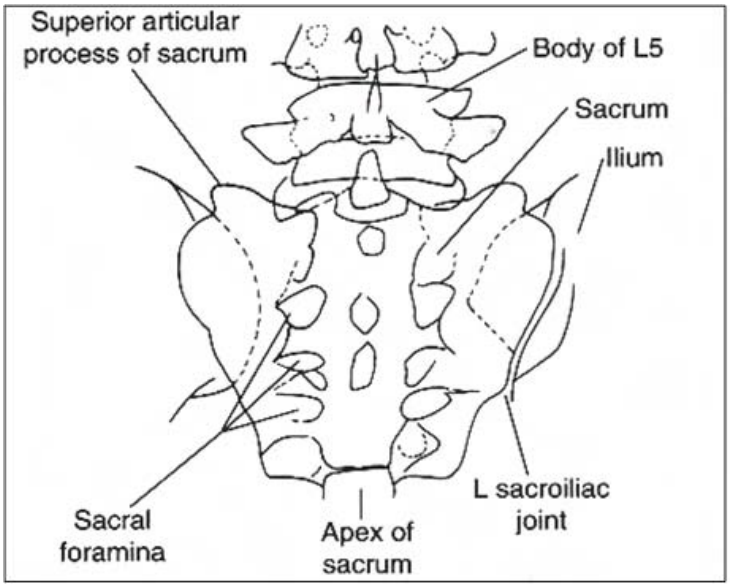
THE ORDER OF PROCEDURE
AP PELVIS

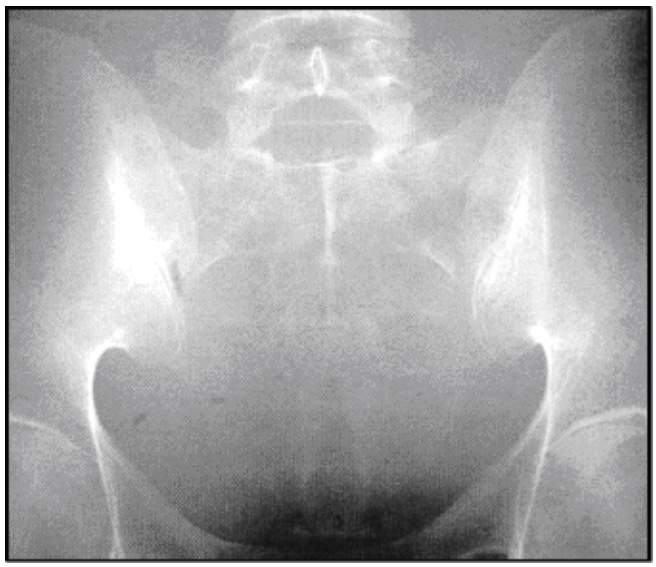
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the ASIS in AP position.	
c. **Technical Factors:** 14 X 17 (CW) bucky.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient supine, arms at sides or across upper chest provide pillow for head and support under the knees. 2. Align midsaggital plane of patient to center line of table and/or cassette. 3. Insure that pelvis is not rotated. 4. Separate legs and feet, then internally rotate long axis of feet and lower limbs 15 to 20 degrees. 5. Center cassette to entire pelvis by aligning CR and midline of cassette to a point midway between the level of the level of the ASIS and the superior border of the greater trochanter.		
f. **CR:** Perpendicular to film.	g. **SID:** 40"	h. **Collimation:** Collimate to film borders.
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** "Don't move."		
j. **Shielding:** Gonadal shielding should be done on all males of reproductive age. Ovarian shielding on females however is generally not possible without obscuring essential pelvic anatomy.		
k. **Demonstrates:** Pelvic girdle, L5, sacrum and coccyx, femoral heads, necks and greater trochanters.		

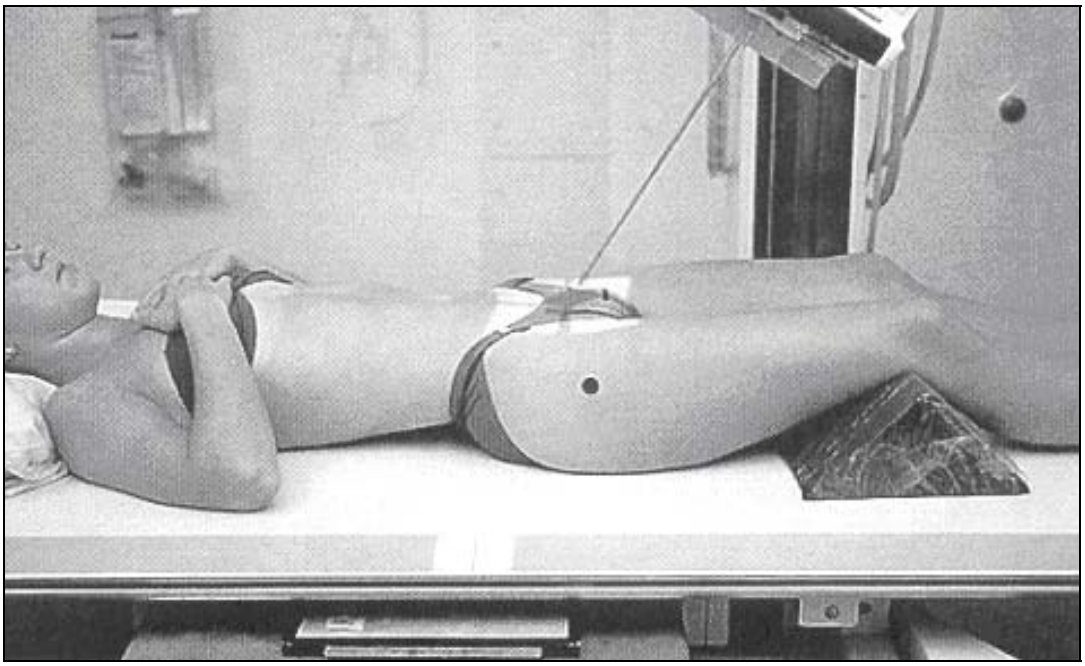
2-6. ANTERIOR POSTERIOR SACRUM

a. **Actions that Give Rise to a Subluxation of the Sacrum.** It is quite common for young soldiers to lift and carry large, heavy pieces of equipment improperly. Should a soldier slip while carrying a heavy item, he may tear the muscles or ligaments, resulting in a subluxation (an incomplete or partial dislocation) of the sacrum. The soldier will be severely limited in his ability to perform and will suffer extreme pain. The medical officer may order radiographs of the sacrum to evaluate this injury. A knowledge of these positions will be essential if you are to produce clinically acceptable radiographs.

b. **A Sacrum Routine.** A routine of the sacrum consists of an AP and lateral sacrum.



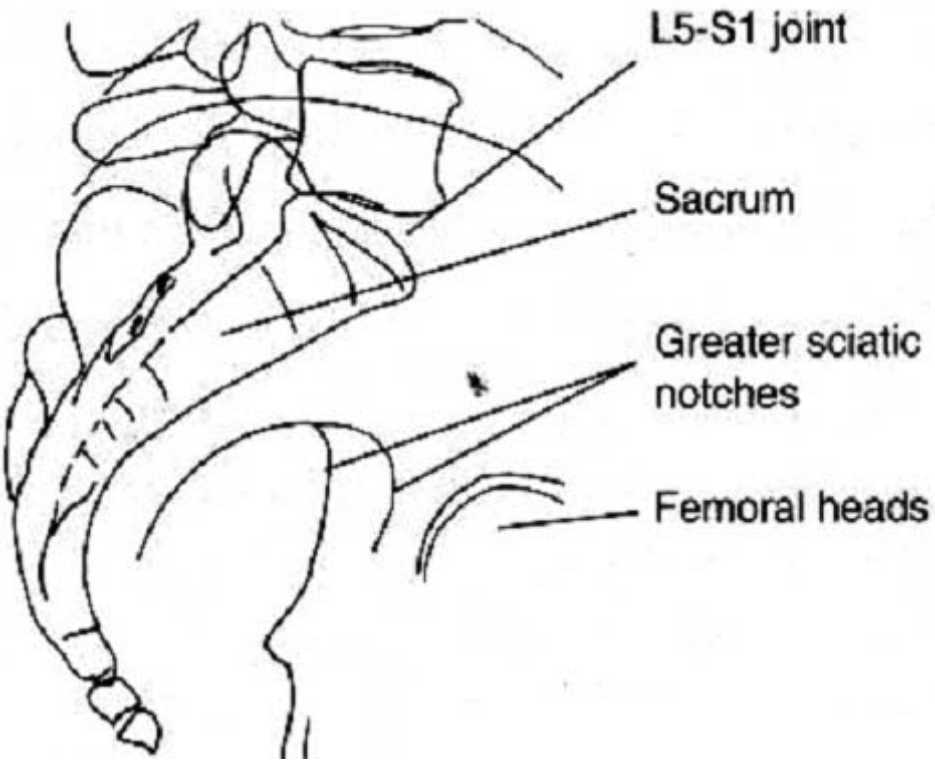


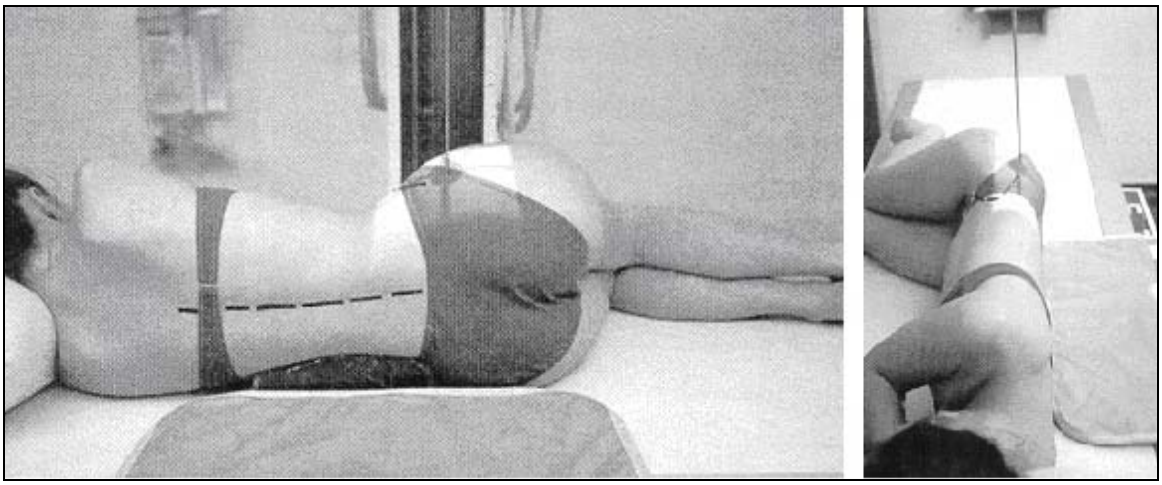


THE ORDER OF PROCEDURE
AP SACRUM

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At a level 2" below the ASIS.	
c. **Technical Factors:** 10 X 12 (LW) bucky.		
d. **LM:** Corresponding side of body within the conefield.		
e. **Patient/Part position:** 1. Patient supine, arms at sides or across upper chest provide pillow for head and support under the knees. 2. Align midsaggital plane of patient to center line of table. 3. Insure that pelvis is not rotated.		
f. **CR:** Angled 15 degrees cephalic to enter at the midsagittal plane midway between the greater trochanter and ASIS.	g. **SID:** 40"	h. **Collimation:** 8 X 8
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** Suspended expiration "Don't move."		
j. **Shielding:** Use gonadal shielding for males, no shielding for females.		
k. **Demonstrates:** Frontal view of sacrum not foreshortened, SI Joints and the L-5 S-1 junction. **NOTE: Urinary bladder should be emptied before beginning this procedure.**		

2-7. LATERAL SACRUM



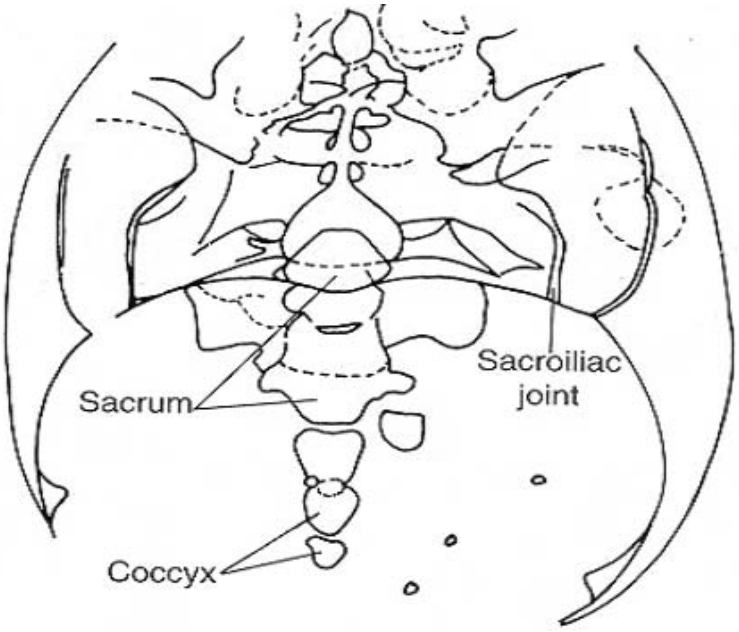


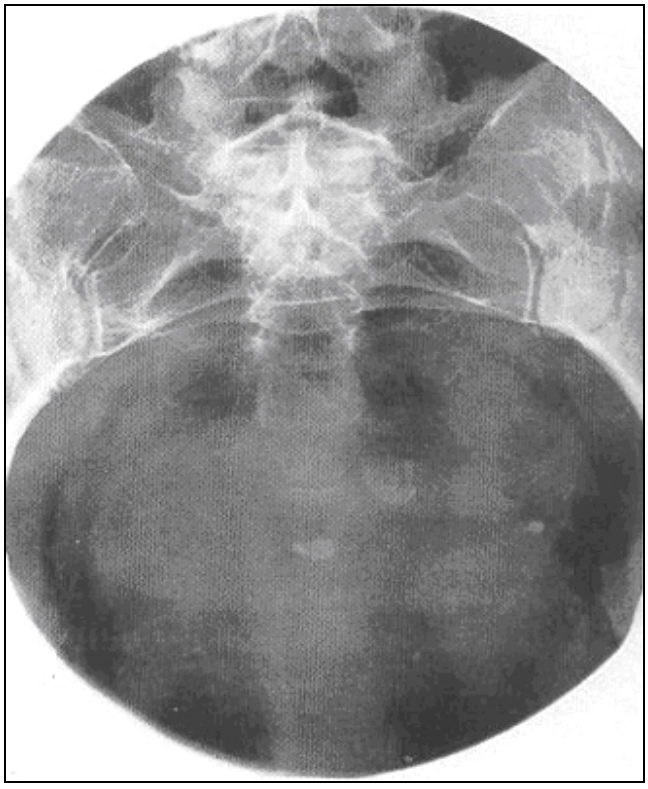
THE ORDER OF PROCEDURE
LATERAL SACRUM

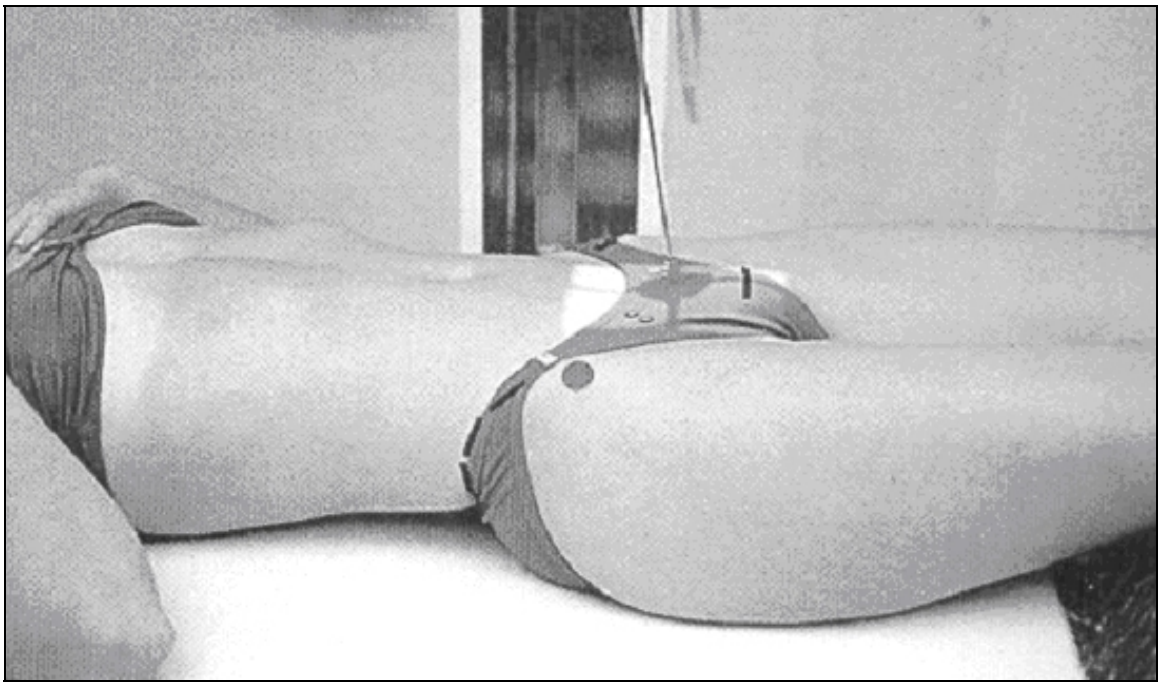
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Laterally at the level of the ASIS.	
c. **Technical Factors:** 10 X 12 (LW) bucky.		
d. **LM:** Corresponding side down.		
e. **Patient/Part position:** 1. Patient is laterally recumbent. 2. Flex hips and knees. 3. Place support under small of waist, and between knees and ankles. 4. Align long axis of sacrum with midline of table and/or cassette.		
f. **CR:** Vertical perpendicular to film, and directed to a point 2 inches anterior to posterior sacral surfaces at level of ASIS.	g. **SID:** 40"	h. **Collimation:** 8 X 8
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** Suspended expiration "Don't move."		
j. **Shielding:** Use gonadal shielding for males, no shielding for females.		
k. **Demonstrates:** Sacrum and L-5-S1 joint in a lateral position.		

2-8. ANTERIOR POSTERIOR COCCYX

A coccyx routine consists of an AP and a lateral coccyx. The coccyx is the only portion of the vertebral column that has no function. It represents the last vestige of a tail, which is why the coccyx is commonly referred to as the tailbone. Injuries to the coccyx usually result from a fall and cause extreme discomfort for the patient.

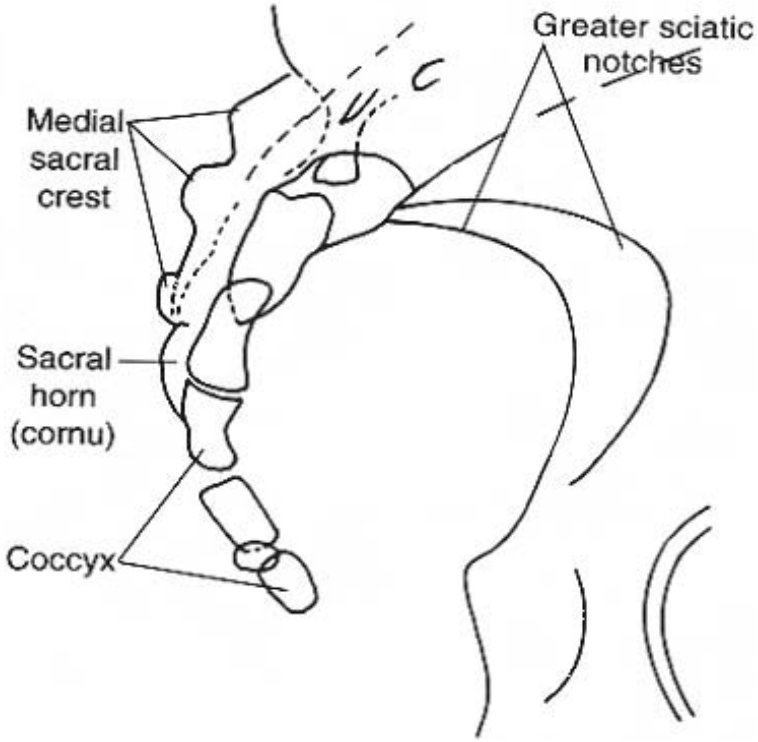


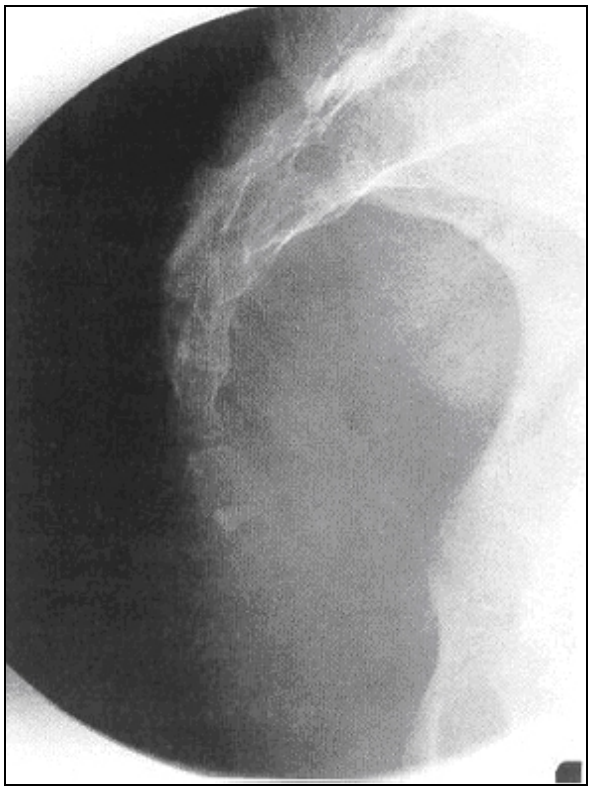


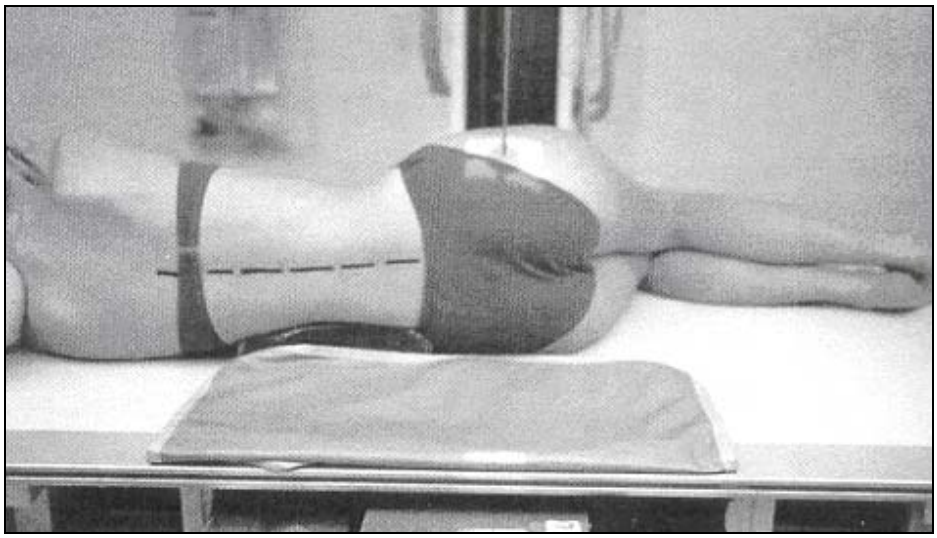


THE ORDER OF PROCEDURE AP COCCYX		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** AP through a level 2 inches below the ASIS	
c. **Technical Factors:** 8 X 10 (LW) bucky.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient supine with legs extended and buttress under knees. 2. Place midsagittal plane over midline of table and or cassette.		
f. **CR:** Angled 10 degrees caudad to enter 2 inches superior to the greater trochanter. Center cassette to CR.	g. **SID:** 40"	h. **Collimation:** 6 X 6
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** Suspended expiration "Don't move."		
j. **Shielding:** Use gonadal shielding for males, no shielding for females.		
k. **Demonstrates:** Coccyx free of self superimposition and superimposition of symphysis pubis.		

2-9. LATERAL COCCYX







THE ORDER OF PROCEDURE
LATERAL COCCYX

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At a level 3 inches below the level of the ASIS.	
c. **Technical Factors:** 8 X 10 (LW) bucky.		
d. **LM:** Corresponding side down.		
e. **Patient/Part position:** 1. Patient is laterally recumbent. 2. Flex hips and knees. 3. Place support under small of waist, and between knees and ankles. 4. Align long axis of coccyx with midline of table and/or cassette. 5. Place pelvis in true lateral position.		
f. **CR:** Vertical perpendicular and centered at a point 2 inches posterior to the coronal plane and 3 inches below the ASIS.	g. **SID:** 40"	h. **Collimation:** 6 X 6
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** Suspended expiration "Don't move."		
j. **Shielding:** Use gonadal shielding for males, no shielding for females.		
k. **Demonstrates:** Anterior angulation of the coccyx in a lateral projection.		

Continue with Exercises

EXERCISES: LESSON 2, SECTION II

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1.	_____ AP sacrum.	a.	A true AP frontal projection of the coccyx.
2.	_____ Lateral sacrum.	b.	A true frontal projection of the sacrum, free of superimpostion or foreshortening.
3.	_____ AP coccyx.	c.	The coccyx in a lateral position.
4.	_____ Lateral coccyx.	d.	A lateral projection of the sacrum.

MULTIPLE- CHOICE. For exercises 5-11, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. What is the appropriate LM for a lateral view of the coccyx?

   a. Corresponding to the side of the injury.

   b. Corresponding extremity.

   c. Corresponding to the side down within the CF.

   d, Corresponding to the side up.

6. For the AP sacrum the CR is angled _____ to show a frontal APO view that is distortion-free.

   a. VP.

   b. HP.

   c. 15 degrees cephalic.

   d. 10 degrees caudad.

7. The proper patient and part position for an APO sacrum or APO coccyx is:

   a. Patient in true lateral recumbent position.

   b. Patient in prone position.

   c. Patient in supine position.

8. The technical factors for an AP and a lateral sacrum is:

   a. 10 x 12 LW NB.

   b. 10 x 12 LW B.

   c. 8 x 10 LW NB.

   d. 8 x 10 LW B.

9. The SID for all the positions discussed in this section is:

   a. 72 inches to the table.

   b. 72 inches to the Bucky.

   c. 40 inches to the table.

   d. 40 inches to the Bucky.

Check Your Answers on Next Page

SOLUTIONS, LESSON 2, SECTION II

1. b (para 2-6)
2. d (para 2-7)
3. a (para 2-8)
4. c (para 2-9)
5. c (para 2-9)
6. c (para 2-6)
7. c (paras 2-6, 2-8)
8. b (paras 2-6, 2-7)
9. d (paras 2-6 through 2-9)

End of Lesson 2

LESSON ASSIGNMENT

LESSON 3 Positioning for Exams of the Trunk.

LESSON ASSIGNMENT Paragraphs 3-1 through 3-12.

LESSON OBJECTIVES After completing this lesson, you should be able to:

3-1. Identify specifications for proper placement of the anatomical structures of the trunk listed below:

Chest, AP.
Chest lateral.
Chest lateral decubitus.

Ribs, AP, above diaphragm.
Ribs, AP, below diaphragm.
Ribs, oblique, above diaphragm.
Ribs, oblique, below diaphragm.

Sternum, RAO.
Sternum, lateral.

Abdomen, AP.
Abdomen, upright.

SUGGESTION After reading and studying the assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

LESSON 3

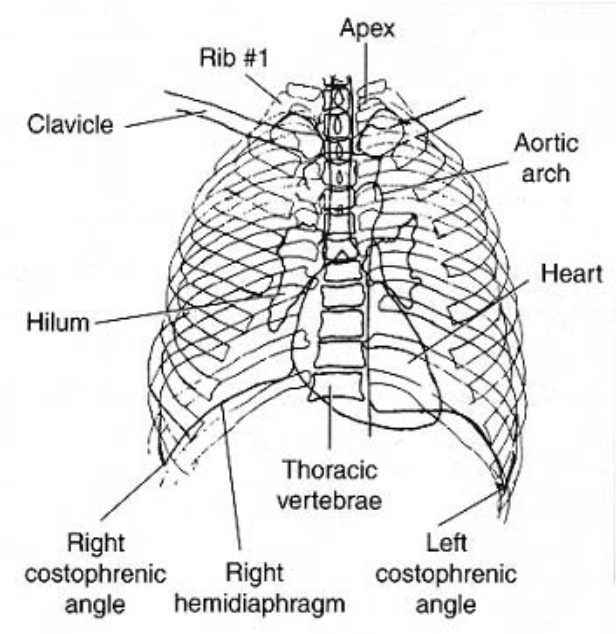
POSITIONING FOR EXAMS OF THE TRUNK

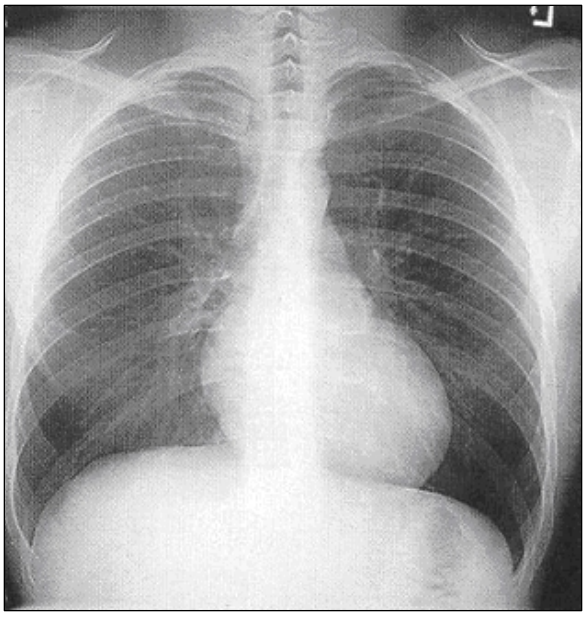
Section I. PROJECTIONS OF THE CHEST

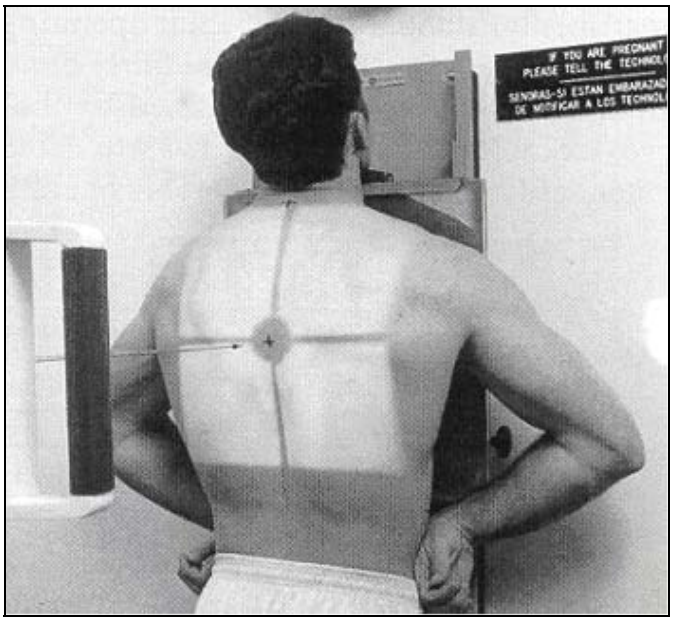
3-1. POSTEROANTERIOR CHEST

a. **Frequency of Chest X-rays.** Chest X-rays, or CXRs as they are commonly called, will comprise a good 60 percent of your workload. Given the number of diseases that can be found or overlooked in the area of the chest cavity, it is imperative that you know and use proper X-ray positioning techniques to consistently produce high-quality radiographs.

b. **Chest Routine**. A chest routine consist of a PA and a lateral chest, with the lateral decubitus chest as an additional view that may required







THE ORDER OF PROCEDURE
PA CHEST

a. **Remove artifacts.** Potential artifacts removed.

b. **Measure part.** Over the shoulder, under the mid-sternum.

c. **Technical Factors:** 14 X 17 (LW) bucky.

d. **LM:** Corresponding side of body.

e. **Patient/Part position:**

1. Patient erect, feet spread slightly, weight equally distributed on both feet.
2. Chin raised, resting against film holder.
3. Hands on lower hip, palms out, elbows partially flexed.
4. Shoulders rotated forward against film holder to allow scapulae to move laterally clear of lung fields.
5. Align midsagittal plane to midline of film holder with equal margins between lateral thorax and sides of film holder.
6. Insure no rotation of thorax.

f. **CR:** Horizontal perpendicular to the film and centered to the midsagittal plane at the level of T-7. (Acromion process 3 in. below upper film border).

g. **SID:** 72"

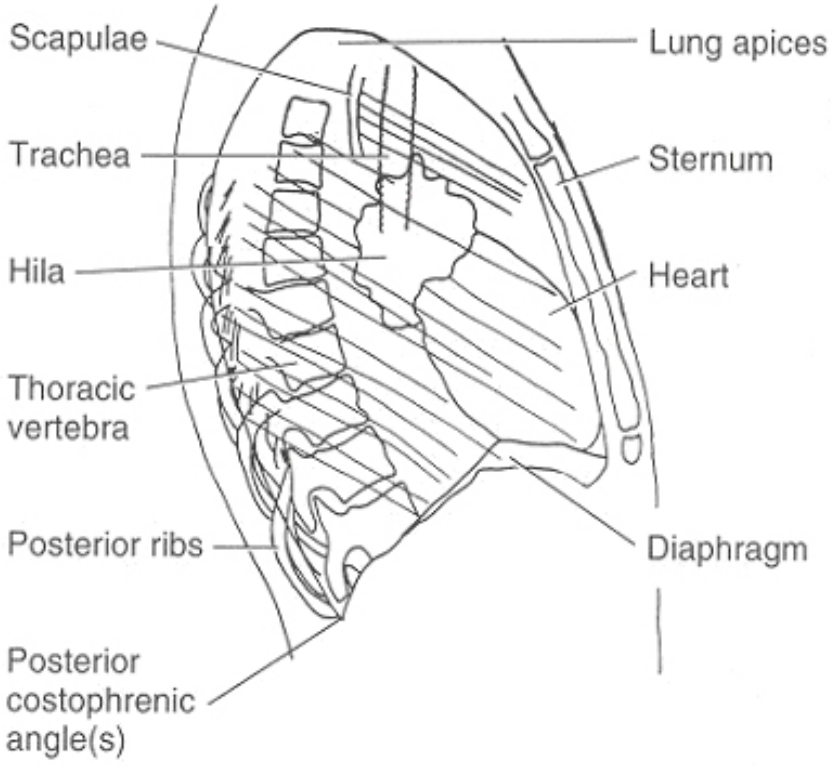
h. **Collimation:** Collimate on four sides to area of lung fields.

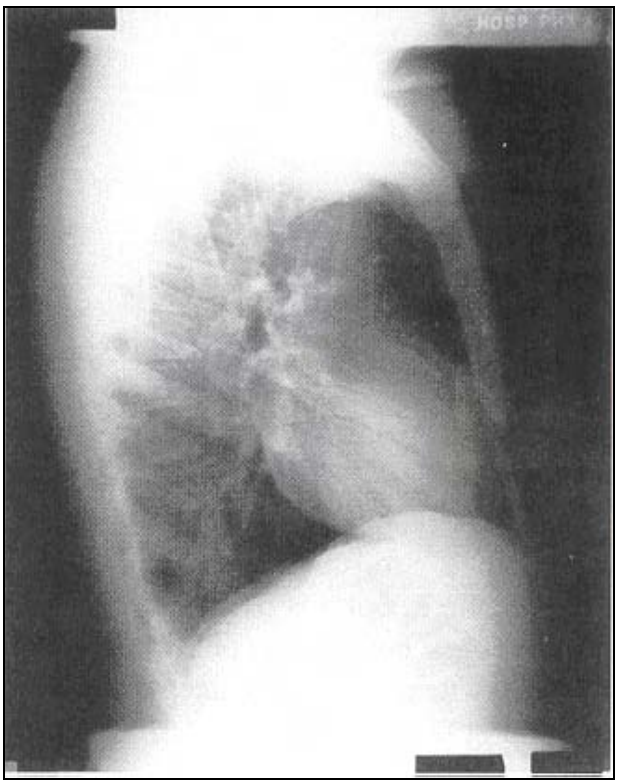
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** Exposure made at end of 2nd full inspiration.

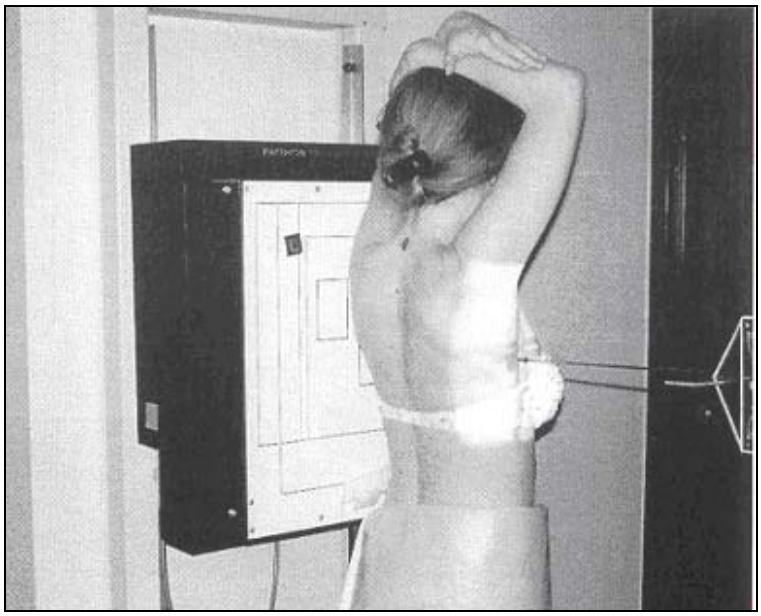
j. **Shielding:** Secure shielding around waist.

k. **Demonstrates:** Lungs, including both apices, air filled trachea, bronchi, heart and great vessels, diaphram to include costophrenic angles, bony thorax.

3-2. LATERAL CHEST







THE ORDER OF PROCEDURE
LATERAL CHEST

a. **Remove artifacts.** Potential artifacts removed.

b. **Measure part.** At the level of the xiphoid process in the lateral position.

c. **Technical Factors:** 14 X 17 (LW) bucky.

d. **LM:** Corresponding to the side against the film.

e. **Patient/Part position:**

1. Patient erect, left side against film.
2. Weight evenly distributed on both feet.
3. Raise arms above head.
4. Center patient to film by checking anterior and posterior aspects of thorax.

f. **CR:** Horizontal perpendicular to the film and centered to the midsagittal plane at the level of T-7. (Acromion process 3 in. below upper film border).

g. **SID:** 72"

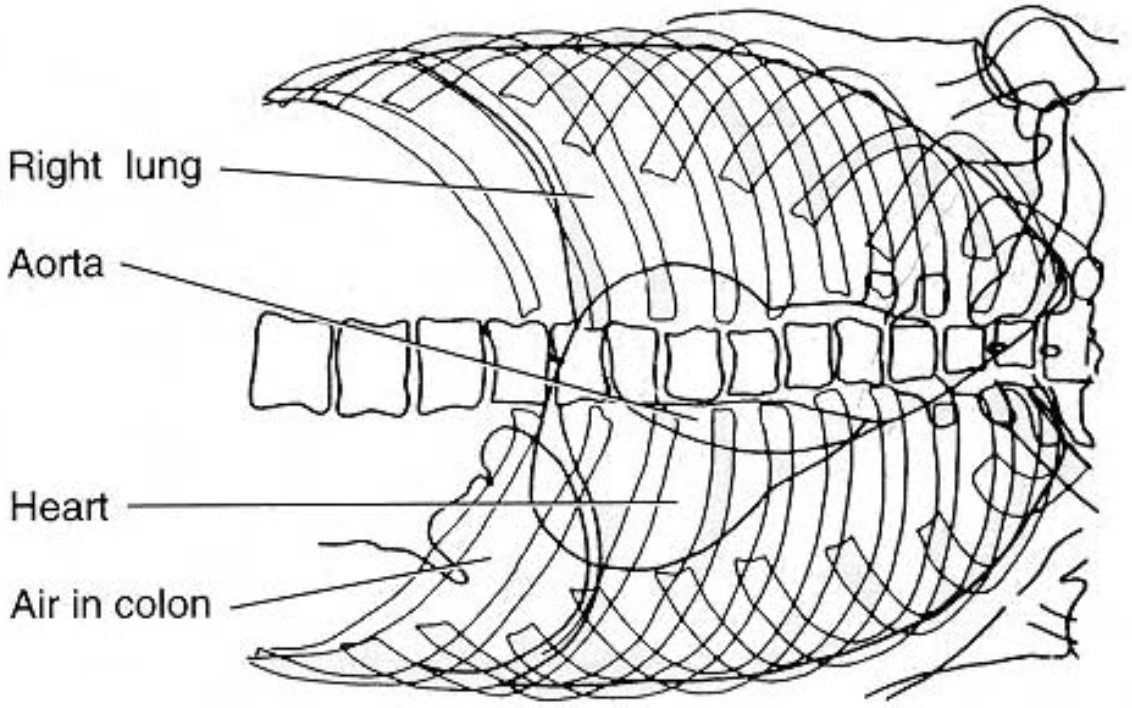
h. **Collimation:** Collimate on four sides to area of lung fields.

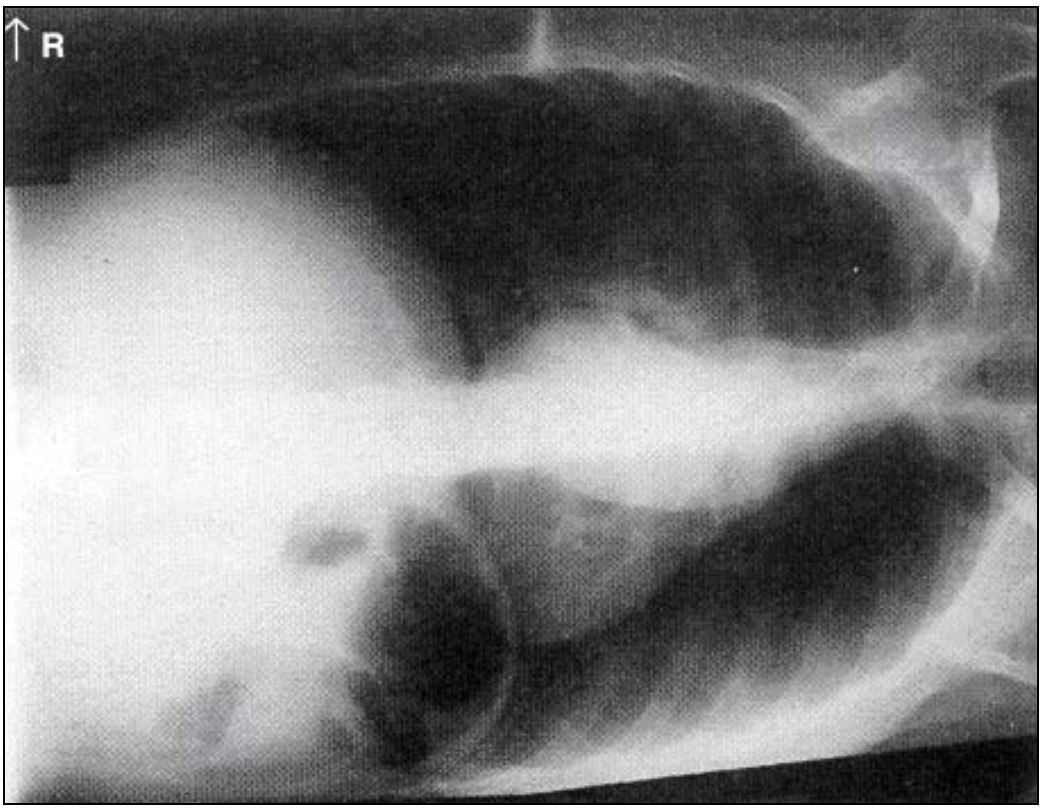
i. **Immobilization:** As needed to hold position. **Pre-exposure command:** Exposure made at end of 2nd full inspiration.

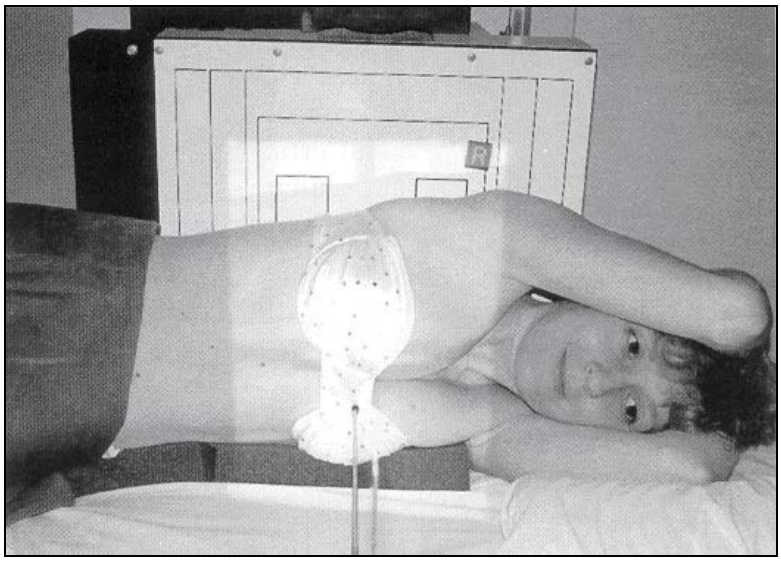
j. **Shielding:** Secure shielding around waist.

k. **Demonstrates:** Lungs, trachea, heart and great vessels, diaphragm including posterior costophrenic angles and bony thorax.

3-3. LEFT LATERAL DECUBITUS CHEST







THE ORDER OF PROCEDURE
LEFT LATERAL DECUBITUS CHEST

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Under the shoulder to the level of the mid-sternum.	
c. **Technical Factors:** 14 X 17 (LW) bucky.		
d. **LM:** Corresponding to the side up with the arrow adjacent to the letter marker.		
e. **Patient/Part position:** 1. Patient lying on left side. 2. Use cardiac board or radiolucent pad under patient. 3. Raise both arms above head to clear lung fields. Place back of patient firmly against film holder. 4. Center patient to film by checking anterior and posterior aspects of thorax. 5. Flex knees slightly and ensure that coronal plane is parallel to film with no body rotation. 6. Adjust height of film holder to center thorax to film. 7. Adjust patient to center midsagittal plane and T7, to CR (top of film is about 2 in. above shoulders).		
f. **CR:** Horizontal Perpendicular, directed to center of film to level of T7, 3 to 4 in. inferior to level of jugular notch.	g. **SID:** 40"	h. **Collimation:** Collimate on four sides to area of lung fields.
i. **Immobilization:** As needed to hold position.	**Pre-exposure command:** Exposure made at end of 2nd full inspiration.	
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Lungs, heart shadow, diaphragm, costophrenic angles, ribs, small pleural effusions (by demonstrating air -fluid levels in the pleural spaces or small amounts of air in the pleural cavity for possible pneumothorax).		

Continue with Exercises

EXERCISES, LESSON 3, SECTION I

MATCHING: For exercises 1 through 3, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____ PA chest.	a. The lungs, trachea, heart, great vessels, diaphragm, posterior costophrenic angles, and bony thorax.
2. _____ Lateral chest.	b. The lungs, apices, costophrenic angles, filled trachea, bronchi, heart, great vessels, diaphragm, and bony thorax.
3. _____ Lateral decubitus chest.	c. The small plural effusions (by demonstrating air-fluid levels in the pleural spaces or small amounts of air in the pleural cavity for possible pneumothorax).

MULTIPLE- CHOICE. For exercises 4-7, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

4. For both the PA chest and lateral chest, the acromion processes are:

   a. Perpendicular.

   b. 2 inches below the lower film border.

   c. 3 inches below the upper film border.

   d. 2 inches from the corresponding film border.

5. The appropriate letter marker for a lateral decubitus chest is corresponding to the side:

   a. Up with the arrow adjacent to the letter marker.

   b. Against the film.

   c. Down.

   d. Away from the film.

6. The proper patient and part position for a PA chest is:

   a. Patient in true lateral recumbent position, knees flexed arms at right angle to body; radiolucent material under lower dorsal region; coronal plane perpendicular to the table.

   b. Patient laterally recumbent, head supported; lying on appropriate side, arms above head; back against film holder; knees and hips flexed; shoulders parallel to film with no rotation.

   c. Patient upright left side against film; median plane parallel to film; weight evenly distributed, part centered.

   d. Patient upright, weight evenly distributed; chin on film holder; hands on hips; shoulder forward; trunk centered.

7. Measurement of the part for an PA chest is done:

   a. Under the shoulder at the mid-sternum.

   b. Over the shoulder and under the mid-sternum.

   c. At the level of the shoulders.

   d. Obliquely through the mid-sternum.

Check Your Answers on Next Page

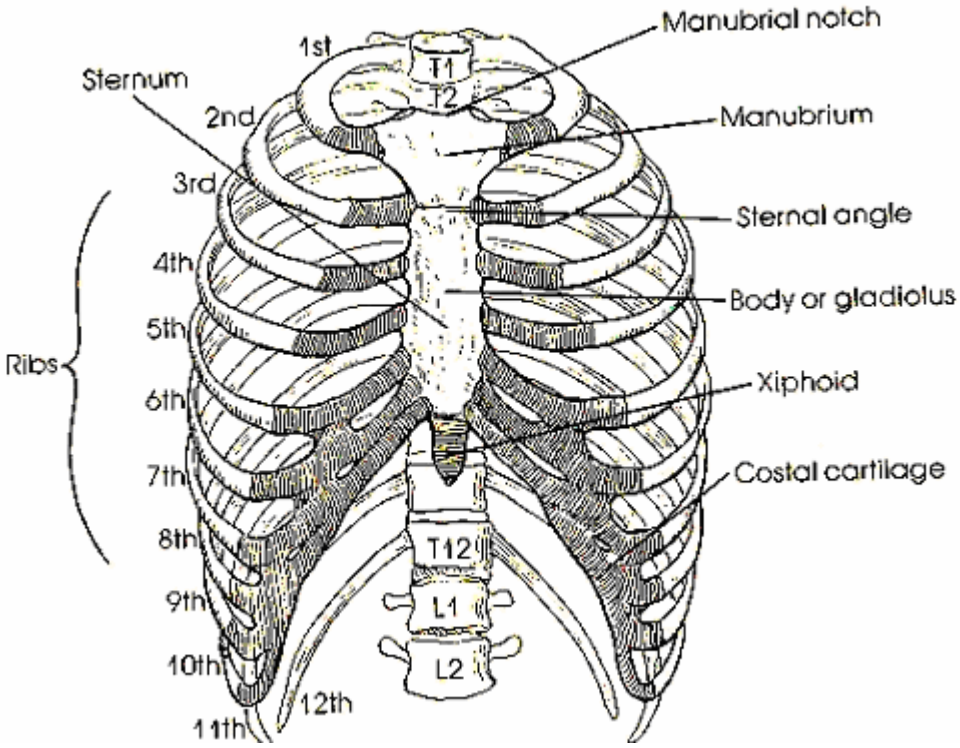
SOLUTIONS, LESSON 3, SECTION I

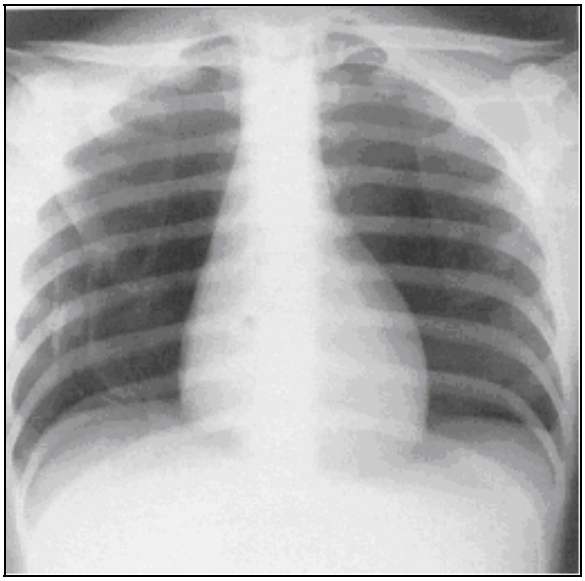
1. b (para 3-1)
2. a (para 3-2)
3. c (para 3-3)
4. c (paras 3-1, 3-2)
5. a (para 3-3)
6. d (para 3-1)
7. b (para 3-1)

Section II. PROJECTIONS OF THE RIBS

3-4. POSTEROANTERIOR RIBS ABOVE DIAPHRAGM

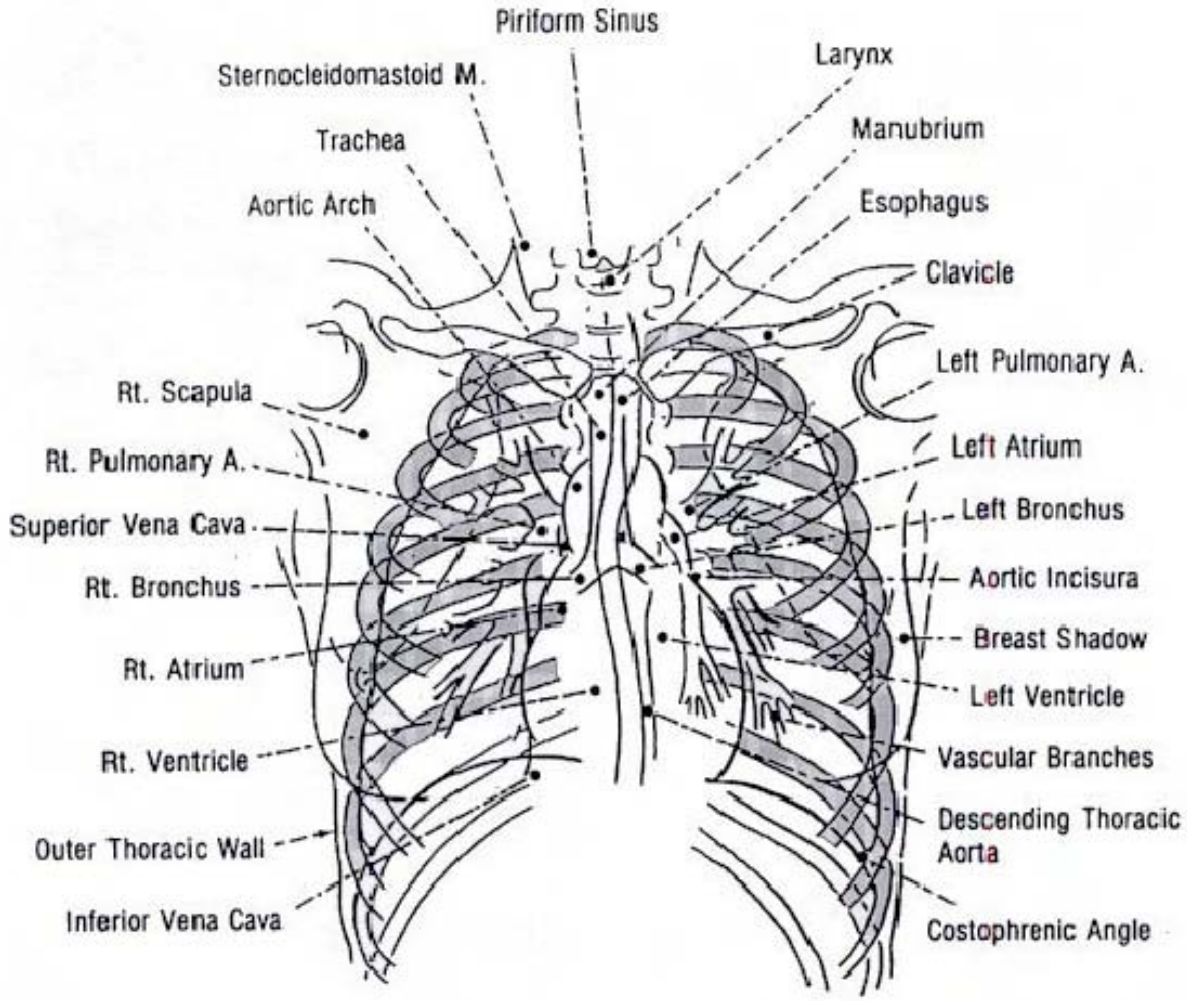
A rib routine consists of a PA or AP rib (above or below the diaphragm), an oblique at the site of injury (anterior or posterior), and a PA chest. While the PA chest is part of the rib routine, it will not be covered, as it was presented earlier. (See paragraph 3-1.)





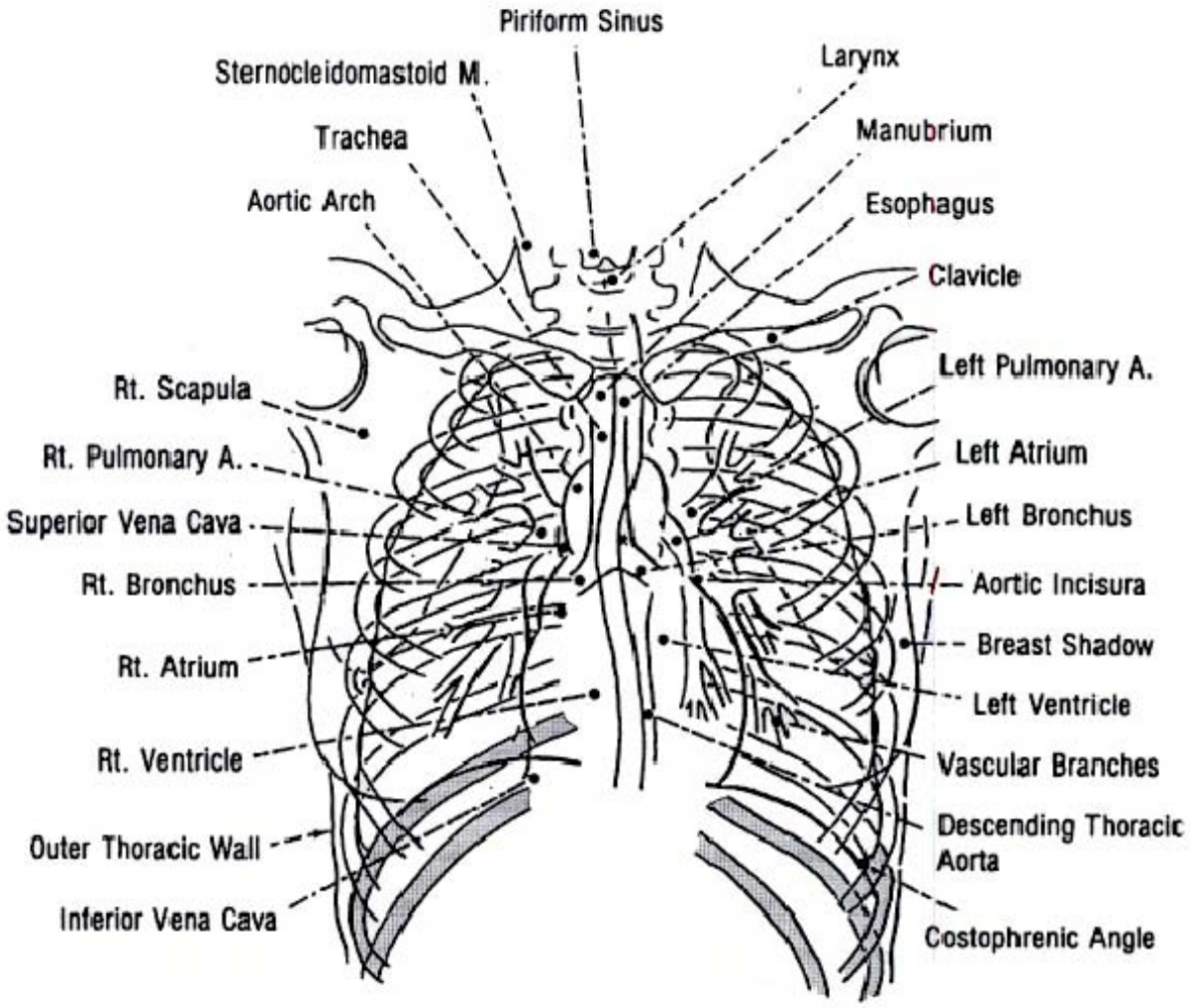
THE ORDER OF PROCEDURE PA RIBS, ABOVE DIAPHRAGM		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At 3-4" below the jugular notch or mid-sternum.	
c. **Technical Factors:** 14 X 17 CW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient erect. 2. Align midsagittal plane to midline of film holder. 3. Rotate shoulders anteriorly to remove scapulae from lung fields. 4. Raise chin to prevent superimposing upper ribs.		
f. **CR:** Perpendicular to film holder. Center CR to cassette (top of cassette should be 1.5 in. above acromion process.)	g. **SID:** 40"	h. **Collimation:** Collimate along lateral margins of thorax, and to upper and lower margins of film.
i. **Immobilization:** None. **Pre-exposure command:** Suspended inspiration.		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Anterior ribs, above the diaphragm.		

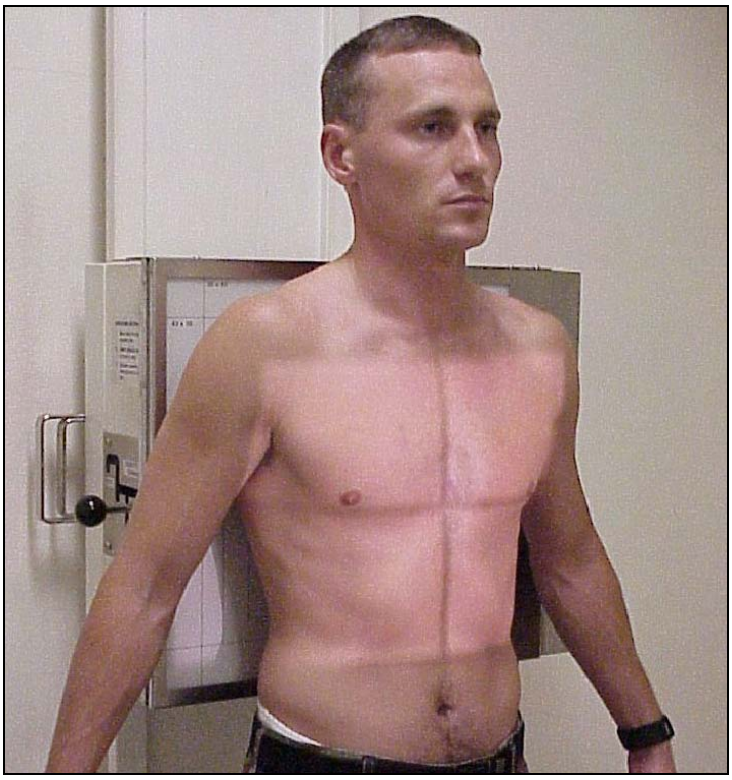
3-5. ANTERIOR POSTERIOR RIBS ABOVE DIAPHRAGM



THE ORDER OF PROCEDURE AP RIBS ABOVE DIAPHRAGM		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At 3-4" below the jugular notch or mid-sternum.	
c. **Technical Factors:** 14 X 17 CW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient erect. 2. Align midsagittal plane to midline of film holder. 3. Rotate shoulders anteriorly to remove scapulae from lung fields. 4. Raise chin to prevent superimposing upper ribs.		
f. **CR:** Perpendicular to film holder. Center CR to cassette (top of cassette should be 1.5 in. above acromion process.)	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of thorax.
i. **Immobilization:** None. **Pre-exposure command:** Suspended inspiration		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Posterior ribs, above the diaphragm.		

3-6. ANTERIOR POSTERIOR RIBS BELOW DIAPHRAGM

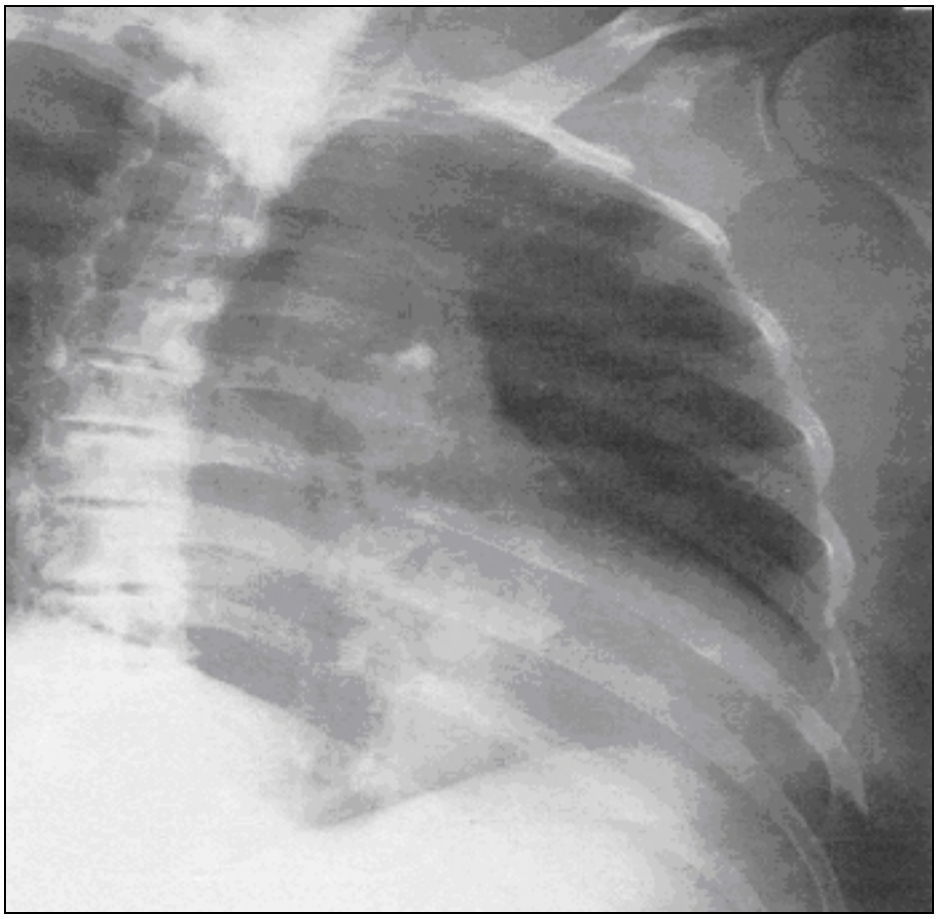


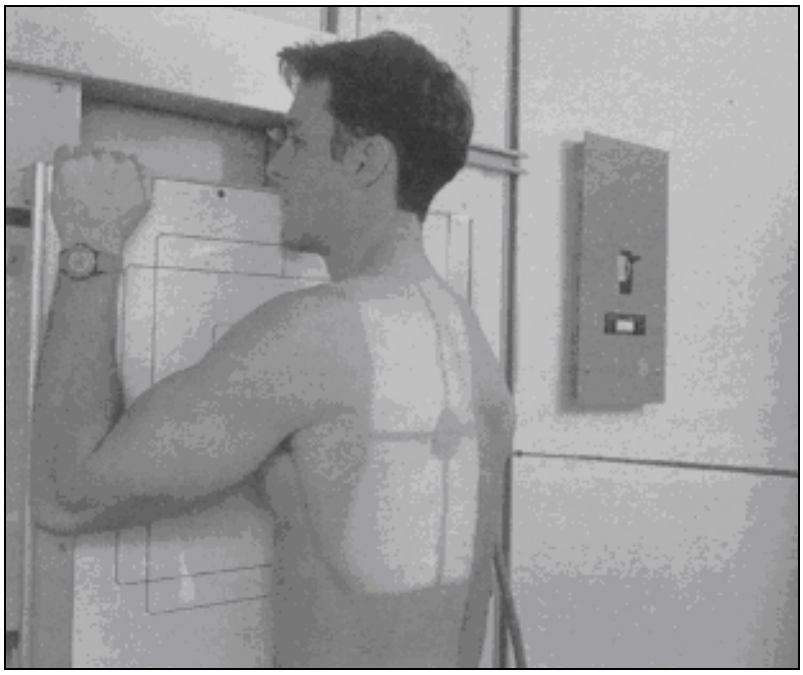


THE ORDER OF PROCEDURE AP BELOW DIAPHRAGM		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the xyphoid process.	
c. **Technical Factors:** 14 X 17 CW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient erect. 2. Align midsagittal plane to midline of film holder. 3. Rotate shoulders anteriorly to remove scapulae from lung fields. 4. Raise chin to prevent superimposing upper ribs.		
f. **CR:** Perpendicular to film holder. Center CR to cassette (bottom of cassette should be at the level of iliac crest.)	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of thorax.
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration.		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Posterior ribs, below the diaphragm.		

3-7. OBLIQUE RIBS, ABOVE DIAPHRAGM

The oblique rib above the diaphragm can be any one of four obliques: an RPO, an LPO, an RAO, or an LAO. Only one of the four obliques, however, is radiographed, and the particular oblique that is selected will depend upon the site of the injury.

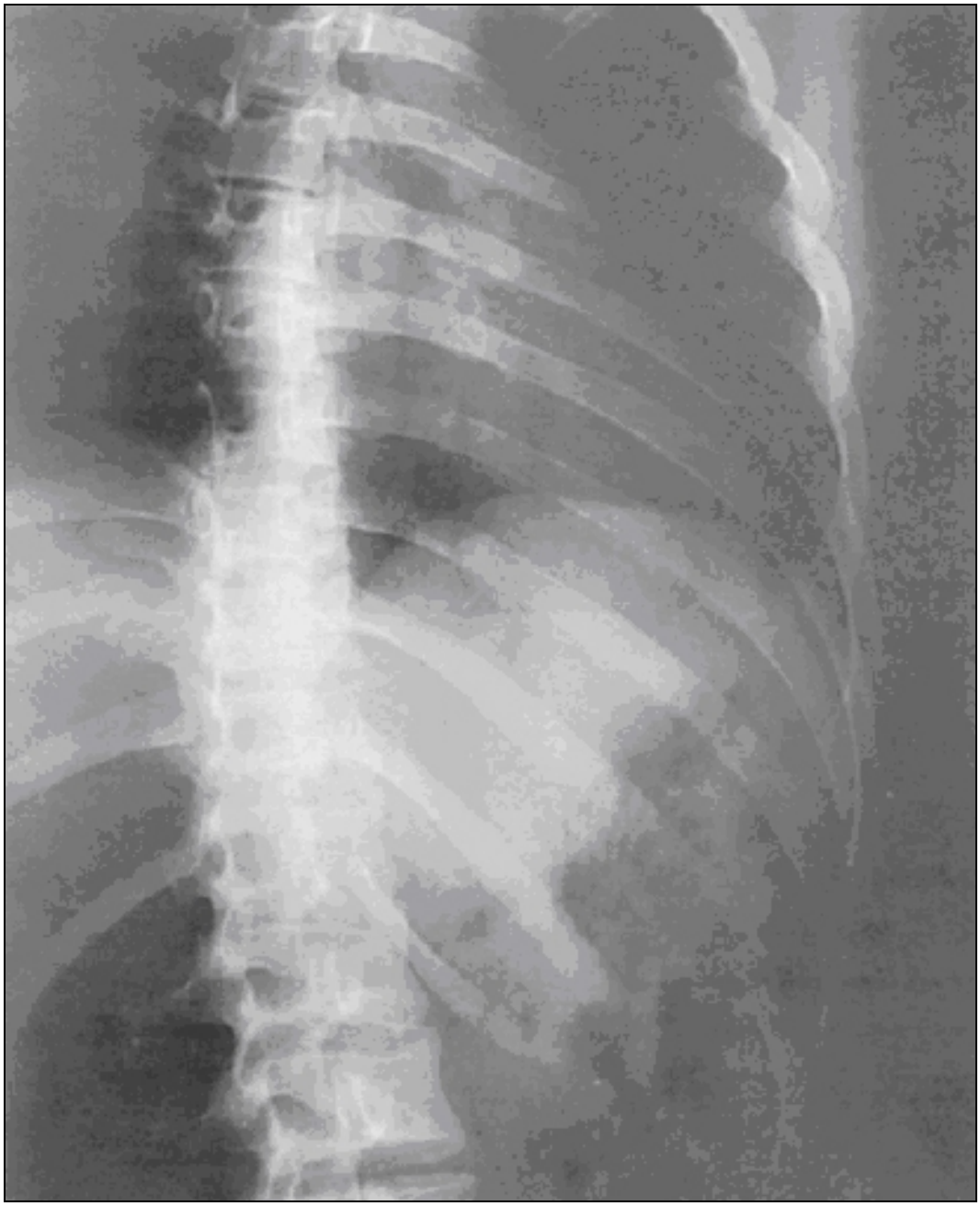




THE ORDER OF PROCEDURE
OBLIQUE RIBS, ABOVE DIAPHRAGM

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At 3-4 inch below the jugular notch with the coronal plane obliqued about 45 degrees.	
c. **Technical Factors:** 14 X 17 LW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient erect. 2. Rotate patient into 45 degree posterior or anterior oblique, affected side closest to the film on posterior oblique; and affected side away from film on anterior oblique. 3. Raise elevated side arm above head; extend opposite arm down and away from thorax. 4. Align a plane of the thorax midway between the spine and the lateral margin of the the thorax on the side of interest to the midline of the table and film.		
f. **CR:** Perpendicular to film holder; centered midway between lateral margin of ribs and spine. **Above diaphragm**: (top of cassette 1.5 in. above acromion process)	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of thorax.
i. **Immobilization:** None. **Pre-exposure command:** Suspended inspiration for above the diaphragm.		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Axillary margins of ribs on the side of interest projected without self-superimposition.		

3-8. OBLIQUE RIBS BELOW DIAPHRAGM



THE ORDER OF PROCEDURE OBLIQUE RIBS, BELOW DIAPHRAGM		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the xyphoid process with the coronal plane obliqued about 45 degrees.	
c. **Technical Factors:** 14 X 17 LW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient erect. 2. Rotate patient into 45 degree posterior or anterior oblique, affected side closest to the film on posterior oblique; and affected side away from film on anterior oblique. 3. Raise elevated side arm above head; extend opposite arm down and away from thorax. 4. Align a plane of the thorax midway between the spine and the lateral margin of the the thorax on the side of interest to the midline of the table and film.		
f. **CR:** Perpendicular to film holder; centered midway between lateral margin of ribs and spine. **Below diaphragm**: (bottom of cassette level at the iliac crest)	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of thorax.
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration for below the diaphragm.		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Axillary margins of ribs on the side of interest projected without self-superimposition.		

Continue with Exercises

EXERCISES: LESSON 3, SECTION II

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____ AP ribs, above diaphragm.
2. _____ AP ribs, below diaphragm.
3. _____ Oblique ribs, above diaphragm.
4. _____ Oblique ribs, below diaphragm.

a. Posterior ribs above the diaphragm.
b. Axillary margin of the ribs on the side of interest projected, without self-superimposition.
c. Posterior ribs below the diaphragm.
d. Axillary margin of the ribs on the side of interest projected, without self-superimposition.

MULTIPLE-CHOICE. For exercises 5 through 8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. Which of the following is correct concerning an AP rib above the diaphragm?

   a. Top of the cassette should be 1.5 inches above the acromion process.

   b. A plane through the iliac crests should be even with the lower film border.

   c. Top of the cassette should be 1.5 inches below the acromion process.

   d. The acromion processes should be even with the upper film border.

6. When rotating the coronal plane 45 degrees posterior for a posterior oblique rib (above or below the diaphragm), the affected side must be:

   a. Away from the film.

   b. Closest to the film.

   c. Centered to the film.

   d. Labeled with the corresponding letter marker.

7. The proper patient and part position for a PA rib, above or below the diaphragm, is:

   a. Patient in true lateral recumbent position, knees flexed arms at right angle to body; radiolucent material under lower dorsal region; coronal plane perpendicular to the table.

   b. Patient supine, midsagittal plane perpendicular to the table.

   c. Patient erect; spine rotated 45 degrees posterior or anterior; arms away form the thorax; trunk centered.

   d. Patient erect; median plane to midline of film; shoulders rotated anteriorly; chin raised.

8. What is the breathing technique for rib positions above the diaphragm?

   a. Suspended respiration.

   b. Suspended expiration.

   c. Suspended inspiration.

   d. Normal breathing.

Check Your Answers on Next Page

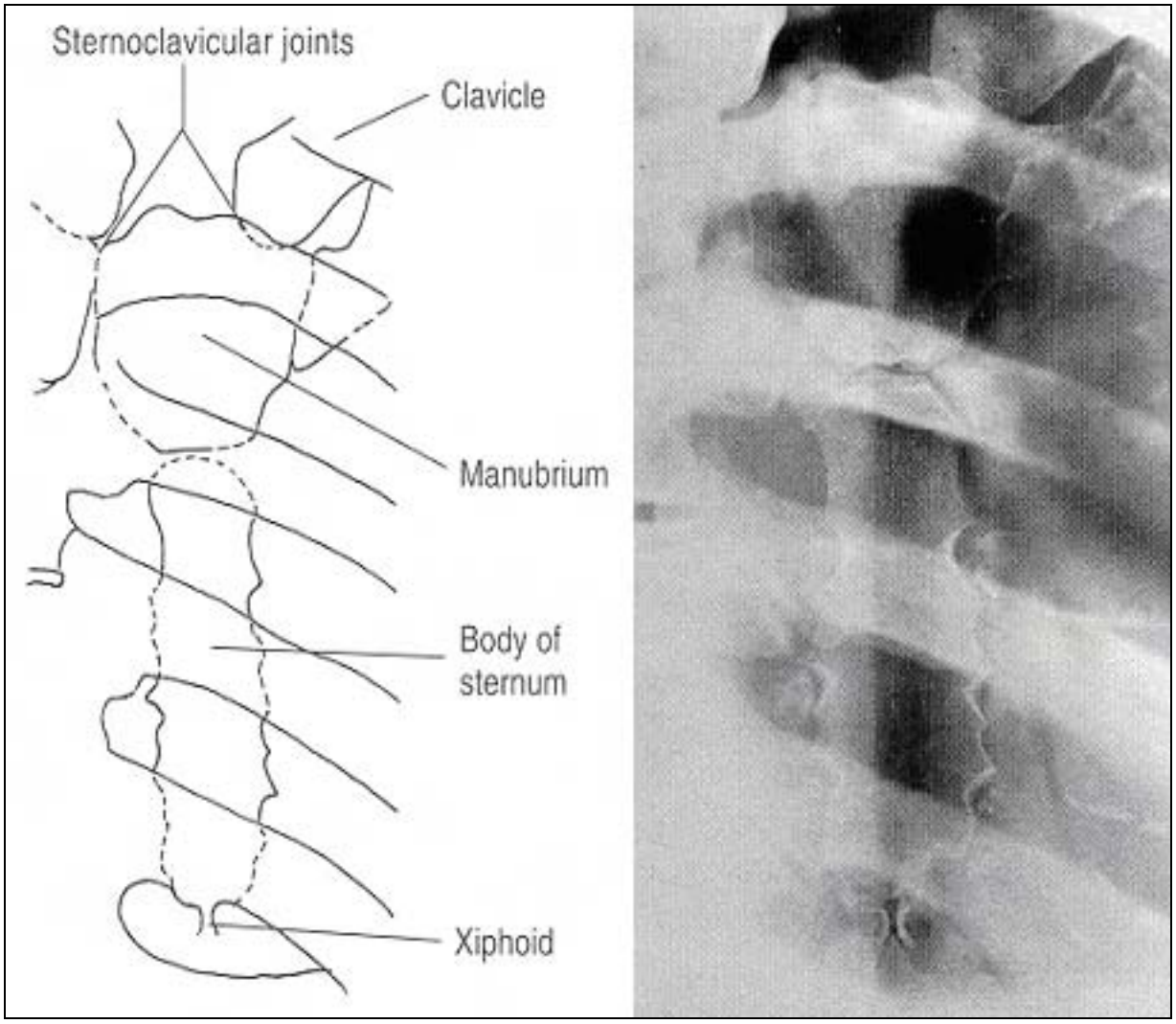
SOLUTIONS, LESSON 3, SECTION II

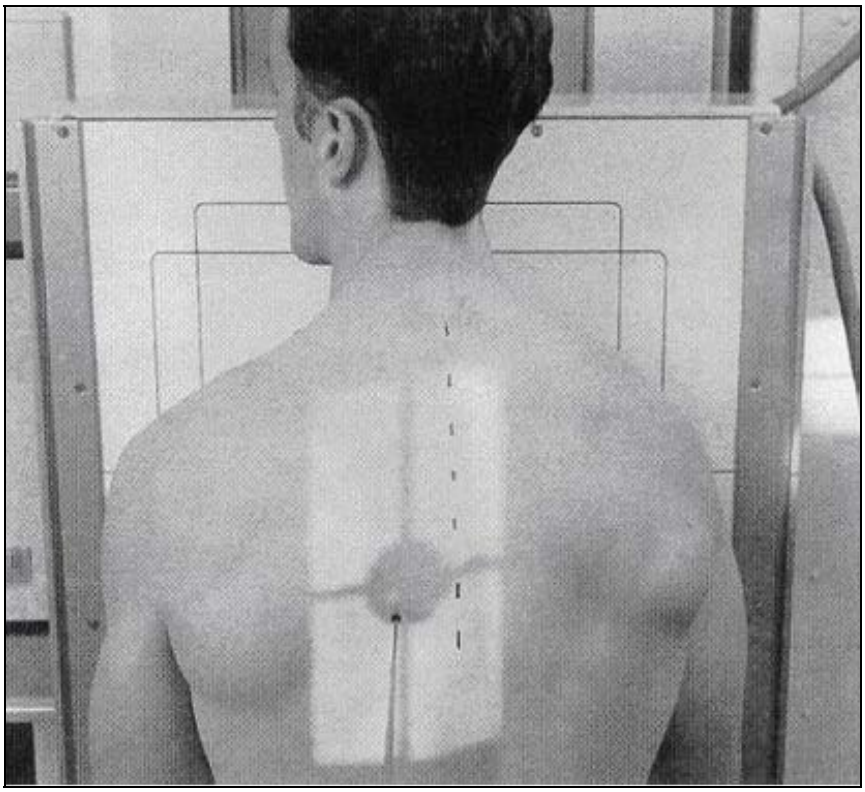
1. a (para 3-5)
2. c (para 3-6)
3. d (para 3-7)
4. b (para 3-8)
5. a (para 3-4)
6. b (paras 3-7, 3-8)
7. d (paras 3-4, 3-5)
8. c (paras 3-4, 3-5, 3-7)

Section III. PROJECTIONS OF THE STERNUM

3-9. RIGHT ANTERIOR OBLIQUE STERNUM

A routine of the sternum consist of a right anterior oblique (RAO) and Lateral sternum.

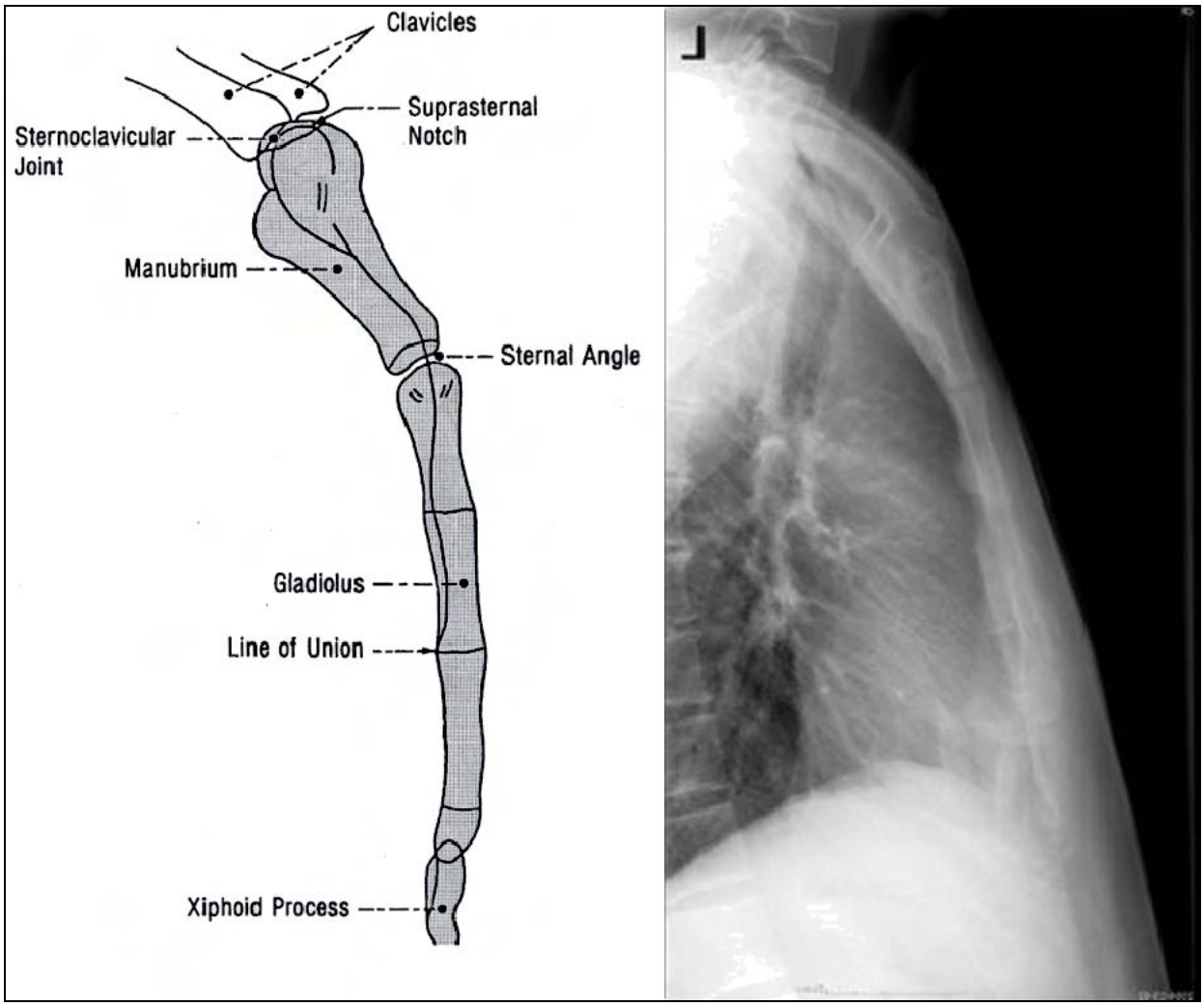


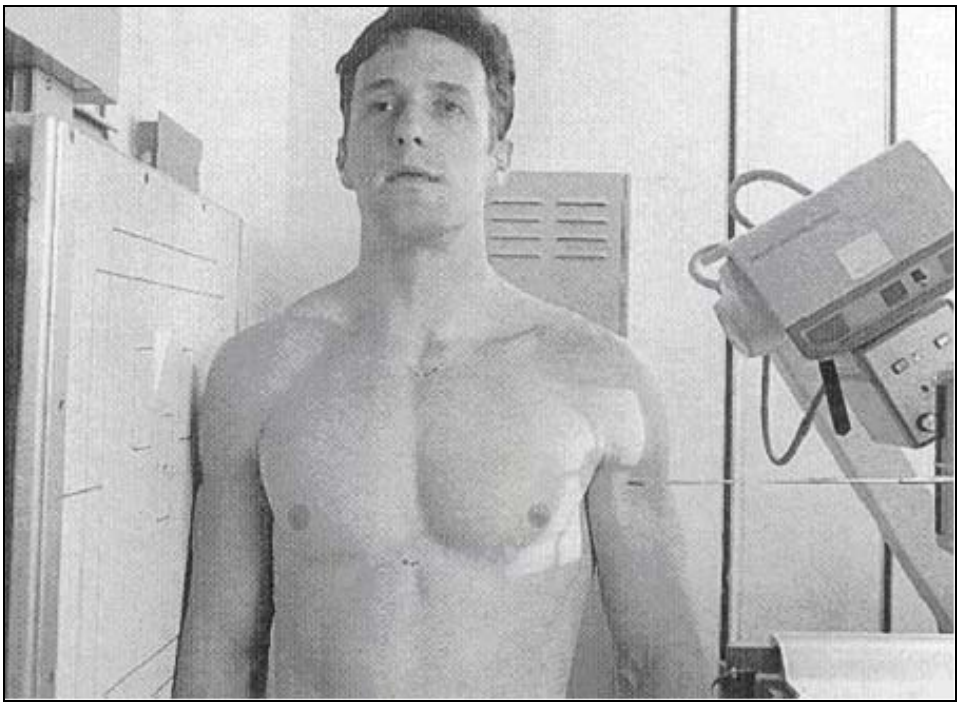


THE ORDER OF PROCEDURE
RAO STERNUM

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Through the mid-sternum.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient erect or prone, depending on patient condition 2. Coronal plan obliqued 15-20 degrees to the right side. NOTE: A thick person requires less obliquity; a thin person, more obliquity. 3. Part centered. 4. Top of cassette 1.5 inches above the jugular notch.		
f. **CR:** Perpendicular to film holder and centered.	g. **SID:** 40"	h. **Collimation:** Collimate to area of sternum.
i. **Immobilization:** None. **Pre-exposure command:** Normal respiration.		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Entire sternum superimposed over heart shadow.		

3-10. LATERAL STERNUM





THE ORDER OF PROCEDURE LATERAL STERNUM		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Through the mid-sternum in the lateral position.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Patient erect. 2. Median plane parallel to the film. 3. The sternum over centerline of film. 4. Shoulders and arms drawn back as far as possible. 5. Top of cassette 1.5 inches above the jugular notch.		
f. **CR:** Perpendicular to film holder and centered.	g. **SID:** 40", or 72inch to reduce magnification.	h. **Collimation:** Collimate to area of sternum.
i. **Immobilization:** None. **Pre-exposure command:** Suspended inspiration.		
j. **Shielding:** Secure shielding around waist.		
k. **Demonstrates:** Entire sternum with minimal overlap of soft tissues.		

Continue with Exercises

EXERCISES, LESSON 3, SECTION III

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____ RAO sternum.
2. _____ Lateral sternum.

a. The entire sternum with minimal overlap of the soft tissues.

b. The entire sternum superimposed over the heart shadow.

MULTIPLE- CHOICE. For exercises 3-8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

3. For a lateral sternum, where is the part measured?

   a. 3 to 4 inches below the jugular notch with the coronal plane obliqued about 45 degrees.

   b. At the level of the jugular notch.

   c. Through the median plane.

   d. At the level of the mid-sternum in the lateral position.

4. The part position for both the RAO sternum and the lateral sternum is:

   a. The jugular notch 1.5 inches below the upper film border.

   b. The upper film border 1.5 inches above the acromion processes.

   c. The iliac crest even with the lower film border.

   d. The jugular notch to the center of the film.

5. The breathing technique for an RAO sternum is:

   a. Suspended respiration.

   b. Normal breathing.

   c. Suspended expiration.

   d. Suspended inspiration.

6. What is the technical factor for the RAO sternum?

   a. 10 X 12 LW B.

   b. 10 X 12 LW NB.

   c. 8 X 10 B.

   d. 8 X 10 NB.

7. The technical factor for the lateral sternum is:

   a. 10 x 12 LW NB.

   b. 10 X 12 LW B.

   c. 8 X 10 LW NB.

   d. 8 X 10 LWB.

8. For a lateral sternum the part position is:

   a. Left side against film; median plane perpendicular to film; weight on both feet.

   b. Median plane to film midline; shoulders rotated anteriorly; chin raised.

   c. Median plane parallel to film; sternum over film centerline; shoulders drawn back.

   d. Patient erect; coronal plane oblique; part centered.

Check Your Answers on Next Page

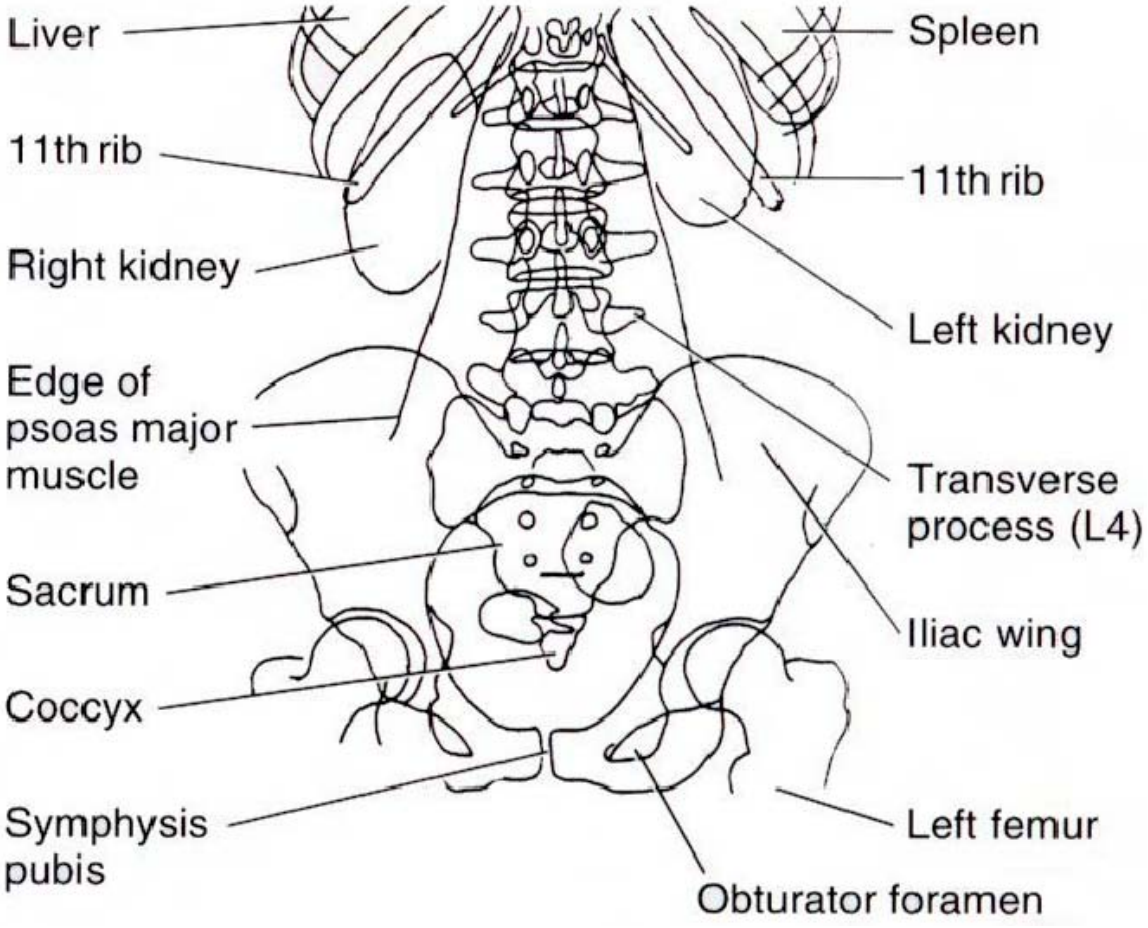
SOLUTIONS, LESSON 3, SECTION III

1. b (para 3-9)
2. a (para 3-10)
3. d (para 3-10)
4. a (para 3-9 and 3-10)
5. b (paras 3-9)
6. a (paras 3-9)
7. b (para 3-10)
8. c (paras 3-10)

Section IV. PROJECTIONS OF THE ABDOMEN

3-11. ANTERIOR POSTERIOR SUPINE ABDOMEN

With its many organs, disease or trauma to the abdominal cavity can cause a variety of complications. Since abdominal injuries are painful and potentially life-threatening, the physician will often order abdominal radiographs as the first step in the diagnostic process. It is, therefore, imperative that you have a thorough knowledge of positional information in order to properly demonstrate an abdomen. You must produce diagnostic radiographs the first time so the patient will receive as little radiation exposure as possible, especially to the reproductive organs.

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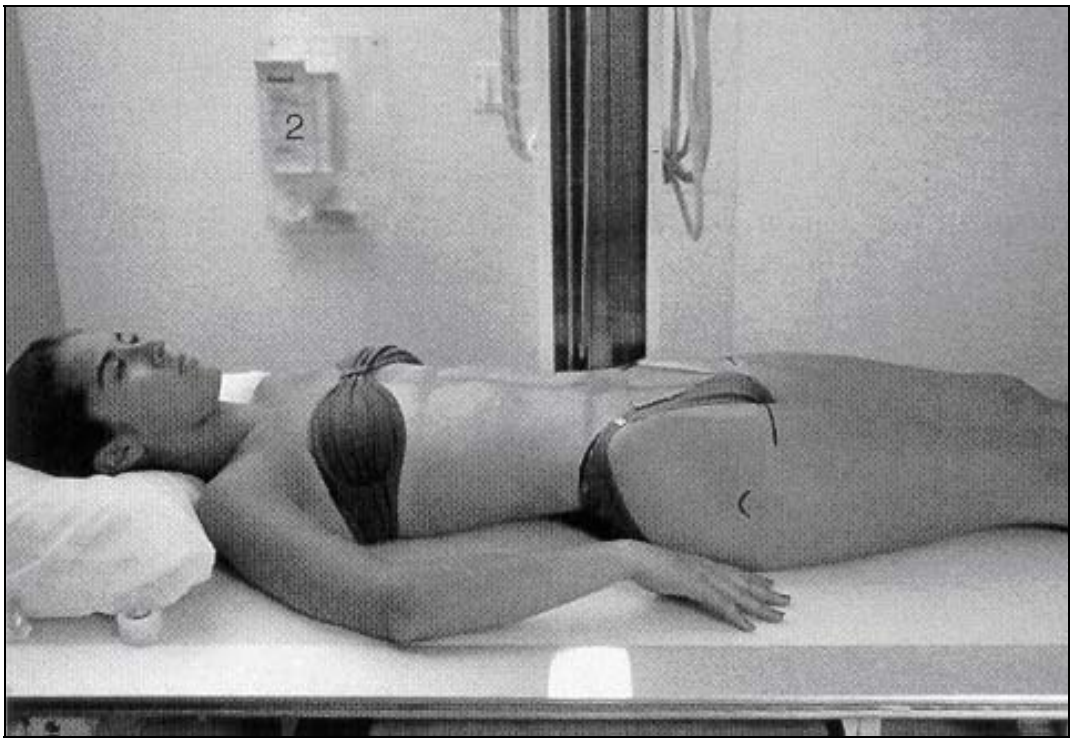
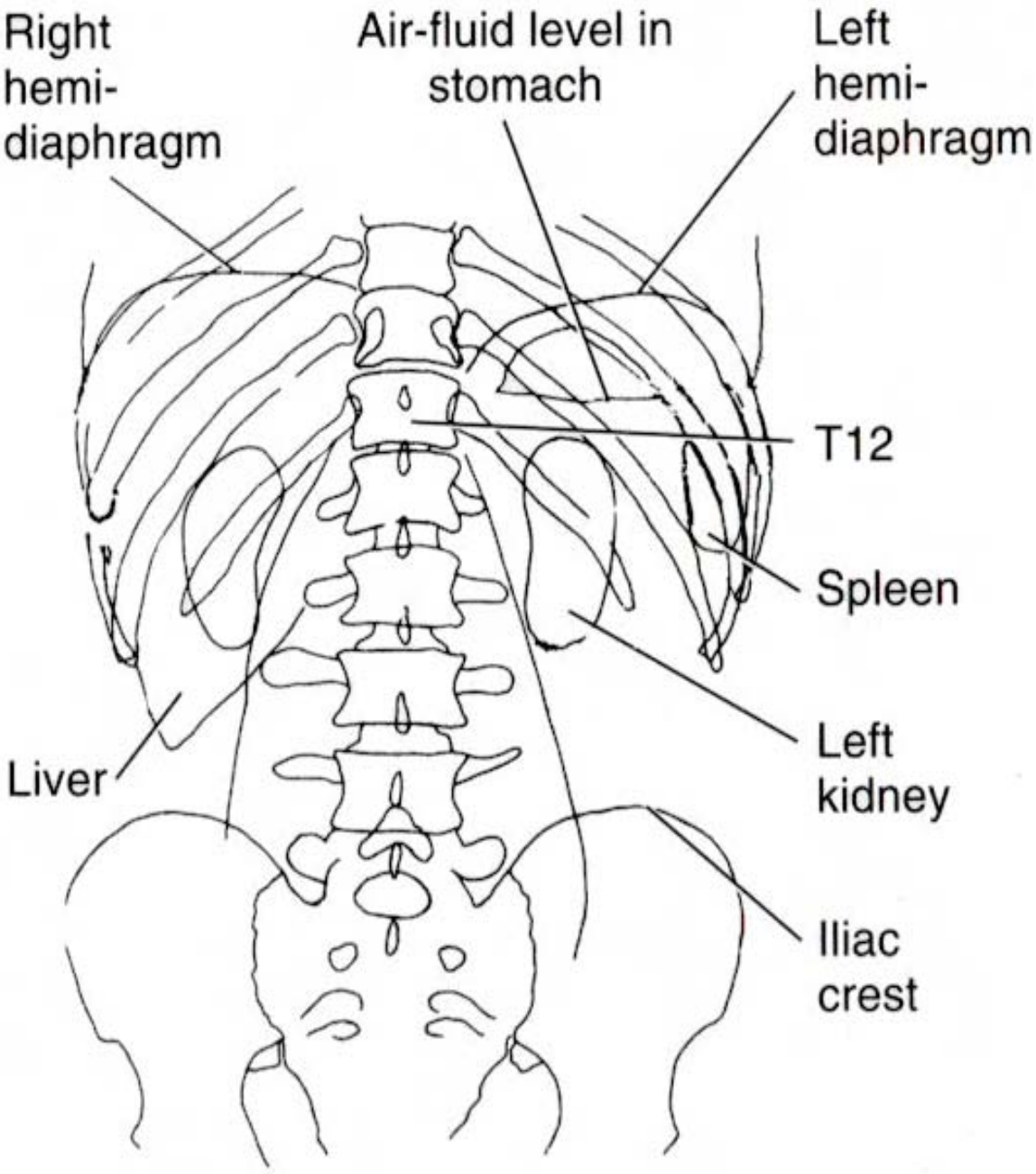
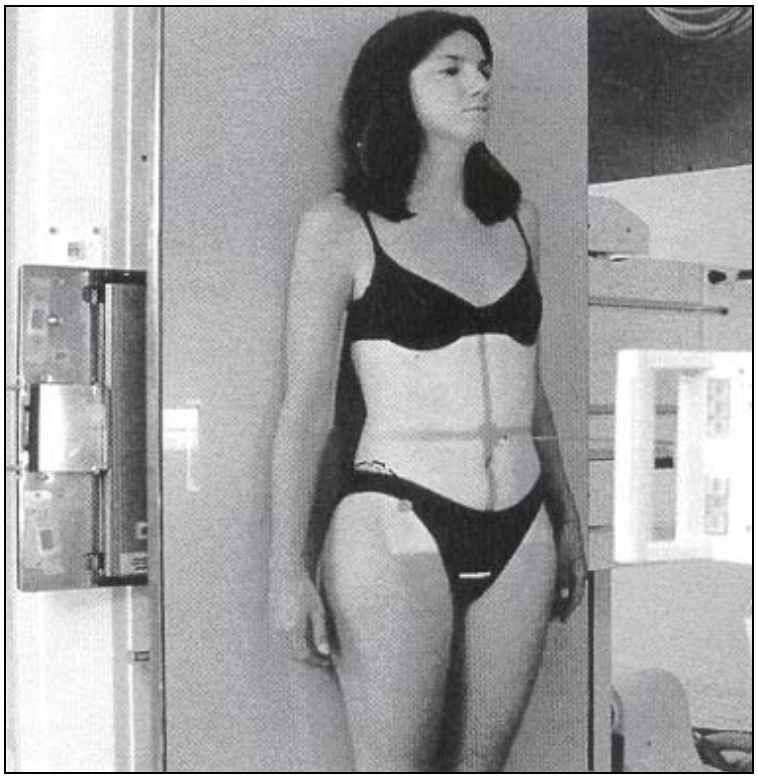


THE ORDER OF PROCEDURE AP SUPINE ABDOMEN (KUB)		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the umbilicus.	
c. **Technical Factors:** 14 X 17 LW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient supine with arms placed at sides, away from body. Provide pillow for head. 2. Midsagittal plane centered to midline of table and/or cassette. 3. Legs extended with support under knees. 4. Center of cassette to level of iliac crest, with bottom margin at pubic symphysis.		
f. **CR:** Perpendicular to film holder and centered.	g. **SID:** 40"	h. **Collimation:** Collimate closely on all four sides.
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration.		
j. **Shielding:** Use gonadal shields if directed by physician. May obstruct part being demonstrated.		
k. **Demonstrates:** Liver, spleen, kidneys, abnormal masses, calcifications or accumulations of gas, pelvis, lumbar spine, and lower ribs.		

3-12. ANTERIOR POSTERIOR UPRIGHT ABDOMEN

NOTE: The kidneys may drop as much as 5 cm. when the patient is in the upright position.





THE ORDER OF PROCEDURE AP UPRIGHT ABDOMEN		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the umbilicus.	
c. **Technical Factors:** 14 X 17 LW B.		
d. **LM:** Corresponding side with upright marker.		
e. **Patient/Part position:** 1. Patient upright, legs slightly spread, back against table. 2. Arms at sides away from body. 3. Midsagittal plane centered to midline of table and/or cassette. 4. Center of cassette is 2 inches above the iliac crest.		
f. **CR:** Horizontal perpendicular to film holder and centered.	g. **SID:** 40"	h. **Collimation:** Collimate closely on all four sides.
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration.		
j. **Shielding:** Use gonadal shields if directed by physician. May obstruct part being demonstrated.		
k. **Demonstrates:** Liver, spleen, kidneys, abnormal masses, Air-fluid levels, accumulation of gas or free intra-abdominal air.		

Continue with Exercises

EXERCISES, LESSON 3, SECTION IV

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____ AP supine abdomen.

2. _____ AP upright abdomen.

a. The internal viscera, air-fluid levels, free intra-abdominal air.

b. The lungs, apices, costophrenic angles, filled trachea, bronchi, heart, great vessels, diaphragm, and bony thorax.

c. The internal viscera, abdominal masses, lumbar spine.

MULTIPLE- CHOICE. For exercises 3-9, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

3. What is the part position for the AP upright abdomen?

   a. The iliac crest is 2 inches below the center of the film.

   b. The iliac crest is 3 inches above the center of the film.

   c. The iliac crest is to the center of the film.

   d. The iliac crest is at the level of the lower film border.

4. What is the part position for the AP supine abdomen?

   a. The iliac crest is 2 inches below the center of the film.

   b. The iliac crest is 3 inches above the center of the film.

   c. The iliac crest is to the center of the film.

   d. The iliac crest is at the level of the lower film border.

5. The CR for an AP upright abdomen is:

   a. VP.

   b. 72 inches SID.

   c. 10 degrees caudad.

   d. HP.

6. The breathing technique for both the AP upright and the AP supine abdomen is:

   a. Normal breathing.

   b. Suspended expiration.

   c. Suspended inspiration after the second inspiration.

   d. Suspended respiration.

7. The proper part position for an AP supine abdomen is:

   a. The median plane perpendicular and over the centerline of the film; the legs are extended with support under the knees.

   b. The patient upright; the median plane is perpendicular and over the centerline of the film.

   c. The patient upright, left side against film; median plane parallel to film; weight evenly distributed; part centered.

   d. Patient upright, weight evenly distributed; chin on film holder; hands on hips; shoulder forward without raising them; median plane perpendicular to film; trunk centered.

8. The proper patient and part position for an AP upright abdomen is:

   a. The median plane perpendicular and over the centerline of the film; the legs are extended with support under the knees.

   b. The patient upright; the median plane is over the centerline of the film.

   c. The patient upright, left side against film; median plane parallel to film; weight evenly distributed; part centered.

   d. Patient upright, weight evenly distributed; chin on film holder; hands on hips; shoulder forward without raising them; median plane perpendicular to film; trunk centered.

9. Measurement of the part for an AP upright or AP supine abdomen is done:

   a. Under the shoulder at the mid-sternum.

   b. At the level of the xiphoid process in the lateral position.

   c. With the arms above the head.

   d. At the level of the umbilicus.

Check Your Answers on Next Page

SOLUTIONS, LESSON 3, SECTION IV

1. c (para 3-11)
2. a (para 3-12)
3. a (para 3-12)
4. c (para 3-11)
5. d (paras 3-12)
6. b (paras 3-11, 3-12)
7. a (paras 3-11)
8. b (paras 3-12)
9. d (paras 3-11, 3-12)

End of Lesson 3

LESSON ASSIGNMENT

LESSON 4 Positioning for Exams of the Spine.

LESSON ASSIGNMENT Paragraphs 4-1 through 4-15.

LESSON OBJECTIVES After completing this lesson, you should be able to identify:

4-1. Identify specifications for proper placement of the anatomical structures of the spine listed below:

AP thoracic spine.
Lateral thoracic spine.

Lateral cervical spine.
AP C-spine.
AP open mouth C-spine.
RPO or LPO oblique C-spine.
Swimmer's lateral cervico-thoracic spine.

AP lumbar spine.
Lateral lumbar spine.
Lateral sumbosacral articulation.
RPO and LPO lumbar spine.

AP lumbosacral articulation joint.
Lateral lumbosacral articulation joint.

AP axial sacroiliac articulation.
Biliateral posterior oblique.

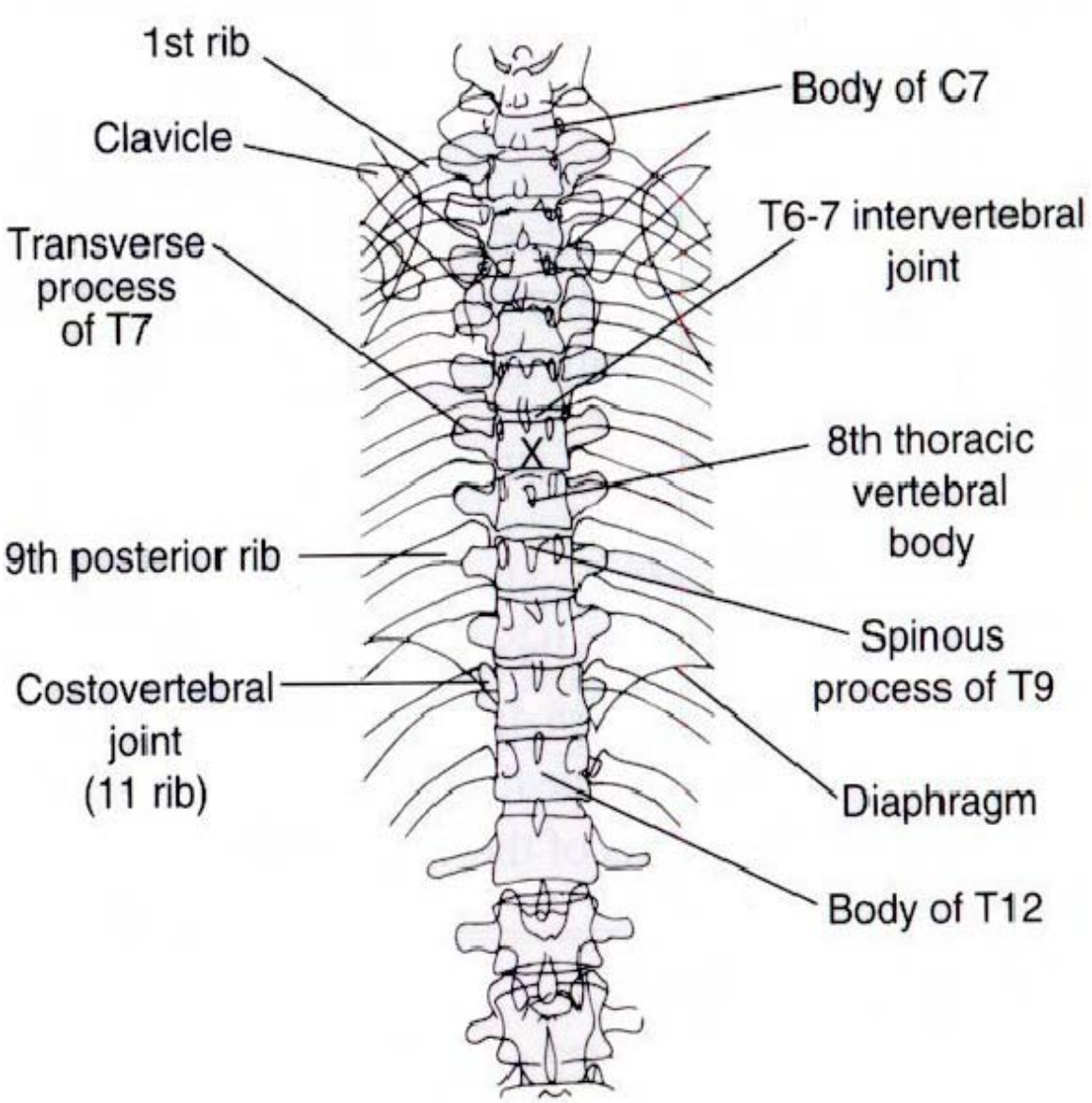
SUGGESTION After reading and studying the assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

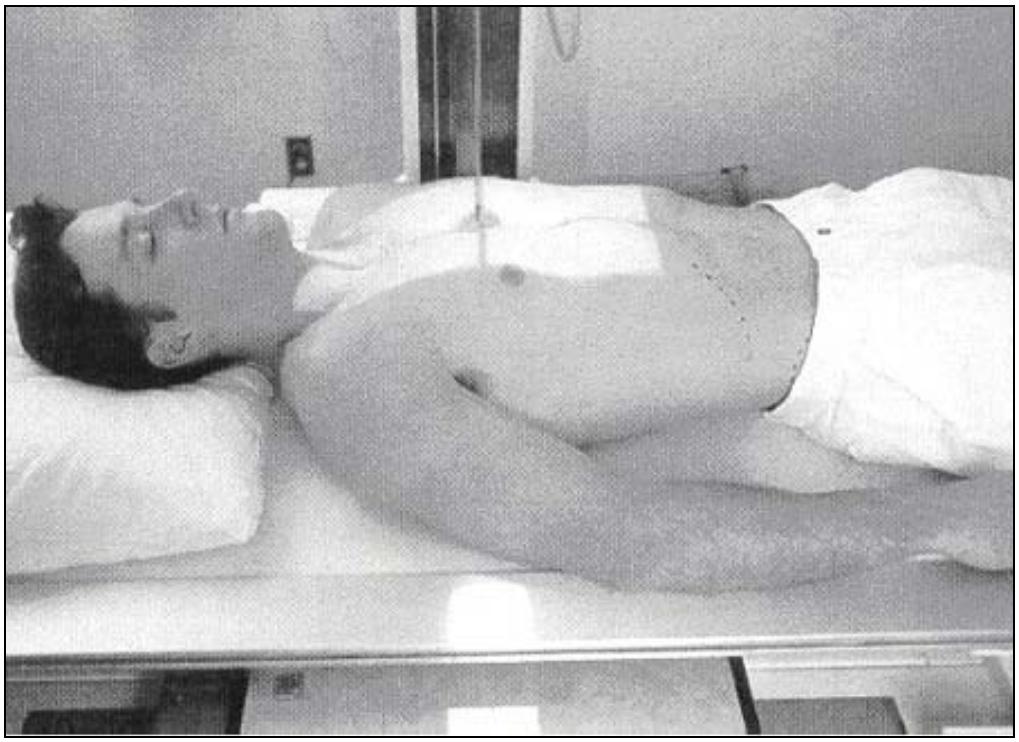
LESSON 4

POSITIONING FOR EXAMS OF THE SPINE

Section I. PROJECTIONS OF THE THORACIC SPINE

4-1. THE ANTERIOR POSTERIOR THORACIC SPINE (T-SPINE)

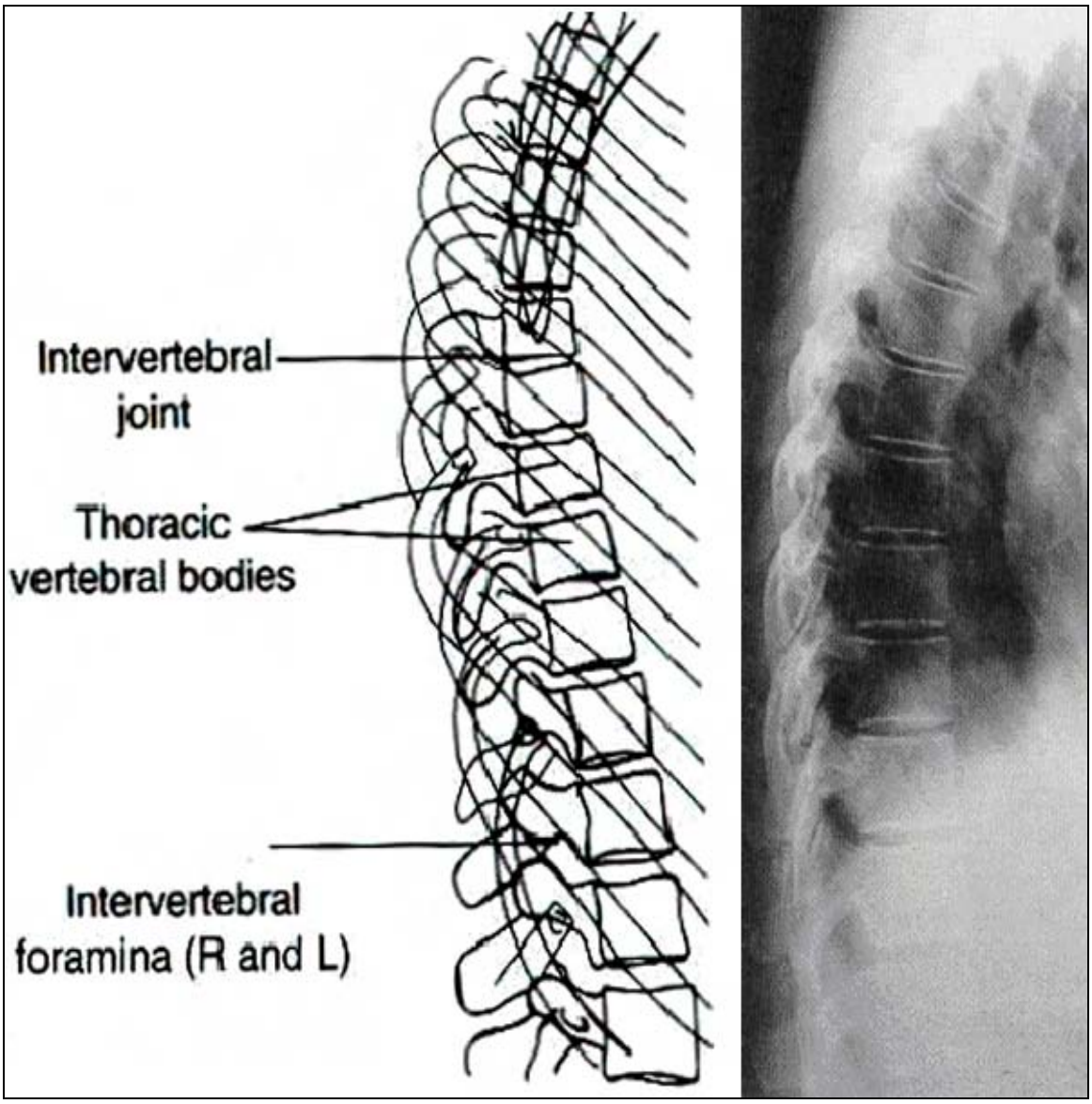


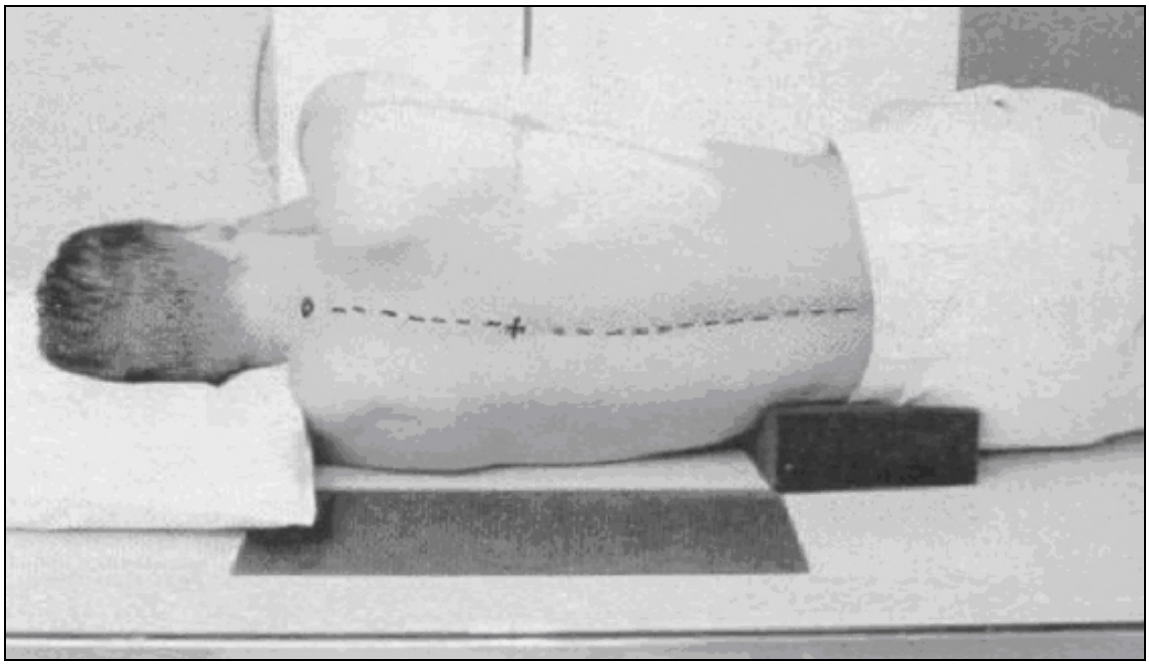


THE ORDER OF PROCEDURE
AP THORACIC SPINE

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the mid-sternum	
c. **Technical Factors:** 14 X 17 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient supine with head at the anode side of the table 2. Head on table or thin pillow with arms at sides of body. 3. Midsagittal plane centered to midline of table. 4. Flex knees and hips with feet flat on table. 5. Assure there is no rotation of the pelvis or thorax.		
f. **CR:** Perpendicular to film holder centered 4 inches below the jugular notch (T7).	g. **SID:** 40"	h. **Collimation:** 7 x 17"
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration.		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** Thoracic vertebral bodies, intervetebral joint spaces, distance between pedicles, spinous processes, posterior ribs, costovertebral articulations		

4-2. THE LATERAL THORACIC SPINE (T-SPINE)





THE ORDER OF PROCEDURE LATERAL THORACIC SPINE		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the mid-sternum in the lateral position.	
c. **Technical Factors:** 14 X 17 LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Patient lateral recumbent. 2. Head on pillow. 3. Align mid-coronal plan to midline of table. 4. Raise arms to right angles to the body with elbows flexed. 5. Support waist so entire spine is parallel to table. 6. Flex hips and knees for stability with support between the knees.		
f. **CR:** Perpendicular to film holder centered 4 inches below the jugular notch, midway between the coronal plan and the posterior surface of the trunk.	g. **SID:** 40"	h. **Collimation:** 7 x 17
i. **Immobilization:** None. **Pre-exposure command:** Normal breathing technique with a 3-4 second exposure.		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** Thoracic vertebral bodies, intervetebral joint spaces.		

Continue with Exercises

EXERCISES, LESSON 4, SECTION I

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____	AP thoracic spine.	a.	Thoracic vertebral bodies, intervertebral joint spaces.
2._____	Lateral thoracic spine.	b.	Thoracic vertebral bodies, intervertebral joint spaces, and spinous processes.

MULTIPLE- CHOICE. For exercises 3-8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

3. What is the appropriate letter marker for a lateral thoracic spine?

   a. Side closest to the cassette.

   b. Corresponding to the side up.

   c. Outside of the conefield so it will not interfere with the part.

4. What is the appropriate letter marker for an AP thoracic spine?

   a. Side closest to the cassette.

   b. Side up.

   c. Corresponding side.

   d. Side down.

5. The technical factor for an AP or a lateral T-spine is:

   a. 14 x 17 LW B.

   b. 14 x 17 LW NB.

   c. 14 x 17 CW.

   d. 14 x 17 CW NB.

6. The conefield for an AP T-spine or a lateral T-spine is:

   a. FFC.

   b. 10 X 17.

   c. 7 X 17 LW.

   d. 5 X 17.

7. The proper patient and part position for an AP thoracic spine is:

   a. Patient in lateral recumbent position, knees flexed, arms at right angles to body, CR perpendicular to film holder.

   b. Patient supine, midsagittal plane perpendicular to the table, legs fully extended but not locked.

   c. Patient supine coronal plane rotated 45 degrees.

   d. Patient suipine, median plane perpendicular and over film centerline, knees flexed, soles of feet on table.

8. The proper patient and part position for a lateral thoracic spine is:

   a. Patient in lateral recumbent position, knees flexed, arms at right angles to body, CR perpendicular to film holder.

   b. Patient supine, midsagittal plane perpendicular to the table, legs extended.

   c. Patient supine coronal plane rotated 45 degrees.

   d. Median plane perpendicular and over film centerline, knees flexed, lower back making contact with the table so as to prevent injury, soles of feet on table.

Check Your Answers on Next Page

SOLUTIONS, LESSON 4, SECTION I

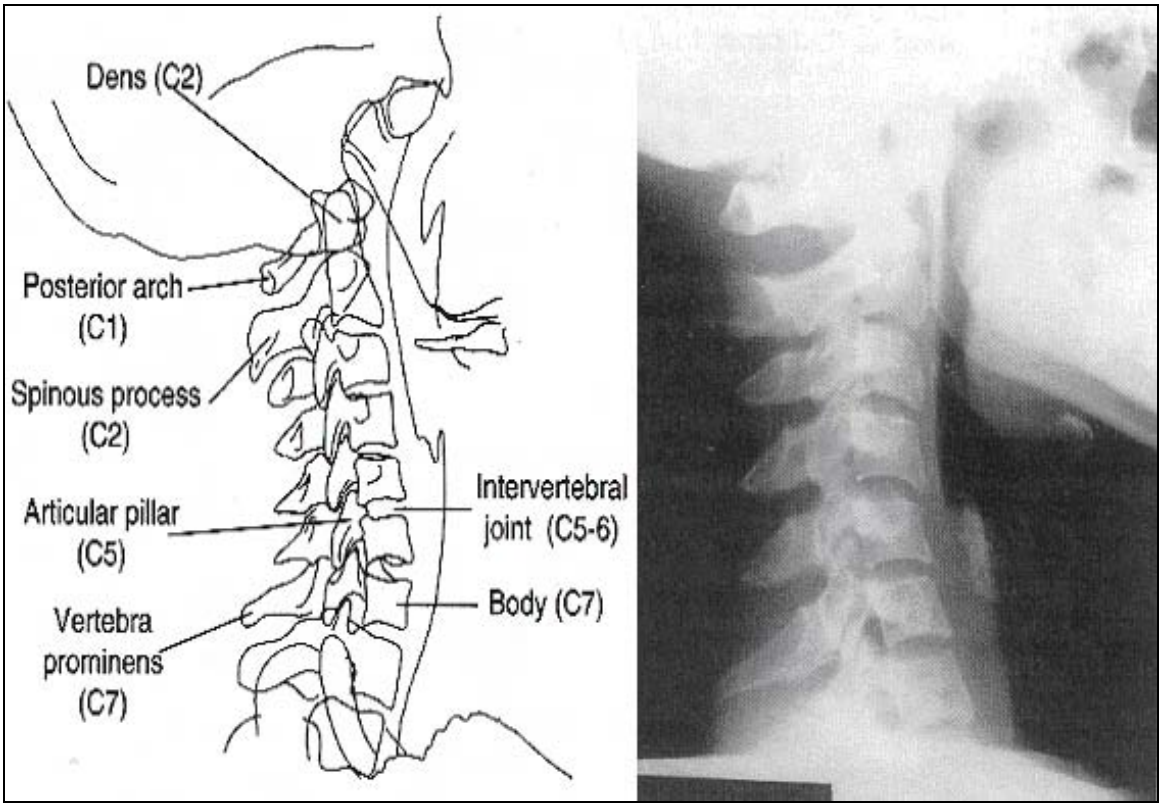
1. b (para 4-1)
2. a (para 4-2)
3. a (para 4-2)
4. c (para 4-1)
5. a (paras 4-1, 4-2)
6. c (paras 4-1, 4-2)
7. d (para 4-1)
8. a (para 4-2)

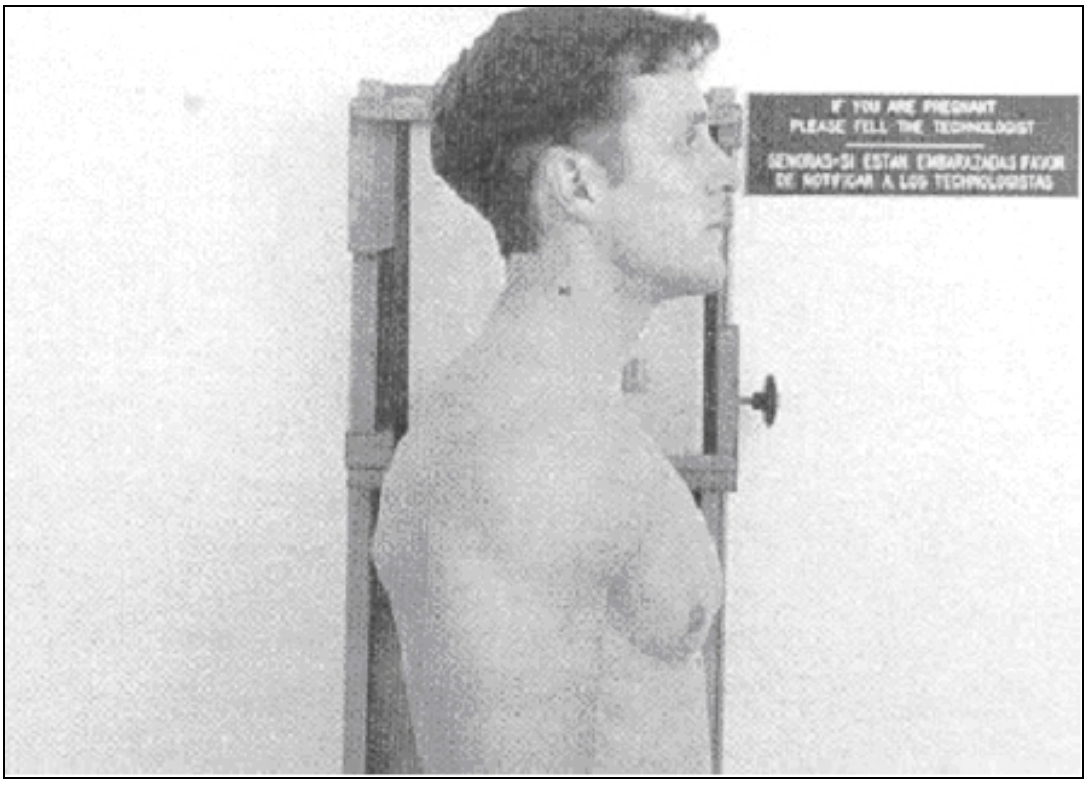
Section II. PROJECTIONS OF THE CERCICAL SPINE

4-3. LATERAL CERVICAL SPINE (C-SPINE)

a. **C-Spine Routine.** A cervical spine routine consist of an AP, a lateral (swimmer's view if the entire C-7 vertebra cannot be demonstrated on the lateral), and an AP open mouth. As a rule, the lateral C-spine is the first view that should be obtained since it shows all seven cervical vertebrae. Additional views that may be required are the obliques.

b. **Special Precautions.** In the event of a trauma, be sure to obtain the authorization of the radiologist or the attending physician before removing the cervical collar. Only after viewing the radiographs for the lateral cervical spine and ascertaining that there is no fracture or other damage to the spine can the physician authorize removal of the collar. Never remove the cervical collar prior to having the lateral view cleared by a radiologist or the attending physician.

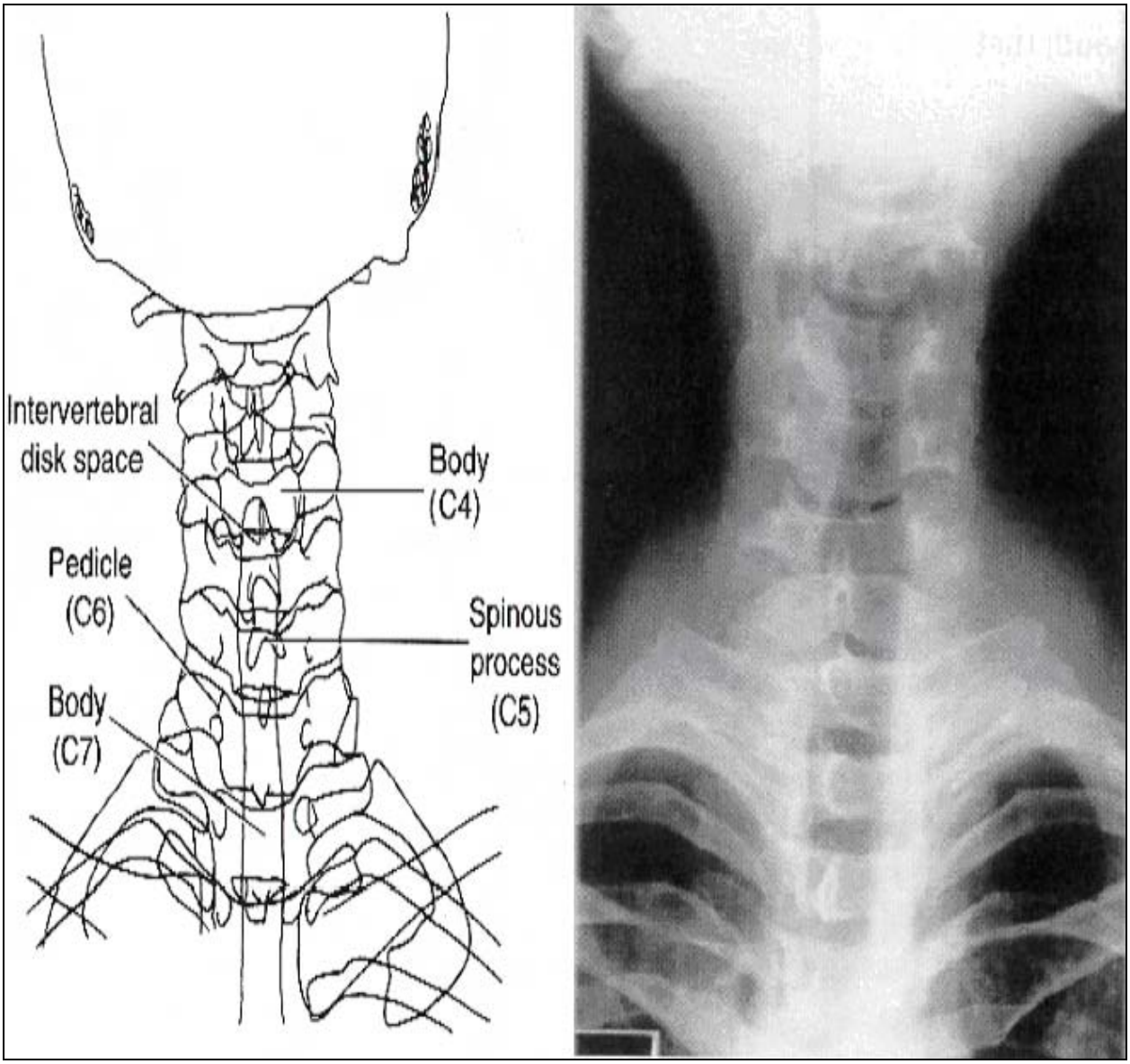


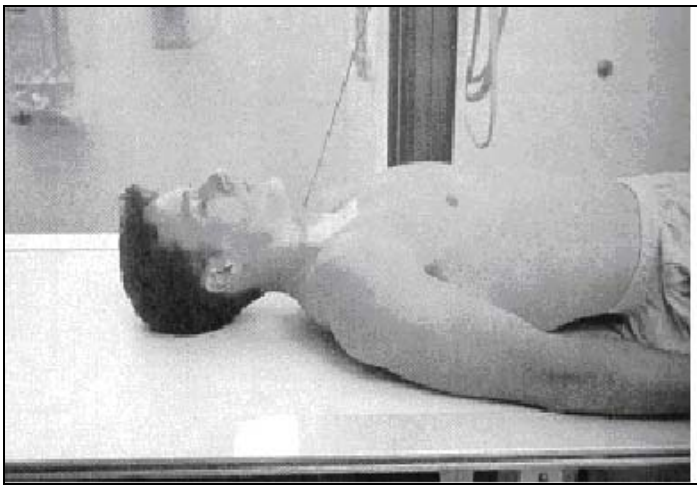


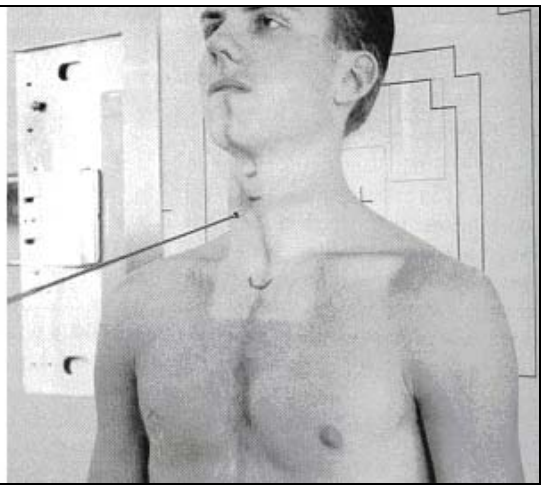
THE ORDER OF PROCEDURE
LATERAL CERVICLE (C-SPINE)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the thyroid cartilage in the lateral position.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Align mid-coronal plane to midline of table and/or cassette 2. Have patient relax and drop shoulders as far as possible (have patient hold equal weights in both hands) 3. Extend chin so the AML is parallel to the floor.		
f. **CR:** Horizontal perpendicular to the film, at the level of the upper margin of the thyroid cartilage.	g. **SID:** 72"	h. **Collimation:** Collimate on all four sides to area of interest.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration on full expiration (for maximum shoulder depression)		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** Cervical vertebral bodies, intervetebral joint spaces, articular pillars, spinous processes, zygapophyseal joints.		

4-4. ANTERIOR POSTERIOR CERVICAL SPINE

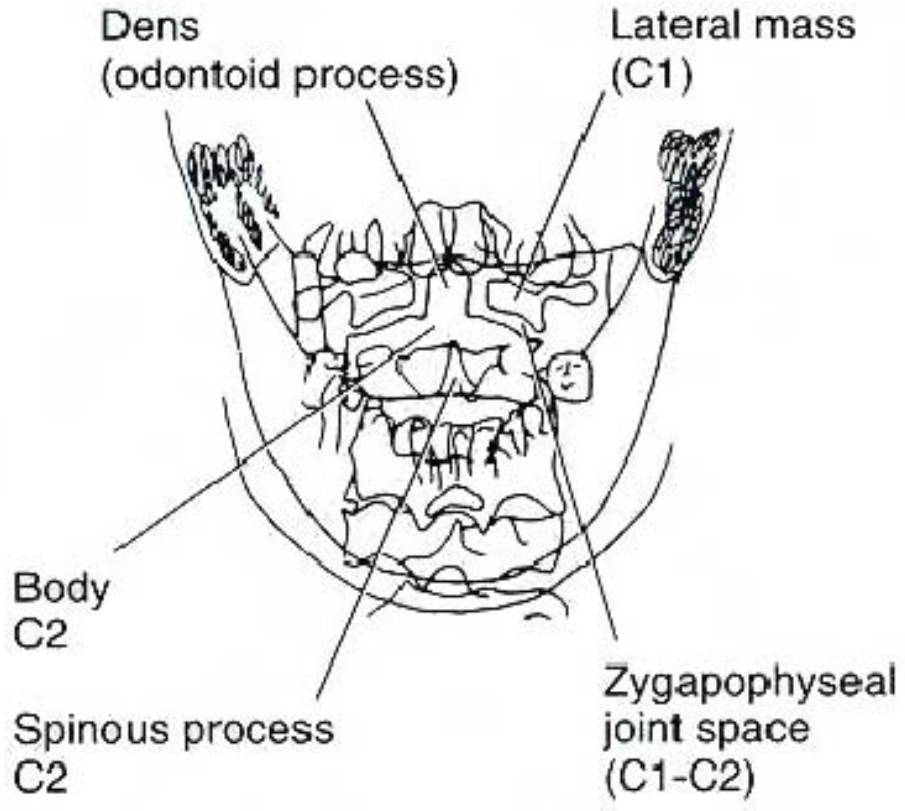


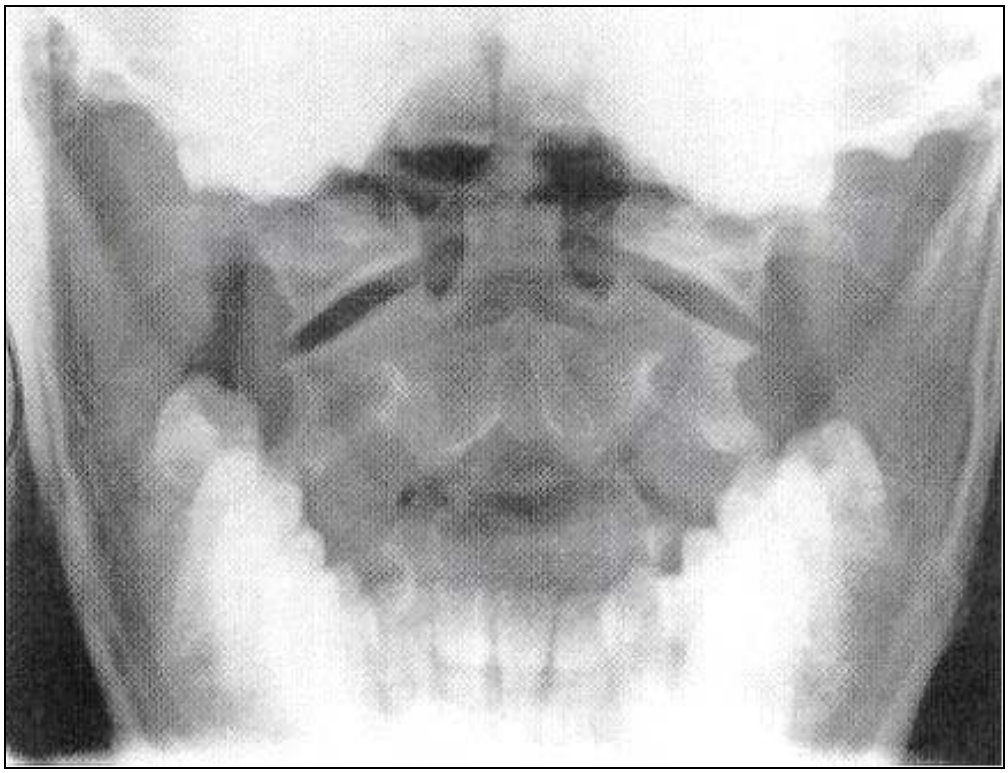


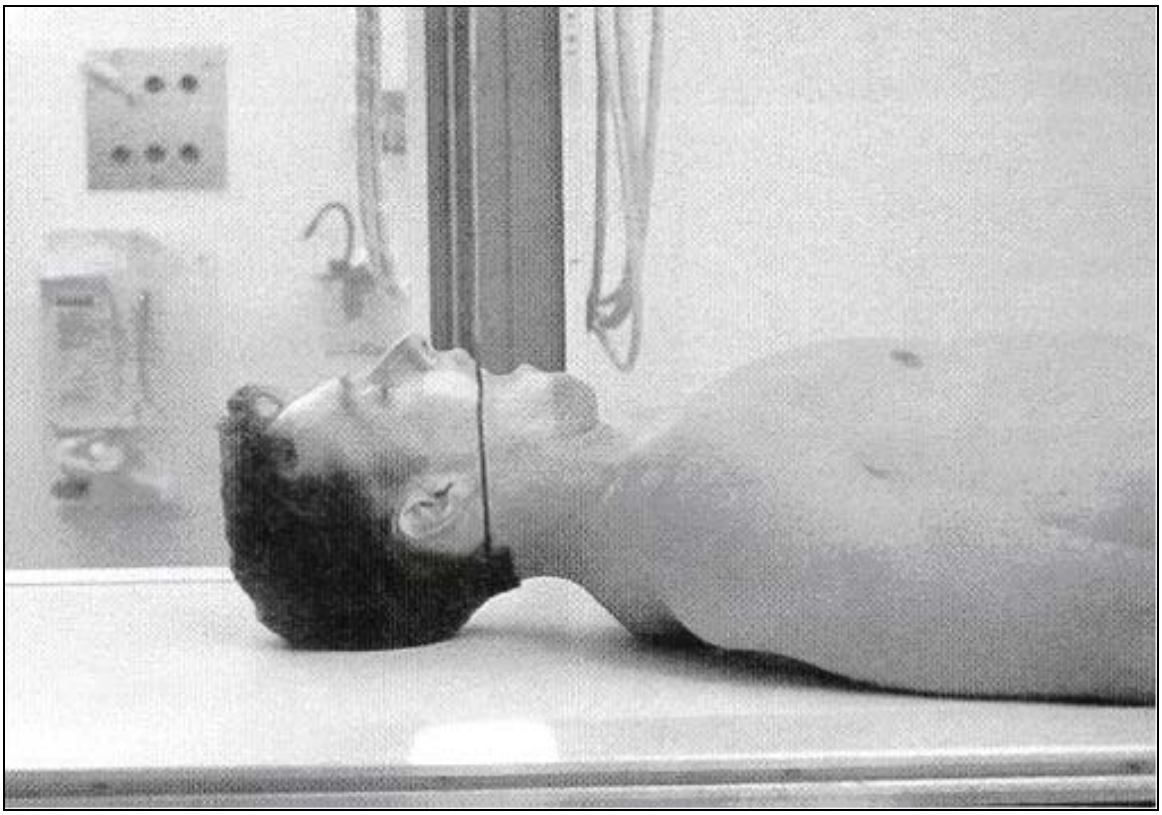


THE ORDER OF PROCEDURE AP C-SPINE		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the lower level of the thyroid cartilage	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient upright or supine 2. Median plane perpendicular to and over the center of the film. 3. Acanthiomeatal (AML) line perpendicular to the film.		
f. **CR:** Perpendicular to the film, at the level of the lower margin of the thyroid cartilage.	g. **SID:** 40"	h. **Collimation:** Collimate on all four sides to area of interest.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** C-3 through C-7, to include vertebral bodies, space between pedicles, intervertebral disc spaces, and spinous process.		

4-5. OPEN MOUTH C-SPINE





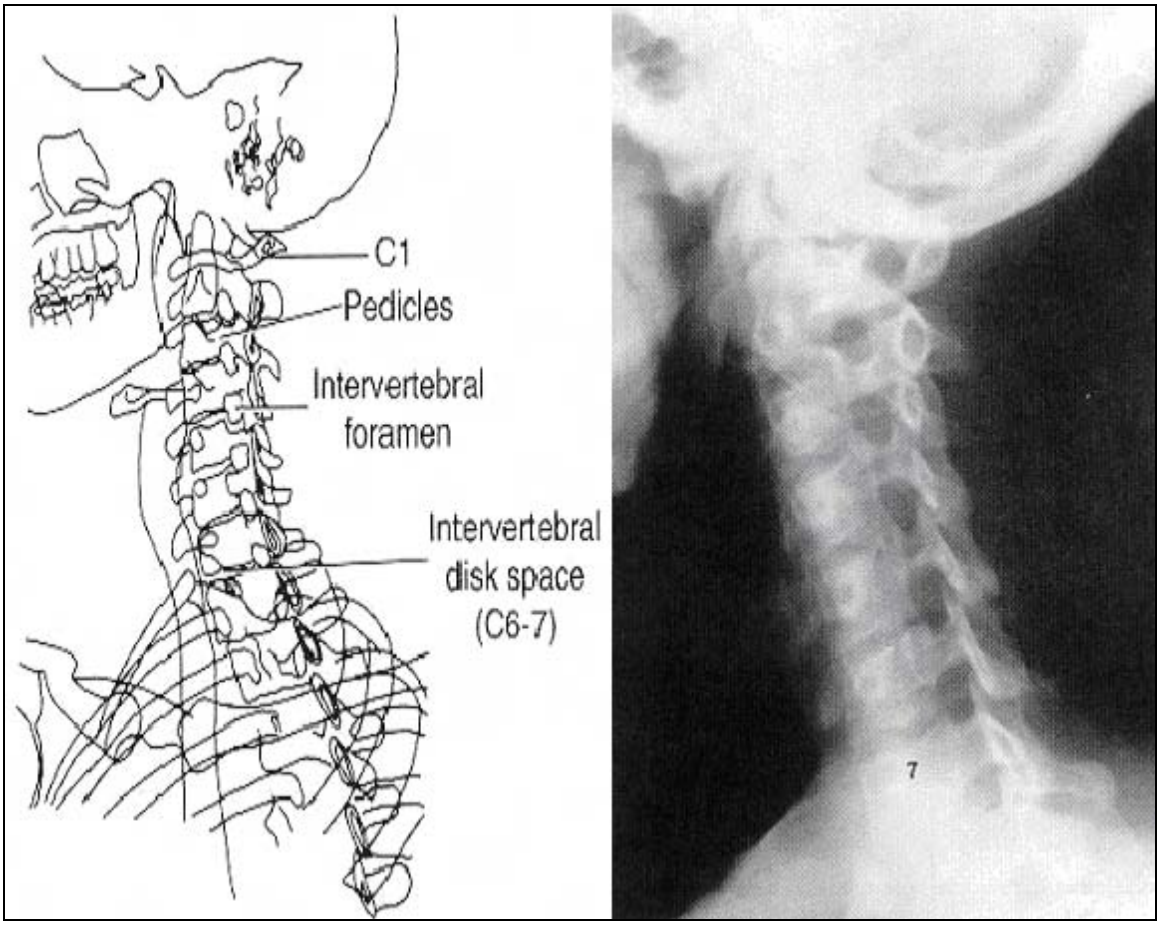


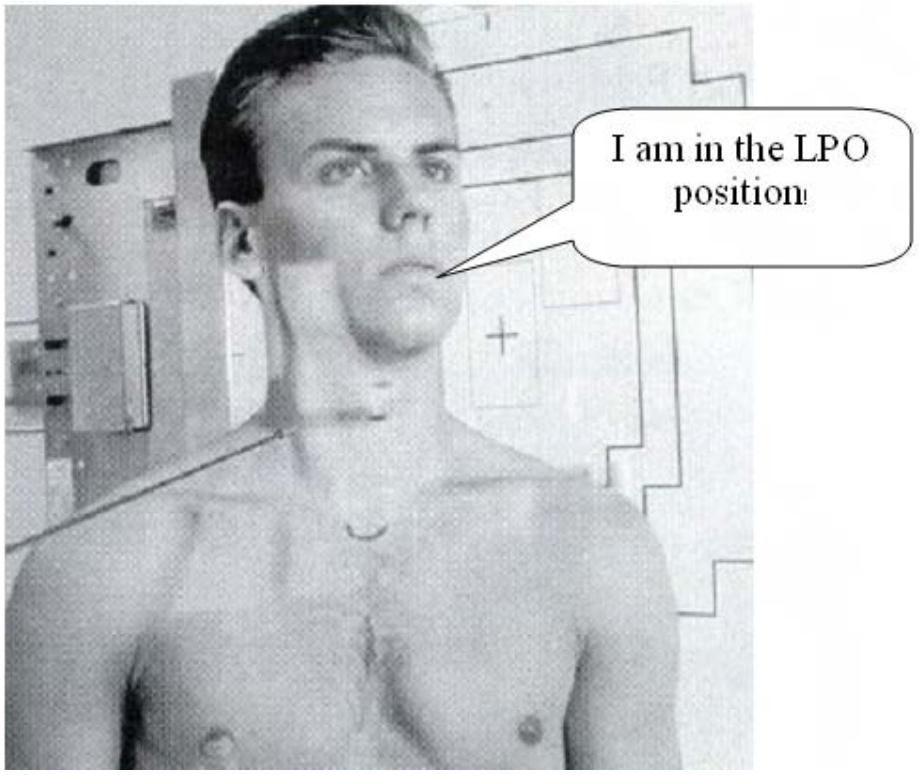
THE ORDER OF PROCEDURE AP OPEN MOUTH C-SPINE		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** From the mental vertex of the chin to the base of the skull.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient upright or supine 2. Median plane perpendicular to and over the center of the film. 3. Acanthiomeatal (AML) line perpendicular to the film. 4. Mouth open to its full extent.		
f. **CR:** Perpendicular to the film, directed to the center of the patients mouth.	g. **SID:** 40"	h. **Collimation:** Collimate on all four sides to area of interest (6" X 6")
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** Dens (odontoid process) and the vertebral body of C-2, lateral masses of C-1, and zygapophyseal joints between C-1 and C-2.		

4-6. RIGHT POSTERIOR OBLIQUE OR LEFT POSTERIOR OBLIQUE C-SPINE

a. **Right Posterior Oblique (RPO):** Position in which the right posterior (back) aspect of the body is closest to the film.

b. **Left Posterior Oblique (LPO):** Position in which the left posterior (back) aspect of the body is closest to the film.

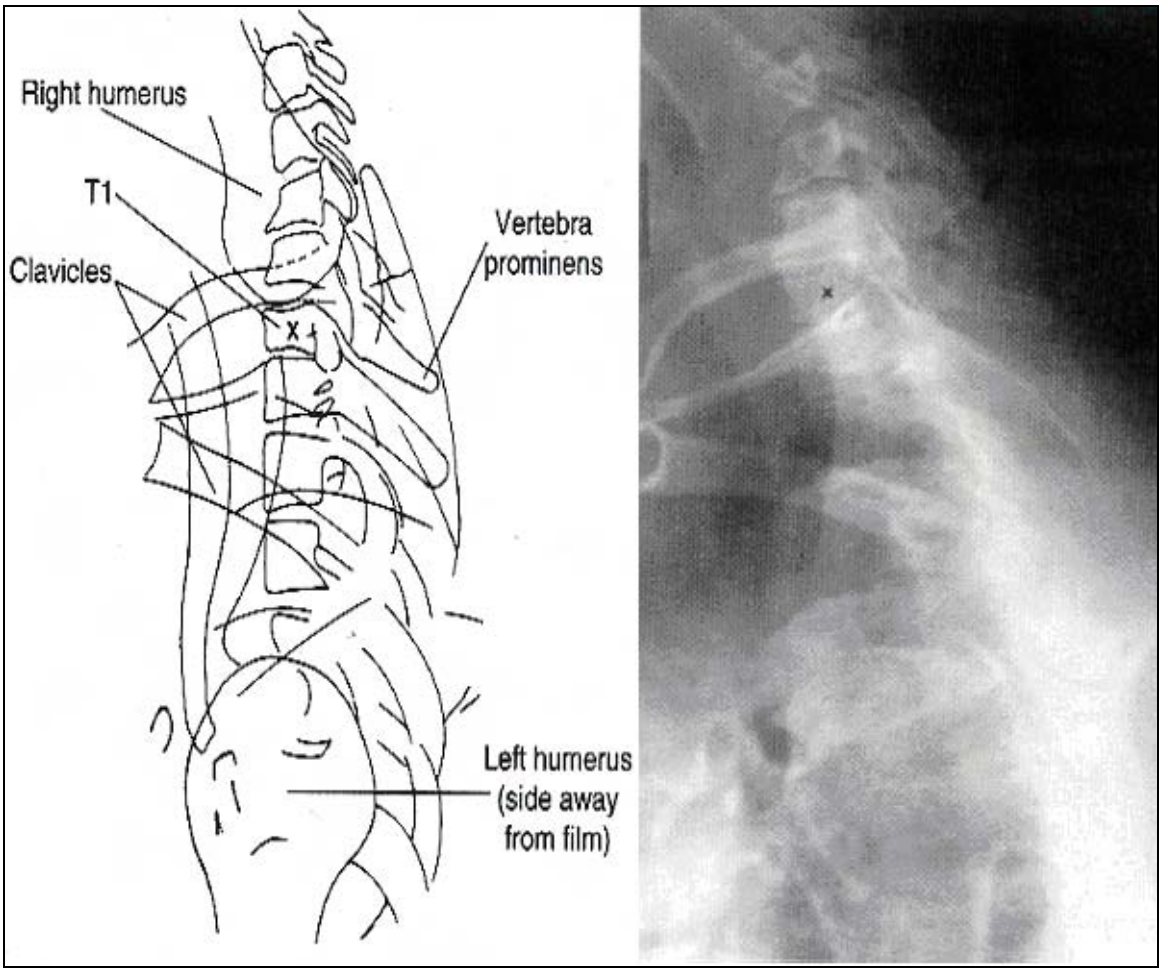


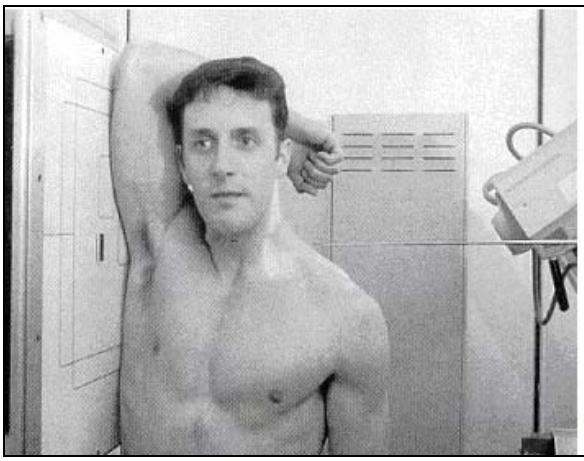


THE ORDER OF PROCEDURE
RPO OR LPO OBLIQUE C-SPINE

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the thyroid cartilage in the oblique position.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient upright (sitting or standing), may be taken recumbent if patient condition requires. 2. Center spine to midline of table and or cassette. 3. Rotate body 45 degrees and place head in a true later position. 4. Extend chin so the AML is parallel to the floor.		
f. **CR:** Ap obliques (RPO/LPO) 15-20 degrees cephalic. PA obliques (RAO/LAO) 15-20 degrees caudad. Both at the level of the thyroid cartilage.	g. **SID:** 40"	h. **Collimation:** To area of interest.
i. **Immobilization:** None. **Pr-exposure command:** Suspended respiration.		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** Ap obliques demonstrate intervertebral foramina and pedicles farthest from the film. PA obliques demonstrate intervertebral foramina and pedicles closest to the film.		

4-7. SWIMMER'S LATERAL CERVICOTHORACIC SPINE





THE ORDER OF PROCEDURE
SWIMMER'S LATERAL CERVICO-THORACIC SPINE

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** From the axilla of the raised arm to the opposite side of the neck.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Patient in lateral recumbent position or erect. 2. Align mid-coronal plane to the midline of table or cassette. 3. Place arm and shoulder nearest the film up and slightly anterior. Rest hand against head for support. 4. Position the armand shoulder away from the film down and slightly posterior (opposite to shoulder nearest film) grasp thigh with hand and pull downward. 5. Head elevated and supported to maintain thorax and head in as true a lateral position as possible.		
f. **CR:** Perpendicular to the film and centered to a point along the coronal plane 1 inch above the jugular notch to the center of the cassette.	g. **SID:** 40"	h. **Collimation:** To area of interest.
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration		
j. **Shielding:** Place lead shield over pelvic area.		
k. **Demonstrates:** Lower cervical and upper thoracic vertebral bodies, intervertebral disc spaces and zygapophyseal joints.		

Continue with Exercises

EXERCISES, LESSON 4, SECTION II

MATCHING: For exercises 1 through 5, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____	Lateral C-spine.	a.	Dens (odontoid process) and the vertebral body of C-2, lateral masses of C-1, and zygapophyseal joints between C-1 and C-2.
2. _____	AP C-spine.	b.	Cervical vertebral bodies, intervertebral joint space, articular pillars, spinous processes, zygapophyseal joints.
3. _____	AP open mouth. C-spine.	c.	C-3 through C-7, to include vertebral bodies, space between pedicles, intervertebral disc spaces, and spinous process.
4. _____	RPO or LPO oblique C-spine.	d.	Intervertebral foramina and pedicles farthest from the film.
5. _____	Swimmer's lateral cervico-thoracic spine.	e.	Lower cervical upper thoracic vertebral bodies, intervertebral disc spaces, and zygapophyseal joints.

MULTIPLE- CHOICE. For exercises 6-9, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

6. The body should be rotated _____ for an oblique C-spine.

   a. 20 degrees.

   b. 30 degrees.

   c. 45 degrees.

   d. 90 degrees.

7. The proper patient and part position for an AP cervical spine is:

   a. Patient standing or seated; part centered; coronal plane rotated 45 degrees to film; if possible, median plane of head parallel to film; acanthiomeatal line parallel to floor.

   b. Patient upright; median plane perpendicular to and over film center; acanthiomeatal line perpendicular to film; mouth open to full extent.

   c. Patient seated/standing; shoulder against film; median plnae parallel to film; acanthiomeatal line parallel to floor; patient holding sandbags with shoulders relaxed and arms hanging to side.

   d. Patient upright; median plane perpendicular to and over the film center; acanthiomeatal line perpendicular to film.

8. When positioning the patient for a/an _____, one arm is raised and the other lowered, and the head is supported at the level of the spine with and the long axis of the thoracic and cervical spine.

   a. Swimmer's lateral cervico-thoracic spine.

   b. RPO or LPO oblique c-spine.

   c. AP open mouth c-spine.

   d. AP c-spine.

   e. Lateral c-spine.

9. Before the radiologist or attending physician authorizes removal of a cervical collar, he will have viewed the radiograph for the _____ to ascertain that there is no fracture or other damage to the spine.

   a. AP c-spine.

   b. Lateral c-spine.

   c. AP open mouth c-spine.

   d. Oblique c-spine.

Check Your Answers on Next Page

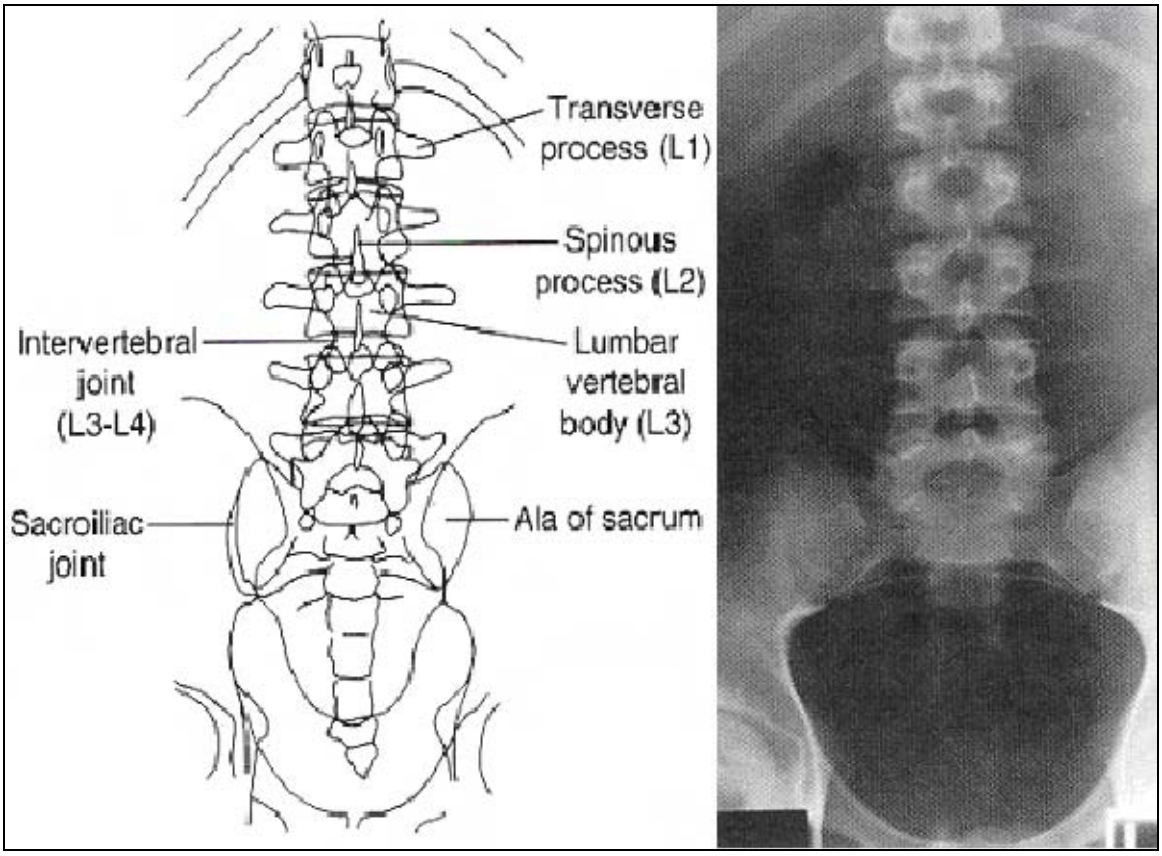
SOLUTIONS, LESSON 4, SECTION II

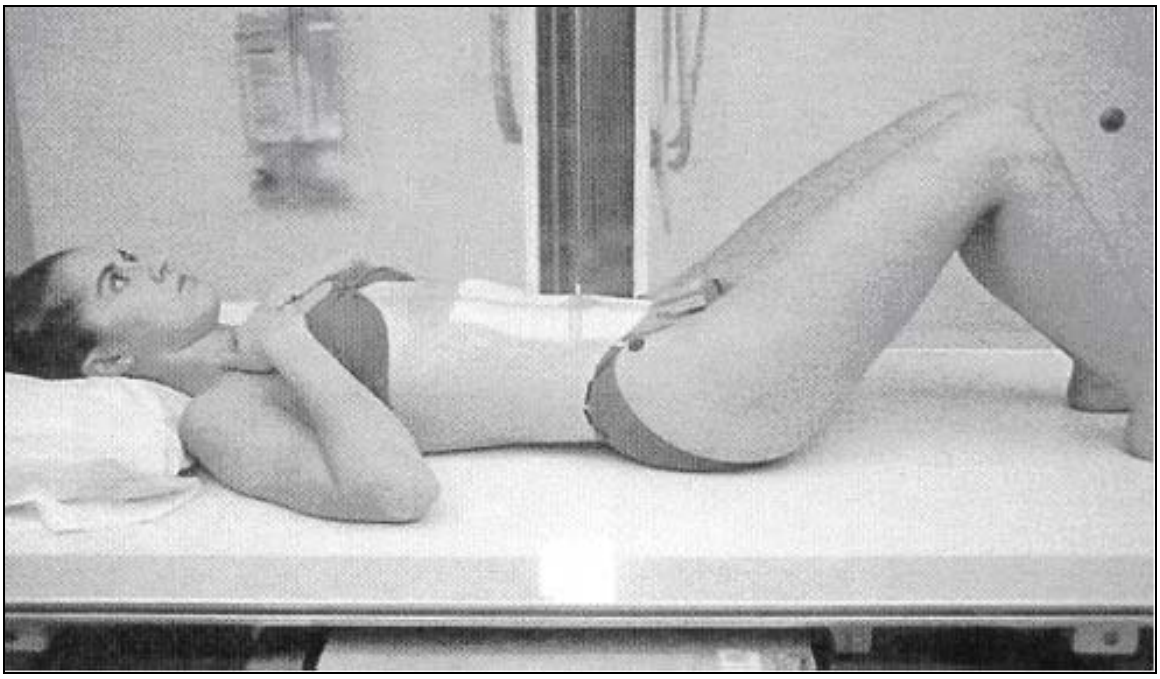
1. b (para 4-3)
2. c (para 4-4)
3. a (para 4-5)
4. d (para 4-6)
5. e (paras 4-7)
6. c (para 4-6)
7. d (para 4-4)
8. a (para 4-7)
9. b (para 4-3b)

Section III. PROJECTIONS OF THE LUMBAR SPINE

4-8. ANTERIOR POSTERIOR LUMBAR SPINE

A lumbo-sacral spine routine consists of the AP, lateral, and lateral lumbosacral articulation (spot L-5/S-1) views. Additional projections that may be requested are the obliques and the AP lumbosacral articulation.

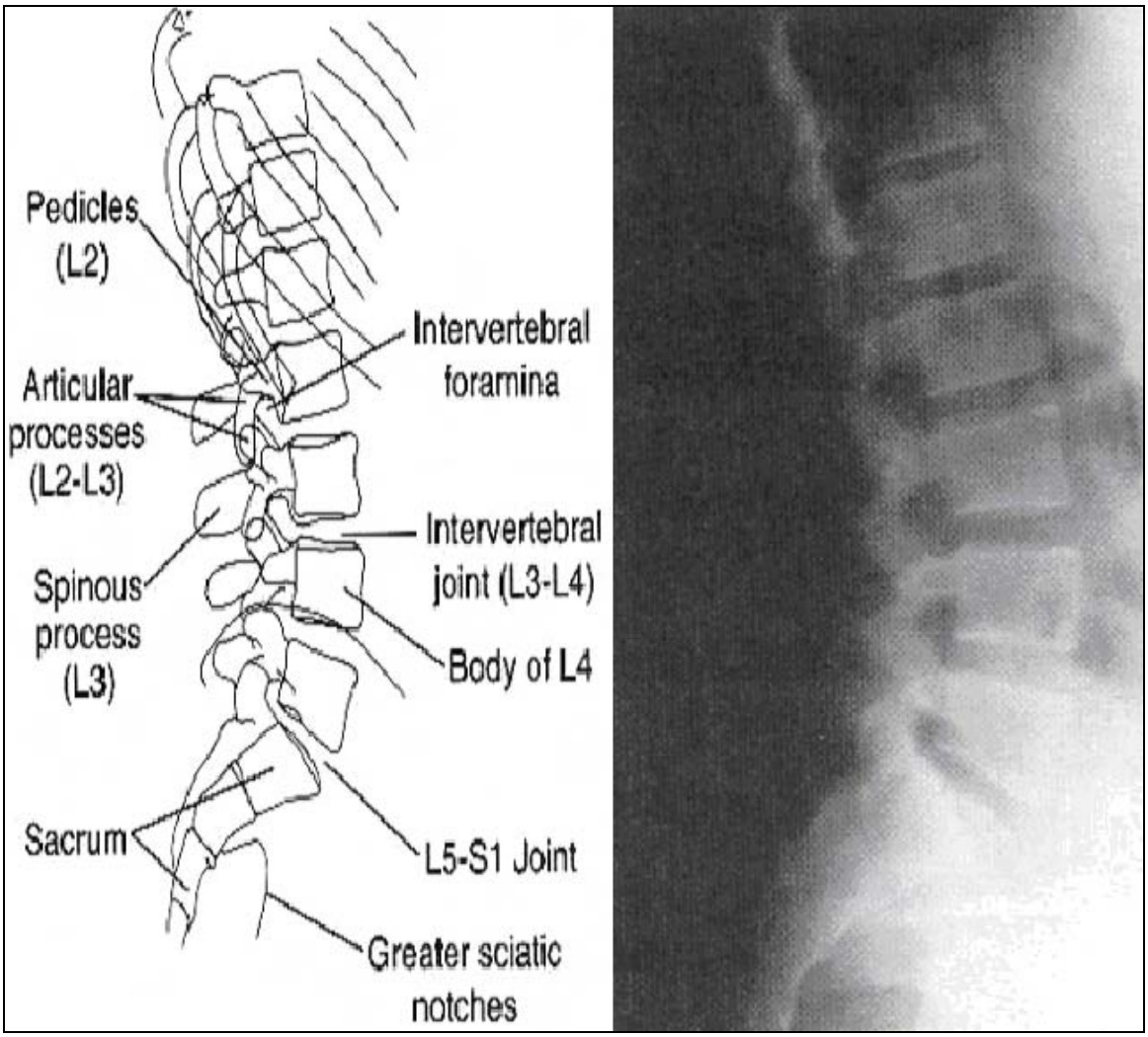


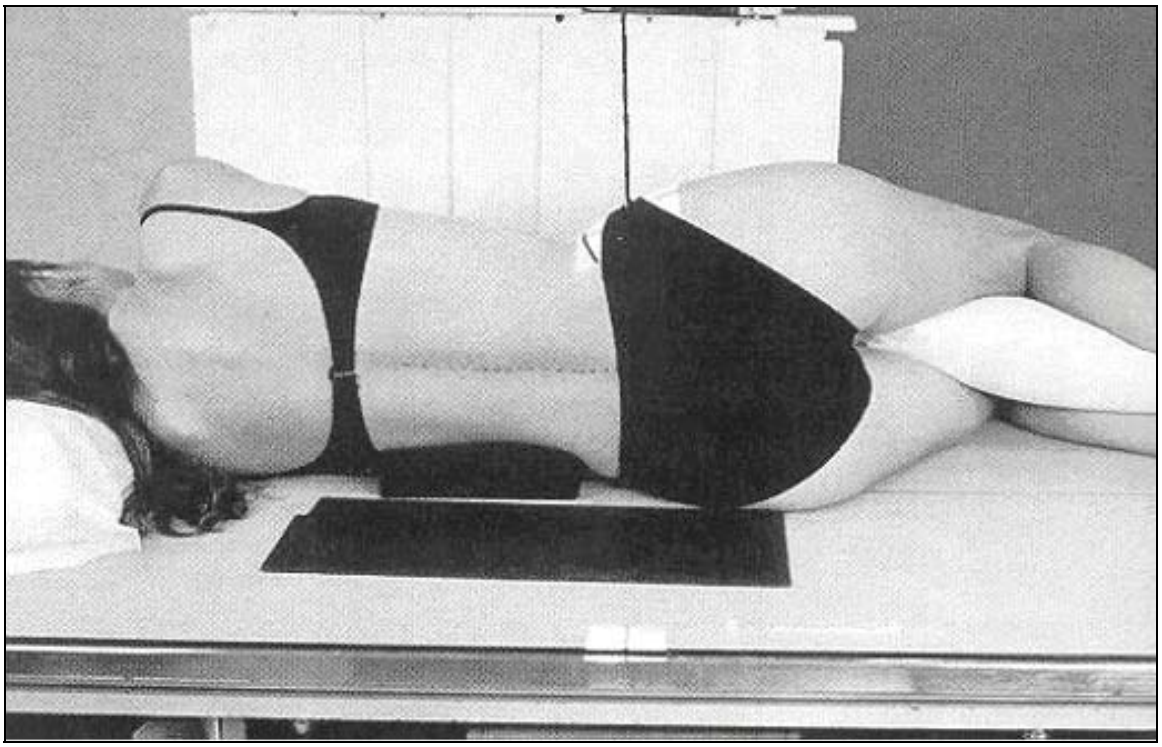


THE ORDER OF PROCEDURE
AP LUMBAR SPINE

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the superior prominence of the iliac crest.	
c. **Technical Factors:** 17 X 14 LW B.		
d. **LM:** corresponding side of body.		
e. **Patient/Part position:** 1. Patient in supine position (head on pillow) 2. Knees and hips flexed with soles of feet on table. 3. Align midsagittal plane to midline of table. 4. Place arms at side or up on chest. NOTE: NO rotation of the torso or the pelvis.		
f. **CR:** Perpendicular to the film and centered to the level of the iliac crest. Center cassette to CR.	g. **SID:** 40"	h. **Collimation:** Collimate to lateral lateral margins to 10 inches
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration		
j. **Shielding:** Place contact shield over gonads without obscuring area of interest.		
k. **Demonstrates:** Lumbar vertebral bodies (*5*), intervetebral joints and Laminae.		

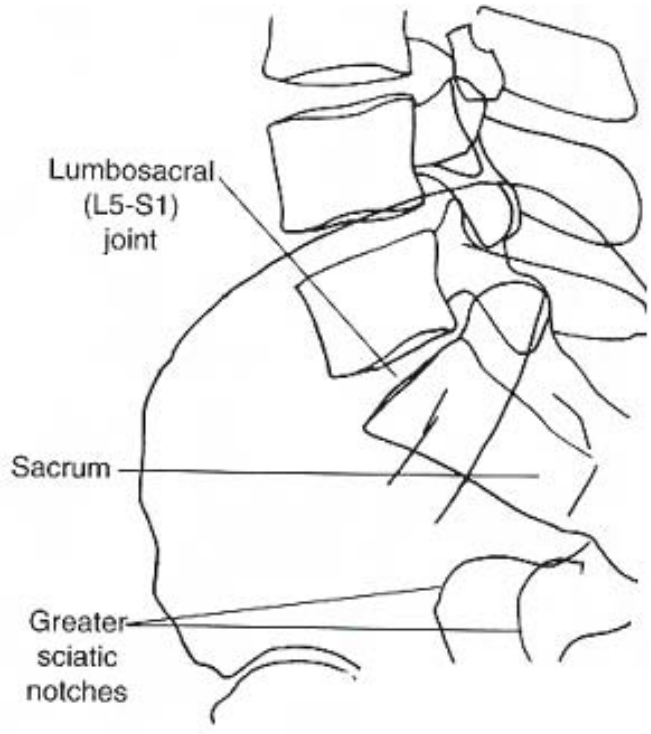
4-9. LATERAL LUMBAR SPINE

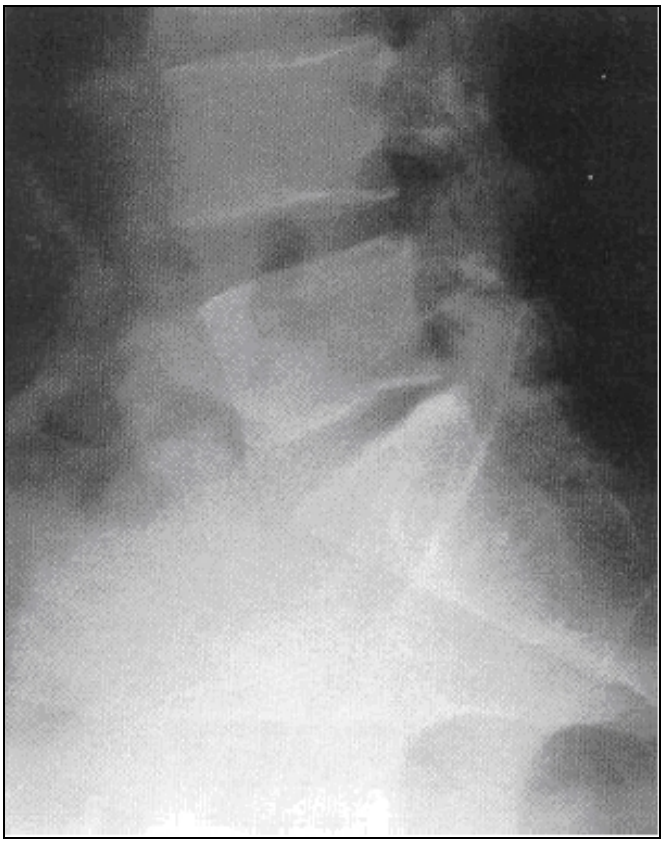


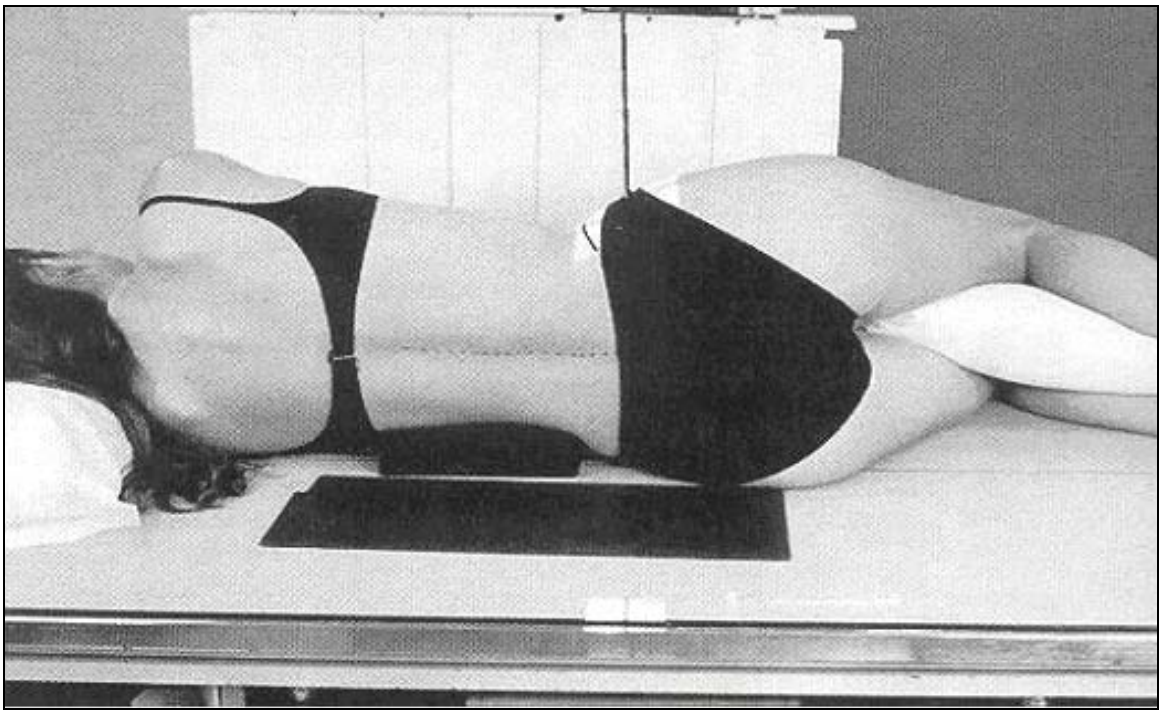


THE ORDER OF PROCEDURE LATERAL LUMBAR SPINE		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the superior prominence of the iliac crest in the lateral position.	
c. **Technical Factors:** 17 X 14 LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Patient laterally recumbent (head on pillow) 2. Knees and hips flexed with support between knees and ankles. 3. Align coronal plane to midline of table. 4. Place radiolucent support under small of waist to insure long axis of spine is parallel to the table. 5. Place pelvis and torso in true lateral position.		
f. **CR:** Perpendicular to the film and centered to the level of the iliac crest. Center cassette to CR.	g. **SID:** 40"	h. **Collimation:** Collimate to lateral lateral margins to 10 inches
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration		
j. **Shielding:** Place contact shield over gonads without obscuring area of interest.		
k. **Demonstrates:** Lumbar vertebral bodies (5), intervetebral joints, spinous processes, L5-S1 junction and		

4-10. LATERAL LUMBOSACRAL ARTICULATION

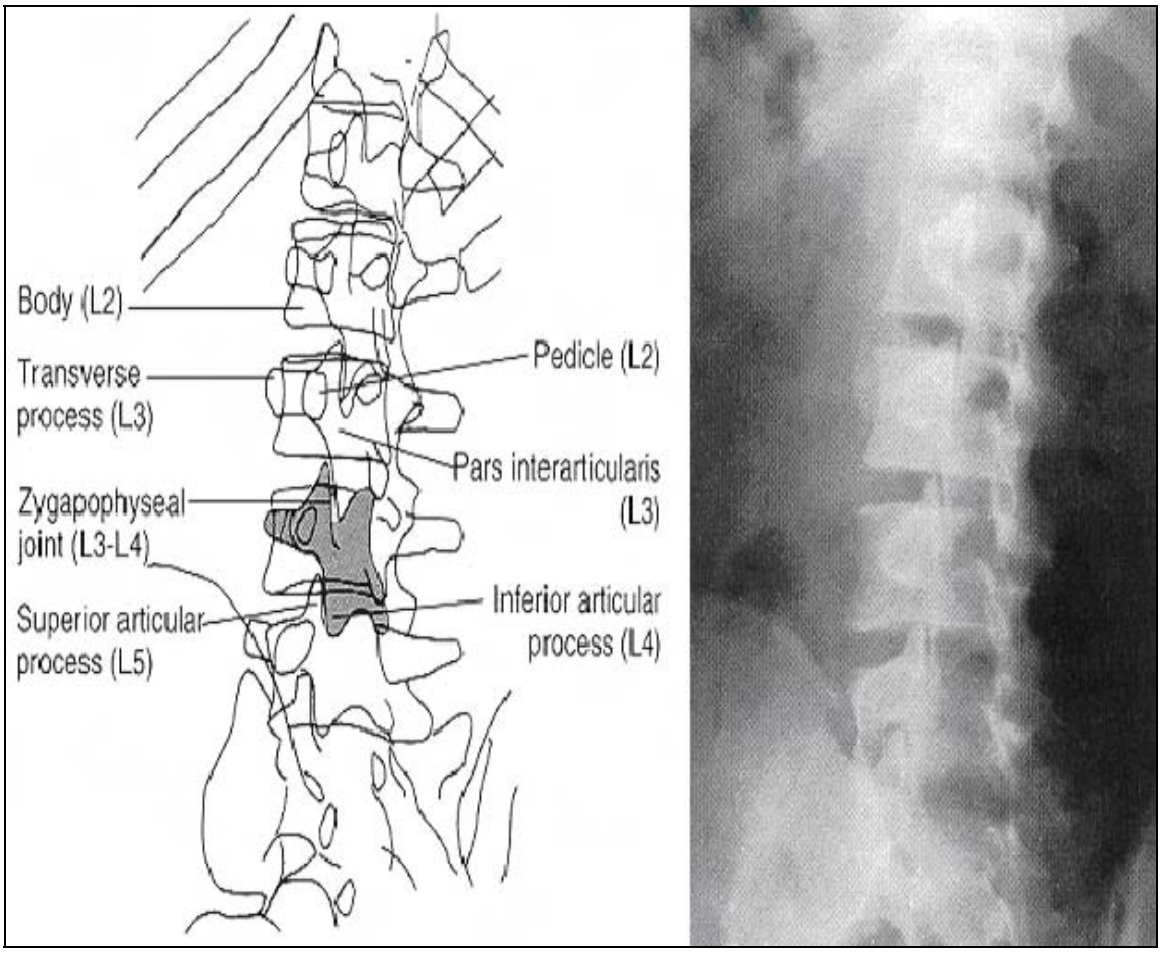






THE ORDER OF PROCEDURE LATERAL LUMBOSACRAL ARTICULATION		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the superior prominence of the iliac crest in the lateral position.	
c. **Technical Factors:** 8 X 10LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Patient laterally recumbent (head on pillow) 2. Knees and hips flexed with support between knees and ankles. 3. Align coronal plane to midline of table. 4. Place radiolucent support under small of waist. 5. Place pelvis and torso in true lateral position.		
f. **CR:** Perpendicular to the film and centered on the coronal plane midway between the superior prominence of the iliac crest and the Asis.	g. **SID:** 40"	h. **Collimation:** 6"X 6"
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration		
j. **Shielding:** Place contact shield over gonads without obscuring area of interest.		
k. **Demonstrates:** L5-S1 joint space in the lateral position.		

4-11. RIGHT POSTERIOR OBLIQUE OR LEFT POSTERIOR OBLIQUE LUMBAR SPINE



THE ORDER OF PROCEDURE RPO & LPO LUMBAR SPINE		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level midway between the superior prominence of the iliac crest and the inferior rib margin.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient semisupine (RPO and LPO) semiprone (RAO and LAO). 2. Rotate patient's body to bring coronal plane at 45 degrees. 3. Flex knee for stability and have patient grasp edge of table. 4. Support lower back and pelvis with radiolucent sponges to maintain position.		
f. **CR:** Perpendicular to the film and centered midway between the iliac crest and the inferior rib margin.	g. **SID:** 40"	h. **Collimation:** Four sided collimation to near borders of film.
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration		
j. **Shielding:** Place contact shield over gonads without obscuring area of interest.		
k. **Demonstrates:** Zygapophyseal joints, RPO and LPO show side down, Zygapophyseal joints, RAO and LAO show side up.		

Continue with Exercises

EXERCISES, LESSON 4, SECTION III

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____	AP lumbar spine.	a.	L-5/S-1 joint space in lateral position.
2. _____	Lateral lumbar spine.	b.	Zygapophyseal joints.
3. _____	Oblique lumbar. spine.	c.	Lumbar vertebrae, intervertebral joints, L-5/S-1 junction.
4. _____	Lateral lumbosacral articulation.	d.	Lumbar vertebral bodies, intervertebral joints, laminae.

MULTIPLE- CHOICE. For exercises 5-10, select the ONE word or phrase that BEST completes the statement or BESTanswers the question.

5. What is centered to the film for an AP lumbar spine?

   a. ASIS.

   b. Greater trochanter.

   c. Level of iliac crest.

   d. Xyphoid process.

6. When viewing an RPO lumbar spine film, what is being demonstrated?

   a. Intervertebral formina of side away.

   b. Interverbral foramina of side down.

   c. Zygapophyseal joints of left side.

   d. Zygapophyseal joints of right side.

7. Why is a radiolucent sponge placed under the patient's waist for a lateral lumbar spine?

   a. For the patient's comfort.

   b. To aid in immobilization.

   c. To bring the long axis of the spine parallel to the table.

   d. To decrease dorsal kyphosis.

8. What is centered to the film for a lumbosacral articulation?

   a. The level of the iliac chest.

   b. The level of the ASIS.

   c. The level of the greater trochanter.

   d. Midway between the superior prominence of the iliac crest and the ASIS.

9. What is the degree of rotation of the coronal plane for an oblique lumbar spine?

   a. 60 degrees.

   b. 45 degrees.

   c. 30 degrees.

   d. 15 to 20 degrees.

10. What is the routine for a lumbar spine exam?

    a. AP and lateral.

    b. AP, lateral, and lumbosacral articulation (L-5/S-1).

    c. AP, lateral, and obliques.

    d. AP, lateral, obliques, and lumbosacral articulation (L-5/S-1).

Check Your Answers on Next Page

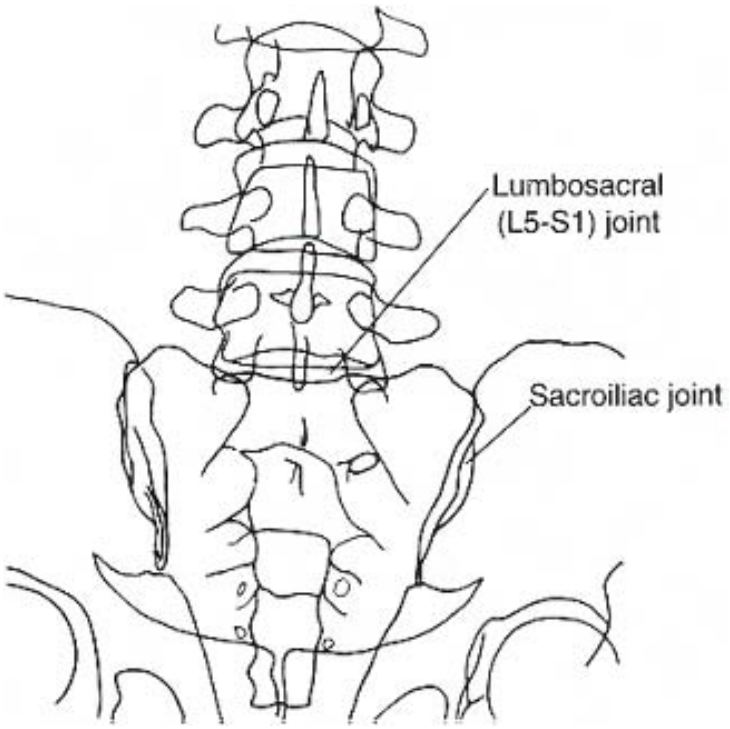
SOLUTIONS, LESSON 4, SECTION III

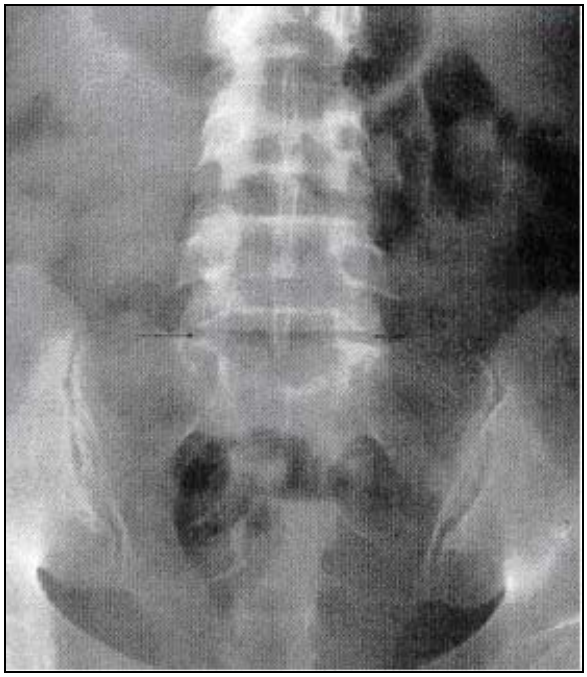
1. d (para 4-8)
2. c (para 4-9)
3. b (para 4-11)
4. a (para 4-10)
5. c (para 4-8)
6. d (para 4-11)
7. c (para 4-9)
8. d (para 4-10)
9. b (para 4-11)
10. b (para 4-8)

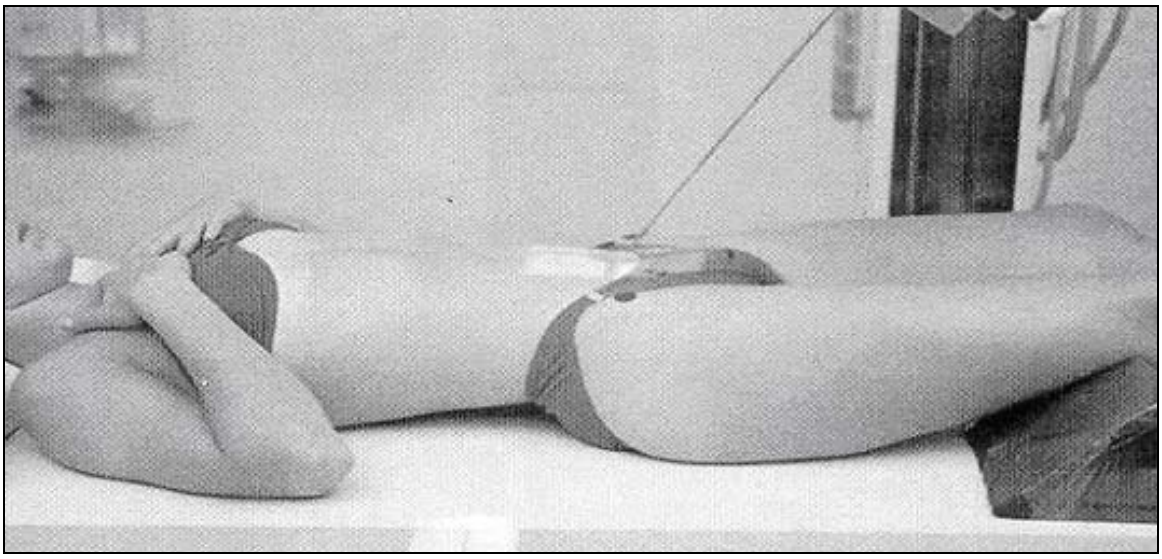
Section IV. PROJECTIONS OF THE LUMBOSACRAL AND SACROILIAC ARTICULATIONS

4-12. ANTERIOR POSTERIORLUMBOSACRAL ARTICULATION (JOINT)

A lumbo-sacral articulation routine consist of a AP lumbosacral articulation as well as a lateral view.



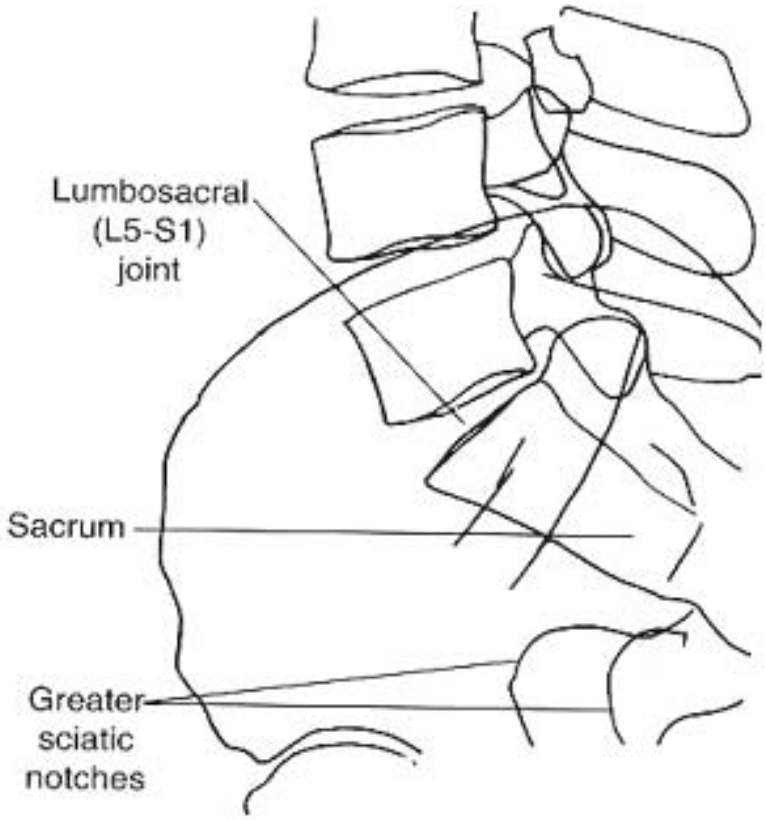


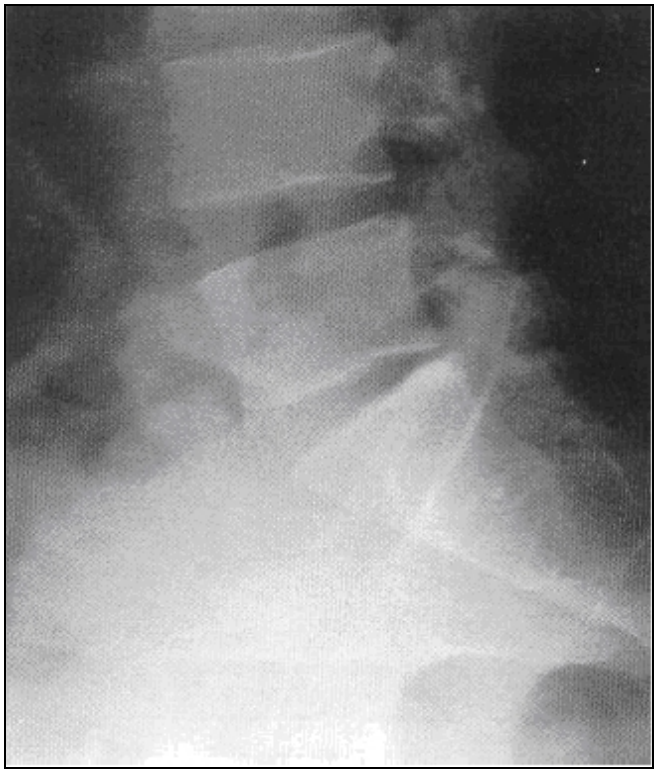


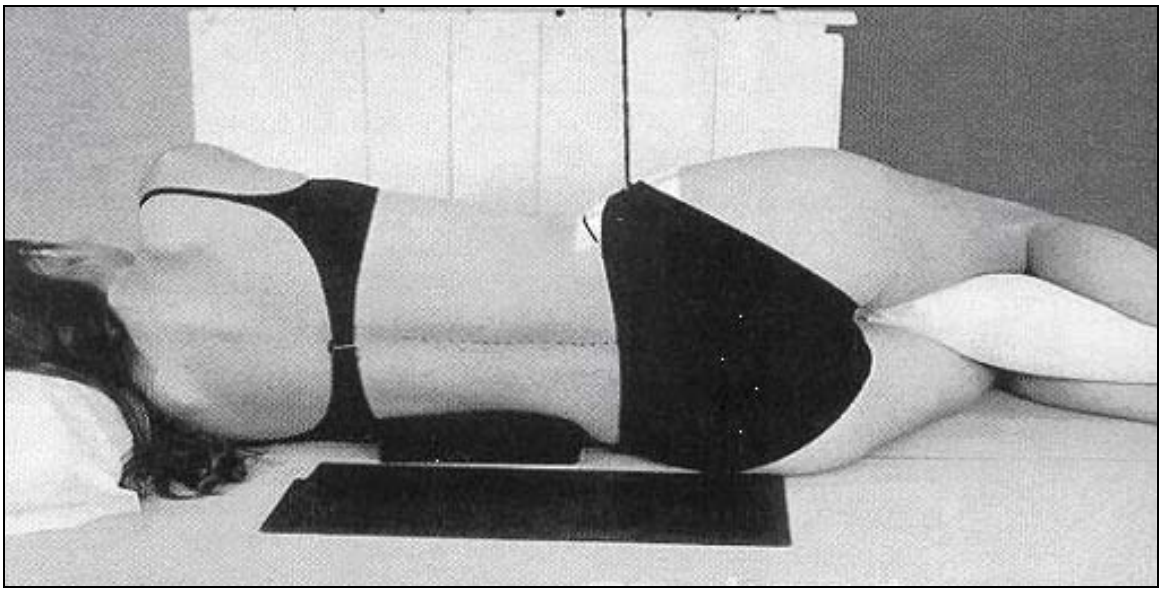
THE ORDER OF PROCEDURE
AP LUMBOSACRAL ARTICULATION

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the level of the ASIS.	
c. **Technical Factors:** 8 X 10LW B.		
d. **LM:** Corresponding side of film.		
e. **Patient/Part position:** 1. Patient supine, legs extended with support under knees. 2. Place arms at side or up on chest. 3. Align midsagittal plane to midline of table and cassette. 4. Assure no rotation of torso or pelvis.		
f. **CR:** Angle CR cephalad, 30 degrees (males) to 35 degrees (females). CR should enter at the level of the ASIS centered to the midline of the body. Center cassette to CR.	g. **SID:** 40"	h. **Collimation:** Close four-sided collimation to area of interest.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Place contact shield over gonads without obscuring area of interest.		
k. **Demonstrates:** L5-S1 joint space and sacroiliac joints in AP projection.		

4-13. LATERAL LUMBOSACRAL ARTICULATION (JOINT)





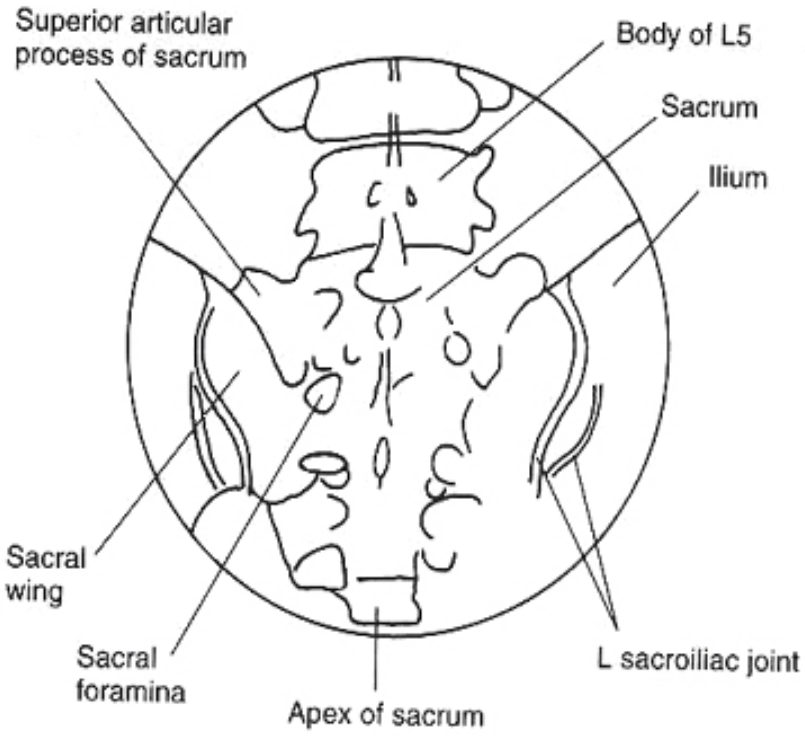


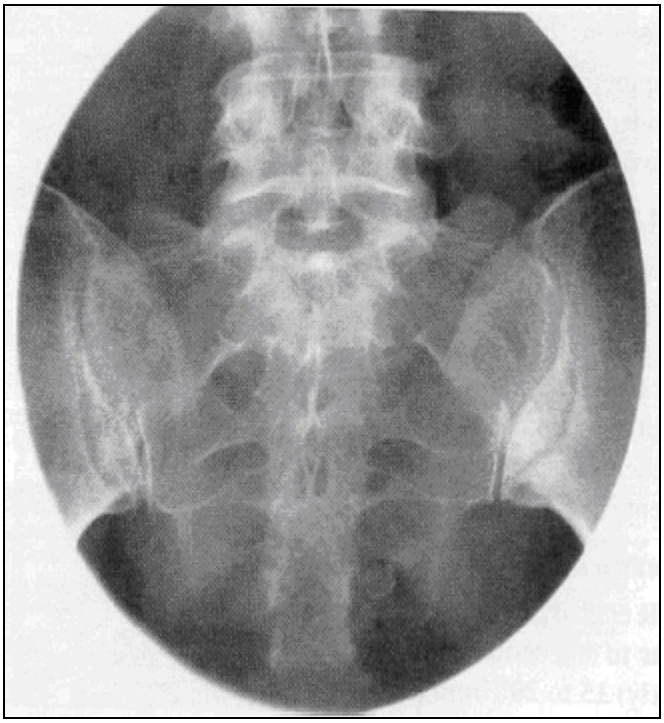
THE ORDER OF PROCEDURE
LATERAL LUMBOSACRAL ARTICULATION

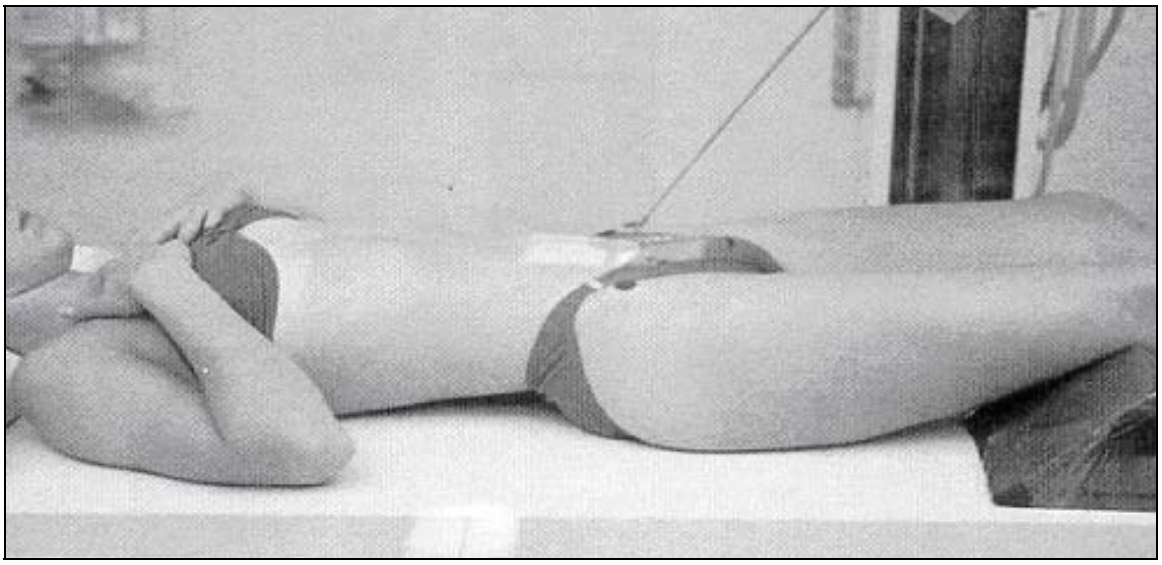
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the superior prominence of the iliac crest in the lateral position.	
c. **Technical Factors:** 8 X 10LW B.		
d. **LM:** Side closest to film.		
e. **Patient/Part position:** 1. Patient laterally recumbent (head on pillow) 2. Knees and hips flexed with support between knees and ankles. 3. Align coronal plane to midline of table. 4. Place radiolucent support under small of waist. 5. Place pelvis and torso in true lateral position.		
f. **CR:** Perpendicular to the film and centered on the coronal plane midway between between the superior prominence of the iliac crest and the Asis.	g. **SID:** 40"	h. **Collimation:** 6"X 6"
i. **Immobilization:** None. **Pre-exposure command:** Suspended expiration		
j. **Shielding:** Place contact shield over gonads without obscuring area of interest.		
k. **Demonstrates:** L5-S1 joint space in the lateral position.		

4-14. ANTERIOR POSTERIOR AXIAL SACROILIAC ARTICULATION

A sacroiliac articulation (or sacroiliac joint) routine consist of a view of the AP axial sacroiliac as both (bilateral) posterior oblique sacroiliac joints.





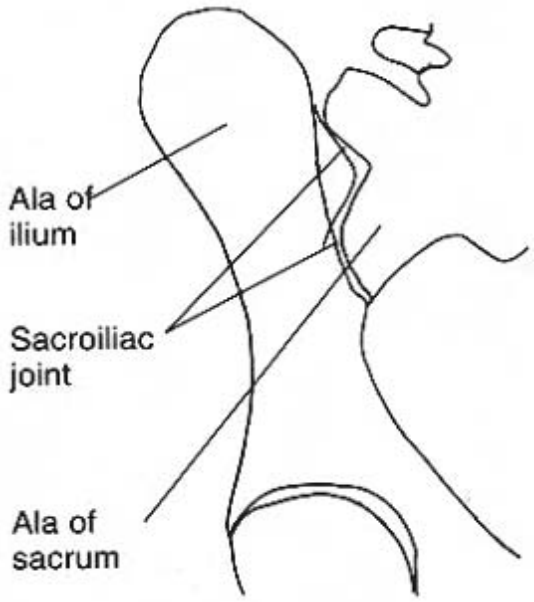


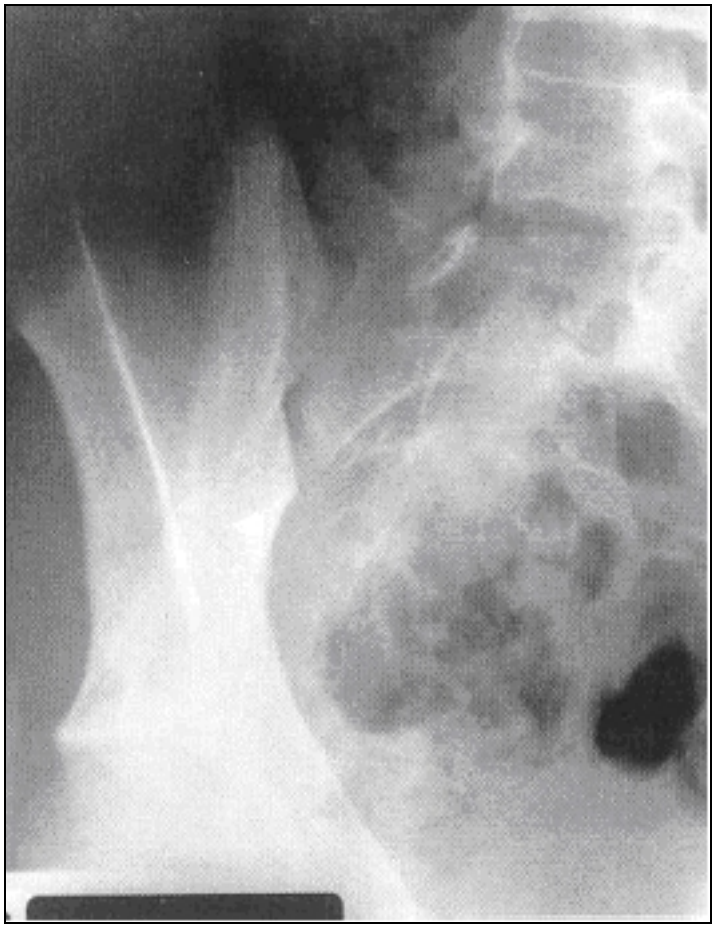
THE ORDER OF PROCEDURE
AP AXIAL SACROILIAC ARTICULATION

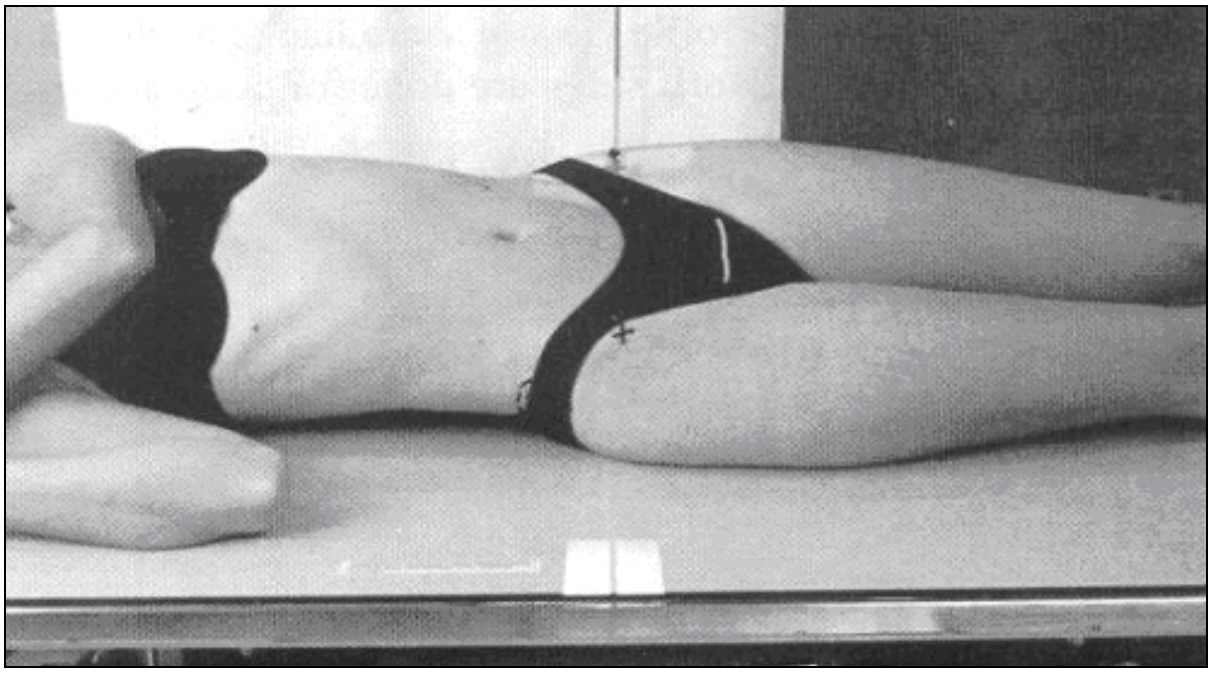
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the level of the level of the ASIS.	
c. **Technical Factors:** 8 X 10LW B.		
d. **LM:** Corresponding side of film.		
e. **Patient/Part position:** 1. Patient supine, legs extended with support under knees. 2. Place arms at side or up on chest. 3. Align midsagittal plane to midline of table and cassette. 4. Assure no rotation of torso or pelvis.		
f. **CR:** Angle CR cephalad, 30 degrees (males) to 35 degrees (females). Direct CR to a point midway between the level of the ASIS and symphysis pubis.	g. **SID:** 40"	h. **Collimation:** Collimate to area of interest.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Carefully place gonadal shielding on males.		
k. **Demonstrates:** Sacroiliac joints, L5-S1 junction, and coccyx.		

4-15. BILATERAL OBLIQUE SACROILIAC ARTICULATION

For comparison, both posterior oblique sacroiliac joints are radiographed.







THE ORDER OF PROCEDURE BILATERAL OBLIQUE SACROILIAC ARTICULATIONS		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At level of the ASIS with the patient in the oblique position.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient supine. 2. Rotate coronal plane 25 – 30 degrees posterior oblique, side of interest elevated. 3. Place support under elevated hip and flex elevated knee. 4. Align joint of interest to midline of table and cassette. 5. Center film to level of ASIS.		
f. **CR:** Perpendicular directed to a point 1 inch medial to upside ASIS.	g. **SID:** 40"	h. **Collimation:** Collimate to area of interest.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Carefully place gonadal shielding on males.		
k. **Demonstrates:** Sacroiliac joints farthest from the film. LPO will visualize right joint. RPO will visualize left joint.		

Continue with Exercises

EXERCISES, LESSON 4, SECTION IV

MATCHING: For exercises 1 through 4, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided.

1. _____	AP lumbosacral articulation.	a.	Sacroiliac joints, L-5/S-1 junction, sacrum, and coccyx.
2. _____	Lateral lumbosacral articulation.	b.	Lumbosacral joint space (L-5/S-1) and sacroiliac joints in AP projection.
3. _____	AP axial sacroiliac joint.	c.	Sacroiliac joints on the elevated side.
4. _____	Posterior obliquel sacroiliac joint.	d.	Lumbosacral joint space (L-5/S-1) in the lateral position.

MULTIPLE- CHOICE. For exercises 5-10, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. What degree of rotation (posterior obliqueing) of the coronal plane is required for a posterior oblique sacroiliac joint?

   a. 25 to 30 degrees.

   b. 30 to 35 degrees.

   c. 40 to 45 degrees.

   d. 75 to 80 degrees.

6. The proper patient and part position for an AP axial sacroiliac articulation is:

    a. Patient supine with median plane perpendicular and over center line of film; legs fully extended with no support under the knees.

    b. Patient laterally recumbent; knees flexed and arms at right angle to body; radiolucent material under the small of the waist; coronal plane perpendicular to the film.

    c. Patient supine; legs fully extended with support under knees for comfort; midsagittal plane aligned to midline of film; no rotation of pelvis.

    d. Patient supine; coronal plane rotated 25 to 30 degrees to the center of the film.

7. The technical factors for a posterior oblique sacroiliac articulation is:

    a. 10 x 12 LW B.

    b. 8 x 10 LW B.

    c. 10 x 12 CW NB.

    d. 8 x 10 LW NB.

8. The central ray for an AP lumbosacral articulation is:

    a. Horizontal perpendicular.

    b. Vertical perpendicular.

    c. Males, 30 degrees cephalic; females 35 degrees cephalic.

9. The part position for a lateral lumbosacral articulation is:

   a. A point 1 inch to the elevated ASIS to the center of the film.

   b. Midway between the superior prominence of the iliac crest and the ASIS.

   c. Along the midsagittal plane, midway between the ASIS and the symphysis pubis to the center of the film.

   d. The midpoint between the AISI projected to the center of the film.

10. The CR for an AP axial sacroliac articulation is directed to:

   a. A point 1 inch to the elevated ASIS to the center of the film.

   b. A point 1.5 inches inferior to the iliac crest on the coronal plane to the center of the film.

   c. Along the midsagittal plane, midway between the ASIS and the symphysis pubis to the center of the film.

   d. The midpoint between the level of the ASIS and symphysis pubis.

Check Your Answers on Next Page

SOLUTIONS,LESSON 4, SECTION IV

1. b (para 4-12)
2. d (para 4-13)
3. a (para 4-14)
4. c (para 4-15)
5. a (para 4-15)
6. c (para 4-14)
7. a (para 4-15)
8. c (para 4-12)
9. b (para 4-13)
10. d (para 4-14)

End of Lesson 4

LESSON ASSIGNMENT

LESSON 5	Positioning for Exams of the Cranium, Sinuses, and Mandible.
LESSON ASSIGNMENT	Paragraphs 5-1 through 5-9.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

5-1. Identify specifications for proper placement of the anatomical structures of the cranium (skull), sinuses, mastoids, and mandible listed below:

PA Skull (Caldwell method).
Bilateral skull.
AP axial skull (Chamberlain Towne or CT skull).

PA projection (Caldwell method).
Parientoacanthial projection (Waters view).
Lateral sinuses.

PA mandible.
Axiolateral (oblique, bilateral) mandible.

SUGGESTION After reading and studying the assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

LESSON 5

POSITIONING FOR EXAMS OF THE CRANIUM, SINUSES, AND MANDIBLE

Section I. PROJECTIONS OF THE CRANIUM (SKULL)

5-1. SURFACE ANATOMY AND REFERENCE POINTS

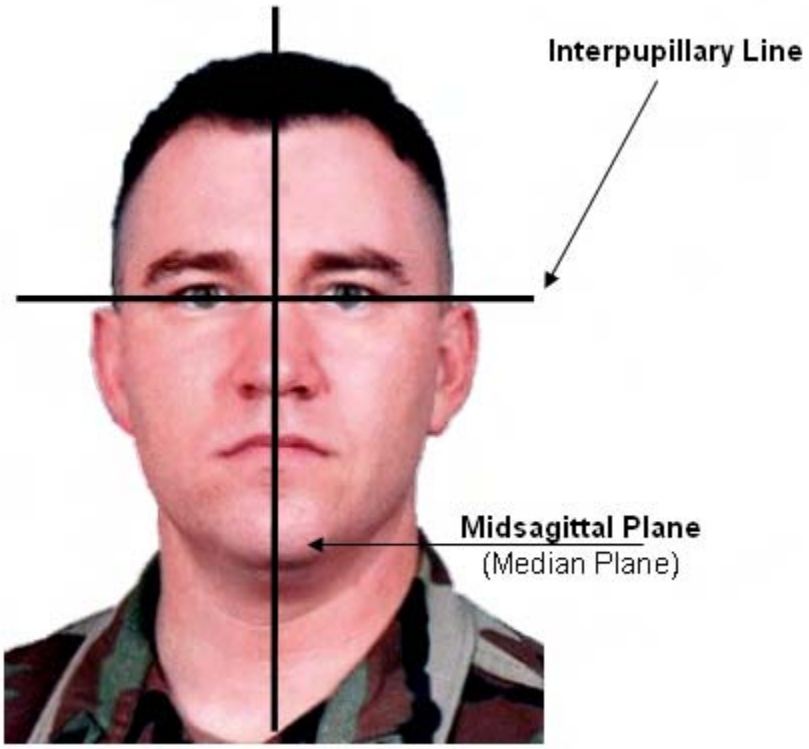
There are 21 terms pertaining to surface anatomy and reference points given in table 5-1. You will need to know these terms in order to comprehend the specifications for the cranium projections that follow. Please take a moment to familiarize yourself with the terms that appear in the table below and on the following page. Be sure to refer to the graphics on the pages following the table. These graphics depict cranial reference points.

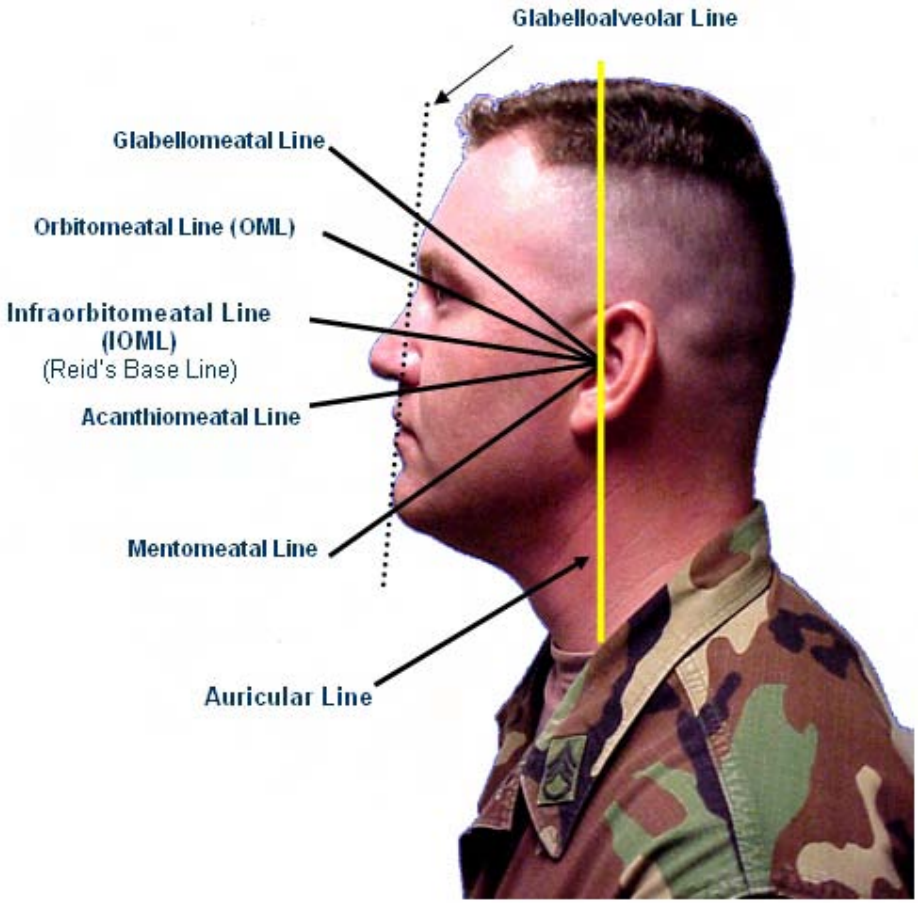
Radiographic Surface Anatomy and Reference Points	
1. Vertex	The most superior portion of the skull
2. Superciliary (arch)	The ridge or arch of the bone extending across the forehead directly above each eye
3. Glabella	Smooth prominence between the eyebrow
4. Nasion	The depression at the bridge of the nose
5. Acanthion	The junction of the upper lip and the nasal septum.
6. Gonion	The angle of the mandible. The most inferior posterior and lateral points on the external angle of the mandible.
7. External auditory meatus (EAM) (see also #20, *tragus*.)	The opening of the external ear canal
8. External occipital protuberance (EOP)	The bump along the midline of the lower back of the head; also referred to as the *inion*.
9. Mental point	The midpoint of the triangular area of the chin; also referred to as the *mental protuberance*.
10. External (outer canthus)	The lateral junction of the eyelids

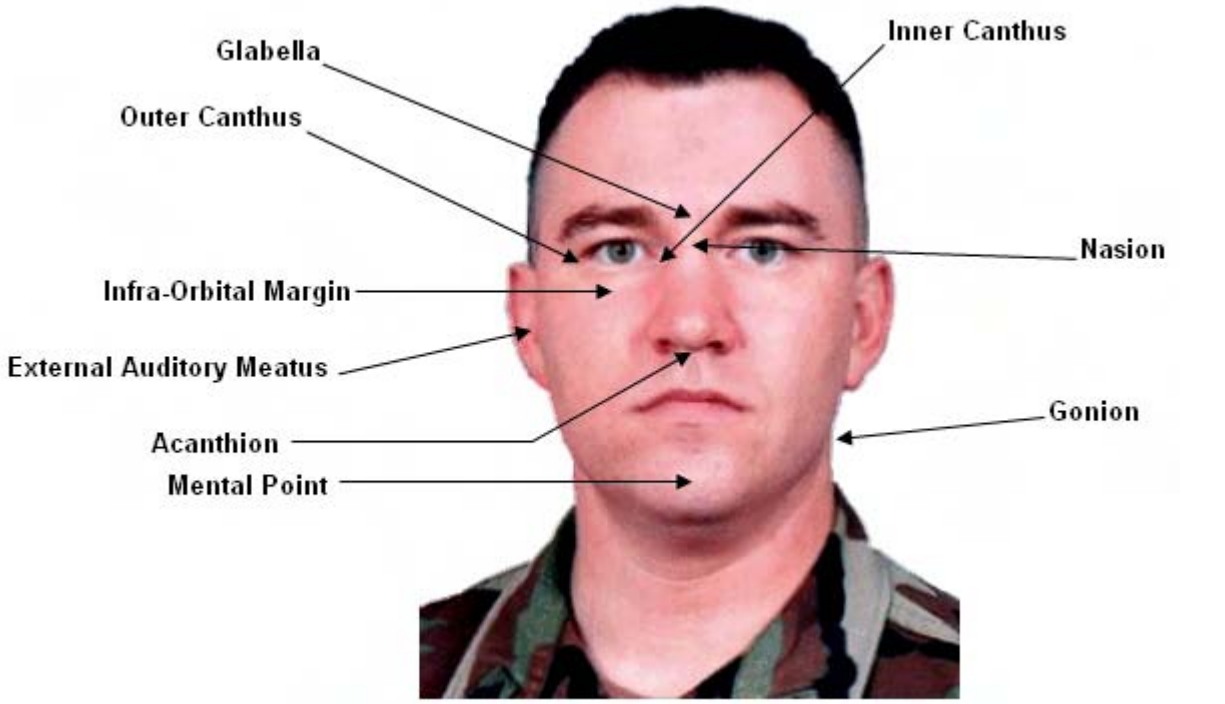
Table 5-1. Terminology (continued).

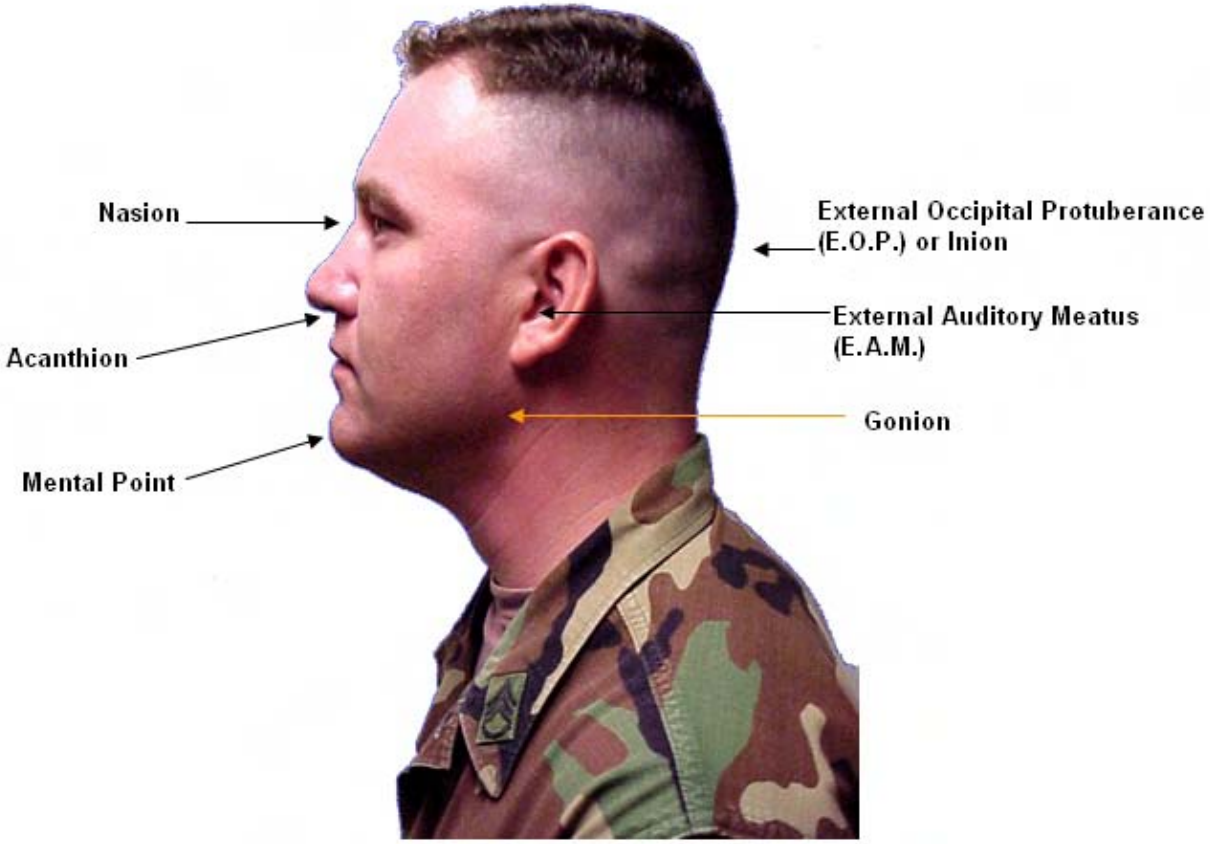
Radiographic Surface Anatomy and Reference Points	
11. Infraorbital margin	The inferior rim of the orbit (the bony cavity of the skull that contains the eye).
12. Midsagittal plane	Plane that divides the body into right and left halves. Cranial reference points are external occipital protuberance (EOP) and the glabella.
13. Acanthiomeatal line (AML)	Line that connects the acanthion and the external auditory meatus (EAM), the opening of the ear. Also know as the *occlusal plane*.
14. Orbitalmeatal line (OML)	Line that connects the external (outer) canthus of the eye and auditory meatus (EAM).
15. Infraorbitmealtal line (IOML)	Line that connects the infraorbital margin and the external auditory meatus (EAM). It is also referred to as the *Reid's base line of the cranium*.
16. Interpupillary line (IPPL)	Line that connects the pupils of the eye. In a true lateral position, the IPPL must be perpendicular to the table.
17. Glabellomeatal line (GML)	Line that connects the glabella and the external auditory meatus (EAM).
18. Gabelloalveolar line (facial plane)	Line that connects the glabella and the mental point.
19. Two-way heal alignment (TWHA)	Two or more planes of the skull are used to ensure proper alignment, *e.g.*, the median plane, the facial plane, the OML, the IOML, the AML and IPPL.
20. Tragus	The cartilaginous projection anterior to the external opening of the ear. (The tragus and EAM are the same.)
21. Mental meatal line (MML)	Line that connects the mental point and the EAM.

Table 5-1. Terminology (concluded).


Interpupillary Line
Midsagittal Plane
(Median Plane)

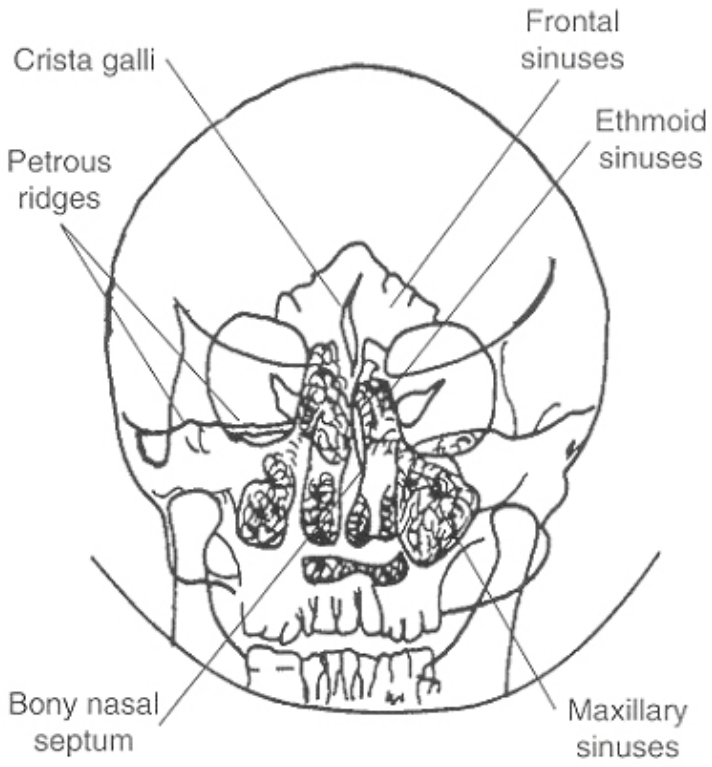

Glabelloalveolar Line
Glabellomeatal Line
Orbitomeatal Line (OML)
Infraorbitomeatal Line
(IOML)
(Reid's Base Line)
Acanthiomeatal Line
Mentomeatal Line
Auricular Line

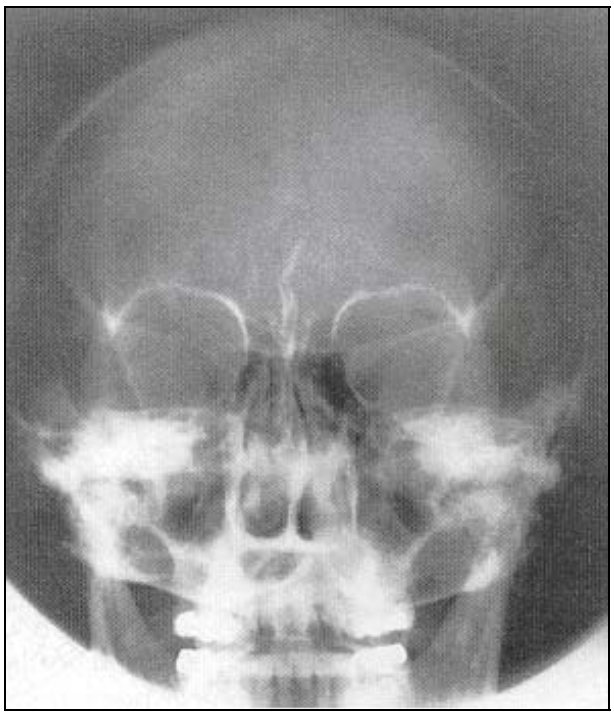

Glabella
Inner Canthus
Outer Canthus
Nasion
Infra-Orbital Margin
External Auditory Meatus
Gonion
Acanthion
Mental Point

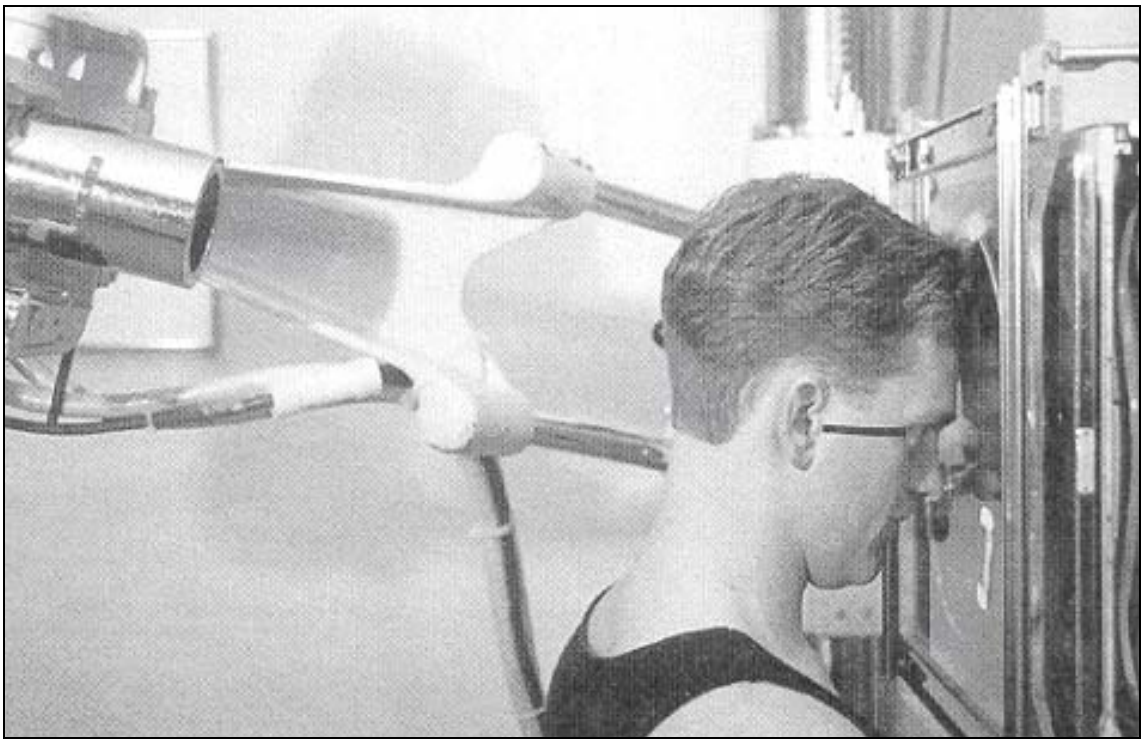

Nasion
External Occipital Protuberance
(E.O.P.) or Inion
External Auditory Meatus
(E.A.M.)
Acanthion
Gonion
Mental Point

5-2. POSTEROANTERIOA SKULL (CALDWELL)

The routine views of the cranium are PA skull (Caldwell), lateral skull (bilateral), and AP axial (Chamberlain Town or CT).



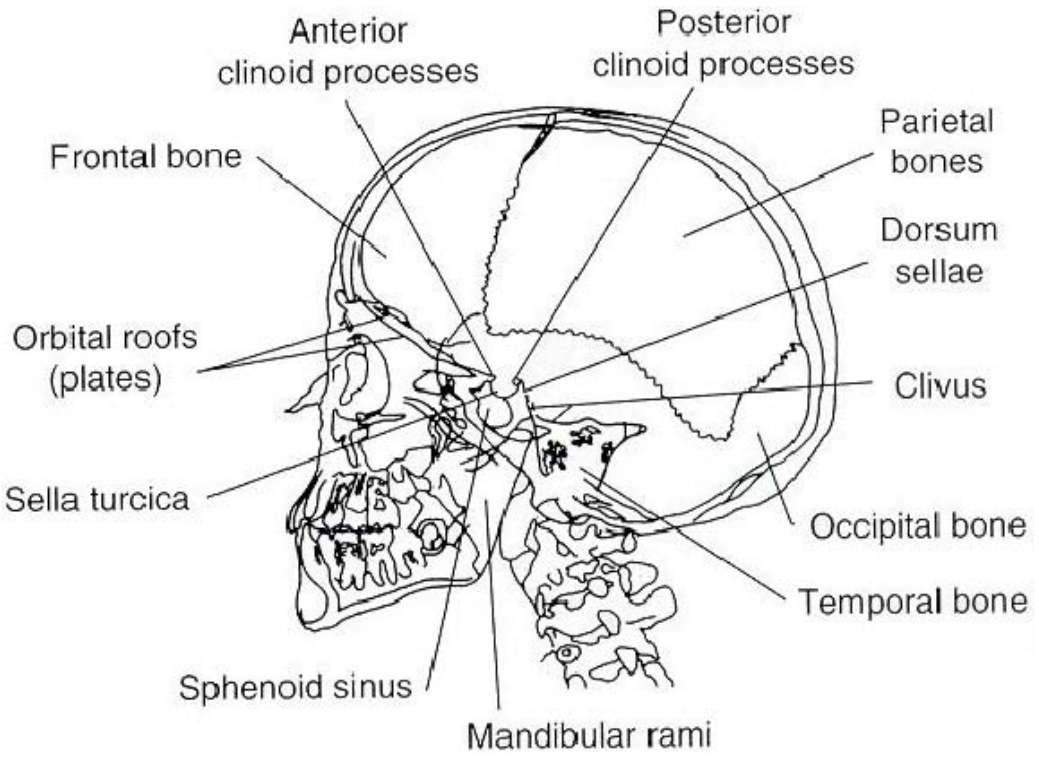


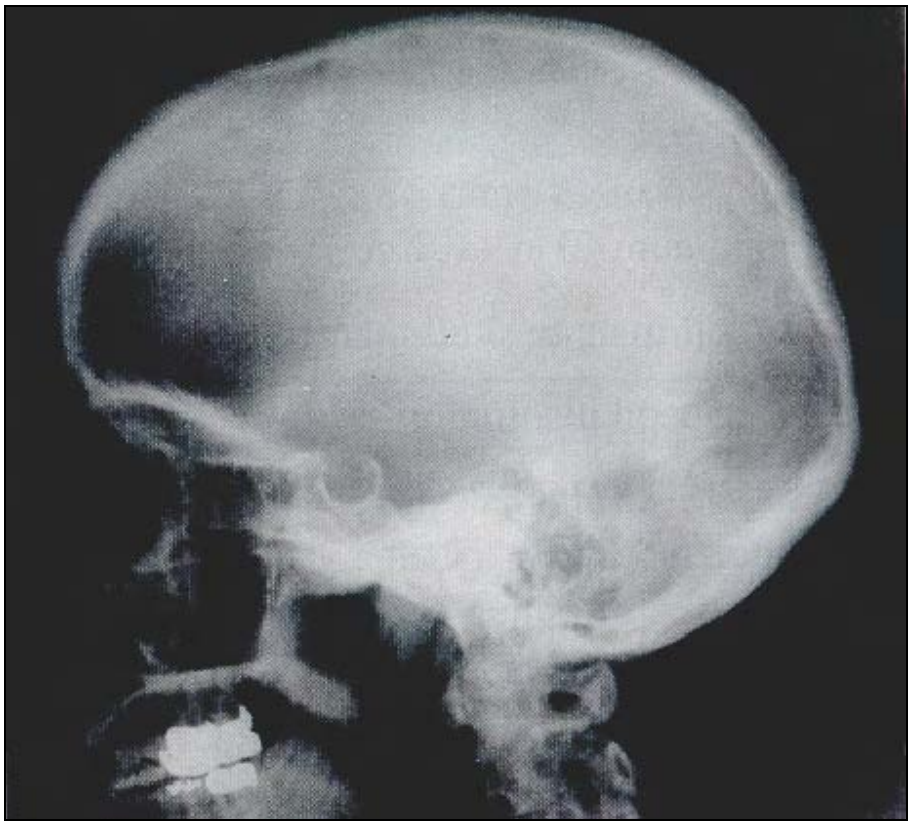


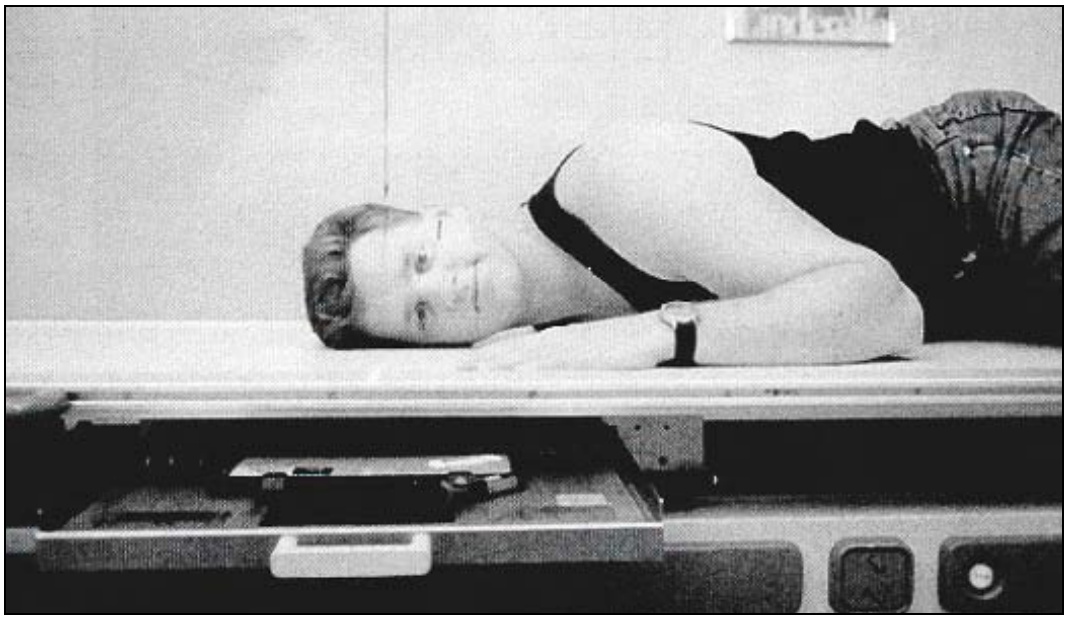
THE ORDER OF PROCEDURE
PA SKULL (CALDWELL METHOD)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** The entry and exit points are between the EOP and the glabella.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient erect or prone. 2. Rest patient's nose and forehead against table top. 3. Tuck chin, bringing OML perpendicular to film. 4. Align midsagittal plane perpendicular to midline of table top preventing head rotation. 5. Center cassette to nasion.		
f. **CR:** Cr angled 15 degree caudad and centered to to cassette.	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of skull.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Frontal bone, greater and lesser sphenoid wings, superior orbital fissures, ethmoid sinuses, foramen rotundum, orbital margin, cristi galli.		

5-3. LATERAL SKULL (BI-LATERAL)







THE ORDER OF PROCEDURE
AXIOLATERAL (OBLIQUE) MANDIBLE

a. **Remove artifacts:** Potential artifacts removed.

b. **Measure part:** Entry/exit, lateral ramus to lateral ramus.

c. **Technical Factors:** 8 X 10 CW B.

d. **LM:** Corresponding side nearest to cassette.

e. **Patient/Part position:**

1. Patient erect or prone.
2. Place head in a lateral position, with side of interest closest to cassette.
3. If possible, have patient close mouth to bring teeth together.
4. Align IPPL perpendicular to cassette with body of mandible to lower film border.
5. Extend chin, to prevent cervical spine superimposition.
6. Oblique (rotate) head. The degree of obliquity will depend on which section of the mandible is of interest. (Area of interest should be parallel to film).
   - Head in **true lateral** position best demonstrates **ramus.**
   - Chin turned **30 degrees** toward film best demonstrates **body.**
   - Chin turned **45 degrees** toward film best demonstrates **mentum.**

f. **CR:** Angle CR 25 degrees cephalic. Midway between angle and mental point of elevated side. Center cassette to CR.

g. **SID:** 40"

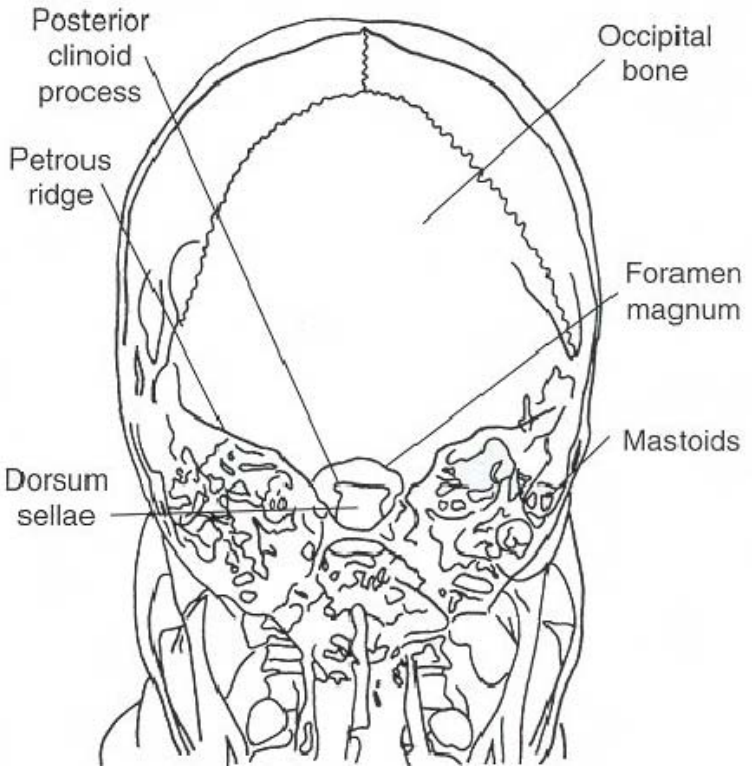
h. **Collimation:** Collimate on all sides to within 2 in. of mandible.

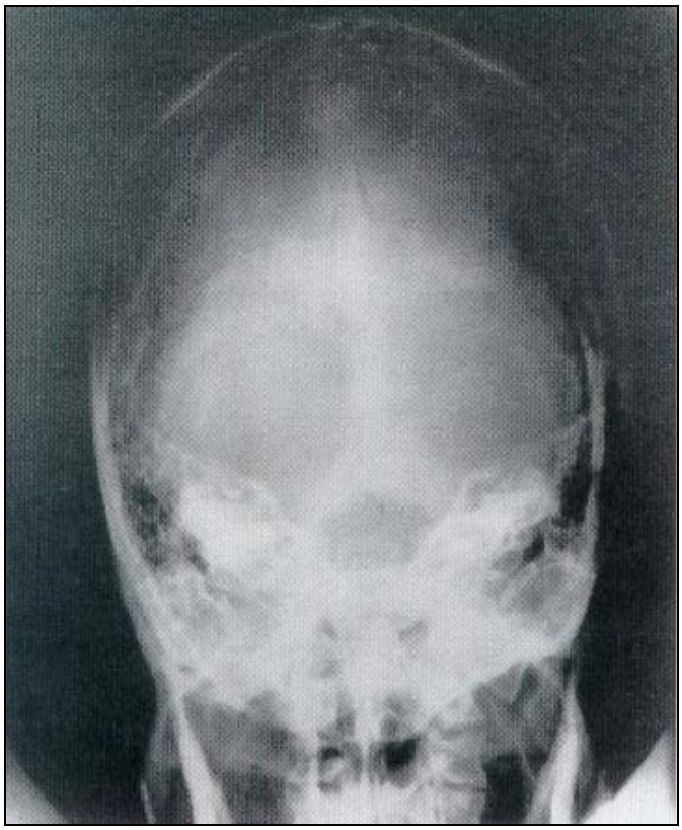
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.

j. **Shielding:** Lead shield over patient's lap.

k. **Demonstrates:** Mandibular rami, body of the mentum of mandible positioned closest to film.

5-4. ANTERIOR POSTERIOR AXIAL (CHAMBERLAIN TOWNE, CT)





THE ORDER OF PROCEDURE
AP AXIAL SKULL (CT)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** The entry and exit points are between the EOP and the glabella.	
c. **Technical Factors:** 10 X 12 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient erect or supine. 2. Depress chin, bringing OML perpendicular to film. 3. Align midsagittal plane perpendicular to midline of table preventing head rotation.		
f. **CR:** Cr angled 30 degree caudad to OML. Center at midsagittal plane 2.5" above the superciliary arch.	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of skull.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Occipital bone, petrous pyramids, foramen magnum with dorsum sellae and posterior clinoids in its shadow.		

Continue with Exercises

EXERCISES, LESSON 5, SECTION I

MATCHING: For exercises 1 through 3, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1._____ PA skull.

2._____ Lateral skull.

3._____ AP axial skull (Towne method).

a. Foramen magnum with dorsum sallae, petrous pyramids, occipital bone, posterior clinoid process.

b. Frontal bone, greater and lesser sphenoid wings, superior orbital fissures, ethmoid sinuses, foramen rotundeum, orbital margin, cristi galli.

c. Lateral cranium closest to the film, sella turcica, anterior and posterior clinoids, dorsum sellae, greater and lesser wings of sphenoid.

d. Petrous ridge in profile, bony labyrinth, tympanic cavity, internal auditory canal, and mastoid air cell.

MULTIPLE- CHOICE. For exercises 4 through 8, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

4. For a lateral skull the _____ is perpendicular to the film.

   a. IOML.

   b. AML.

   c. OML.

   d. Midsagittal plane.

5. The proper patient and part position for a PA skull is:

    a. Patient in semi-prone position; midsagittal plane parallel to film; IOML perpendicular to front edge of cassette; midpoint between the EOP and the glabella is over the midline of the table.

    b. Patient in prone position (nose-forehead position; meidsagittal plane perpendicular and over the midline of the film; orbitomeatal line perpendicular to the film.

    c. Patient in supine position (posterior skull against table top); midsagittal plane perpendicular and over the midline of the film; OML perpendicular to the film.

    d. Patient prone (nose-forehead position); midsagittal plane perpendicular and over midline of film; infraorbitomeatal line perpendicular to film.

6. What is centered for a lateral skull?

    a. Midsagittal plane, 2.5 inches above the superciliary arch.

    b. Nasion.

    c. A point 2 inches superior to the EAM.

    d. EAM.

7. What is perpendicular to the film for a PA (Caldwell) skull?

    a. IOML.

    b. AML.

    c. OML.

    d. IPPL.

8. Which of the following names go together?

   a. PA and Towne.

   b. AP axial and Towne.

   c. AP axial and Caldwell.

   d. Lateral and Caldwell.

Check Your Answers on Next Page

SOLUTION, LESSON 5, SECTION I

1. b (para 5-2)
2. c (para 5-3)
3. a (para 5-4)
4. a (para 5-3)
5. b (para 5-2)
6. c (para 5-3)
7. c (para 5-2)
8. b (para 5-4)

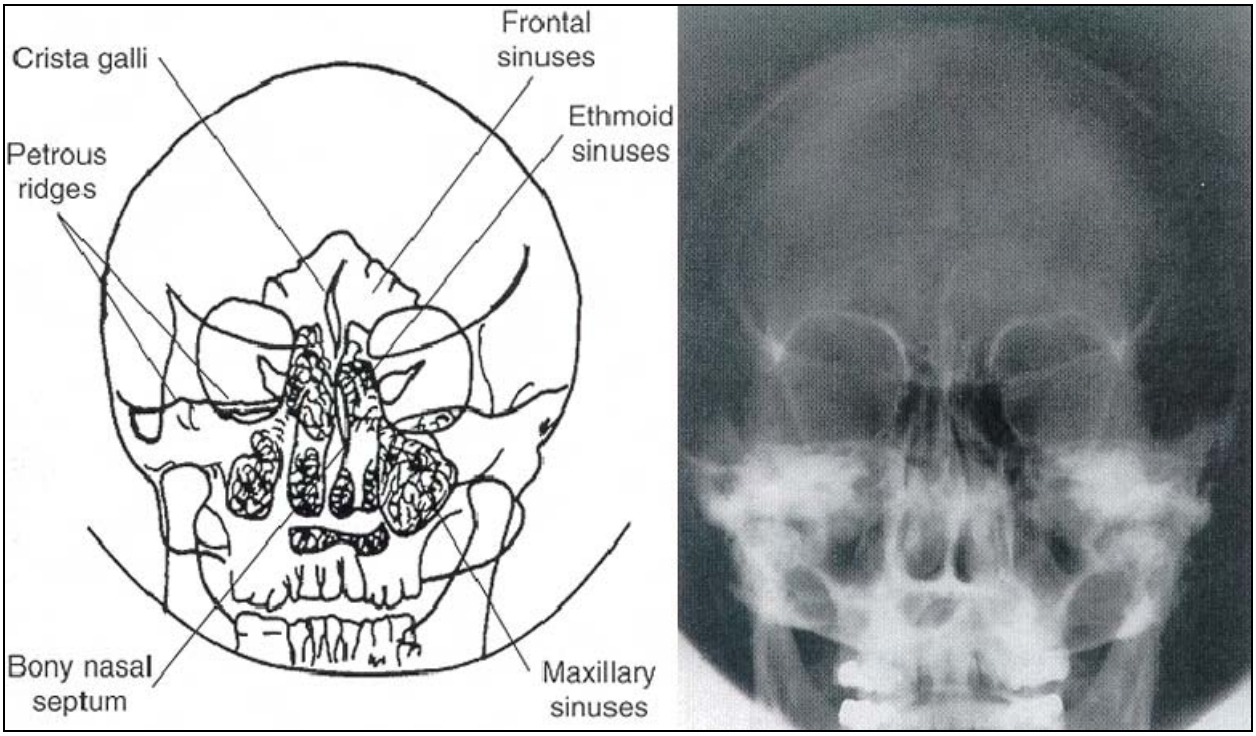
Section II. PROJECTIONS OF THE SINUSES

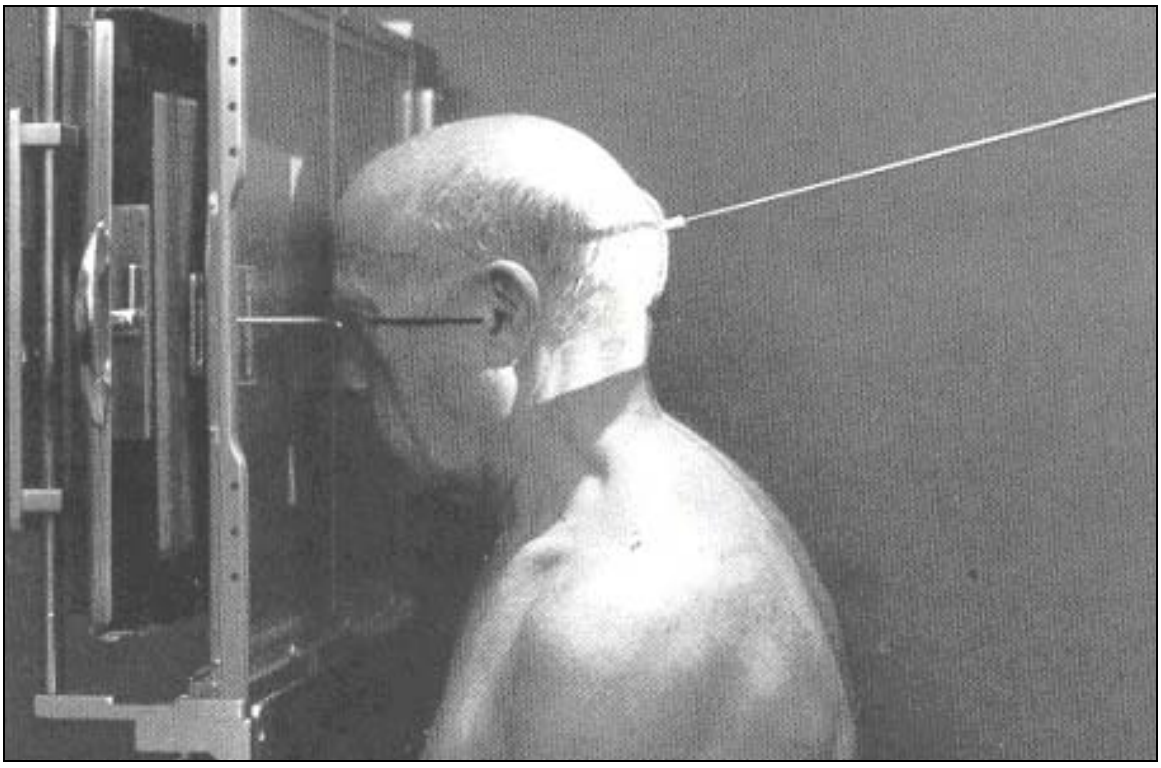
5-5. POSTEROANTERIOA PROJECTION (CALDWELL METHOD)

a. **Sinus Routine**. The routine views are the PA projection (Caldwell method), parietoacanthial projection (Waters), and lateral sinuses.

b. **The Sinuses**. The four sinuses are the frontal sinus, the ethmoid sinus, the sphenoid sinus, and the maxillary sinus.

c. **Best Demonstrated**. The PA projection (Caldwell method) best demonstrates the frontal and ethmoid sinuses. The Waters best demonstrates the maxillary sinuses. The lateral projection best demonstrates all four sinuses.

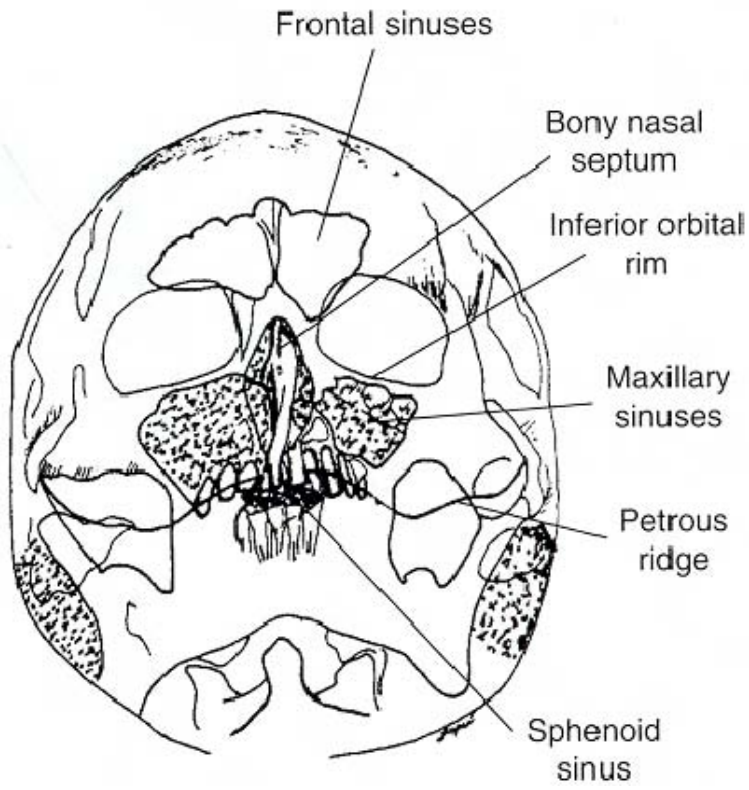


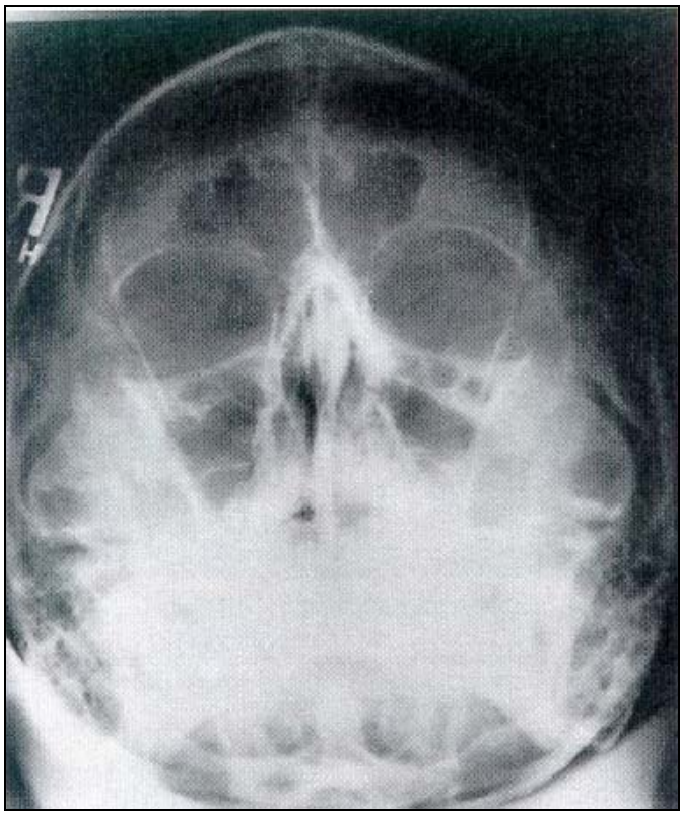


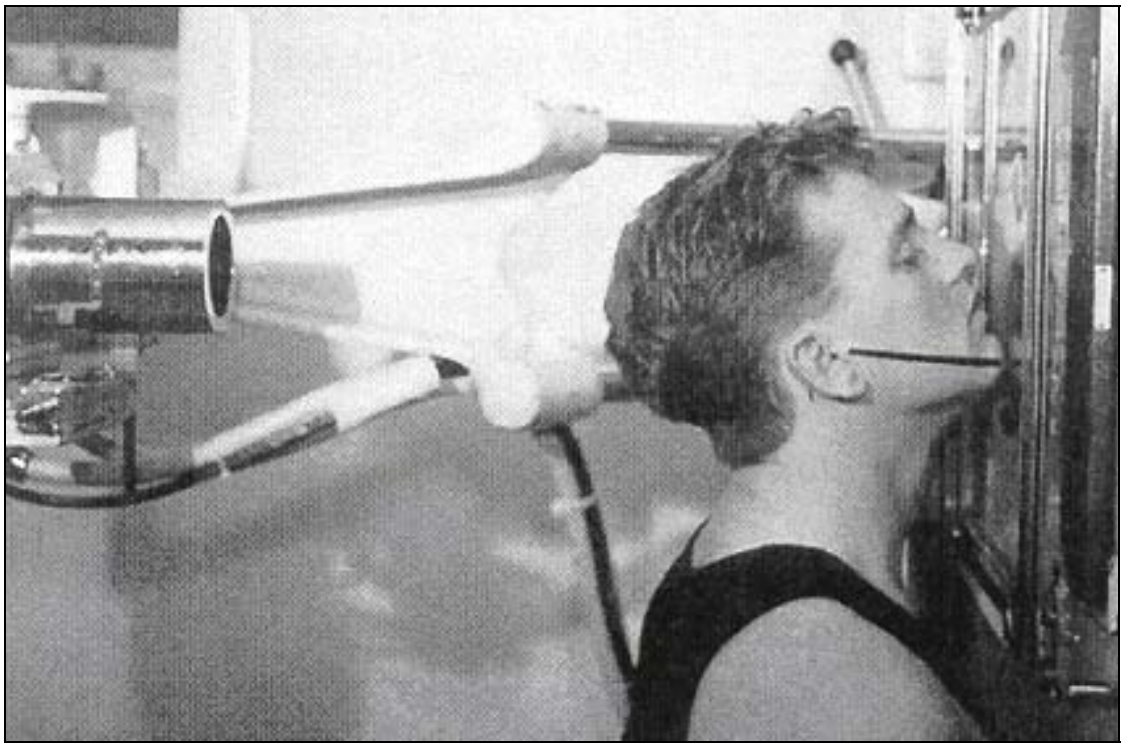
THE ORDER OF PROCEDURE
PA PROJECTION (CALDWELL METHOD)

a. Remove **artifacts.** Potential artifacts removed.	b. **Measure part.** Entry/exit, external occipital protuberance (EOP) to nasion.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient erect. 2. Rest patient's nose and forehead against upright tabletop. 3. Tuck chin, bringing OML perpendicular to film. 4. Align midsagittal plane perpendicular to midline of table top preventing head rotation. 5. Center cassette to nasion.		
f. **CR:** Cr angled 15 degree caudad and centered to cassette.	g. **SID:** 40"	h. **Collimation:** 6 X 6" conefield
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Frontal sinuses, anterior ethmoid sinuses.		

5-6. PARIETOACNTHIAL PROJECTION (WATERS METHOD)



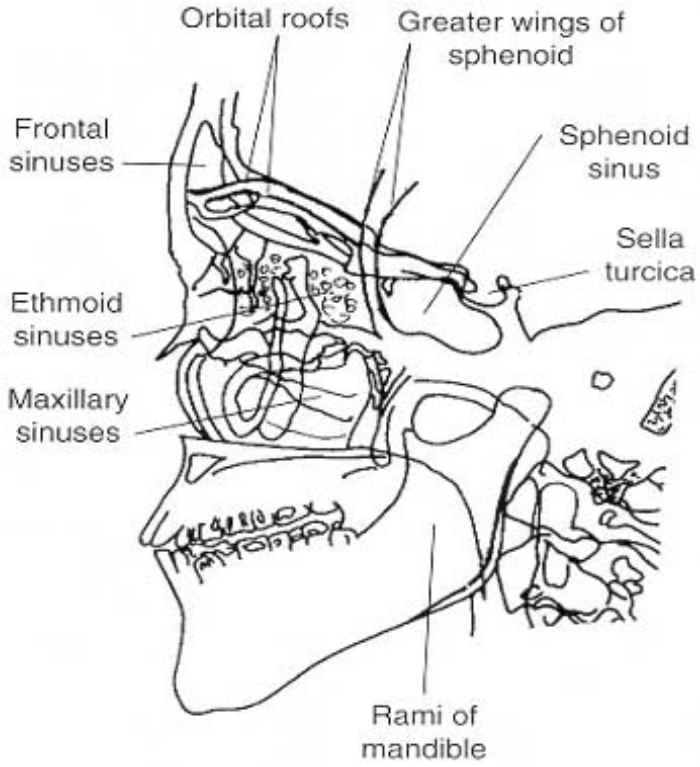


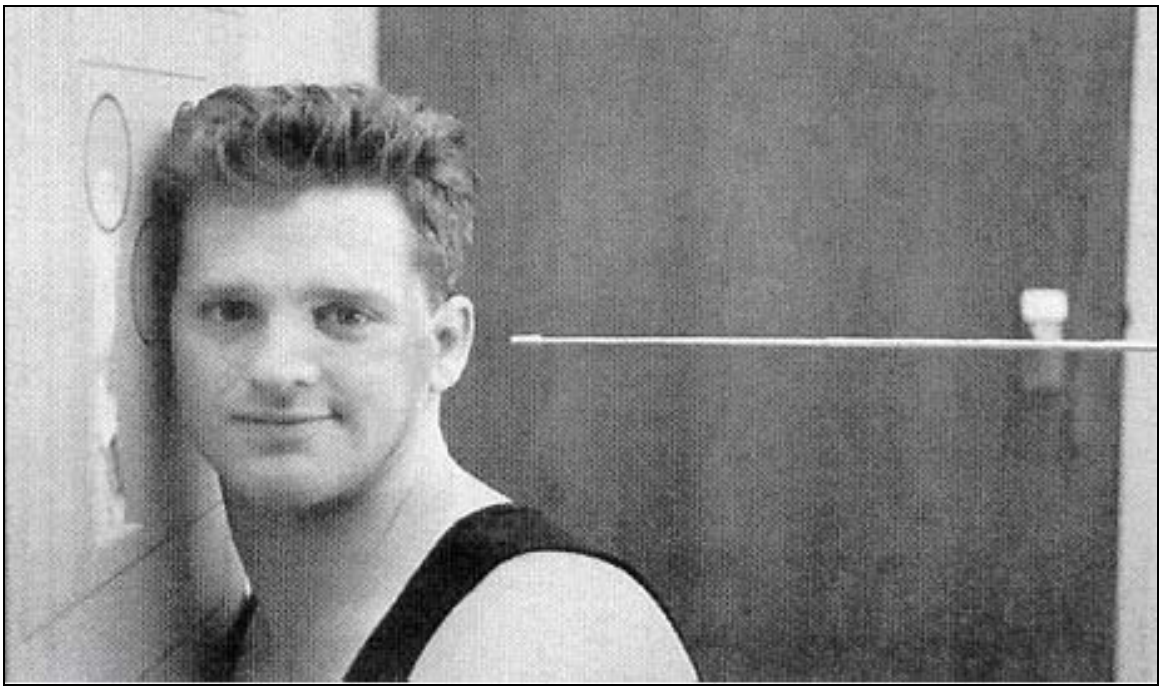


THE ORDER OF PROCEDURE
PARIETOACANTHIAL PROJECTION
(WATERS METHOD)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Between the (EOP) and acanthion.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient erect. 2. Extend the patient's neck resting the chin and nose against the upright tabletop. 3. Adjust the patient's head until the OML forms a 37 degree angle with the tabletop. 4. Position the midsagittal plane perpendicular to the midline of the film. 5. Center cassette to acanthion		
f. **CR:** Horizontal perpendicular centered to the cassette.	g. **SID:** 40"	h. **Collimation:** 6 X 6" conefield
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Maxillary sinuses, nasal fossae.		

5-7. LATERAL SINUSES





THE ORDER OF PROCEDURE LATERAL SINUSES		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Entry/exit, laterally at mid-point.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side nearest to cassette.		
e. **Patient/Part position:** 1. Patient erect. 2. Place head in a true lateral position, with side of interest closest to film, oblique body as needed for patient comfort. 3. Align midsagittal plane parallel to film, insuring no rotation or tilt. 4. IPPL perpendicular to film. 5. Adjust chin to bring IOML perpendicular to front edge of cassette.		
f. **CR:** Horizontal perpendicular, centered to a point midway between the outer canthus and EAM. Center cassette to the CR.	g. **SID:** 40"	h. **Collimation:** 6 X 6
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Sphenoid sinuses, superimposed frontal sinuses, ethmoid sinuses, maxillary sinuses, sella tucica, orbital roofs.		

Continue with Exercises

EXERCISES, LESSON 5, SECTION II

MATCHING: For exercises 1 through 3, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1._____	PA sinuses. (Caldwell method)	a. Maxillary sinuses and nasal fossae.
2._____	Parietoacanthia sinuses (Waters method).	b. Frontal sinuses and anterior ethmoid sinuses.
3._____	Lateral sinuses.	c. Sphenoid sinuses, superimposed frontal sinuses, ethmoid sinuses, maxillary sinuses, sella turcica, orbital roofs.
		d. Petrous ridge in profile, bony labyrinth, tympanic cavity, internal auditory canal, and mastooid air cell.

MULTIPLE- CHOICE. For exercises 4 through 7, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

4. The technical factors for the three sinus projections taught in this lesson are:

   a. 8 x 10 LW NB.

   b. 8 x 10 LW B.

   c. 10 x 12 CW B.

   d. 10 x 12 LW B

5. The part centered for the parietoacanthial sinus (Waters method) is:

   a. Nasion to the center of the film

   b. Acanthion to the center of the cassette.

   c. Midway between the outer canthus and the EAM to the center of the cassette.

   d. Glabella to the center of the cassette.

6. The proper patient and part position for a PA sinus (Caldwell method) is:

   a. Patient erect; midsagittal plane perpendicular to the midline of film; OML perpendicular to the film.

   b. Patient erect; midsagittal plane perpendicular to the midline of the film; IOML perpendicular to the film.

   c. Patient erect, head in true lateral position; midsagittal plane parallel to film; IPPL perpendicular to film; IOML perpendicular to front edge of cassette.

   d. Patient erect; chin against table or upright Bucky, MML perpendicular to film; OML at a 37 degree angle; midsagittal plane perpendicular to film.

7. For a parietoacanthial projection (Waters), the angle of the OML is:

   a. 15 degrees.

   b. 25 degrees.

   c. 30 degrees.

   d. 37 degrees.

Check Your Answers on Next Page

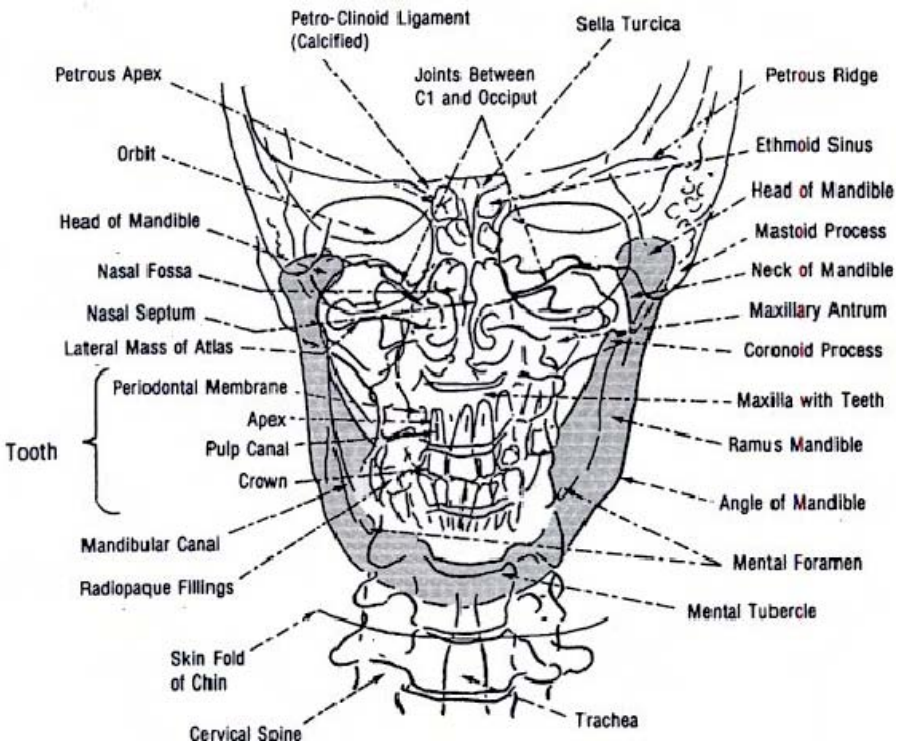
SOLUTIONS, LESSON 5, SECTION II

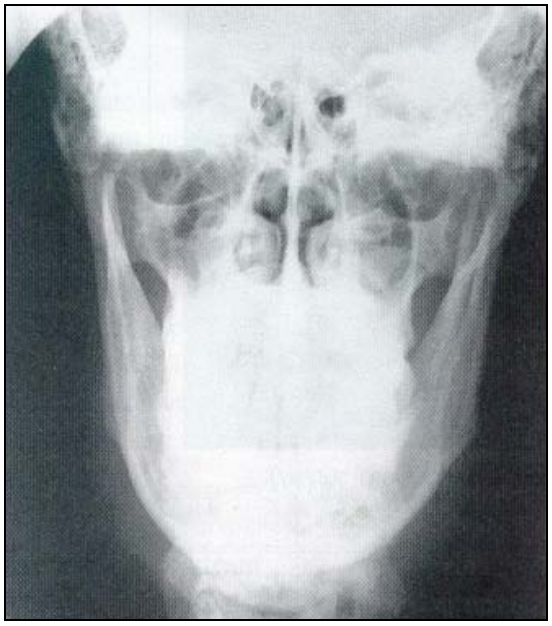
1. b (para 5-5)
2. a (para 5-6)
3. c (para 5-7)
4. b (paras 5-5, 5-6, 5-7)
5. b (para 5-6)
6. a (para 5-5)
7. d (para 5-6)

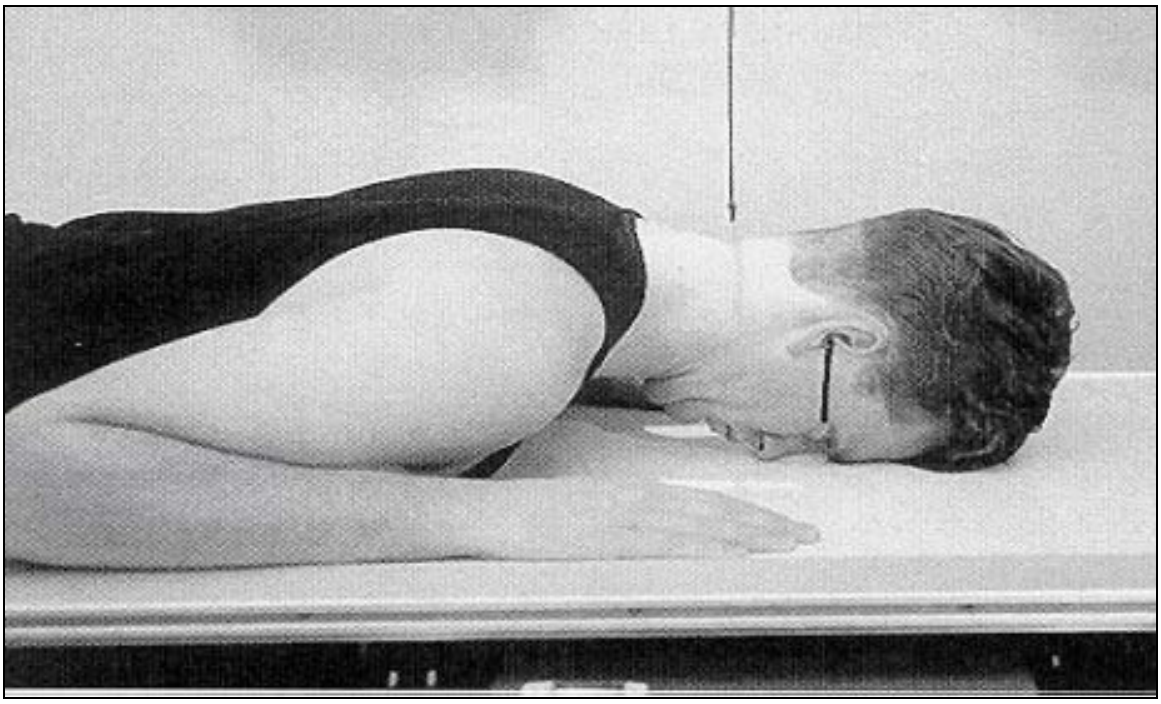
Section III. PROJECTIONS OF THE MANDIBLE

5-8. POSTEROANTERIOR MANDIBLE

The posterioranterior (PA) and the axiolateral (oblique) are the routine views for the mandible.

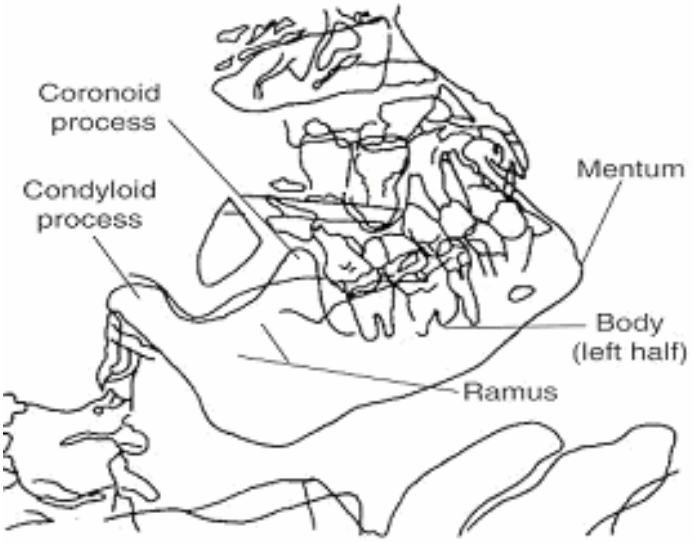


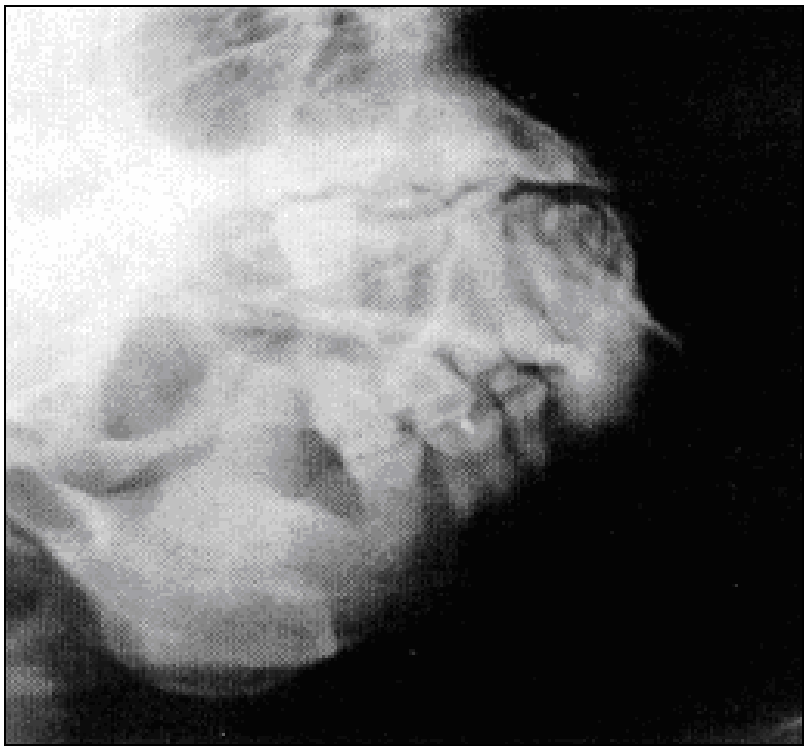


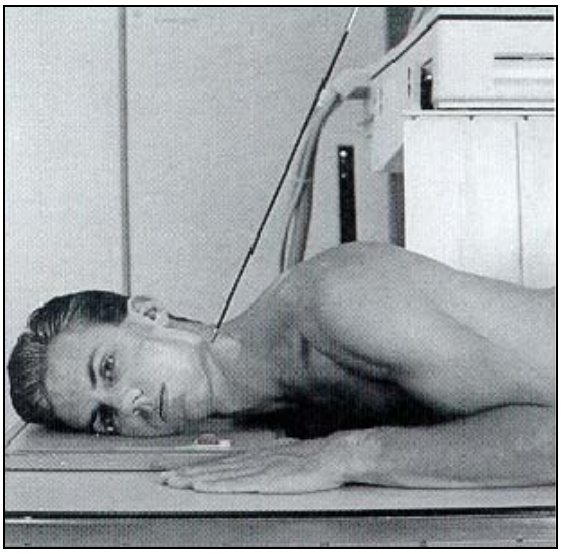


THE ORDER OF PROCEDURE PA MANDIBLE		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Entry/exit, between EOP and mental point	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side nearest to cassette.		
e. **Patient/Part position:** 1. Patient erect or prone. 2. Rest patient's forehead and nose against tabletop. 3. Tuck chin, bringing orbitomeatal line (OML) perpendicular to film. 4. Align midsagittal plane perpendicular to midline of tabletop. 5. Center cassette to junction of lips.		
f. **CR:** Align CR perpendicular to film. Center CR to cassette (to junction of lips).	g. **SID:** 40"	h. **Collimation:** Collimate on all sides to within 1 in. of mandible.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Mandibular ramus, body of mandible, mentum (mental protuberance).		

5-9. AXIOLATERAL (OBLIQUE) MANDIBLE







THE ORDER OF PROCEDURE
AXIOLATERAL (OBLIQUE) MANDIBLE

a. **Remove artifacts:** Potential artifacts removed.	b. **Measure part:** Entry/exit, lateral ramus to lateral ramus.	
c. **Technical Factors:** 8 X 10 CW B.		
d. **LM:** Corresponding side nearest to cassette.		
e. **Patient/Part position:** 1. Patient erect or prone. 2. Place head in a lateral position, with side of interest closest to cassette. 3. If possible, have patient close mouth to bring teeth together. 4. Align IPPL perpendicular to cassette with body of mandible to lower film border. 5. Extend chin, to prevent cervical spine superimposition. 6. Oblique (rotate) head. The degree of obliquity will depend on which section of the mandible is of interest. (Area of interest should be parallel to film). • Head in **true lateral** position best demonstrates **ramus.** • Chin turned **30 degrees** toward film best demonstrates **body.** • Chin turned **45 degrees** toward film best demonstrates **mentum.**		
f. **CR:** Angle CR 25 degrees cephalic. Midway between angle and mental point of elevated side. Center cassette to CR.	g. **SID:** 40"	h. **Collimation:** Collimate on all sides to within 2 in. of mandible.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Mandibular rami, body of the mentum of mandible positioned closest to film.		

Continue with Exercises

EXERCISES, LESSON 5, SECTION III

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1. _____ PA mandible.

2. _____ Axiolateral oblique mandible.

a. An end-on view of the petrous portion, EAM canal, mastoid air cells, and mastoid antrum.

b. Mandibular ramus, body of mandible, mentum.

c. Mandibular rami, body of mentum of mandible positioned closest to film.

MULTIPLE-CHOICE. For exercises 3 through 6, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

3. When measuring the part for a PA mandible, the entry/exit point is:

   a. Between the external occipital protuberance (EOP) and the mental point.

   b. Laterally between the midpoint of the mandible.

   c. Between the EOP and tragus.

   d. Between the vertex of the skull and the tragus.

4. The proper patient and part position for an axiolateral oblique mandible is:

   a. Patient in true lateral recumbent position, knees flexed, arms at right angle to body; radiolucent material under lower dorsal region, coronal plane perpendicular to the table.

   b. Patient supine, midsagittal plane perpendicular to the table.

   c. Patient seated or standing (nose-forehead position); midsagittal plane perpendicular and over the center line of the film; OML perpendicular to the film.

   d. Patient erect or prone; head in a lateral position, with side of interest closest to cassette; IPPL perpendicular to table; midsagittal plane (chin) rotated 30 degrees face down towards the mandible body being demonstrated.

5. The technical factors for the PA mandible is:

   a. 10 x 12 LW NB

   b. 10 x 12 LW B

   c. 8x 10 CW NB

   d. 8 x 10 LW B

6. The proper patient and part position for a PA mandible is:

   a. Patient in true lateral recumbent position, knees flexed, arms at right angle to body; radiolucent material under lower dorsal region; coronal plane perpendicular to the table.

   b. Patient prone, midsagittal plane perpendicular to table top, OML perpendicular to film.

   c. Patient seated or standing (not forehead position); midsagittal plane perpendicular and over the centerline of the film' OML perpendicular to the film.

   d. Patient semi-prone, one arm down by the side and the other supporting the side up. Shoulder in down and out of CF chin extended until the inferior margin of side up is parallel with lower edge of cassette. Midsagittal plane of skull tilted 15 degrees vertex down.

Check Your Answers on Next Page

SOLUTIONS, LESSON 5, SECTION III

1. b (para 5-8)
2. c (para 5-9)
3. a (para 5-8)
4. d (para 5-9)
5. d (paras 5-8 and 5-9)
6. b (para 5-9)

End of Lesson 5

LESSON ASSIGNMENT

LESSON 6	Positioning for Additional Skull Procedures
LESSON ASSIGNMENT	Paragraphs 6-1 through 6-6.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

6-1. Identify specifications for proper placement of the anatomical structures of the cranium (skull), sinuses, mastoids, and mandible listed below:

Axiolateral position Schuller method (bilateral open and closed mouth).
Lateral nasal bones (bilateral).

Parietoacanthial facial bones (Waters method).
Lateral facial bones.

Submentovertex (SMV) projection (Basilar position).
Oblique axial position (tangential projection).

SUGGESTION After reading and studying the assignment, complete the exercises. These exercises will help you to achieve the lesson objectives.

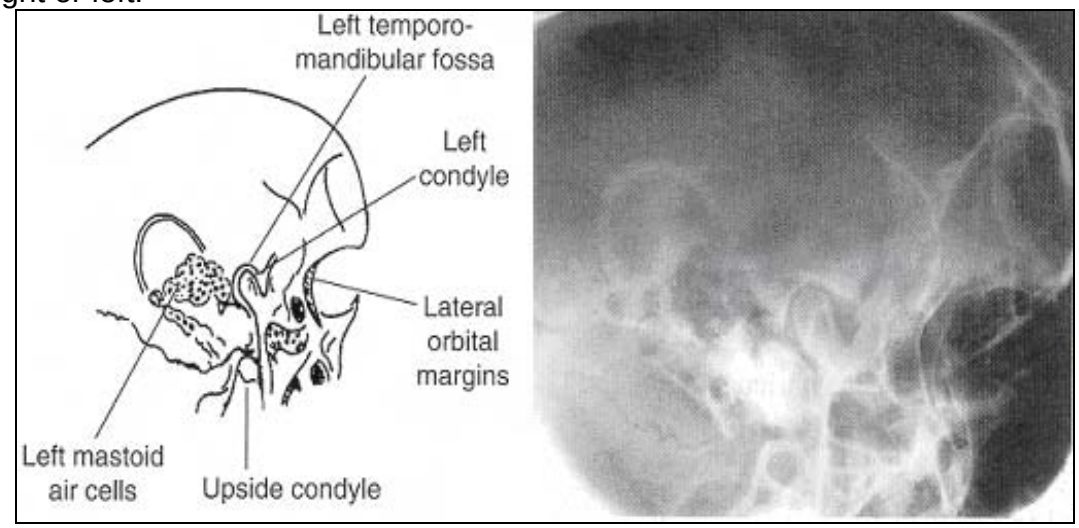
LESSON 6

POSITIONING FOR ADDITIONAL SKULL PROCEDURES

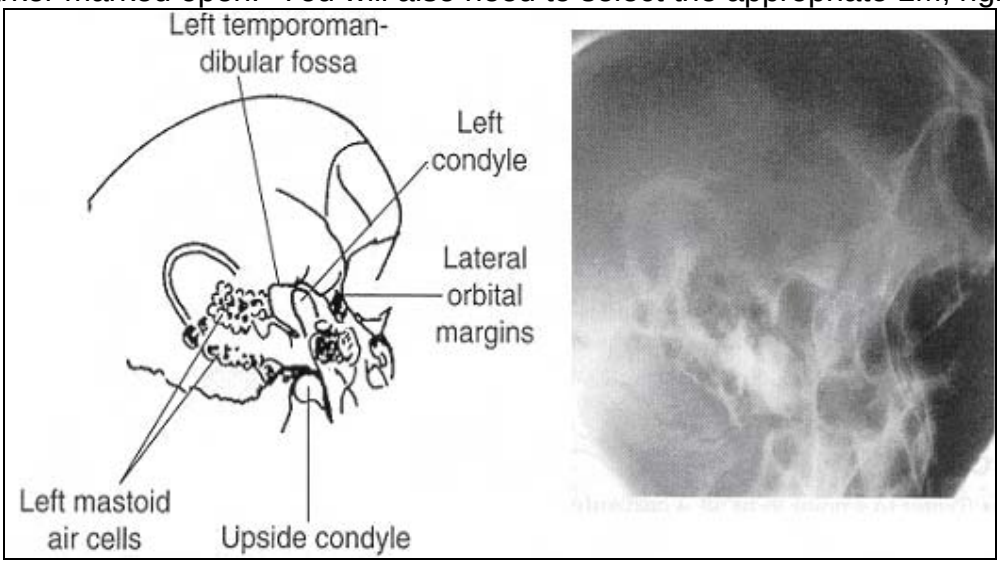
Section I. THE TEMPOROMANDIBULAR JOINT AND THE NOSE

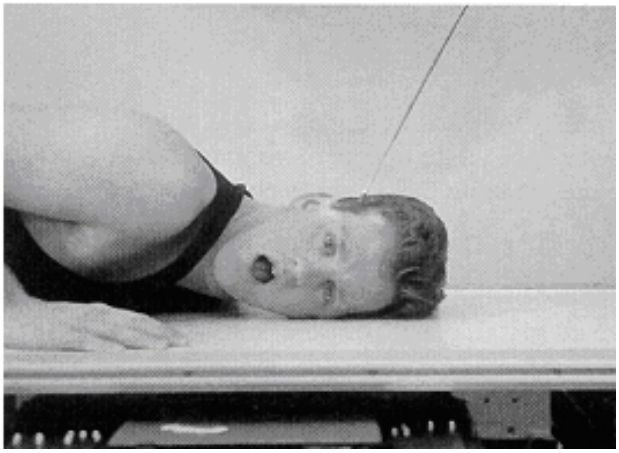
6-1. AXIOLATERAL POSITION, SCHULLER METHOD (BILATERAL, OPEN AND CLOSED-MOUTH)

a. **Closed-Mouth View.** Both views of the temporomandibular joint (TMJ)s are done exactly the same way, except for the letter markers. For the mouth closed view you will need to choose the LM marked closed. You will also need to select the appropriate LM, right or left.



b. **Open Mouth View.** For the mouth open view, you will need to choose the letter marker marked open. You will also need to select the appropriate LM, right or left.

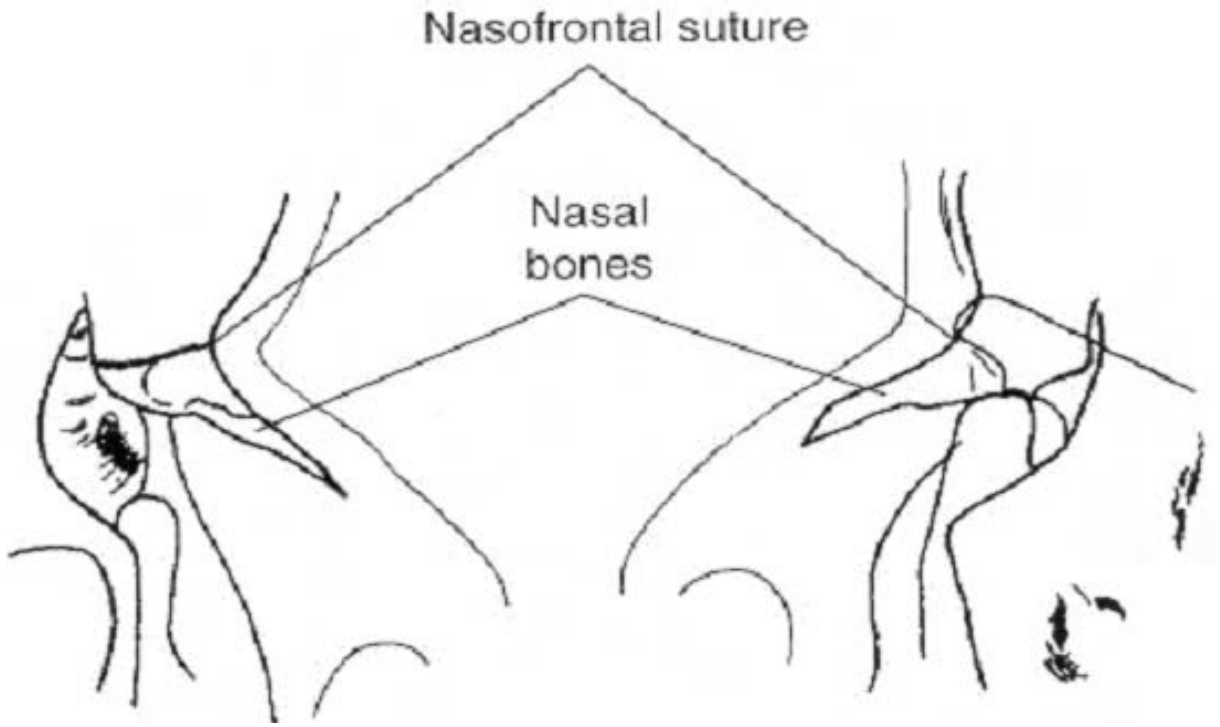


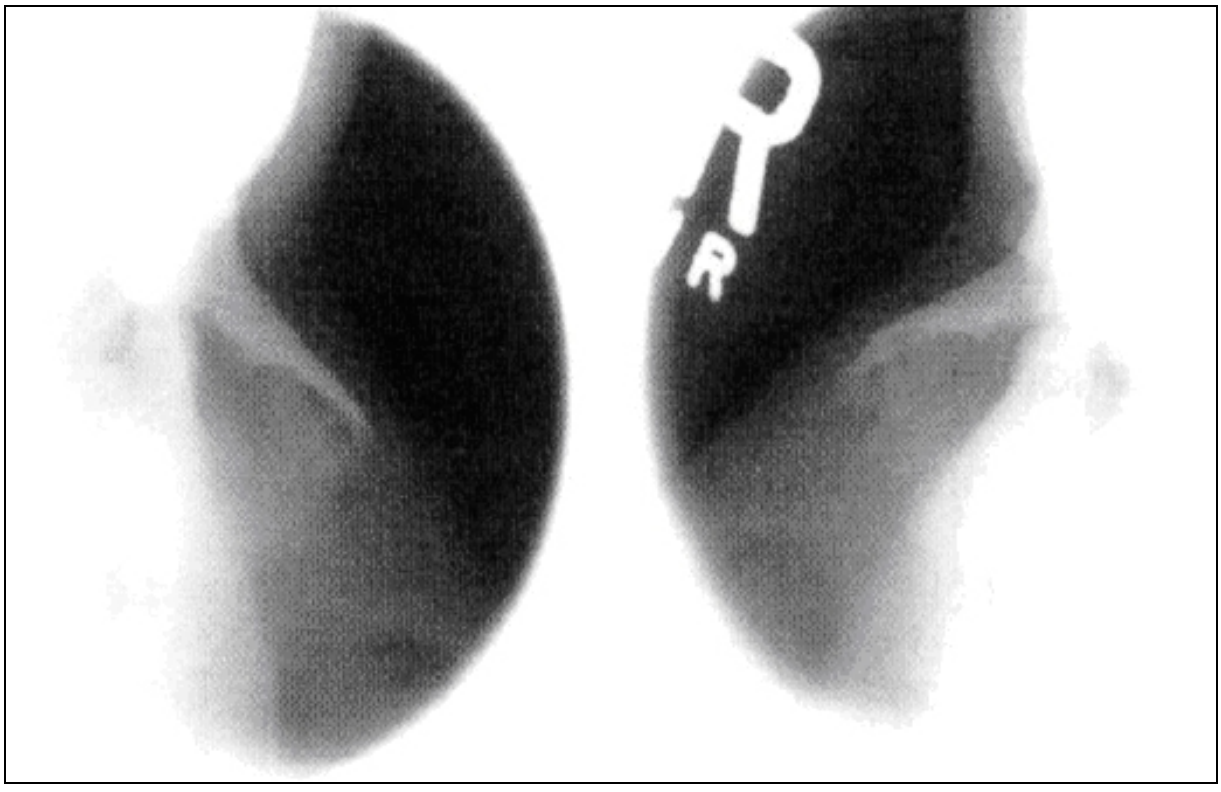


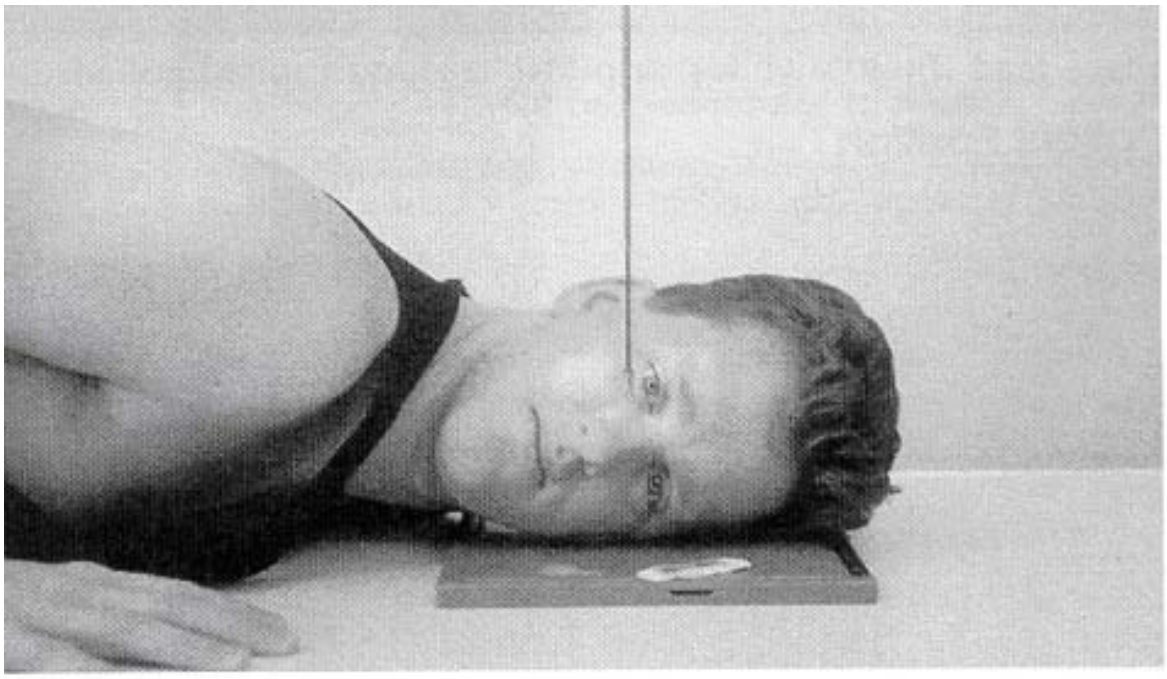
THE ORDER OF PROCEDURE
AXIOLATERAL TMJ, SCHULLER METHOD
(BILATERAL, OPEN AND CLOSED-MOUTH)

a. **Remove artifacts:** Potential artifacts removed.	b. **Measure part:** Entry/exit, laterally between the tragic.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side down, with (o) for open-mouth and (c) for closed mouth.		
e. **Patient/Part position:** 1. Patient erect or prone. 2. Rest lateral side of head against tabletop, with side of interest closest to cassette. 3. Adjust head into true lateral position, oblique body as needed for comfort. 4. Align midsagittal plane parallel with tabletop. 5. Adjust interpupillary line to film. 6. Position IOML perpendicular to front edge of cassette. 7. Do not allow the chin to tilt inward toward the cassette. 8. Center cassette to TMJ positioned adjacent to cassette, located 1 inch anterior to EAM.		
f. **CR:** Angle CR 25 degrees caudad. Centered 1" anterior and 2" superior to elevated EAM.	g. **SID:** 40"	h. **Collimation:** 4 X 4"
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient to shield gonads.		
k. **Demonstrates:** TMJ closest to film (Bilateral, open and closed mouth position).		

6-2. LATERAL NASAL BONES (BILATERAL)







THE ORDER OF PROCEDURE LATERAL NASAL BONES (BILATERAL)		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Entry/exit, laterally at mid-point.	
c. **Technical Factors:** ½ 8 X 10CW NB.		
d. **LM:** Corresponding letter marker side down.		
e. **Patient/Part position:** 1. Patient erect or prone. 2. Place head in a true lateral position, with side of interest closest to film, oblique body as needed for patient comfort. 3. Position nasal bone to center of unmasked half of cassette. 4. Align midsagittal plane parallel to film, insuring no rotation or tilt. 5. IPPL perpendicular to film. 6. Adjust chin to bring IOML perpendicular to front edge of cassette.		
f. **CR:** Perpendicular to film. Center ½ in. inferior and posterior to nasion.	g. **SID:** 40"	h. **Collimation:** 4 X 4"
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Nasal bone and soft tissue nose structure.		

Continue with Exercises

EXERCISES, LESSON 6, SECTION I

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1._____ Axiolateral TMJ, Schuller method (bilateral open and closed-mouth).

2._____ Lateral nasal bones (bilateral).

a. Temporomandibular joint closest to the film.

b. Superimposed facial bones, greater wings of the sphenoid, orbital roofs, sella turcica, zygoma, and mandible.

c. Nasal bone and soft tissue nose structures.

INDENTIFICATION. Exercises 3 and 4 depict the proper alignment for a particular position. Write the name of the position in the space provided.

3. _____

4. _____

MULTIPLE-CHOICE. For exercises 5 through 9, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. The appropriate positioning and LM for a right axiolateral TMJ view (Schuller method, bilateral open-mouthed) are:

   a. Corresponding side up with (r) and (o) letter marker.

   b. Corresponding side up with (l) and (o) letter marker.

   c. Corresponding side down with (l) and (o) letter marker.

   d. Corresponding side down with (o) and (r) letter marker.

6. What are the entry/exit points for measuring the part for a view of the lateral nasal bones (bilateral)?

   a. Laterally at midpoint.

   b. Laterally between the tragi.

   c. Between the EOP and the acanthion.

   d. Laterally between the zygomatic arches.

7. The proper alignment for an axiolateral TMJ (Schuller method, bilateral open and closed mouth) is:

   a. Patient in true lateral recumbent position, knees flexed, arms at right angle to body; radiolucent material under lower dorsal region, coronal plane perpendicular to the table.

   b. Patient prone or erect; head in true lateral; midsagittal plane parallel with table or upright Bucky; IOML perpendicular to front edge of cassette.

   c. Patient prone or erect; head in true lateral; midsagittal plane parallel with table or upright Bucky; OML perpendicular to front edge of cassette.

   d. Patient prone or erect; chin against table or upright Bucky; MML perpendicular to film; OML forms a 37 degree angle, midsagittal plane perpendicular to film.

8. The FRD for a view of the lateral nasal bones (bilateral) is:

   a. 10 x 12 or 8 x 10 LW B

   b. 10 x 12 or 8 x 10 LW NB

   c. ½ 8x 10 CW NB

   d. 8 x 10 LW B

9. The FRD for a view of the axiolateral TMJ (Schuller method, bilateral open and closed mouth) is:

   a. 10 x 12 CW B

   b. 10 x 12 LW NB

   c. 8 x 10 CW NB

   d. 8 x 10 LW B

Check Your Answers on Next Page

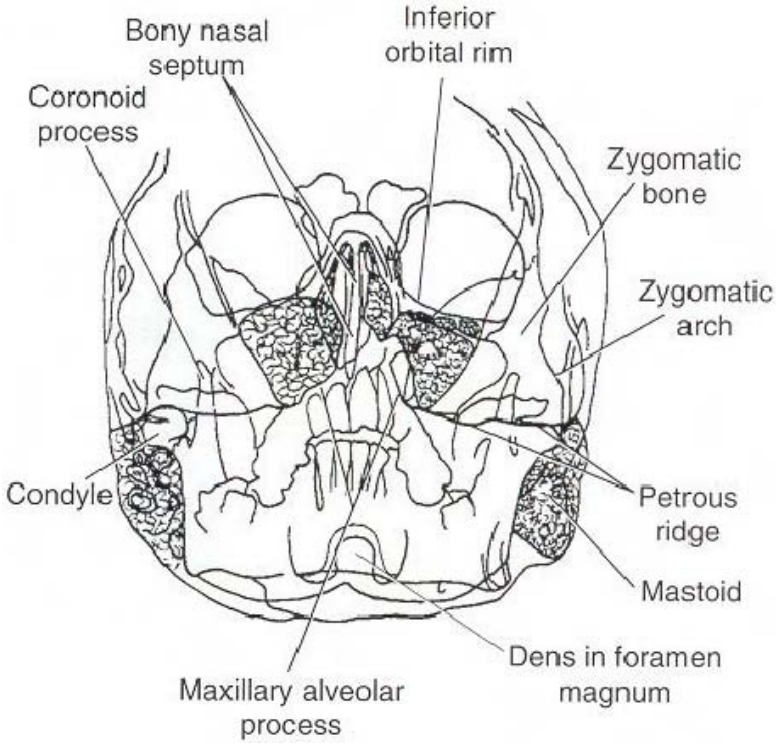
SOLUTIONS, LESSON 6, SECTION I

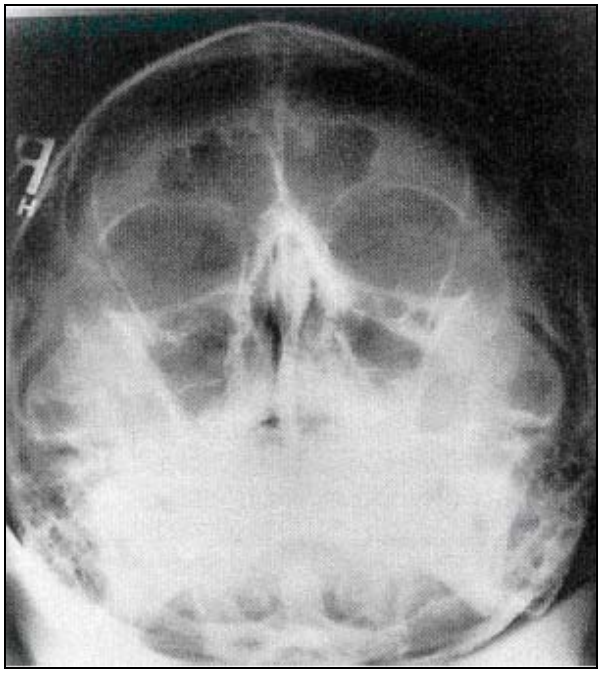
1. a (para 6-1)
2. c (para 6-2)
3. Axiolateral TMJ (Schuller method, bilateral open and closed mouth) (para 6-1)
4. Lateral nasal bones (para 6-2)
5. d (para 6-1)
6. a (para 6-2)
7. b (para 6-1)
8. c (para 6-2)
9. d (para 6-1)

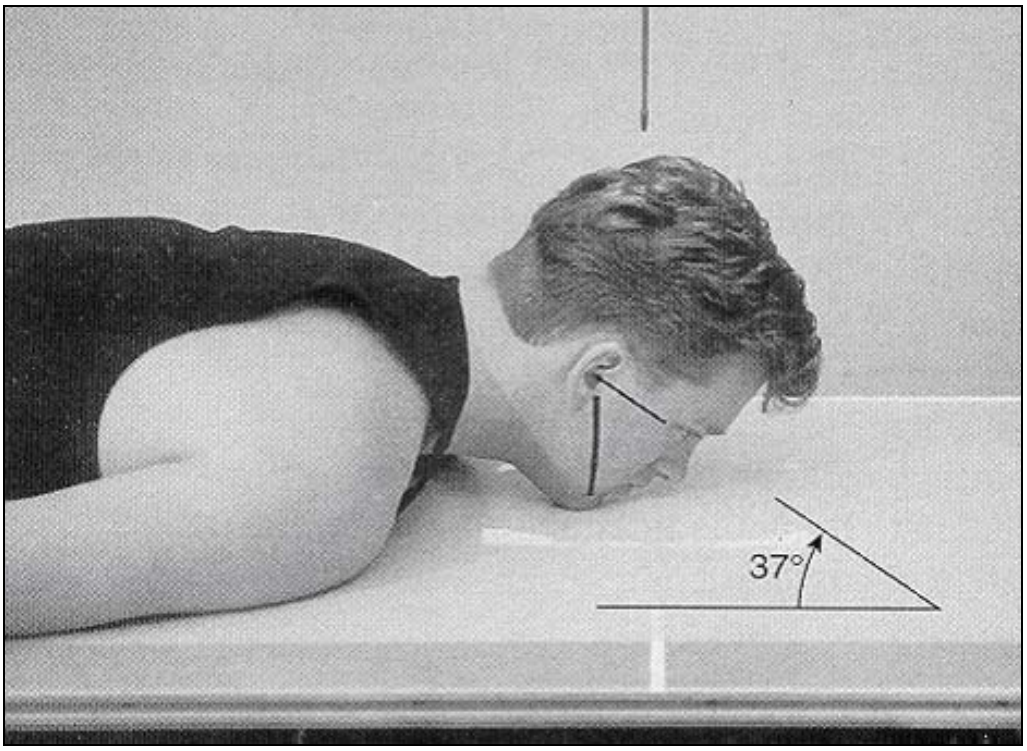
Section II. PROJECTIONS OF THE FACIAL BONES

6-3. PARIETOACANTHIAL FACIAL BONES (WATERS METHOD)

The routine for the facial bones consist of the parietoacanthial (Waters method), and the lateral position.

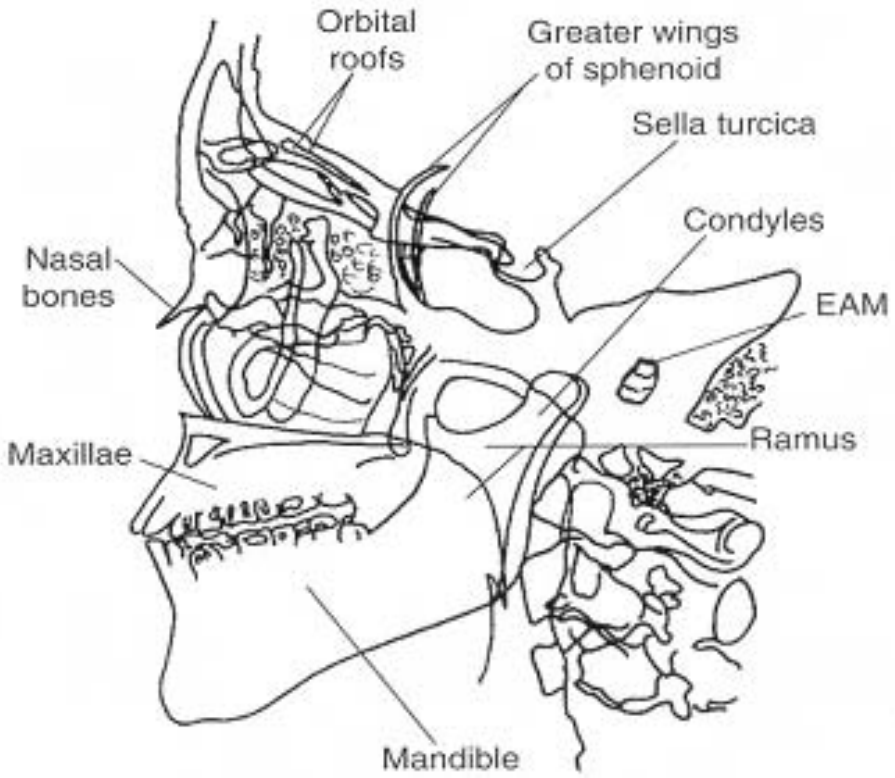


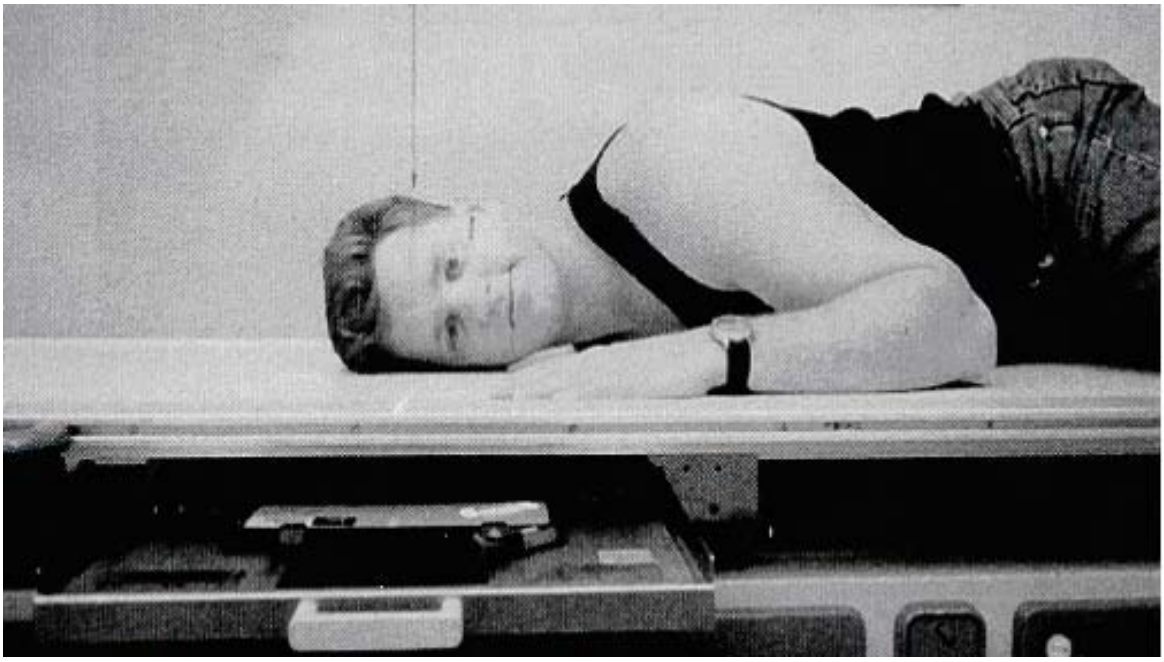




THE ORDER OF PROCEDURE PARIETOACANTHIAL PROJECTION (WATERS METHOD)		
a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Between the (EOP) and acanthion.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side of body.		
e. **Patient/Part position:** 1. Patient prone or erect. 2. Extend the patient's neck resting the chin and nose against the table top. 3. Adjust the patient's head until the OML forms a 37 degree angle with the tabletop. 4. Position the midsagittal plane perpendicular to the midline of the film. 5. Center cassette to acanthion.		
f. **CR:** Horizontal perpendicular centered to the cassette.	g. **SID:** 40"	h. **Collimation:** Full Film Coverage
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** inferior orbital rim, maxillae, nasal septum, zygomatic bones and arches, anterior nasal spine.		

6-4. LATERAL FACIAL BONES





THE ORDER OF PROCEDURE
LATERAL FACIAL BONES

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** Entry/exit, laterally between the zygomatic arches.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side nearest to cassette.		
e. **Patient/Part position:** 1. Patient erect or prone. 2. Place head in a true lateral position, with side of interest closest to film, oblique body as needed for patient comfort. 3. Align midsagittal plane parallel to film, insuring no rotation or tilt. 4. IPPL perpendicular to film. 5. Adjust chin to bring IOML perpendicular to front edge of cassette.		
f. **CR:** Perpendicular to film. Center CR to zygoma, at a level halfway between outer canthus and EAM. Center cassette to CR.	g. **SID:** 40"	h. **Collimation:** Full film coverage (FFC).
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Superimposed facial bones, greater wings of the sphenoid, orbital roofs, sella turcica, zygoma and mandible.		

Continue with Exercises

EXERCISES, LESSON 6, SECTION II

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1._____ Parietoacanthial facial bones. (Waters method).

2._____ Lateral facial bones.

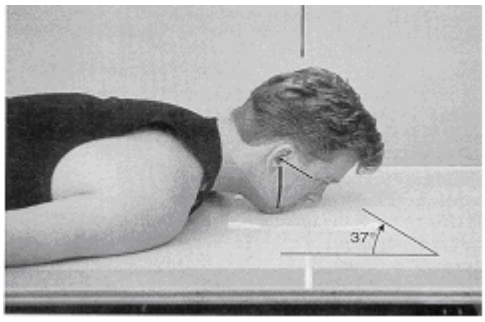
a. A true AP frontal projection of the zygomatic bones.

b. Inferior orbital rim, maxillae, nasal septum, zygomatic bones and arches, anterior nasal spine.

c. Superimposed facial bones, greater wings of the sphenoid, orbital roofs, sella turcica, zygoma, and mandible.

INDENTIFICATION. Exercises 3 and 4 depict the proper alignment for a particular position. Write the name of the position in the space provided.

3._____



4._____

MULTIPLE-CHOICE. For exercises 5 through 10, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. The proper patient and part position for a parietoacanthial view of the facial bones (Waters method) is:

   a. Patient in true lateral recumbent position, knees flexed, arms at right angle to body; radiolucent material under lower dorsal region, coronal plane perpendicular to the table.

   b. TWHA, with patient prone or erect; midsagittal plane parallel with table or upright Bucky; IPPL perpendicular to film, IOML perpendicular to front edge of cassette.

   c. Patient in supine position; midsagittal plane perpendicular and over the center line of the table.

   d. TWHA with patient prone or erect; chin against table or upright Bucky; CR perpendicular to film; OML forms a 37° angle; midsagittal plane is perpendicular to film.

6. What two lines are perpendicular to the film for a lateral facial position?

   a. Midsagittal plane and IPPL.

   b. Midsagittal plane and OIML.

   c. OIML and IPPL

7. What is centered for a view of the lateral facial bones?

   a. Zygoma at a level halfway between the outer canthus and the EAM.

   b. Acanthion to the center of the film.

   c. ½ inch inferior and posterior to the EAM.

   d. Acanthion to the center of the film.

   e. CR 1 inch anterior and 2 inches superior to the upside EAM.

8. The technical factor for the parietoacanthal facial bones (Waters method) is:

   a. 10 x 12 LW NB

   b. 8 x 10 LW B

   c. 8x 10 LW NB

   d. ½ 8 x 10 LW B

9. What is centered for a view of the parietoacanthial facial bones (Waters method)?

   a. Acanthion to the center of the film

   b. Zygoma at a level halfway between the outer canthus and the EAM

   c. Nasion to the center of the film

   d. Glabella to the center of the film

10. The proper patient and part position for a lateral view of the facial bones is:

    a. Patient in true lateral recumbent position, knees flexed, arms at right angle to body; radiolucent material under lower dorsal region; coronal plane perpendicular to the table.

    b. Patient prone or erect; midsagittal plane parallel with table or upright Bucky; IPPL perpendicular to film; IOML perpendicular to front edge of cassette.

    c. Patient in supine position; midsagittal plane perpendicular and over the centerline of the table.

    d. Patient prone or erect; chin against table or upright Bucky; MML perpendicular to film; OML forms a 37 degree angle; midsagittal plane is perpendicular to film.

Check Your Answers on Next Page

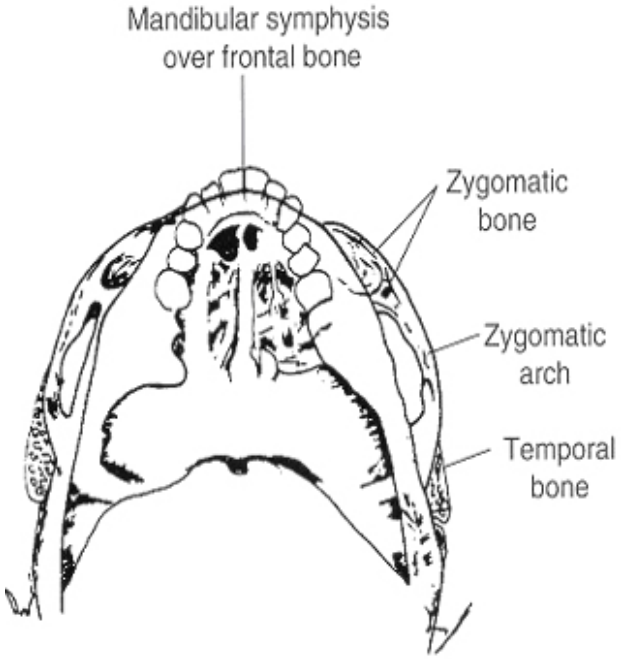
SOLUTIONS, LESSON 6, SECTION II

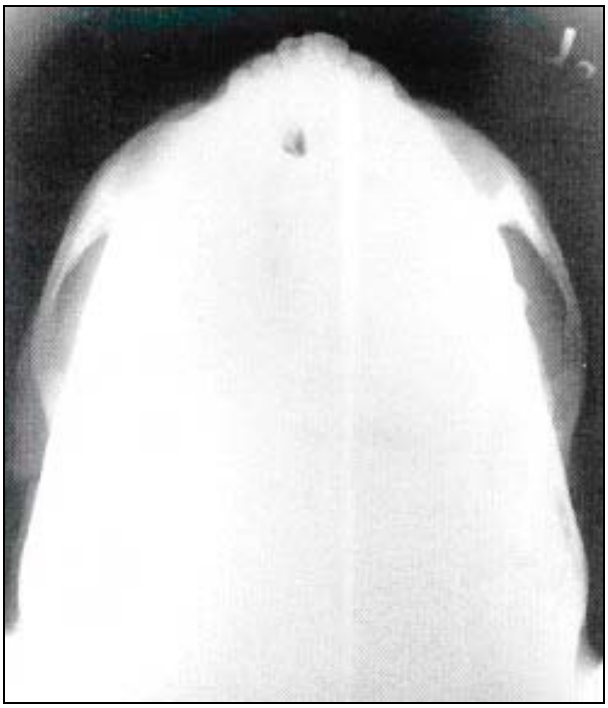
1. b (para 6-3)
2. c (para 6-4)
3. Parietoacanthial facial bones (Waters method) (para 6-3)
4. Lateral facial bones (para 6-4)
5. d (para 6-3)
6. c (para 6-4)
7. a (para 6-4)
8. b (para 6-3)
9. a (para 6-3)
10. b (para 6-4)

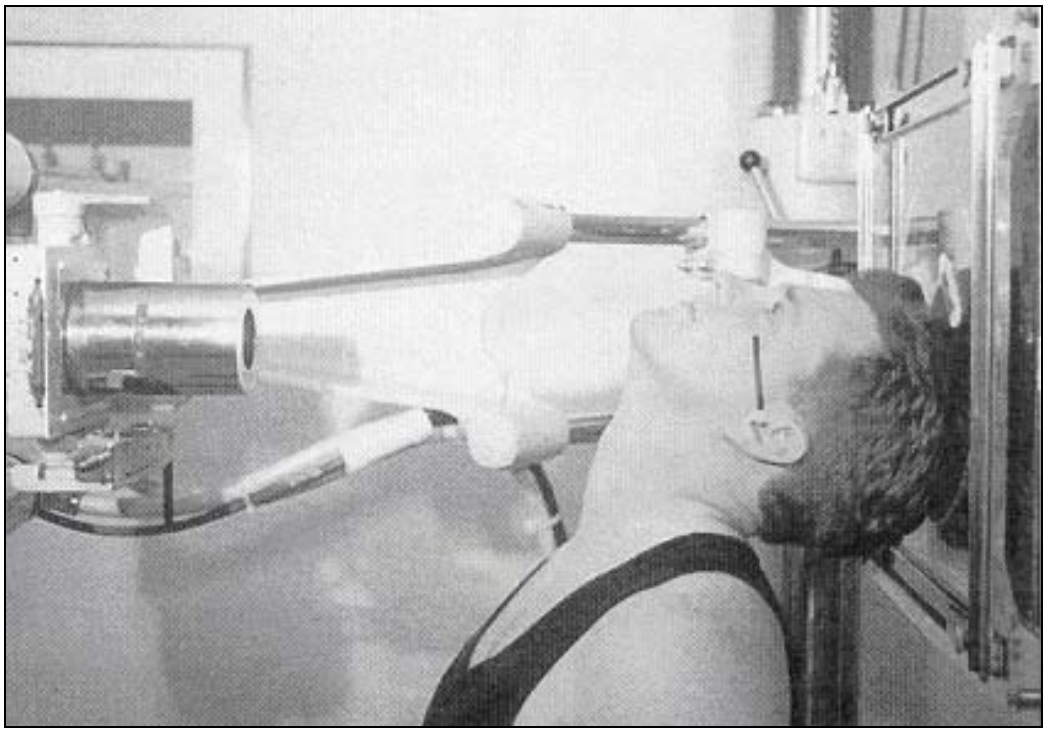
Section III. PROJECTIONS OF ZYGOMATIC ARCHES

6-5. SUBMENTOVERTEX PROJECTION (BASILAR POSITION)

The following positions compromise a routine of the zygomatic arches: submentovertex (SMV) projection (Basilar position) and the oblique axial position (tangential projection).



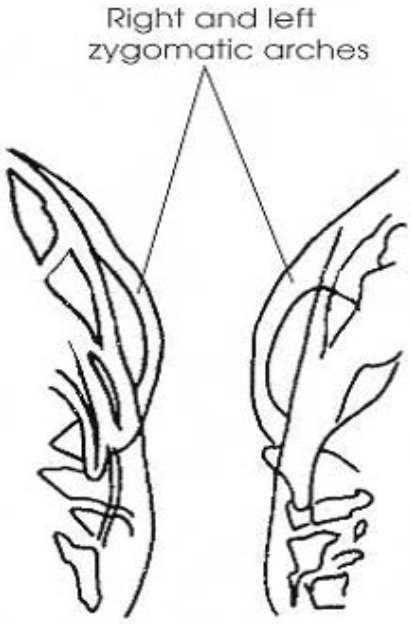


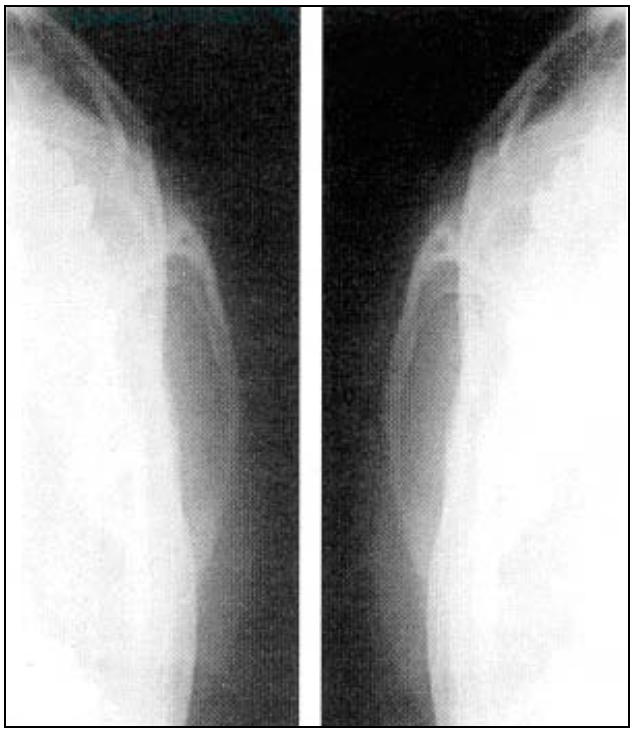


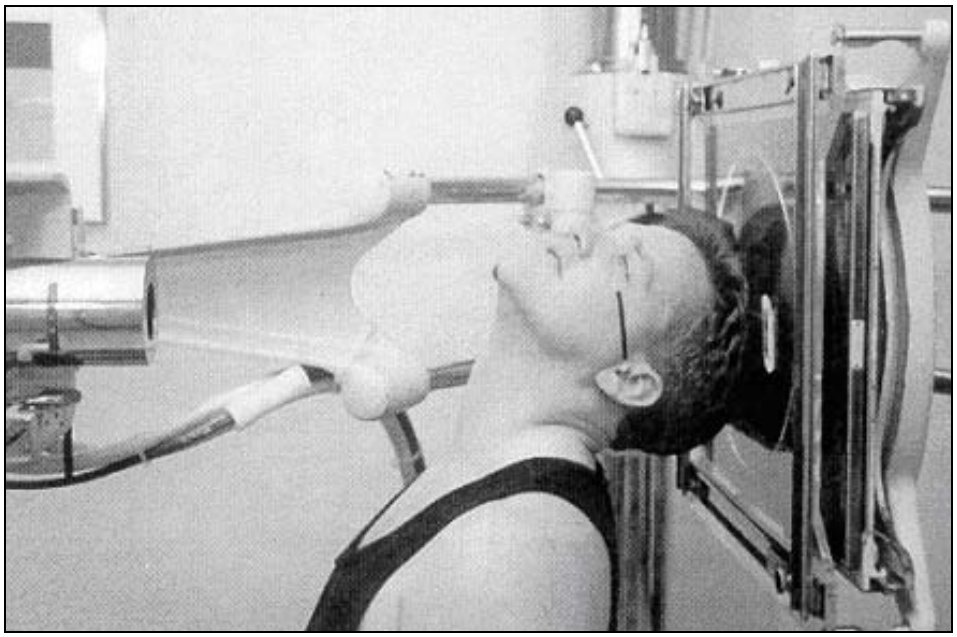
THE ORDER OF PROCEDURE
SUBMENTOVERTEX (SMV) PROJECTION

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the angle of the mandible and vertex of the skull.	
c. **Technical Factors:** 8 X 10 CW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient seated or standing. 2. Chin raised, neck hyperextended until the infraorbitomeatal line (IOML) is parallel to the film. 3. Head resting on the vertex of the skull. 4. Midsagittal plane perpendicular to the film.		
f. **CR:** Horizontal perpendicular, centered midway between the angles of the mandible to the center of the film.	g. **SID:** 40"	h. **Collimation:** Collimate to outer margins of the skull.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** The zygomatic arches (bilateral).		

6-6. OBLIQUE AXIAL POSITION (TANGENTIAL PROJECTION)







THE ORDER OF PROCEDURE
OBLIQUE AXIAL (TANGENTIAL PROJECTION)

a. **Remove artifacts.** Potential artifacts removed.	b. **Measure part.** At the angle of the mandible and the external canthus.	
c. **Technical Factors:** 8 X 10 LW B.		
d. **LM:** Corresponding side.		
e. **Patient/Part position:** 1. Patient seated or standing. 2. Chin raised, neck hyperextended until the IOML is parallel to the film. 3. Head resting on the vertex of the skull. 4. Turn the head 15 degrees towards the side to be examined; then tilt the head to bring the midsagittal plane 15 degrees towards the side to be examined.		
f. **CR:** Horizontal perpendicular, centered to the zygomatic arch of interest and centered to cassette.	g. **SID:** 40"	h. **Collimation:** Within 1" of affected zygomatic arch.
i. **Immobilization:** None. **Pre-exposure command:** Suspended respiration.		
j. **Shielding:** Lead shield over patient's lap.		
k. **Demonstrates:** Single zygomatic arch free of superimposition.		

Continue with Exercises

EXERCISES, LESSON 6, SECTION III

MATCHING: For exercises 1 through 2, match the position with the anatomical structure(s) that the position demonstrates. Enter the letter that corresponds to your choice in the space provided. (There is an extra alternative that will not be selected.)

1._____ Submentovertex (SMV) projection (Basilar position).

2._____ Oblique axial (tangential projection).

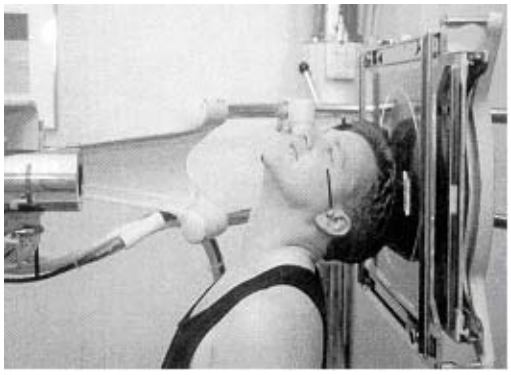
a. Bilateral zygomatic arches.

b. Single zygomatic arch free of superimposition of the parietal bone and mandible.

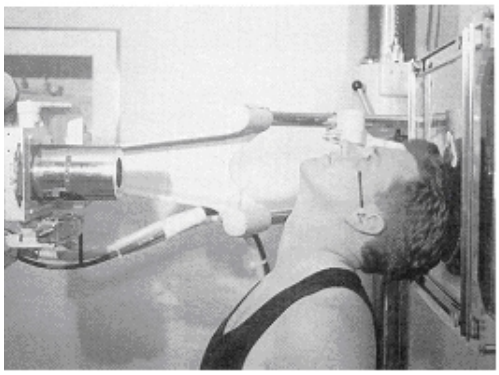
c. Superimposed zygomatic arches.

INDENTIFICATION. Exercises 3 and 4 depict the proper alignment for a particular position. Write the name of the position in the space provided.

3._____



4._____



MULTIPLE-CHOICE. For exercises 5 through 10, select the ONE word or phrase that BEST completes the statement or BEST answers the question.

5. What is centered for the SMV zygomatic arch?

   a. Mental point.

   b. Midway between angles of the mandible.

   c. Midway between bodies of the mandible

   d. Midway between EAMs.

6. What is centered for the oblique axial zygomatic arch?

   a. Zygomatic arch of side closest to film.

   b. Zygomatic arch away from film.

   c. Angle of body of side closest to film.

   d. Angle of body of side farthest from film.

7. For the oblique axial zygomatic arch, the midsagittal plane is angled at ____ degrees to the film.

   a. 5.

   b. 10.

   c. 15.

   d. 20.

8. What line is parallel to the film for the oblique axial zygomatic arch (tangential projection)?

   a. OML.

   b. AML.

   c. MML.

   d. IOML.

9. What is the routine for the zygomatic archies?

   a. SMV, lateral.

   b. SMV, oblique axial.

   c. SMV, AP.

   d. SMV, PA.

10 After aligning the midsagittal plane 15 degrees to the film for an obique axial zygomatic arch (tangential projection), the head is then tilted _____ degrees?

   a. 5.

   b. 10.

   c. 15.

   d. 20.

Check Your Answers on Next Page

SOLUTIONS, LESSON 6, SECTION III

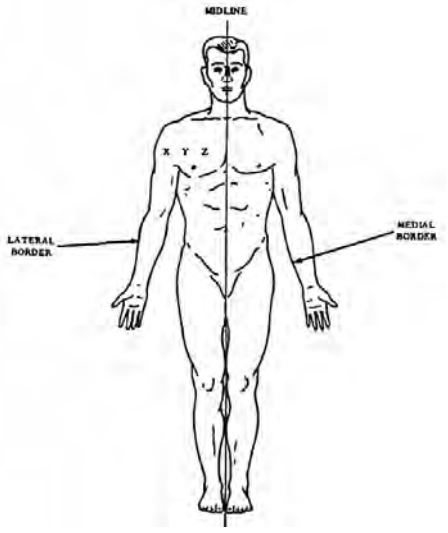
1. a (para 6-5)
2. b (para 6-6)
3. Oblique axial (tangential position) (para 6-6)
4. Submentovertex (Basilar position) (para 6-5)
5. b (para 6-5)
6. a (para 6-6)
7. c (para 6-6)
8. d (para 6-6)
9. b (para 6-5)
10. c (para 6-6)

End of Lesson 6

APPENDIX

GLOSSARY OF TERMS

A

AAS	Acute abdominal series; AP supine and AP upright, usually with a CXR.	
abduction	A movement of the arm or leg away from the centerline or median plane of the body, as in the alignment for the *lateral frog leg pelvis*.	
acanthion	Junction of the upper lip and the nasal septum.	
acanthiomeatal line (AML)	Line that connects the acanthion and the external auditory meatus (EAM), the opening of the ear. (When the patient's head is up against the film, the head must be tilted back for the acanthiomeatal line to be perpendicular to the film.)	
Anatomical position		An upright position, arms adducted (down), palms forward, hands and feet directed straight ahead. This specific body position is used as a reference for other positioning terms.

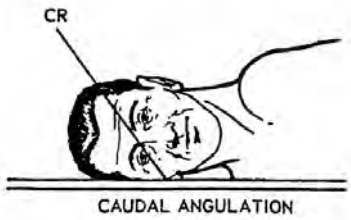
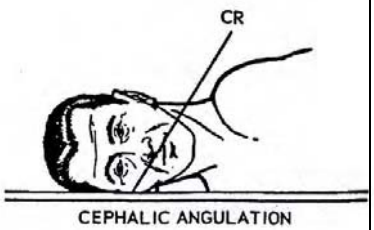
STUDY TIPS: Use the glossary to recap key terms and as part of your overall review of the whole manual. It will help, in some sense, to bring together certain concepts.

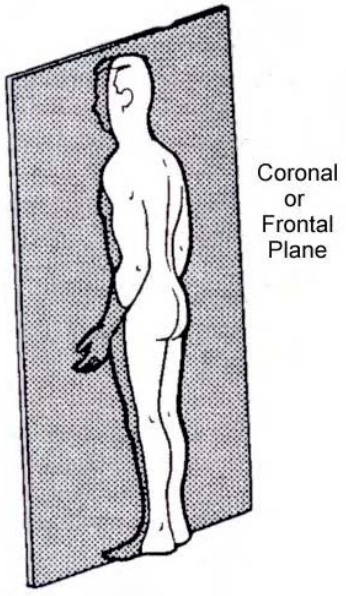
ASIS	Acronym that stands for “anterior-superior iliac spine;” palpation point on the ilium of the pelvis.
axial	Any angle of the central ray along the long axis of a structure or part, around which a rotating body turns or is arranged. *EX*: For a *tangential (axial) projection of the knee (Settegast method),* the angle of the CR is along the long axis of the knee.
axiolateral position	A position in which the part being radiographed is in a lateral position with respect to the film and the CR is being directed at an angle to the long axis of the body.

B

Bilateral	Both lateral; e.g., for a *bilateral* skull both sides of the skull are radiographed for comparison purposes.
Bucky (Potter-Bucky Diaphragm)	Sliding tray-like device found just below the X-ray table that reduces secondary (scatter) radiation that could reach the film.
buttress	Use or radiolucent material *i.e.*, sponges, for support of patient.

C

caudal  CAUDAL ANGULATION	Refers to parts *away* from the head of the body.
cephalic  CEPHALIC ANGULATION	Refers to parts of the body *towards* the head.

central ray-to-part reference (CRPR)	Specific placement of central ray in relation to an anatomical part or palpation point so that the part or point is *projected to the center of the film/cassette*.	
collimation	The limiting of a beam of radiation to the required dimensions.	
coronal	Pertaining to the crown of the head	
coronal plane		Frontal plane along the long axis of the body that divides the body into its front and back halves.
CR	Acronym for *central ray*; the CR is the central beam of rays emanating from the X-ray tube.	
CXR	Acronym for *chest X-ray*.	

D

decubitus	A body position meaning to lie on a horizontal surface. This term is used to denote both a recumbent body position and the use of a horizontal x-ray beam. The patient may be lying on the back (dorsal), front (ventral), or side (right or left lateral). Decubitus positions are used to detect air-fluid levels or free air in a body cavity, such as the chest or abdomen.
distal	Away from the source or away from the trunk.

dorsal	Refers to the back part of the body or organ: also referred to as *posterior*.
DP projection	Dorso-plantar projection, special projection of the AP foot; the CR enters the dorsal aspect of the foot and exits the plantar surface.

E

extension	The angle between parts is increased *e.g.,* taking a flexed extremity and putting it into a straight posture. For example, the leg must be fully extended for a *plantodorsal calcaneus*.
external auditory meatus (EAM)	Opening of the external ear canal.
external (outer) canthus	Lateral junction of the eyelids.
external occipital protuberance (EOP)	Bump along the midline of the lower back of the head; also referred to as the *inion*.

F

flexion	When the angle between a part is decreased, as for a lateral knee.
FRD	Film run down; size and method of use of film.
full field coverage (FFC)	Total exposure of the area of the film cassette that is used without any coning down.

G

glabella	Smooth prominence between the eyebrows.
glabelloalveolar line (facial plane)	Line that connects the glabella and the mental point.
glabellomeatal line (GML)	Line that connects the glabella and the external auditory meatus (EAM).

gonio	The angle of the mandible; the most inferior, posterior, and lateral points on the external angle of the mandible.

H-I

inferosuperior projection	Refers to the direction that the CR travels in relation to the body part; e.g., for an inferosuperior hip, the CR is horizontal and enters the inferior portion of the hip. The central ray then exits the superior surface to the center of the film.
infraorbital margin	The inferior rim of the orbit (the bony cavity of the skull that contains the eye).
infraorbitomeatal line (IOML)	Line that connects the infraorbital margin and the external auditory meatus(EAM). It is also referred to as the *Reid's base line of the cranium*.
inion	(See *EOP*.)
interpupillary line (IPPL)	Line that connects the pupils of the eyes. In a true lateral position, the IPPL must be perpendicular to the table.

J-K

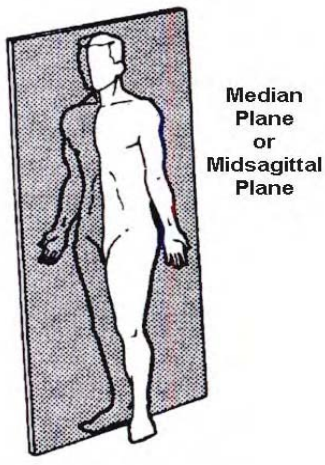
kilovoltage peak (kVp)	The very highest voltage occurring at any time during a electrical cycle. The peak kilovoltage used in making any X-ray exposure. Primarily controls the penetrating ability of the X-ray beam.
KUB	Kidney, ureters, bladder; also known as an AP supine projection. The AP supine or AP upright may be referred to as the supine KUB or upright KUB, respectively.

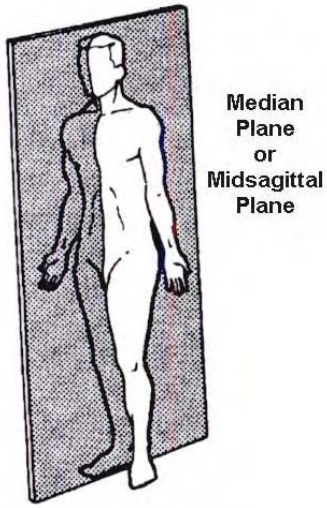
L

lateral	*Away from* the center or away from the midline of the body.
lateral oblique	Position in which the part is rotated *away from the midline of the body.*
lateral position	Position in which the body is rotated 90° from a true AP or PA
lateral recumbent	Lying on the right or left side, as for a lateral coccyx.

left anterior oblique (LAO)	Position in which the *left anterior* (front) aspect of the body is closest to the film. This may be either in the erect or recumbent position.
left lateral decubitus	Patient lies on his or her left side; CR is directed horizontally.
left posterior oblique (LPO)	Position in which the *left posterior* (back) aspect of the body is closest to the film. This may be either in the erect or recumbent position.
LM	Acronym for *letter marker*.

M

March fracture	Stress fracture of a bone of the lower extremity (the heads of the second and third metatarsals); the fracture develops after repeated stresses, as seen in soldiers with no history of trauma; also called *fatigue fracture*.	
medial	Toward the center or toward the midline of the body.	
medial lateral projection	Projection in which the lateral aspect is *closest* to the film and the medial aspect is *farthest* from the film, as in a *lateral ankle.*	
median plane	Also known as midsagittal plane. Imaginary line dividing body into equal right and left halves along vertical axis. Cranial reference points for midsagittal plane: external occipital protuberance (EOP) and the glabella.	
mental point	Midpoint of the triangular area of the chin. Also referred to as the *mental protuberance*.	
mental meatal line (MML)	Line that connects the mental point and the EAM or tragus.	
mental protuberance	(See *mental point*)	

midsagittal plane	A plane that divides the body into right and left halves along its vertical axis	
milliamperage (mA)	The number of electrons flowing from the cathode end of the X-ray tube to the anode end of the X-ray tube, measured in thousandths of ampere. Primarily controls the quantity of the X-ray beam.	
milliamperage and seconds (mAs)	The millamperage and exposure time (measured in seconds).	

N

nasion	Depression at the bridge of the nose.
nose-forehead position	Position in which the patient's head and nose make contact with the tabletop or the upright Bucky, as for the PA mandible.

O

oblique	Position in which the body is angled between a lateral and an AP or PA position. (See also lateral oblique, left anterior oblique (LAO), LPO, RAO, and RPO.)
occlusal plane	Same as the acanthiomeatal line. Line that connects the acanthion and the external auditory meatus (EAM), the opening of ear or the lower margin of the upper teeth even with the base of the skull

optic foramen	Passageway through which the optic nerves pass, located at the most posterior portion or apex pf the bilateral cone-shaped orbits of the face.
orbitomeatal line (OML)	Line that connects the external (outer) canthus of the eye and the auditory meatus (EAM).
orbits (bilateral orbits)	The two cone-shaped cavities of the facial bones, containing the vital organs of sight and associated nerves and blood vessels.

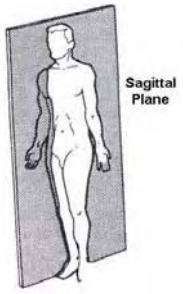
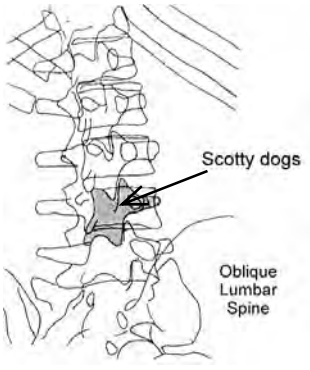
P

PA projection	*Posterior-anterior* projection; a projection in which the X-ray beam enters a posterior surface and exits an anterior surface
palpation point	An anatomical landmark, such as the ASIS, used for positioning patients.
parietal	Pertaining to the walls of a cavity; located near the parietal bone, as in the parietal lobe.
patient position	Patient alignment and the part to film reference (PFR).
plantar surface	Refers to the sole of the foot.
position	Used in reference to the body part closest to the film or the surface on which the patient is lying. Also used to describe a general body position.
posterior	Refers to the *back* part of the body or of an organ; synonymous with *dorsal. Ex:* For an axial calcaneus the part will be placed on the posterior surface.
Pott's Fracture	Fracture of the lower part of the fibula, with serious injury of the lower tibial articulation, usually a chipping off of a portion of the medial malleolus, or rupture of the medial ligament; called also a *Dupoytren's Fracture*.
projection	Refers to the path of the X-ray beam, projecting an image on the radiographic film.
proximal	Near the source or beginning part closer to the trunk, as in *proximal femur*.

Q-R

recumbent	Lying down in any position. For a lateral foot, the patient is *laterally recumbent*.
right anterior oblique (RAO)	That position in which the *right anterior* (front) aspect of the body is closest to the film. This may be either in the erect or recumbent position.
right lateral decubitus	The patient is lying on their right side and the CR is directed horizontally. As an example, the right lateral decubitus is utilized in place of an upright abdomen and an upright chest, if the patient cannot stand.
right posterior oblique (RPO)	That position in which the *right posterior* (back) aspect of the body is closest to the film. This may be either in the erect or recumbent position.
routine	Standard or basic views commonly taken on the average patient.

S

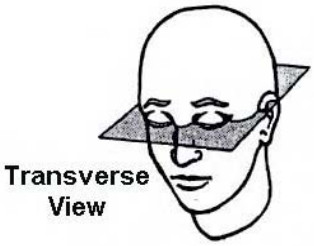
sagittal plane	Any vertical plane that is parallel with the median	
Scotty dogs	On a properly positioned oblique lumbar spine, silhouettes resembling Scotty dogs (zygapophyseal joints closest to the film) should be visualized on all five lumbar vertebrae.	

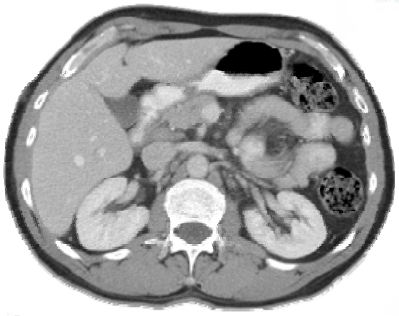
S-I	Sacro-iliac joint.
SMV	Acronym for *submentovertex*.
SMV projection	Projection in which the CR enters beneath the mandible and exits the vertex of the skull to the center of the film.
source to image receptor distance (SID)	Distance in inches between the X-ray tube focal spot and the film. Also referred to as the anode-film distance and the focal spot-film distance
subluxation	An incomplete or partial dislocation.
supercilliary arch	The ridge or arch of the bone extending across the forehead directly above each eye
supine	Lying on back; as in the AP *supine abdomen.*
suspended expiration	The patient is instructed to take a deep breath and blow it all the way out and stop breathing; as in the thoracic spine
suspended inspiration	The patient is instructed to take a deep breath and hold it.
suspended respiration	The patient is instructed to stop breathing.

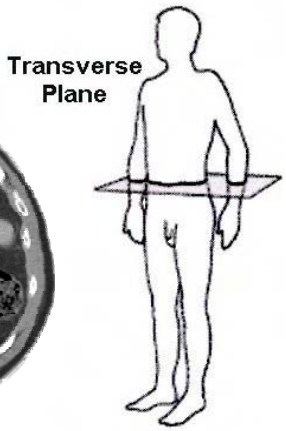
T

table factors	The central ray (CR) and source to image receptor distance (SID).	
tangential projection	A projection in which the CR merely skims the body part to project it away from the other body parts.	
tragus	The cartilaginous projection anterior to the external opening of the ear.	

transverse plane	A horizontal plane that passes at right angles to the median and coronal plane, dividing the body into superior and inferior parts







true lateral position (head)	Position in which the IMOL is perpendicular to the film; the facial line is parallel to the film; the IPPL is perpendicular to the film.
TWHA	Two or more planes of the skull are used to ensure proper alignment, *e.g.*, the median plane, the facial plane, the OML, the IOML, the AML and IPPL.

U

unilateral	One lateral position, as opposed to a bilateral position, in which both sides are X-rayed. Normally the chest is examined in a unilateral view, the left lateral chest. A right lateral chest is not normally taken.

V-W-X-Y-Z

vertex	The most superior portion of the skull.
view	The radiographic image

End of Appendix