

PRACTICE EXAM 7: 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. For a patient with suspected pulmonary tuberculosis, which precaution is required?
 - A. Contact precautions with shoe covers
 - B. Droplet precautions using gloves only
 - C. Protective isolation for neutropenia
 - D. Airborne precautions with appropriate respirator

2. Which transfer device is most appropriate for moving a non-weight-bearing patient laterally?
 - A. A cane held by the radiographer
 - B. A friction-reducing transfer board or sheet
 - C. A gait belt used for walking
 - D. A stool placed beside the table

3. What should the radiographer do after contrast extravasation is recognized?
 - A. Stop the injection and follow the facility protocol
 - B. Increase pressure to complete the dose
 - C. Massage the site vigorously without assessment
 - D. Remove documentation from the record

4. Which action best protects patient confidentiality?

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

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

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

6. Which route delivers medication directly into a vein?

- A. Intravenous administration
- B. Oral administration
- C. Topical administration
- D. Subcutaneous administration

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

- A. Choose a procedure without consultation
- B. Clarify the order before exposing the patient
- C. Alter the diagnosis to fit the study
- D. Perform every possible projection

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

- 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

9. Before beginning an examination, which action best confirms the correct patient?

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

10. A competent adult refuses a radiographic examination after receiving an explanation. What should the radiographer do?

- A. Proceed because the order is signed
- B. Ask security to restrain the patient
- C. Respect the refusal and notify the provider
- D. Obtain consent from another patient

11. Which communication method is appropriate for a patient with limited English proficiency?

- A. Rely on a young family member
- B. Use a qualified medical interpreter
- C. Speak louder using medical jargon
- D. Skip the procedural explanation

12. Which action is part of medical aseptic technique?

- A. Reuse gloves between similar patients
- B. Place clean supplies on a soiled surface

- C. Recap every contaminated needle
- D. Perform hand hygiene before and after contact

13. 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

14. 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

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

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

16. During a routine examination, for a patient with suspected pulmonary tuberculosis, which precaution is required?

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

17. During a routine examination, 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 friction-reducing transfer board or sheet
- D. A stool placed beside the table

18. During a routine examination, what should the radiographer do after contrast extravasation is recognized?

- A. Stop the injection and follow the facility protocol
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- A. Review cases in a public elevator
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- D. Discuss information only with involved personnel

20. During a routine examination, a patient begins having a generalized seizure on the imaging table. What is the priority?

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

21. During a routine examination, which route delivers medication directly into a vein?

- A. Oral administration
- B. Topical administration
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- A. Twist while lifting from the waist
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- C. Pull suddenly using one arm
- D. Keep the load close and use the legs

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- A. Rely on a young family member
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- A. Perform hand hygiene before and after contact
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- A. Contact precautions with shoe covers
- B. Droplet precautions using gloves only
- C. Airborne precautions with appropriate respirator
- D. Protective isolation for neutropenia

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

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

33. 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

34. What is the purpose of collimation?

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

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

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

36. What happens to wavelength when photon frequency increases?

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

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

- A. Characteristic production only

- B. Bremsstrahlung production
- C. Coherent scattering
- D. Pair production

38. Which action most directly reduces repeat exposures?

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

39. 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 fixed barrier attenuating scatter radiation
- D. A system for enlarging the image

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

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

41. 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. Four times the original intensity

D. One fourth of the original intensity

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

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

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

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

44. What is the primary purpose of added filtration?

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

45. Which effect is classified as stochastic?

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

46. Which cell population is generally most radiosensitive?

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

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

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

48. 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. Lean over the patient during exposure
- D. Stand as far from the patient as practical

49. During a routine examination, what is the purpose of collimation?

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

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

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

51. During a routine examination, what happens to wavelength when photon frequency increases?

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

52. During a routine examination, which target interaction produces a continuous spectrum of x-ray energies?

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

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

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

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

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

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

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

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

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

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

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, 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

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- A. Sievert
- B. Coulomb per kilogram

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- 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

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- B. Compton interaction
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73. In an imaging department scenario, which exposure factor primarily controls x-ray beam quantity?

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

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- D. Radiation-induced cancer

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

77. While preparing a patient, what is the SI unit of absorbed dose?

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

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 artifact can result from incorrect histogram analysis?

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

80. What does detective quantum efficiency describe?

- A. How rapidly the tube rotor spins
- B. How efficiently a detector preserves signal-to-noise information
- C. How strongly a grid absorbs primary radiation
- D. How long the patient holds breath

81. Which receptor system uses a photostimulable phosphor plate?

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

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

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

83. Which factor primarily controls radiographic contrast in displayed digital images after acquisition?

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

D. Rotor speed alone

84. 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

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

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

86. Which change most directly reduces geometric magnification?

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

87. 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

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

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

89. 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

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. 2 mm
- D. 0.2 mm

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

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

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

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

93. During a routine examination, what is the purpose of PACS?

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

94. During a routine examination, which artifact can result from incorrect histogram analysis?

- A. True anatomical fracture
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- A. How efficiently a detector preserves signal-to-noise information
- B. How rapidly the tube rotor spins
- C. How strongly a grid absorbs primary radiation
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96. During a routine examination, which receptor system uses a photostimulable phosphor plate?

- A. Direct flat-panel radiography
- B. Computed radiography
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- A. Provide feedback about detector exposure
- B. Prove the patient received no radiation
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- A. Monitor luminance test
- B. Spatial frequency test
- C. Beam-restriction congruence test
- D. Dosimeter exchange test

101. 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

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

- A. Increase object motion
- B. Increase object-to-image distance
- C. Use a smaller focal spot
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103. During a routine examination, what is the likely result of insufficient receptor exposure in digital radiography?

- A. Reduced geometric distortion
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104. During a routine examination, what is the function of an automatic exposure control system?

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

105. During a routine examination, which digital imaging term describes the range of exposures a detector can record?

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

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109. In an imaging department scenario, which artifact can result from incorrect histogram analysis?

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

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

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

111. In an imaging department scenario, which receptor system uses a photostimulable phosphor plate?

- A. Direct flat-panel radiography
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112. In an imaging department scenario, what is the purpose of flat-field calibration?

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

113. In an imaging department scenario, which factor primarily controls radiographic contrast in displayed digital images after acquisition?

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

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- B. Increase object-to-image distance
- C. Use a larger focal spot
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- D. Measure patient blood pressure

124. While preparing a patient, which artifact can result from incorrect histogram analysis?

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

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

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

126. While preparing a patient, which receptor system uses a photostimulable phosphor plate?

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

128. While preparing a patient, which factor primarily controls radiographic contrast in displayed digital images after acquisition?

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

129. 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

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

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

131. 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

132. 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

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

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

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

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

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

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

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

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

137. 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

138. 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

139. 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

140. Which projection best demonstrates the patellofemoral joint space?

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

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

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

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

143. 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

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

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

145. 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

146. 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

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

148. 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

149. 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

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

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

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

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

152. During a routine examination, 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

153. During a routine examination, 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

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

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

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

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

156. 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

157. 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. Internally rotate both legs 15 to 20 degrees
- C. Flex both hips to 90 degrees
- D. Cross both ankles tightly

158. During a routine examination, 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

159. During a routine examination, 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

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

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

161. 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

162. 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

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

- A. It magnifies the lungs
- B. It closes the costophrenic angles

- C. It reduces cardiac magnification
- D. It increases object-to-image distance

164. During a routine examination, 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

165. 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

166. During a routine examination, 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

167. During a routine examination, 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. Lateral swimmer position

D. Posterior oblique position

168. During a routine examination, 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

169. 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. AP axial clavicle projection
- D. Fuchs or Judd projection

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

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

171. 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

172. 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

173. In an imaging department scenario, 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

174. 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. Lateral humerus with extension
- D. AP oblique elbow with lateral rotation

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

- A. AP internal rotation only
- B. AP oblique Grashey projection
- C. Tangential intertubercular groove

D. PA axial clavicle projection

176. In an imaging department scenario, which projection is useful for evaluating anterior or posterior shoulder dislocation?

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

177. In an imaging department scenario, for an AP pelvis, how are the legs positioned when trauma is not suspected?

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

178. In an imaging department scenario, 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

179. 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

180. 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

181. In an imaging department scenario, 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

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- 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

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- A. It magnifies the lungs
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- C. It closes the costophrenic angles
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- A. Suspend after the second full inspiration
- B. Suspend after forced expiration
- C. Breathe shallowly throughout
- D. Perform repeated Valsalva maneuvers

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

186. 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 level of the iliac crests
- C. At the xiphoid process
- D. At the greater trochanters

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- C. Posterior oblique position
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- 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

189. 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

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

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

191. While preparing a patient, 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

192. While preparing a patient, 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

193. While preparing a patient, 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

194. While preparing a patient, 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

195. While preparing a patient, which shoulder projection demonstrates the glenohumeral joint space open?

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

D. AP oblique Grashey projection

196. While preparing a patient, which projection is useful for evaluating anterior or posterior shoulder dislocation?

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

197. While preparing a patient, for an AP pelvis, how are the legs positioned when trauma is not suspected?

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

198. While preparing a patient, which projection is used for a trauma patient with suspected hip fracture?

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

199. While preparing a patient, which knee projection best demonstrates the intercondylar fossa?

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

D. AP axial clavicle projection

200. While preparing a patient, which projection best demonstrates the patellofemoral joint space?

A. AP femur projection

B. PA hand projection

C. Tangential patella projection

D. Lateral chest projection

Practice Exam 7: Answer Key and Explanations

1. D — 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.

2. B — 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.

3. A — 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.

4. C — 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.

5. 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.

6. 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.

7. B — 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.

8. 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.

9. A — 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.

10. C — 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.

11. B — 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.

12. D — 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.

13. 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.

14. 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.

15. A — 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.

16. C — 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.

17. C — 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.

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21. C — 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.

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24. A — 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.

25. D — 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.

26. C — 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.

27. 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.

28. 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.

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31. C — 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.

32. B — 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. 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.

34. B — 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.

35. 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.

36. 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.

37. 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.

38. D — 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.

39. C — 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.

40. A — 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 — 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.

42. 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.

43. 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.

44. B — 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.

45. 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.

46. A — 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.

47. C — 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.

48. D — 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.

49. A — 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.

50. C — 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. B — 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.

52. 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.

53. D — 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.

54. C — 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.

55. B — 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.

56. 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.

57. D — 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.

58. 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.

59. B — 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.

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. 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.

62. C — 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.

63. D — 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.

64. A — 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.

65. 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.

66. A — 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.

67. C — 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.

68. D — 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.

69. 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.

70. 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.

71. 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.

72. 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.

73. D — 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.

74. 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.

75. D — 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.

76. A — 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.

77. 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.

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. 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.

80. 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.

81. 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.

82. B — 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.

83. 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.

84. 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.

85. 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.

86. D — 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.

87. 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.

88. A — 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.

89. 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.

90. D — 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. 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.

92. B — 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.

93. D — 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.

94. 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.

95. 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.

96. 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.

97. B — 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.

98. 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.

99. A — 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.

100. 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.

101. 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.

102. 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.

103. D — 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.

104. 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.

105. A — 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.

106. B — 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.

107. 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.

108. D — 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.

109. A — 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.

110. C — 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 — 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.

112. 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.

113. A — 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.

114. 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.

115. 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.

116. D — 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.

117. 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.

118. 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.

119. 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.

120. 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.

121. B — 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.

122. 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.

123. 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.

124. A — 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.

125. D — 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. 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.

127. 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.

128. A — 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.

129. 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.

130. B — 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.

131. 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.

132. 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.

133. D — 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.

134. B — 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.

135. C — 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.

136. A — 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.

137. 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.

138. 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.

139. 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.

140. C — 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.

141. B — 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.

142. D — 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.

143. 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.

144. C — 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.

145. 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.

146. 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.

147. D — 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.

148. 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.

149. 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.

150. C — 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.

151. D — 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.

152. 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.

153. 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.

154. A — 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.

155. D — 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.

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157. B — 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.

158. 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.

159. 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

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

160. C — 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.

161. 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.

162. 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.

163. C — 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.

164. 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.

165. 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.

166. B — 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.

167. D — 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.

168. 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.

169. 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.

170. C — 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.

171. 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.

172. 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.

173. 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.

174. 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.

175. B — 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.

176. 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.

177. A — 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.

178. 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.

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

180. C — 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.

181. 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.

182. 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.

183. 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.

184. 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.

185. A — 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.

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187. 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.

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196. A — 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.

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