

PRACTICE EXAM 4: ARRT RADIOGRAPHY SIMULATION

(200 QUESTIONS)

This practice exam contains 200 scored-style questions aligned to the ARRT Radiography content specifications effective March 1, 2027. Select the single best answer for each question. Suggested time: 230 minutes. A scaled score of 75 is required on the official examination; 75 is not a percentage score.

1. Before beginning an examination, which action best confirms the correct patient?
 - A. Ask only for the room number
 - B. Confirm the diagnosis by appearance
 - C. Match two identifiers with the order
 - D. Use the wristband color alone

2. A competent adult refuses a radiographic examination after receiving an explanation. What should the radiographer do?
 - A. Proceed because the order is signed
 - B. Respect the refusal and notify the provider
 - C. Ask security to restrain the patient
 - D. Obtain consent from another patient

3. Which communication method is appropriate for a patient with limited English proficiency?
 - A. Rely on a young family member
 - B. Speak louder using medical jargon
 - C. Skip the procedural explanation
 - D. Use a qualified medical interpreter

4. Which action is part of medical aseptic technique?

- A. Perform hand hygiene before and after contact
- B. Reuse gloves between similar patients
- C. Place clean supplies on a soiled surface
- D. Recap every contaminated needle

5. A patient becomes pale, diaphoretic, and dizzy while standing. What is the best immediate response?

- A. Finish the upright exposure quickly
- B. Assist the patient to a safe recumbent position
- C. Leave to locate the requisition
- D. Offer food while the patient stands

6. Which item belongs in a puncture-resistant sharps container?

- A. An unopened alcohol pad
- B. A disposable paper drape
- C. An empty contrast carton
- D. A used hollow-bore needle

7. Which finding most strongly suggests a severe contrast reaction?

- A. Transient warmth at injection
- B. A brief metallic taste
- C. Hypotension with airway compromise
- D. Limited localized itching

8. For a patient with suspected pulmonary tuberculosis, which precaution is required?

- A. Airborne precautions with appropriate respirator
- B. Contact precautions with shoe covers
- C. Droplet precautions using gloves only
- D. Protective isolation for neutropenia

9. Which transfer device is most appropriate for moving a non-weight-bearing patient laterally?

- A. A cane held by the radiographer
- B. A gait belt used for walking
- C. A stool placed beside the table
- D. A friction-reducing transfer board or sheet

10. What should the radiographer do after contrast extravasation is recognized?

- A. Increase pressure to complete the dose
- B. Massage the site vigorously without assessment
- C. Stop the injection and follow the facility protocol
- D. Remove documentation from the record

11. Which action best protects patient confidentiality?

- A. Review cases in a public elevator
- B. Discuss information only with involved personnel
- C. Leave the worklist visible to visitors
- D. Post images through personal messaging

12. A patient begins having a generalized seizure on the imaging table. What is the priority?

- A. Protect the patient from injury and summon help
- B. Restrain all extremities firmly
- C. Place an object between the teeth

D. Continue the exposure sequence

13. Which route delivers medication directly into a vein?

A. Oral administration

B. Intravenous administration

C. Topical administration

D. Subcutaneous administration

14. What is the safest response to an unclear or inconsistent imaging order?

A. Choose a procedure without consultation

B. Alter the diagnosis to fit the study

C. Perform every possible projection

D. Clarify the order before exposing the patient

15. Which action demonstrates proper body mechanics during a transfer?

A. Keep the load close and use the legs

B. Twist while lifting from the waist

C. Reach across the table with locked knees

D. Pull suddenly using one arm

16. During a routine examination, before beginning an examination, which action best confirms the correct patient?

A. Ask only for the room number

B. Confirm the diagnosis by appearance

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17. During a routine examination, a competent adult refuses a radiographic examination after receiving an explanation. What should the radiographer do?

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18. During a routine examination, which communication method is appropriate for a patient with limited English proficiency?

- A. Use a qualified medical interpreter
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- C. Speak louder using medical jargon
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- A. Reuse gloves between similar patients
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- A. Restrain all extremities firmly
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28. During a routine examination, which route delivers medication directly into a vein?

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- A. Twist while lifting from the waist
- B. Reach across the table with locked knees
- C. Keep the load close and use the legs
- D. Pull suddenly using one arm

31. In an imaging department scenario, before beginning an examination, which action best confirms the correct patient?

- A. Ask only for the room number
- B. Match two identifiers with the order
- C. Confirm the diagnosis by appearance
- D. Use the wristband color alone

32. At 100 cm from a point source, intensity is 16 mGy. What intensity is expected at 200 cm?

- A. 4 mGy
- B. 8 mGy
- C. 16 mGy
- D. 32 mGy

33. According to the inverse square law, doubling distance from a point source changes intensity to what fraction?

- A. One half of the original intensity
- B. One fourth of the original intensity
- C. Twice the original intensity
- D. Four times the original intensity

34. Which photon interaction contributes most to occupational scatter in diagnostic imaging?

- A. Photoelectric absorption
- B. Pair production
- C. Compton interaction
- D. Photodisintegration

35. Which exposure factor primarily controls x-ray beam quantity?

- A. Milliampere-seconds
- B. Kilovoltage alone
- C. Source-to-image distance
- D. Focal spot selection

36. What is the primary purpose of added filtration?

- A. Increase geometric magnification
- B. Create more scattered radiation
- C. Shorten the source-to-image distance
- D. Remove low-energy photons from the beam

37. Which effect is classified as stochastic?

- A. Radiation-induced cancer
- B. Skin erythema above threshold
- C. Temporary epilation
- D. Tissue necrosis

38. Which cell population is generally most radiosensitive?

- A. Mature nerve cells
- B. Rapidly dividing, less differentiated cells
- C. Adult skeletal muscle cells
- D. Highly specialized neurons

39. What is the SI unit of absorbed dose?

- A. Sievert
- B. Coulomb per kilogram
- C. Becquerel
- D. Gray

40. A technique uses 10 mAs at 100 cm SID. What mAs maintains receptor exposure at 150 cm SID?

- A. 15 mAs
- B. 20 mAs
- C. 22.5 mAs
- D. 25 mAs

41. What is the purpose of collimation?

- A. Increase focal spot size

- B. Raise patient entrance exposure
- C. Eliminate the need for positioning
- D. Restrict the beam to the anatomy of interest

42. Which dosimeter placement is appropriate when wearing one badge without a lead apron?

- A. Inside a supply cabinet
- B. At the collar or upper torso
- C. On the imaging table
- D. Attached to the control panel

43. What happens to wavelength when photon frequency increases?

- A. Wavelength increases
- B. Wavelength remains fixed
- C. Wavelength decreases
- D. Wavelength becomes zero

44. Which target interaction produces a continuous spectrum of x-ray energies?

- A. Bremsstrahlung production
- B. Characteristic production only
- C. Coherent scattering
- D. Pair production

45. Which action most directly reduces repeat exposures?

- A. Widening the field routinely
- B. Accurate positioning and clear communication
- C. Removing all technique charts
- D. Ignoring exposure indicators

46. What is the principal protective feature of the control booth?

- A. A fixed barrier attenuating scatter radiation
- B. A source of additional filtration
- C. A device that increases tube current
- D. A system for enlarging the image

47. During a routine examination, which interaction is the principal source of occupational exposure during routine radiography?

- A. Visible light from the collimator
- B. Sound from the rotor
- C. Heat from the tube housing
- D. Scatter radiation from the patient

48. During a routine examination, according to the inverse square law, doubling distance from a point source changes intensity to what fraction?

- A. One half of the original intensity
- B. Twice the original intensity
- C. One fourth of the original intensity
- D. Four times the original intensity

49. During a routine examination, which photon interaction contributes most to occupational scatter in diagnostic imaging?

- A. Photoelectric absorption
- B. Compton interaction
- C. Pair production
- D. Photodisintegration

50. An exposure uses 300 mA for 0.04 second. What is the resulting mAs?

- A. 7.5 mAs
- B. 30 mAs
- C. 120 mAs
- D. 12 mAs

51. During a routine examination, what is the primary purpose of added filtration?

- A. Remove low-energy photons from the beam
- B. Increase geometric magnification
- C. Create more scattered radiation
- D. Shorten the source-to-image distance

52. During a routine examination, which effect is classified as stochastic?

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54. During a routine examination, what is the SI unit of absorbed dose?

- A. Gray
- B. Sievert
- C. Coulomb per kilogram
- D. Becquerel

55. During a routine examination, which practice best applies the distance principle during mobile radiography?

- A. Place hands near the collimator
- B. Stand beside the tube housing
- C. Stand as far from the patient as practical
- D. Lean over the patient during exposure

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60. A fluoroscopy run lasts 2.5 minutes at an average air-kerma rate of 18 mGy per minute. What is the accumulated air kerma?

- A. 20.5 mGy
- B. 36 mGy
- C. 45 mGy
- D. 72 mGy

61. During a routine examination, what is the principal protective feature of the control booth?

- A. A source of additional filtration
- B. A device that increases tube current
- C. A system for enlarging the image
- D. A fixed barrier attenuating scatter radiation

62. In an imaging department scenario, which interaction is the principal source of occupational exposure during routine radiography?

- A. Visible light from the collimator
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- A. Scatter radiation from the patient
- B. Visible light from the collimator
- C. Sound from the rotor
- D. Heat from the tube housing

78. A radiograph uses 400 mA and 25 ms. What mAs was delivered?

- A. 6.25 mAs
- B. 16 mAs
- C. 100 mAs
- D. 10 mAs

79. Which factor most directly improves recorded spatial resolution?

- A. Increase object motion
- B. Use a smaller focal spot
- C. Increase object-to-image distance
- D. Apply stronger smoothing

80. What is the likely result of insufficient receptor exposure in digital radiography?

- A. Reduced geometric distortion
- B. Elimination of scatter
- C. Increased quantum noise
- D. Higher spatial frequency response

81. What is the function of an automatic exposure control system?

- A. Terminate exposure after adequate detector signal
- B. Select the anatomical position
- C. Move the patient automatically
- D. Remove scatter without a grid

82. Which digital imaging term describes the range of exposures a detector can record?

- A. Focal spot blooming
- B. Exposure latitude
- C. Anode rotation speed
- D. Tube housing leakage

83. What is the purpose of a lookup table in image processing?

- A. Increase x-ray tube filtration
- B. Control rotor acceleration
- C. Physically reduce focal spot size
- D. Map pixel values to displayed brightness

84. Which system standard supports communication of medical images between devices?

- A. OSHA
- B. ALARA
- C. DICOM
- D. SDS

85. What is the purpose of PACS?

- A. Generate x-rays inside the tube
- B. Sterilize imaging receptors
- C. Store, retrieve, and distribute medical images
- D. Measure patient blood pressure

86. Which artifact can result from incorrect histogram analysis?

- A. True anatomical fracture
- B. Inappropriate brightness or contrast processing
- C. Higher tube heat capacity
- D. Reduced patient motion

87. What does detective quantum efficiency describe?

- A. How rapidly the tube rotor spins
- B. How strongly a grid absorbs primary radiation
- C. How long the patient holds breath

D. How efficiently a detector preserves signal-to-noise information

88. Which receptor system uses a photostimulable phosphor plate?

- A. Computed radiography
- B. Direct flat-panel radiography
- C. Image-intensified fluoroscopy
- D. Screen-film tomography

89. What is the purpose of flat-field calibration?

- A. Correct nonuniform detector response
- B. Increase patient motion
- C. Change the anatomical projection
- D. Create a larger focal spot

90. A 2,000 by 2,000 pixel image covers a 40 cm square field. What is the pixel pitch in millimeters?

- A. 0.02 mm
- B. 0.5 mm
- C. 0.2 mm
- D. 2 mm

91. What is the purpose of exposure indicators?

- A. Prove the patient received no radiation
- B. Replace technique charts completely
- C. Identify every positioning error
- D. Provide feedback about detector exposure

92. Which quality-control test evaluates alignment of the light and radiation fields?

- A. Monitor luminance test
- B. Beam-restriction congruence test
- C. Spatial frequency test
- D. Dosimeter exchange test

93. During a routine examination, which change most directly reduces geometric magnification?

- A. Decrease object-to-image distance
- B. Decrease source-to-object distance
- C. Increase object-to-image distance
- D. Use a larger focal spot

94. During a routine examination, which factor most directly improves recorded spatial resolution?

- A. Increase object motion
- B. Increase object-to-image distance
- C. Apply stronger smoothing
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- A. Increase patient motion
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105. During a routine examination, which factor primarily controls radiographic contrast in displayed digital images after acquisition?

- A. Tabletop thickness alone
- B. Anode angle alone
- C. Rotor speed alone
- D. Processing and window settings

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109. In an imaging department scenario, which factor most directly improves recorded spatial resolution?

- A. Increase object motion
- B. Increase object-to-image distance
- C. Use a smaller focal spot
- D. Apply stronger smoothing

110. A detector receives 5 mGy when 20 mAs is used. Assuming proportionality, what detector exposure is expected at 32 mAs?

- A. 8 mGy
- B. 6.4 mGy
- C. 10 mGy
- D. 12.5 mGy

111. In an imaging department scenario, what is the function of an automatic exposure control system?

- A. Select the anatomical position
- B. Terminate exposure after adequate detector signal
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123. While preparing a patient, which change most directly reduces geometric magnification?

- A. Decrease source-to-object distance
- B. Decrease object-to-image distance
- C. Increase object-to-image distance
- D. Use a larger focal spot

124. While preparing a patient, which factor most directly improves recorded spatial resolution?

- A. Use a smaller focal spot
- B. Increase object motion
- C. Increase object-to-image distance
- D. Apply stronger smoothing

125. A contrast protocol requires 1.5 mL per kilogram for a 72 kg patient. What volume is calculated?

- A. 108 mL
- B. 48 mL
- C. 72 mL
- D. 144 mL

126. While preparing a patient, what is the function of an automatic exposure control system?

- A. Select the anatomical position
- B. Move the patient automatically
- C. Remove scatter without a grid
- D. Terminate exposure after adequate detector signal

127. While preparing a patient, which digital imaging term describes the range of exposures a detector can record?

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128. While preparing a patient, what is the purpose of a lookup table in image processing?

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129. For an upright PA chest projection, where is the central ray directed?

- A. To the level of C3
- B. To the level of L4

- C. To the level of T7
- D. To the level of the iliac crest

130. Why is the PA chest preferred over the AP chest when the patient can stand?

- A. It reduces cardiac magnification
- B. It magnifies the lungs
- C. It closes the costophrenic angles
- D. It increases object-to-image distance

131. Which breathing instruction is used for a routine chest exposure?

- A. Suspend after forced expiration
- B. Suspend after the second full inspiration
- C. Breathe shallowly throughout
- D. Perform repeated Valsalva maneuvers

132. Which projection best demonstrates free intraperitoneal air when the patient cannot stand?

- A. Right lateral decubitus abdomen
- B. Prone abdomen only
- C. AP axial sacrum
- D. Left lateral decubitus abdomen

133. Where is the central ray centered for an AP supine abdomen?

- A. At the level of the iliac crests
- B. At the level of C7
- C. At the xiphoid process
- D. At the greater trochanters

134. Which position best demonstrates the cervical intervertebral foramina on the side closest to the receptor?

- A. Anterior oblique position
- B. AP open-mouth position
- C. Posterior oblique position
- D. Lateral swimmer position

135. What is the purpose of the AP open-mouth projection?

- A. Demonstrate the thoracic spinous processes
- B. Demonstrate C1 and C2 through the open mouth
- C. Show the lumbar zygapophyseal joints
- D. Evaluate the sternoclavicular joints

136. Which projection best demonstrates the dens when the open-mouth view is nondiagnostic?

- A. Tangential patella projection
- B. Lateral sternum projection
- C. AP axial clavicle projection
- D. Fuchs or Judd projection

137. For a lateral lumbar spine, which structure should be superimposed?

- A. Posterior vertebral body margins
- B. Both obturator foramina
- C. Both femoral condyles
- D. Anterior ribs at all levels

138. Which oblique lumbar position demonstrates the zygapophyseal joints closest to the receptor?

- A. Anterior oblique position
- B. Posterior oblique position
- C. AP axial position
- D. Dorsal decubitus position

139. Which projection best demonstrates the scaphoid without superimposition?

- A. AP forearm with radial deviation
- B. Lateral elbow in flexion
- C. Tangential carpal canal only
- D. PA wrist with ulnar deviation

140. For a lateral elbow, how should the joint be positioned?

- A. Extended with epicondyles parallel
- B. Flexed 45 degrees with hand pronated
- C. Flexed 90 degrees with epicondyles perpendicular
- D. Hyperextended with palm posterior

141. Which projection demonstrates the radial head with reduced ulnar superimposition?

- A. AP oblique elbow with medial rotation
- B. PA wrist with flexion
- C. AP oblique elbow with lateral rotation
- D. Lateral humerus with extension

142. Which shoulder projection demonstrates the glenohumeral joint space open?

- A. AP oblique Grashey projection

- B. AP internal rotation only
- C. Tangential intertubercular groove
- D. PA axial clavicle projection

143. Which projection is useful for evaluating anterior or posterior shoulder dislocation?

- A. AP bilateral AC joints only
- B. Scapular Y lateral projection
- C. PA hand projection
- D. Tangential calcaneus projection

144. For an AP pelvis, how are the legs positioned when trauma is not suspected?

- A. Externally rotate both legs 45 degrees
- B. Flex both hips to 90 degrees
- C. Cross both ankles tightly
- D. Internally rotate both legs 15 to 20 degrees

145. Which projection is used for a trauma patient with suspected hip fracture?

- A. Cross-table lateral hip
- B. Frog-leg lateral hip
- C. Weight-bearing bilateral knee
- D. Tangential patella projection

146. Which knee projection best demonstrates the intercondylar fossa?

- A. AP ankle projection
- B. PA axial tunnel projection
- C. Lateral foot projection
- D. AP axial clavicle projection

147. Which projection best demonstrates the patellofemoral joint space?

- A. AP femur projection
- B. PA hand projection
- C. Lateral chest projection
- D. Tangential patella projection

148. For an AP ankle, which action produces the mortise view?

- A. Externally rotate the foot 45 degrees
- B. Dorsiflex only without rotation
- C. Internally rotate the leg about 15 degrees
- D. Flex the knee and abduct the hip

149. During a routine examination, for an upright PA chest projection, where is the central ray directed?

- A. To the level of C3
- B. To the level of T7
- C. To the level of L4
- D. To the level of the iliac crest

150. During a routine examination, why is the PA chest preferred over the AP chest when the patient can stand?

- A. It reduces cardiac magnification
- B. It magnifies the lungs
- C. It closes the costophrenic angles
- D. It increases object-to-image distance

151. During a routine examination, which breathing instruction is used for a routine chest exposure?

- A. Suspend after forced expiration
- B. Breathe shallowly throughout
- C. Perform repeated Valsalva maneuvers
- D. Suspend after the second full inspiration

152. During a routine examination, which projection best demonstrates free intraperitoneal air when the patient cannot stand?

- A. Right lateral decubitus abdomen
- B. Prone abdomen only
- C. Left lateral decubitus abdomen
- D. AP axial sacrum

153. During a routine examination, where is the central ray centered for an AP supine abdomen?

- A. At the level of C7
- B. At the xiphoid process
- C. At the level of the iliac crests
- D. At the greater trochanters

154. During a routine examination, which position best demonstrates the cervical intervertebral foramina on the side closest to the receptor?

- A. Posterior oblique position
- B. Anterior oblique position
- C. AP open-mouth position
- D. Lateral swimmer position

155. During a routine examination, what is the purpose of the AP open-mouth projection?

- A. Demonstrate the thoracic spinous processes
- B. Show the lumbar zygapophyseal joints
- C. Evaluate the sternoclavicular joints
- D. Demonstrate C1 and C2 through the open mouth

156. During a routine examination, which projection best demonstrates the dens when the open-mouth view is nondiagnostic?

- A. Tangential patella projection
- B. Fuchs or Judd projection
- C. Lateral sternum projection
- D. AP axial clavicle projection

157. During a routine examination, for a lateral lumbar spine, which structure should be superimposed?

- A. Both obturator foramina
- B. Both femoral condyles
- C. Anterior ribs at all levels
- D. Posterior vertebral body margins

158. During a routine examination, which oblique lumbar position demonstrates the zygapophyseal joints closest to the receptor?

- A. Posterior oblique position
- B. Anterior oblique position
- C. AP axial position
- D. Dorsal decubitus position

159. During a routine examination, which projection best demonstrates the scaphoid without superimposition?

- A. AP forearm with radial deviation
- B. Lateral elbow in flexion
- C. PA wrist with ulnar deviation
- D. Tangential carpal canal only

160. During a routine examination, for a lateral elbow, how should the joint be positioned?

- A. Extended with epicondyles parallel
- B. Flexed 90 degrees with epicondyles perpendicular
- C. Flexed 45 degrees with hand pronated
- D. Hyperextended with palm posterior

161. During a routine examination, which projection demonstrates the radial head with reduced ulnar superimposition?

- A. AP oblique elbow with medial rotation
- B. PA wrist with flexion
- C. Lateral humerus with extension
- D. AP oblique elbow with lateral rotation

162. During a routine examination, which shoulder projection demonstrates the glenohumeral joint space open?

- A. AP oblique Grashey projection
- B. AP internal rotation only
- C. Tangential intertubercular groove
- D. PA axial clavicle projection

163. During a routine examination, which projection is useful for evaluating anterior or posterior shoulder dislocation?

- A. AP bilateral AC joints only
- B. Scapular Y lateral projection
- C. PA hand projection
- D. Tangential calcaneus projection

164. During a routine examination, for an AP pelvis, how are the legs positioned when trauma is not suspected?

- A. Externally rotate both legs 45 degrees
- B. Flex both hips to 90 degrees
- C. Internally rotate both legs 15 to 20 degrees
- D. Cross both ankles tightly

165. During a routine examination, which projection is used for a trauma patient with suspected hip fracture?

- A. Frog-leg lateral hip
- B. Cross-table lateral hip
- C. Weight-bearing bilateral knee
- D. Tangential patella projection

166. During a routine examination, which knee projection best demonstrates the intercondylar fossa?

- A. AP ankle projection
- B. Lateral foot projection
- C. PA axial tunnel projection
- D. AP axial clavicle projection

167. During a routine examination, which projection best demonstrates the patellofemoral joint space?

- A. Tangential patella projection
- B. AP femur projection
- C. PA hand projection
- D. Lateral chest projection

168. During a routine examination, for an AP ankle, which action produces the mortise view?

- A. Externally rotate the foot 45 degrees
- B. Dorsiflex only without rotation
- C. Flex the knee and abduct the hip
- D. Internally rotate the leg about 15 degrees

169. In an imaging department scenario, for an upright PA chest projection, where is the central ray directed?

- A. To the level of C3
- B. To the level of L4
- C. To the level of T7
- D. To the level of the iliac crest

170. In an imaging department scenario, why is the PA chest preferred over the AP chest when the patient can stand?

- A. It magnifies the lungs
- B. It reduces cardiac magnification
- C. It closes the costophrenic angles
- D. It increases object-to-image distance

171. In an imaging department scenario, which breathing instruction is used for a routine chest exposure?

- A. Suspend after the second full inspiration
- B. Suspend after forced expiration
- C. Breathe shallowly throughout
- D. Perform repeated Valsalva maneuvers

172. In an imaging department scenario, which projection best demonstrates free intraperitoneal air when the patient cannot stand?

- A. Right lateral decubitus abdomen
- B. Prone abdomen only
- C. AP axial sacrum
- D. Left lateral decubitus abdomen

173. In an imaging department scenario, where is the central ray centered for an AP supine abdomen?

- A. At the level of C7
- B. At the xiphoid process
- C. At the greater trochanters
- D. At the level of the iliac crests

174. In an imaging department scenario, which position best demonstrates the cervical intervertebral foramina on the side closest to the receptor?

- A. Anterior oblique position
- B. Posterior oblique position
- C. AP open-mouth position
- D. Lateral swimmer position

175. In an imaging department scenario, what is the purpose of the AP open-mouth projection?

- A. Demonstrate C1 and C2 through the open mouth

- B. Demonstrate the thoracic spinous processes
- C. Show the lumbar zygapophyseal joints
- D. Evaluate the sternoclavicular joints

176. In an imaging department scenario, which projection best demonstrates the dens when the open-mouth view is nondiagnostic?

- A. Tangential patella projection
- B. Lateral sternum projection
- C. Fuchs or Judd projection
- D. AP axial clavicle projection

177. In an imaging department scenario, for a lateral lumbar spine, which structure should be superimposed?

- A. Both obturator foramina
- B. Both femoral condyles
- C. Anterior ribs at all levels
- D. Posterior vertebral body margins

178. In an imaging department scenario, which oblique lumbar position demonstrates the zygapophyseal joints closest to the receptor?

- A. Anterior oblique position
- B. Posterior oblique position
- C. AP axial position
- D. Dorsal decubitus position

179. In an imaging department scenario, which projection best demonstrates the scaphoid without superimposition?

- A. PA wrist with ulnar deviation
- B. AP forearm with radial deviation
- C. Lateral elbow in flexion
- D. Tangential carpal canal only

180. In an imaging department scenario, for a lateral elbow, how should the joint be positioned?

- A. Extended with epicondyles parallel
- B. Flexed 90 degrees with epicondyles perpendicular
- C. Flexed 45 degrees with hand pronated
- D. Hyperextended with palm posterior

181. In an imaging department scenario, which projection demonstrates the radial head with reduced ulnar superimposition?

- A. AP oblique elbow with medial rotation
- B. PA wrist with flexion
- C. AP oblique elbow with lateral rotation
- D. Lateral humerus with extension

182. In an imaging department scenario, which shoulder projection demonstrates the glenohumeral joint space open?

- A. AP oblique Grashey projection
- B. AP internal rotation only
- C. Tangential intertubercular groove
- D. PA axial clavicle projection

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- A. AP bilateral AC joints only
- B. PA hand projection
- C. Scapular Y lateral projection
- D. Tangential calcaneus projection

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- A. Externally rotate both legs 45 degrees
- B. Flex both hips to 90 degrees
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- D. Internally rotate both legs 15 to 20 degrees

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- A. Frog-leg lateral hip
- B. Cross-table lateral hip
- C. Weight-bearing bilateral knee
- D. Tangential patella projection

186. In an imaging department scenario, which knee projection best demonstrates the intercondylar fossa?

- A. AP ankle projection
- B. Lateral foot projection
- C. AP axial clavicle projection
- D. PA axial tunnel projection

187. In an imaging department scenario, which projection best demonstrates the patellofemoral joint space?

- A. AP femur projection
- B. PA hand projection
- C. Tangential patella projection
- D. Lateral chest projection

188. In an imaging department scenario, for an AP ankle, which action produces the mortise view?

- A. Internally rotate the leg about 15 degrees
- B. Externally rotate the foot 45 degrees
- C. Dorsiflex only without rotation
- D. Flex the knee and abduct the hip

189. While preparing a patient, for an upright PA chest projection, where is the central ray directed?

- A. To the level of C3
- B. To the level of L4
- C. To the level of T7
- D. To the level of the iliac crest

190. While preparing a patient, why is the PA chest preferred over the AP chest when the patient can stand?

- A. It magnifies the lungs
- B. It reduces cardiac magnification
- C. It closes the costophrenic angles
- D. It increases object-to-image distance

191. While preparing a patient, which breathing instruction is used for a routine chest exposure?

- A. Suspend after the second full inspiration
- B. Suspend after forced expiration

- C. Breathe shallowly throughout
- D. Perform repeated Valsalva maneuvers

192. While preparing a patient, which projection best demonstrates free intraperitoneal air when the patient cannot stand?

- A. Right lateral decubitus abdomen
- B. Prone abdomen only
- C. AP axial sacrum
- D. Left lateral decubitus abdomen

193. While preparing a patient, where is the central ray centered for an AP supine abdomen?

- A. At the level of C7
- B. At the level of the iliac crests
- C. At the xiphoid process
- D. At the greater trochanters

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- C. Posterior oblique position
- D. Lateral swimmer position

195. While preparing a patient, what is the purpose of the AP open-mouth projection?

- A. Demonstrate C1 and C2 through the open mouth
- B. Demonstrate the thoracic spinous processes
- C. Show the lumbar zygapophyseal joints

D. Evaluate the sternoclavicular joints

196. While preparing a patient, which projection best demonstrates the dens when the open-mouth view is nondiagnostic?

- A. Tangential patella projection
- B. Lateral sternum projection
- C. AP axial clavicle projection
- D. Fuchs or Judd projection

197. While preparing a patient, for a lateral lumbar spine, which structure should be superimposed?

- A. Both obturator foramina
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- C. Posterior vertebral body margins
- D. Anterior ribs at all levels

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- A. AP forearm with radial deviation
- B. Lateral elbow in flexion
- C. Tangential carpal canal only

D. PA wrist with ulnar deviation

200. While preparing a patient, for a lateral elbow, how should the joint be positioned?

- A. Flexed 90 degrees with epicondyles perpendicular
- B. Extended with epicondyles parallel
- C. Flexed 45 degrees with hand pronated
- D. Hyperextended with palm posterior

Practice Exam 4: Answer Key and Explanations

1. C — Two independent identifiers, such as full name and date of birth, reduce wrong-patient errors. The order and clinical indication should also agree before exposure. The keyed response is therefore match two identifiers with the order. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

2. B — A competent patient may withdraw consent. The radiographer should stop, document the refusal according to policy, and notify the responsible provider rather than coercing the patient. The keyed response is therefore respect the refusal and notify the provider. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

3. D — A qualified interpreter supports accurate informed communication and confidentiality. Children or untrained companions may omit, alter, or misunderstand clinically important information. The keyed response is therefore use a qualified medical interpreter. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm. Correct application also helps prevent repeats and supports consistent diagnostic image.

4. A — Hand hygiene interrupts transmission before and after patient contact. Gloves supplement rather than replace hand hygiene, and contaminated sharps require immediate disposal in approved containers. The keyed response is therefore perform hand hygiene before and after contact. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

5. B — The findings suggest presyncope. Preventing a fall and supporting circulation take priority; the radiographer then assesses the patient and summons appropriate assistance. The keyed response is therefore assist the patient to a safe recumbent position. This approach prioritizes patient safety, accurate

communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

6. D — Used needles can puncture ordinary waste bags and transmit bloodborne pathogens. They should be discarded immediately in a closable, labeled, puncture-resistant sharps container. The keyed response is therefore a used hollow-bore needle. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

7. C — Airway compromise and hypotension indicate a potentially life-threatening systemic reaction requiring immediate emergency response. Warmth and metallic taste are expected sensations, while limited itching is usually milder. The keyed response is therefore hypotension with airway compromise. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

8. A — Tuberculosis spreads through airborne droplet nuclei. Appropriate respiratory protection and an airborne-infection isolation environment reduce exposure to staff and other patients. The keyed response is therefore airborne precautions with appropriate respirator. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm. Correct application also helps prevent repeats and supports consistent diagnostic image.

9. D — A lateral transfer device reduces friction and caregiver strain when the patient cannot bear weight. Canes and gait belts are intended for supported ambulation. The keyed response is therefore a friction-reducing transfer board or sheet. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

10. C — Stopping injection limits additional infiltration. The site and distal circulation should be assessed, the patient monitored, and the event documented and escalated according to policy. The keyed response is therefore stop the injection and follow the facility protocol. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

11. B — Confidential information should be accessed and shared only for legitimate care functions. Public discussion, exposed screens, and personal messaging create avoidable privacy breaches. The keyed response is therefore discuss information only with involved personnel. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

12. A — During a seizure, protect the head, clear hazards, and call for assistance. Do not force objects into the mouth or restrain convulsive movements. The keyed response is therefore protect the patient from injury and summon help. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

13. B — Intravenous administration places medication directly into venous circulation, producing rapid systemic availability. Oral, topical, and subcutaneous routes have different absorption pathways. The keyed response is therefore intravenous administration. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

14. D — The radiographer should reconcile the order, patient identity, and clinical indication before exposure. Clarification prevents wrong-site or unnecessary imaging. The keyed response is therefore clarify the order before exposing the patient. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm. Correct application also helps prevent repeats and supports consistent diagnostic image.

15. A — A wide base, neutral alignment, bent knees, and a close load reduce spinal stress. Twisting or reaching while lifting increases injury risk. The keyed response is therefore keep the load close and use the legs. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

16. C — Two independent identifiers, such as full name and date of birth, reduce wrong-patient errors. The order and clinical indication should also agree before exposure. The keyed response is therefore match two identifiers with the order. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

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25. C — Stopping injection limits additional infiltration. The site and distal circulation should be assessed, the patient monitored, and the event documented and escalated according to policy. The keyed response is therefore stop the injection and follow the facility protocol. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

26. B — Confidential information should be accessed and shared only for legitimate care functions. Public discussion, exposed screens, and personal messaging create avoidable privacy breaches. The keyed response is therefore discuss information only with involved personnel. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

27. D — During a seizure, protect the head, clear hazards, and call for assistance. Do not force objects into the mouth or restrain convulsive movements. The keyed response is therefore protect the patient from injury and summon help. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

28. A — Intravenous administration places medication directly into venous circulation, producing rapid systemic availability. Oral, topical, and subcutaneous routes have different absorption pathways. The keyed response is therefore intravenous administration. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

29. D — The radiographer should reconcile the order, patient identity, and clinical indication before exposure. Clarification prevents wrong-site or unnecessary imaging. The keyed response is therefore clarify the order before exposing the patient. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm. Correct application also helps prevent repeats and supports consistent diagnostic image.

30. C — A wide base, neutral alignment, bent knees, and a close load reduce spinal stress. Twisting or reaching while lifting increases injury risk. The keyed response is therefore keep the load close and use the legs. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

31. B — Two independent identifiers, such as full name and date of birth, reduce wrong-patient errors. The order and clinical indication should also agree before exposure. The keyed response is therefore match two identifiers with the order. This approach prioritizes patient safety, accurate communication, and appropriate documentation while avoiding shortcuts that could cause preventable harm.

32. A — The inverse square law uses the original intensity multiplied by the square of the original distance divided by the new distance. Doubling the distance reduces intensity to one fourth, so 16 mGy becomes 4 mGy. The keyed response is therefore 4 mgy. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation.

33. B — Radiation intensity varies inversely with the square of distance. Doubling distance produces one divided by two squared, or one fourth, of the original intensity. The keyed response is therefore one fourth of the original intensity. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

34. C — Compton interactions eject outer-shell electrons and redirect photons, creating scatter that can reach personnel. Photoelectric absorption contributes image contrast but not a scattered photon. The keyed response is therefore compton interaction. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

35. A — Milliampere-seconds determines the total electron flow across the tube and therefore primarily controls photon quantity. Kilovoltage strongly affects photon energy and also influences quantity. The keyed response is therefore milliampere-seconds. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

36. D — Filtration preferentially removes low-energy photons that would be absorbed superficially without contributing useful receptor exposure. This increases average beam energy and reduces skin dose. The keyed response is therefore remove low-energy photons from the beam. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

37. A — Stochastic effects have no assumed threshold and increasing dose raises probability rather than severity. Cancer and hereditary effects are stochastic; tissue reactions have thresholds. The keyed response is therefore radiation-induced cancer. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

38. B — Radiosensitivity generally increases with mitotic activity and decreases with differentiation. Rapidly dividing precursor cells are therefore more vulnerable than mature muscle or nerve cells. The keyed response is therefore rapidly dividing, less differentiated cells. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

39. D — The gray measures absorbed energy per unit mass, equal to one joule per kilogram. The sievert expresses equivalent or effective dose. The keyed response is therefore gray. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

40. C — The direct square law for maintaining receptor exposure requires mAs to change with the square of SID. Multiplying 10 mAs by 150 squared divided by 100 squared gives 22.5 mAs. The keyed response is therefore 22.5 mas. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

41. D — Collimation reduces irradiated tissue volume and scatter production, improving radiation protection and often image contrast. It does not replace accurate positioning. The keyed response is therefore restrict the beam to the anatomy of interest. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

42. B — A personal dosimeter must represent the wearer's occupational exposure. Collar or upper-torso placement is commonly used when no apron is worn. The keyed response is therefore at the collar or upper torso. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

43. C — Electromagnetic frequency and wavelength are inversely related because their product equals the speed of light. Higher frequency therefore corresponds to shorter wavelength. The keyed response is therefore wavelength decreases. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice. Correct application also helps prevent repeats and supports consistent diagnostic image.

44. A — Bremsstrahlung occurs when electrons are deflected and slowed by target nuclei, releasing variable fractions of their energy as photons and creating a continuous spectrum. The keyed response is therefore bremsstrahlung production. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

45. B — Accurate positioning, appropriate technique, and patient instruction reduce motion and positioning errors that otherwise cause repeats. Repeat analysis supports corrective action. The keyed response is therefore accurate positioning and clear communication. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

46. A — The control booth provides structural shielding between the radiographer and radiation sources. Proper use reduces occupational exposure from scatter and leakage. The keyed response is therefore a fixed barrier attenuating scatter radiation. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

47. D — The patient becomes the main source of scattered radiation after the primary beam interacts with tissue. Distance, shielding, and avoiding the primary beam reduce occupational dose. The keyed response is therefore scatter radiation from the patient. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

48. C — Radiation intensity varies inversely with the square of distance. Doubling distance produces one divided by two squared, or one fourth, of the original intensity. The keyed response is therefore one fourth of the original intensity. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

49. B — Compton interactions eject outer-shell electrons and redirect photons, creating scatter that can reach personnel. Photoelectric absorption contributes image contrast but not a scattered photon. The keyed response is therefore compton interaction. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

50. D — Milliampere-seconds equals tube current multiplied by exposure time. Multiplying 300 mA by 0.04 second gives 12 mAs, the value that represents total electron quantity for this exposure. The keyed response is therefore 12 mas. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

51. A — Filtration preferentially removes low-energy photons that would be absorbed superficially without contributing useful receptor exposure. This increases average beam energy and reduces skin dose. The keyed response is therefore remove low-energy photons from the beam. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

52. C — Stochastic effects have no assumed threshold and increasing dose raises probability rather than severity. Cancer and hereditary effects are stochastic; tissue reactions have thresholds. The keyed response is therefore radiation-induced cancer. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

53. B — Radiosensitivity generally increases with mitotic activity and decreases with differentiation. Rapidly dividing precursor cells are therefore more vulnerable than mature muscle or nerve cells. The keyed response is therefore rapidly dividing, less differentiated cells. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

54. A — The gray measures absorbed energy per unit mass, equal to one joule per kilogram. The sievert expresses equivalent or effective dose. The keyed response is therefore gray. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

55. C — Increasing distance from the patient reduces scatter intensity according to the inverse square relationship. Personnel should also use shielding and avoid the primary beam. The keyed response is therefore stand as far from the patient as practical. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

56. D — Collimation reduces irradiated tissue volume and scatter production, improving radiation protection and often image contrast. It does not replace accurate positioning. The keyed response is therefore restrict the beam to the anatomy of interest. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

57. A — A personal dosimeter must represent the wearer's occupational exposure. Collar or upper-torso placement is commonly used when no apron is worn. The keyed response is therefore at the collar or upper torso. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

58. D — Electromagnetic frequency and wavelength are inversely related because their product equals the speed of light. Higher frequency therefore corresponds to shorter wavelength. The keyed response is therefore wavelength decreases. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice. Correct application also helps prevent repeats and supports consistent diagnostic image.

59. B — Bremsstrahlung occurs when electrons are deflected and slowed by target nuclei, releasing variable fractions of their energy as photons and creating a continuous spectrum. The keyed response is therefore bremsstrahlung production. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

60. C — Accumulated air kerma equals the average rate multiplied by elapsed time when the rate is treated as constant. Multiplying 18 mGy per minute by 2.5 minutes gives 45 mGy. The keyed response is therefore 45 mgy. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

61. D — The control booth provides structural shielding between the radiographer and radiation sources. Proper use reduces occupational exposure from scatter and leakage. The keyed response is therefore a fixed barrier attenuating scatter radiation. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

62. C — The patient becomes the main source of scattered radiation after the primary beam interacts with tissue. Distance, shielding, and avoiding the primary beam reduce occupational dose. The keyed response is therefore scatter radiation from the patient. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

63. A — Radiation intensity varies inversely with the square of distance. Doubling distance produces one divided by two squared, or one fourth, of the original intensity. The keyed response is therefore one fourth of the original intensity. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

64. B — Compton interactions eject outer-shell electrons and redirect photons, creating scatter that can reach personnel. Photoelectric absorption contributes image contrast but not a scattered photon. The keyed response is therefore Compton interaction. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

65. A — Milliampere-seconds determines the total electron flow across the tube and therefore primarily controls photon quantity. Kilovoltage strongly affects photon energy and also influences quantity. The keyed response is therefore milliampere-seconds. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

66. C — Filtration preferentially removes low-energy photons that would be absorbed superficially without contributing useful receptor exposure. This increases average beam energy and reduces skin dose. The keyed response is therefore remove low-energy photons from the beam. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

67. B — Stochastic effects have no assumed threshold and increasing dose raises probability rather than severity. Cancer and hereditary effects are stochastic; tissue reactions have thresholds. The keyed response is therefore radiation-induced cancer. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

68. D — Radiosensitivity generally increases with mitotic activity and decreases with differentiation. Rapidly dividing precursor cells are therefore more vulnerable than mature muscle or nerve cells. The keyed response is therefore rapidly dividing, less differentiated cells. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

69. A — The gray measures absorbed energy per unit mass, equal to one joule per kilogram. The sievert expresses equivalent or effective dose. The keyed response is therefore gray. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

70. C — Increasing distance from the patient reduces scatter intensity according to the inverse square relationship. Personnel should also use shielding and avoid the primary beam. The keyed response is therefore stand as far from the patient as practical. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

71. D — Collimation reduces irradiated tissue volume and scatter production, improving radiation protection and often image contrast. It does not replace accurate positioning. The keyed response is therefore restrict the beam to the anatomy of interest. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

72. B — A personal dosimeter must represent the wearer's occupational exposure. Collar or upper-torso placement is commonly used when no apron is worn. The keyed response is therefore at the collar or upper torso. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

73. C — Electromagnetic frequency and wavelength are inversely related because their product equals the speed of light. Higher frequency therefore corresponds to shorter wavelength. The keyed response is therefore wavelength decreases. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice. Correct application also helps prevent repeats and supports consistent diagnostic image.

74. D — Bremsstrahlung occurs when electrons are deflected and slowed by target nuclei, releasing variable fractions of their energy as photons and creating a continuous spectrum. The keyed response is therefore bremsstrahlung production. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

75. A — Accurate positioning, appropriate technique, and patient instruction reduce motion and positioning errors that otherwise cause repeats. Repeat analysis supports corrective action. The keyed response is therefore accurate positioning and clear communication. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

76. B — The control booth provides structural shielding between the radiographer and radiation sources. Proper use reduces occupational exposure from scatter and leakage. The keyed response is therefore a fixed barrier attenuating scatter radiation. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

77. A — The patient becomes the main source of scattered radiation after the primary beam interacts with tissue. Distance, shielding, and avoiding the primary beam reduce occupational dose. The keyed response is therefore scatter radiation from the patient. The alternative choices either misstate the physical principle or would increase unnecessary exposure rather than support sound radiation protection practice.

78. D — Convert milliseconds to seconds before multiplying current by time. Twenty-five milliseconds equals 0.025 second, and 400 mA multiplied by 0.025 second produces 10 mAs. The keyed response is therefore 10 mas. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

79. B — A smaller focal spot reduces geometric unsharpness. Motion, larger object-to-image distance, and aggressive smoothing reduce visibility of fine detail. The keyed response is therefore use a smaller focal spot. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

80. C — Too few detected photons create statistical fluctuation known as quantum noise or quantum mottle. Postprocessing cannot restore signal that was never acquired. The keyed response is therefore increased quantum noise. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

81. A — Automatic exposure control monitors radiation reaching selected detectors and terminates the exposure when the preset signal is achieved. Correct detector selection and positioning remain essential. The keyed response is therefore terminate exposure after adequate detector signal. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

82. B — Exposure latitude describes the range of receptor exposures that can be captured and processed into a useful image. Wide latitude does not justify unnecessary patient exposure. The keyed response is therefore exposure latitude. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

83. D — A lookup table maps processed pixel values to displayed grayscale values, shaping brightness and contrast presentation. It does not change the original patient exposure. The keyed response is therefore map pixel values to displayed brightness. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

84. C — DICOM standardizes medical image files and communication so compatible modalities, archives, and workstations can exchange images and related information. The keyed response is therefore dicom. The remaining choices describe unrelated equipment functions or changes that would

degrade image quality instead of correcting the stated imaging problem. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

85. C — A picture archiving and communication system manages digital image storage, retrieval, viewing, and distribution across authorized clinical systems. The keyed response is therefore store, retrieve, and distribute medical images. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

86. B — If the system identifies the wrong anatomy or field, histogram analysis can apply an unsuitable processing model and alter displayed brightness or contrast. The keyed response is therefore inappropriate brightness or contrast processing. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

87. D — Detective quantum efficiency reflects how effectively an imaging detector converts incident x-ray information into a useful image signal relative to noise. The keyed response is therefore how efficiently a detector preserves signal-to-noise information. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

88. A — Computed radiography stores x-ray energy in a photostimulable phosphor plate that is later scanned by a reader to release the latent image. The keyed response is therefore computed radiography. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

89. A — Flat-field calibration compensates for variations among detector elements so a uniform exposure produces a uniform image. Poor calibration can create fixed-pattern artifacts. The keyed response is therefore correct nonuniform detector response. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

90. C — Pixel pitch equals field dimension divided by the number of pixels along that dimension. Forty centimeters equals 400 millimeters; dividing 400 millimeters by 2,000 pixels gives 0.2 millimeter per pixel. The keyed response is therefore 0.2 mm. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

91. D — Exposure indicators provide system-specific feedback about radiation reaching the detector. They help detect exposure creep but are not direct patient-dose measurements. The keyed response is therefore provide feedback about detector exposure. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

92. B — A beam-restriction congruence test checks whether the visible light field accurately represents the x-ray field, supporting proper collimation and anatomy coverage. The keyed response is therefore beam-restriction congruence test. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

93. A — Placing anatomy closer to the receptor reduces object-to-image distance and magnification. Increasing source-to-image distance can also reduce magnification. The keyed response is therefore decrease object-to-image distance. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

94. D — A smaller focal spot reduces geometric unsharpness. Motion, larger object-to-image distance, and aggressive smoothing reduce visibility of fine detail. The keyed response is therefore use a smaller focal spot. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

95. C — Too few detected photons create statistical fluctuation known as quantum noise or quantum mottle. Postprocessing cannot restore signal that was never acquired. The keyed response is therefore increased quantum noise. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

96. B — Automatic exposure control monitors radiation reaching selected detectors and terminates the exposure when the preset signal is achieved. Correct detector selection and positioning remain essential. The keyed response is therefore terminate exposure after adequate detector signal. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

97. C — Exposure latitude describes the range of receptor exposures that can be captured and processed into a useful image. Wide latitude does not justify unnecessary patient exposure. The keyed response is therefore exposure latitude. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

98. A — A lookup table maps processed pixel values to displayed grayscale values, shaping brightness and contrast presentation. It does not change the original patient exposure. The keyed response is therefore map pixel values to displayed brightness. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

99. D — DICOM standardizes medical image files and communication so compatible modalities, archives, and workstations can exchange images and related information. The keyed response is therefore dicom. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

100. B — A picture archiving and communication system manages digital image storage, retrieval, viewing, and distribution across authorized clinical systems. The keyed response is therefore store, retrieve, and distribute medical images. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

101. D — If the system identifies the wrong anatomy or field, histogram analysis can apply an unsuitable processing model and alter displayed brightness or contrast. The keyed response is therefore

inappropriate brightness or contrast processing. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

102. B — Detective quantum efficiency reflects how effectively an imaging detector converts incident x-ray information into a useful image signal relative to noise. The keyed response is therefore how efficiently a detector preserves signal-to-noise information. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

103. A — Computed radiography stores x-ray energy in a photostimulable phosphor plate that is later scanned by a reader to release the latent image. The keyed response is therefore computed radiography. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

104. C — Flat-field calibration compensates for variations among detector elements so a uniform exposure produces a uniform image. Poor calibration can create fixed-pattern artifacts. The keyed response is therefore correct nonuniform detector response. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

105. D — Digital display contrast is strongly influenced by processing, window width, and lookup-table mapping. Acquisition still must provide adequate signal and avoid saturation. The keyed response is therefore processing and window settings. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

106. B — Exposure indicators provide system-specific feedback about radiation reaching the detector. They help detect exposure creep but are not direct patient-dose measurements. The keyed response is therefore provide feedback about detector exposure. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

107. C — A beam-restriction congruence test checks whether the visible light field accurately represents the x-ray field, supporting proper collimation and anatomy coverage. The keyed response is therefore beam-restriction congruence test. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

108. A — Placing anatomy closer to the receptor reduces object-to-image distance and magnification. Increasing source-to-image distance can also reduce magnification. The keyed response is therefore decrease object-to-image distance. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

109. C — A smaller focal spot reduces geometric unsharpness. Motion, larger object-to-image distance, and aggressive smoothing reduce visibility of fine detail. The keyed response is therefore use a smaller

focal spot. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

110. A — With other factors unchanged, receptor exposure is directly proportional to mAs. Multiplying 5 mGy by the ratio 32 divided by 20 produces an expected detector exposure of 8 mGy. The keyed response is therefore 8 mgy. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

111. B — Automatic exposure control monitors radiation reaching selected detectors and terminates the exposure when the preset signal is achieved. Correct detector selection and positioning remain essential. The keyed response is therefore terminate exposure after adequate detector signal. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

112. D — Exposure latitude describes the range of receptor exposures that can be captured and processed into a useful image. Wide latitude does not justify unnecessary patient exposure. The keyed response is therefore exposure latitude. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

113. A — A lookup table maps processed pixel values to displayed grayscale values, shaping brightness and contrast presentation. It does not change the original patient exposure. The keyed response is therefore map pixel values to displayed brightness. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

114. D — DICOM standardizes medical image files and communication so compatible modalities, archives, and workstations can exchange images and related information. The keyed response is therefore dicom. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

115. B — A picture archiving and communication system manages digital image storage, retrieval, viewing, and distribution across authorized clinical systems. The keyed response is therefore store, retrieve, and distribute medical images. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

116. C — If the system identifies the wrong anatomy or field, histogram analysis can apply an unsuitable processing model and alter displayed brightness or contrast. The keyed response is therefore inappropriate brightness or contrast processing. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

117. A — Detective quantum efficiency reflects how effectively an imaging detector converts incident x-ray information into a useful image signal relative to noise. The keyed response is therefore how efficiently a detector preserves signal-to-noise information. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

118. B — Computed radiography stores x-ray energy in a photostimulable phosphor plate that is later scanned by a reader to release the latent image. The keyed response is therefore computed radiography. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

119. D — Flat-field calibration compensates for variations among detector elements so a uniform exposure produces a uniform image. Poor calibration can create fixed-pattern artifacts. The keyed response is therefore correct nonuniform detector response. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

120. C — Digital display contrast is strongly influenced by processing, window width, and lookup-table mapping. Acquisition still must provide adequate signal and avoid saturation. The keyed response is therefore processing and window settings. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

121. C — Exposure indicators provide system-specific feedback about radiation reaching the detector. They help detect exposure creep but are not direct patient-dose measurements. The keyed response is therefore provide feedback about detector exposure. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

122. D — A beam-restriction congruence test checks whether the visible light field accurately represents the x-ray field, supporting proper collimation and anatomy coverage. The keyed response is therefore beam-restriction congruence test. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

123. B — Placing anatomy closer to the receptor reduces object-to-image distance and magnification. Increasing source-to-image distance can also reduce magnification. The keyed response is therefore decrease object-to-image distance. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem. Correct application also helps prevent repeats and supports consistent diagnostic image evaluation.

124. A — A smaller focal spot reduces geometric unsharpness. Motion, larger object-to-image distance, and aggressive smoothing reduce visibility of fine detail. The keyed response is therefore use a smaller focal spot. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

125. A — The calculated contrast volume is the prescribed volume per kilogram multiplied by patient mass. Multiplying 1.5 mL per kilogram by 72 kilograms gives 108 mL before any protocol maximum or patient-specific adjustment is applied. The keyed response is therefore 108 ml. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated.

126. D — Automatic exposure control monitors radiation reaching selected detectors and terminates the exposure when the preset signal is achieved. Correct detector selection and positioning remain essential. The keyed response is therefore terminate exposure after adequate detector signal. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

127. B — Exposure latitude describes the range of receptor exposures that can be captured and processed into a useful image. Wide latitude does not justify unnecessary patient exposure. The keyed response is therefore exposure latitude. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

128. C — A lookup table maps processed pixel values to displayed grayscale values, shaping brightness and contrast presentation. It does not change the original patient exposure. The keyed response is therefore map pixel values to displayed brightness. The remaining choices describe unrelated equipment functions or changes that would degrade image quality instead of correcting the stated imaging problem.

129. C — The central ray for an upright PA chest is directed perpendicular to the receptor at approximately T7, commonly near the inferior angle of the scapula. The keyed response is therefore to the level of T7. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

130. A — In the PA position, the heart lies closer to the receptor, reducing magnification compared with an AP projection. Upright positioning also demonstrates air-fluid levels. The keyed response is therefore it reduces cardiac magnification. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

131. B — A full second inspiration expands the lungs, lowers the diaphragm, and improves demonstration of pulmonary anatomy. Exposure during motion would reduce detail. The keyed response is therefore suspend after the second full inspiration. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

132. D — A left lateral decubitus abdomen allows free air to rise along the right lateral liver margin, where it is not confused with gastric air. The keyed response is therefore left lateral decubitus abdomen. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

133. A — For a routine AP supine abdomen, centering at the iliac crests generally includes the kidneys through the urinary bladder on an adequately sized receptor. The keyed response is therefore at the level of the iliac crests. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

134. C — Posterior oblique cervical projections demonstrate the foramina closest to the receptor, while anterior obliques demonstrate the side farthest from the receptor. The keyed response is therefore

posterior oblique position. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

135. B — The open-mouth projection shows the atlas, axis, dens, and lateral masses when the lower incisors and skull base are properly aligned. The keyed response is therefore demonstrate c1 and c2 through the open mouth. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

136. D — Fuchs or Judd methods can demonstrate the dens through the foramen magnum when the open-mouth projection cannot be obtained or is obscured. The keyed response is therefore fuchs or judd projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

137. A — A true lateral lumbar image shows near-superimposition of posterior vertebral body margins and open intervertebral spaces when alignment and central-ray placement are correct. The keyed response is therefore posterior vertebral body margins. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

138. B — Posterior oblique lumbar positions demonstrate the zygapophyseal joints closest to the receptor; anterior obliques demonstrate those farthest from the receptor. The keyed response is therefore posterior oblique position. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

139. D — Ulnar deviation elongates the scaphoid and reduces its foreshortening and superimposition, improving evaluation for an occult scaphoid fracture. The keyed response is therefore pa wrist with ulnar deviation. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

140. C — A routine lateral elbow uses about 90 degrees of flexion with the humeral epicondyles perpendicular to the receptor, superimposing them and demonstrating the joint. The keyed response is therefore flexed 90 degrees with epicondyles perpendicular. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

141. C — Lateral rotation of the elbow places the radial head, neck, and tuberosity in profile with less superimposition by the ulna. The keyed response is therefore ap oblique elbow with lateral rotation. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

142. A — The Grashey method rotates the patient until the scapular plane is parallel to the receptor, producing an open glenohumeral joint space. The keyed response is therefore ap oblique grashey projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

143. B — The scapular Y projection shows the relationship of the humeral head to the glenoid. Displacement from the center of the Y suggests dislocation. The keyed response is therefore scapular y lateral projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

144. D — Internal rotation places the femoral necks parallel to the receptor and reduces foreshortening, unless fracture or dislocation is suspected. The keyed response is therefore internally rotate both legs 15 to 20 degrees. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

145. A — The cross-table lateral demonstrates the proximal femur without moving the injured leg. A frog-leg position could displace a fracture and is contraindicated in acute trauma. The keyed response is therefore cross-table lateral hip. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

146. B — A PA axial tunnel projection directs the beam through the flexed knee joint to demonstrate the intercondylar fossa and tibial spines. The keyed response is therefore pa axial tunnel projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

147. D — A tangential patella projection profiles the patellofemoral articulation and can demonstrate patellar alignment and surface abnormalities when safely performed. The keyed response is therefore tangential patella projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship. Correct application also helps prevent repeats and supports consistent diagnostic image.

148. C — About 15 to 20 degrees of internal rotation places the intermalleolar line parallel to the receptor and opens the ankle mortise. The keyed response is therefore internally rotate the leg about 15 degrees. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

149. B — The central ray for an upright PA chest is directed perpendicular to the receptor at approximately T7, commonly near the inferior angle of the scapula. The keyed response is therefore to the level of t7. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

150. A — In the PA position, the heart lies closer to the receptor, reducing magnification compared with an AP projection. Upright positioning also demonstrates air-fluid levels. The keyed response is therefore it reduces cardiac magnification. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

151. D — A full second inspiration expands the lungs, lowers the diaphragm, and improves demonstration of pulmonary anatomy. Exposure during motion would reduce detail. The keyed response is therefore suspend after the second full inspiration. The other choices use landmarks or positions

intended for different anatomy and would not demonstrate the requested structures with the required relationship.

152. C — A left lateral decubitus abdomen allows free air to rise along the right lateral liver margin, where it is not confused with gastric air. The keyed response is therefore left lateral decubitus abdomen. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

153. C — For a routine AP supine abdomen, centering at the iliac crests generally includes the kidneys through the urinary bladder on an adequately sized receptor. The keyed response is therefore at the level of the iliac crests. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

154. A — Posterior oblique cervical projections demonstrate the foramina closest to the receptor, while anterior obliques demonstrate the side farthest from the receptor. The keyed response is therefore posterior oblique position. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

155. D — The open-mouth projection shows the atlas, axis, dens, and lateral masses when the lower incisors and skull base are properly aligned. The keyed response is therefore demonstrate c1 and c2 through the open mouth. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

156. B — Fuchs or Judd methods can demonstrate the dens through the foramen magnum when the open-mouth projection cannot be obtained or is obscured. The keyed response is therefore fuchs or judd projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

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158. A — Posterior oblique lumbar positions demonstrate the zygapophyseal joints closest to the receptor; anterior obliques demonstrate those farthest from the receptor. The keyed response is therefore posterior oblique position. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

159. C — Ulnar deviation elongates the scaphoid and reduces its foreshortening and superimposition, improving evaluation for an occult scaphoid fracture. The keyed response is therefore pa wrist with ulnar deviation. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

160. B — A routine lateral elbow uses about 90 degrees of flexion with the humeral epicondyles perpendicular to the receptor, superimposing them and demonstrating the joint. The keyed response is

therefore flexed 90 degrees with epicondyles perpendicular. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

161. D — Lateral rotation of the elbow places the radial head, neck, and tuberosity in profile with less superimposition by the ulna. The keyed response is therefore ap oblique elbow with lateral rotation. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

162. A — The Grashey method rotates the patient until the scapular plane is parallel to the receptor, producing an open glenohumeral joint space. The keyed response is therefore ap oblique grashey projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

163. B — The scapular Y projection shows the relationship of the humeral head to the glenoid. Displacement from the center of the Y suggests dislocation. The keyed response is therefore scapular y lateral projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

164. C — Internal rotation places the femoral necks parallel to the receptor and reduces foreshortening, unless fracture or dislocation is suspected. The keyed response is therefore internally rotate both legs 15 to 20 degrees. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

165. B — The cross-table lateral demonstrates the proximal femur without moving the injured leg. A frog-leg position could displace a fracture and is contraindicated in acute trauma. The keyed response is therefore cross-table lateral hip. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

166. C — A PA axial tunnel projection directs the beam through the flexed knee joint to demonstrate the intercondylar fossa and tibial spines. The keyed response is therefore pa axial tunnel projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

167. A — A tangential patella projection profiles the patellofemoral articulation and can demonstrate patellar alignment and surface abnormalities when safely performed. The keyed response is therefore tangential patella projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship. Correct application also helps prevent repeats and supports consistent diagnostic image.

168. D — About 15 to 20 degrees of internal rotation places the intermalleolar line parallel to the receptor and opens the ankle mortise. The keyed response is therefore internally rotate the leg about 15 degrees. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

169. C — The central ray for an upright PA chest is directed perpendicular to the receptor at approximately T7, commonly near the inferior angle of the scapula. The keyed response is therefore to the level of T7. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

170. B — In the PA position, the heart lies closer to the receptor, reducing magnification compared with an AP projection. Upright positioning also demonstrates air-fluid levels. The keyed response is therefore it reduces cardiac magnification. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

171. A — A full second inspiration expands the lungs, lowers the diaphragm, and improves demonstration of pulmonary anatomy. Exposure during motion would reduce detail. The keyed response is therefore suspend after the second full inspiration. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

172. D — A left lateral decubitus abdomen allows free air to rise along the right lateral liver margin, where it is not confused with gastric air. The keyed response is therefore left lateral decubitus abdomen. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

173. D — For a routine AP supine abdomen, centering at the iliac crests generally includes the kidneys through the urinary bladder on an adequately sized receptor. The keyed response is therefore at the level of the iliac crests. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

174. B — Posterior oblique cervical projections demonstrate the foramina closest to the receptor, while anterior obliques demonstrate the side farthest from the receptor. The keyed response is therefore posterior oblique position. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

175. A — The open-mouth projection shows the atlas, axis, dens, and lateral masses when the lower incisors and skull base are properly aligned. The keyed response is therefore demonstrate C1 and C2 through the open mouth. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

176. C — Fuchs or Judd methods can demonstrate the dens through the foramen magnum when the open-mouth projection cannot be obtained or is obscured. The keyed response is therefore Fuchs or Judd projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

177. D — A true lateral lumbar image shows near-superimposition of posterior vertebral body margins and open intervertebral spaces when alignment and central-ray placement are correct. The keyed response is therefore posterior vertebral body margins. The other choices use landmarks or positions

intended for different anatomy and would not demonstrate the requested structures with the required relationship.

178. B — Posterior oblique lumbar positions demonstrate the zygapophyseal joints closest to the receptor; anterior obliques demonstrate those farthest from the receptor. The keyed response is therefore posterior oblique position. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

179. A — Ulnar deviation elongates the scaphoid and reduces its foreshortening and superimposition, improving evaluation for an occult scaphoid fracture. The keyed response is therefore pa wrist with ulnar deviation. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

180. B — A routine lateral elbow uses about 90 degrees of flexion with the humeral epicondyles perpendicular to the receptor, superimposing them and demonstrating the joint. The keyed response is therefore flexed 90 degrees with epicondyles perpendicular. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

181. C — Lateral rotation of the elbow places the radial head, neck, and tuberosity in profile with less superimposition by the ulna. The keyed response is therefore ap oblique elbow with lateral rotation. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

182. A — The Grashey method rotates the patient until the scapular plane is parallel to the receptor, producing an open glenohumeral joint space. The keyed response is therefore ap oblique grashey projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

183. C — The scapular Y projection shows the relationship of the humeral head to the glenoid. Displacement from the center of the Y suggests dislocation. The keyed response is therefore scapular y lateral projection. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

184. D — Internal rotation places the femoral necks parallel to the receptor and reduces foreshortening, unless fracture or dislocation is suspected. The keyed response is therefore internally rotate both legs 15 to 20 degrees. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

185. B — The cross-table lateral demonstrates the proximal femur without moving the injured leg. A frog-leg position could displace a fracture and is contraindicated in acute trauma. The keyed response is therefore cross-table lateral hip. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

186. D — A PA axial tunnel projection directs the beam through the flexed knee joint to demonstrate the intercondylar fossa and tibial spines. The keyed response is therefore pa axial tunnel projection. The

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191. A — A full second inspiration expands the lungs, lowers the diaphragm, and improves demonstration of pulmonary anatomy. Exposure during motion would reduce detail. The keyed response is therefore suspend after the second full inspiration. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.

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200. A — A routine lateral elbow uses about 90 degrees of flexion with the humeral epicondyles perpendicular to the receptor, superimposing them and demonstrating the joint. The keyed response is therefore flexed 90 degrees with epicondyles perpendicular. The other choices use landmarks or positions intended for different anatomy and would not demonstrate the requested structures with the required relationship.