Rad Science Registry Review 1 Summer 2026

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. An automatic exposure controlled (AEC) unit is calibrated for 400 speed image receptor (Medium). Which of the following is likely to occur if a 200 speed image receptor (low) is mistakenly used during the imaging procedure?
   a. The radiographic images will appear to be underexposed
   b. The AEC unit will terminate the exposure before the desired mAs value is obtained
   c. The AEC unit will extend the exposure until the desired mAs is obtained
   d. The radiographic image will appear to be overexposed

2. How much mAs is produced when the mA is 500 and the exposure time is 400 ms?
   a. 20 mAs.
   b. 200 mAs.
   c. 2,000 mAs.
   d. 20,000 mAs.

3. Which changes will NOT affect contrast in a digital radiograph?
   1. mAs
   2. kVp
   3. Focal spot size (FSS)

   a. 1only
   b. 1and 2 only
   c. 1 and 3 only
   d. 1,2,and 3

4. Which of the following are forms of electromagnetic radiation?
   1. Microwaves
   2. Visible light
   3. X-rays
   4. Gamma rays
   5. Ultraviolet radiation
   a. 1, 2, and 3 only
   b. 2, 3, and 4 only
   c. 3, 4, and 5 only
   d. All the options

5. Given the three sets of mAs calculations that follow, all three should yield the same degree of EI.
   Exposure 1: 200 mA × 0.05 ms
   Exposure 2: 100 mA × 0.10 ms
   Exposure 3: 400 mA × 0.025 ms
   This is known as
   a. the inverse square law.
   b. the kVp/mAs ratio.
   c. mA/mAs proportionality.
   d. mAs reciprocity.

6. The most important exposure setting a radiographer can adjust to control penetrability of the beam is the:
   a. Kilovoltage peak setting
   b. Milliamperage-seconds setting
   c. Exposure timer setting
   d. Source-to-image receptor distance

7. Lowering kVp _____ patient dose and _____ image contrast.

a. lowers, decreases
b. increases, decreases
c. lowers, increases
d. increases, increases

8. Which of the following DIs is associated with the image receptor being UNDEREXPOSED 50% (1/2 of desired mAs)?
   a. +6
   b. +3
   c. +2
   d. -3
   e. -6

9. An exposure of 300 mA, 80 milliseconds and 87 kVp is employed to produce an acceptable radiographic image at a 200 centimeter source-to-image receptor distance. What new mAs setting could be employed to produce a similar EI at a 100 centimeter source-to-image receptor distance?
   a. 24 mAs
   b. 12 mAs
   c. 6 mAs
   d. 3 mAs

10. Which statements correctly describe components of the cathode assembly (--)?
    1. Contains one or two filaments
    2. Includes the focusing cup
    3. Contains the rotating anode
    4. Produces the electron space charge
    a. 1 and 2 only
    b. 2 and 3 only
    c. 1, 2, and 4 only
    d. 1 ,2, 3, and 4

11. A radiographic image of the chest is obtained in the PA projection at a 180 centimeters source-to-image receptor distance. This longer than usual source-to-image receptor distance is used to:
    a. Reduce respiratory motion of the lungs
    b. Decrease the magnification of the heart
    c. Project the clavicles above the lungs
    d. Increase the size distortion of the ribs

12. Which factors will increase radiographic contrast in digital imaging?
    1. Lower kVp
    2. Narrow WW
    3. Increased OID
    4. Increased grid ratio
    a. 1, 2 and 3 only
    b. 1,2, and 4 only
    c. 2, 3, and 4 only
    d. 1 ,2, 3, and 4

13. _____ SID is typically used to image the chest so that the heart is seen with minimal magnification.
    a. 30 inches
    b. 40 inches
    c. 72 inches
    d. 90 inches

14. 100 kVp should be changed to _____ kVp to INCREASE the exposure to the IR by a factor of 2.
    a. 50
    b. 85
    c. 115
    d. none of the above

15. When there is a significant amount of scatter radiation reaching the AEC detector, the exposure time will
    a. be shorter than needed (premature exposure termination)
    b. be appropriate
    c. be longer than needed
    d. will not be affected

16. The window level controls of a direct capture digital radiographic display DR are provided to:
    a. Reduce the spatial resolution of the image
    b. Reduce the radiation exposure to the patient
    c. Chage the brightness of the image
    d. Control the noise level within the image
    e. Chage the contrast of the image

17. Ionization chamber AEC detectors are entrance-type devices because the x-rays must
    a. enter the detector after passing through the IR
    b. enter the detector before entering the patient
    c. enter the detector before getting to the IR
    d. all of the above

18. A radiographic image of the abdomen is obtained on a patient that has ascites (fluid in the abdominal cavity) that appears to have an insufficient EI. This was most likely caused by the:
    a. Excessive penetration of the x-rays through the abdominal fuid
    b. Excessive production scattered by the abdominal fluid
    c. Insufficient penetration of the x-rays through the abdominal fluid
    d. Inability of the image receptor to respond to high energy x-rays

19. Pre-established guidelines used by the radiographer to select standardized manual or AEC exposure factors for each type of radiographic examination are called
    a. anatomical programming
    b. exposure technique charts
    c. mA reciprocity
    d. quantum noise detectors

20. The production of x-radiation that occurs in an x-ray tube requires the movement of negatively charged particles traveling from one side of the tube to the other. This movement of charges must occur in
    a. an aqueous medium.
    b. a vacuum.
    c. a tungsten gas environment.
    d. any condition that exists inside the x-ray tube, including a nonvacuum.

21. When using a digital imaging system, changing from 8 × 10 collimation to 14 × 17 collimation would result in _____ brightness and _____ contrast.
    a. No change in; no change in
    b. Decreased; increased
    c. No change in; decreased
    d. Decreased; decreased

22. This phenomenon is referred to as maintaining consistent Exposure Index (EI) across three sets of radiographic techniques, where:

    Exposure 1: 20 mAs and 80 kVp
    Exposure 2: 10 mAs and 92 kVp

Exposure 3: 5 mAs and 106 kVp

The goal is to ensure uniform EI values despite variations in mAs and kVp settings. This phenomenon is referred to as:

a. the inverse square law.
b. the kVp/mAs ratio.
c. mA/mAs proportionality.
d. mAs reciprocity.
e. 15% rule

23. Which of the following accessory devices must be standardized in order to obtain the desired SNR (EI) if an automatic exposure controlled (AEC) unit is to function properly?
    a. The correct speed of the image receptor
    b. The correct focal spot size
    c. The correct thickness of the patient
    d. The correct physical density of the patient

24. A technologist used 80 mAs for a chest radiograph and obtained an Exposure Index (EI) of 1600. The Target Exposure Index (TEI) for this system is 400.What new mAs should the technologist use to reach the target EI, assuming all other factors remain constant?
    a. 10 mAs
    b. 20 mAs
    c. 40 mAs
    d. 80 mAs

25. Which statements describe the effect of increasing kVp in a diagnostic beam?
    1. Increases photon energy (quality)
    2. Increases photon quantity (intensity)
    3. Produces a more penetrating beam
    4. Increases radiographic contrast
    a. 1and 2 only
    b. 2 and 3 only
    c. 1,2,and 3 only
    d. 1, 2, 3 and 4

26. The reason to have a back-up time is to
    a. protect the patient from excessive exposure
    b. make sure the right mAs is used
    c. keep the tube from excessive heat-loading
    d. A and C

27. If the intensity of radiation at 72 inches is 480 mR, what is the intensity if the SID is DECREASED to 36 inches?
    a. 1920 mR.
    b. 960 mR.
    c. 240 mR.
    d. 120 mR.
    e. 60 mR

28. A digital radiograph displays a Deviation Index (DI) of –2.8. This value indicates that the exposure received by the detector is approximately:
    a. 75%above the target exposure
    b. About 25% above the target exposure
    c. About 50% of the target exposure
    d. About twice the target exposure

29. The purpose of rotating the x-ray tube target is to:
    a. create a space charge
    b. speed up the electrons in the electron stream
    c. remove long-wavelength photons from the x-ray beam

d. focus the electron stream on a small target area
e. increase the heat capacity of the anode

30. If the SID is decreased while all other factors remain constant, what happens to beam intensity at the image receptor?
    a. It increases because the beam is less divergent (spread put)
    b. It decreases because the photons lose energy (attenuation)
    c. It remains unchanged because SID affects only magnification
    d. It decreases due to added filtration

31. Which of the following controlling factors will most affect radiographic resolution?
    a. kV
    b. mAs
    c. Filtration
    d. Focal spot size

32. Which of the following results in all-directional scatter?
    a. Bremsstrahlung
    b. Compton interaction
    c. Photoelectric interaction
    d. All of the above

33. All of the following statements accurately compare x-rays and gamma rays EXCEPT:
    a. They both travel with the speed of light
    b. Gamma rays originate from the electron orbital void
    c. X-rays are less penetrating than gamma rays
    d. All of the above

34. The maximum length of time that an exposure lasts when using AEC is the
    a. mAs readout
    b. back-up time
    c. minimum response time
    d. density controls

35. Which of the following factors has the greatest effect on the brightness of the digital image?
    a. kV
    b. mAs
    c. WW
    d. Matrix size
    e. WL

36. When performing a lateral thoracic spine, a technologist intentionally uses a 3–4 second exposure time. This technique is used primarily to:
    a. Improve visualization of intervertebral disk spaces
    b. Blur the ribs and pulmonary markings to better see the thoracic vertebrae
    c. Reduce scatter radiation from the chest
    d. Decrease the need for a grid

37. If the intensity of radiation at 36 inches is 480 mR, what is the intensity if the SID is increased to 72 inches?
    a. 360 mR.
    b. 240 mR.
    c. 120 mR.
    d. 60 mR.

38. Which change affects image contrast without changing the amount of radiation reaching the detector?
    a. Increasing mAs
    b. Decreasing kVp
    c. Adjusting window width (WW)
    d. Reducing exposure time

39. The invisible, unprocessed data on an image detector immediately after x-ray exposure form the _____ image.
    a. remnant
    b. manifest
    c. primary
    d. latent

40. A technologist notices increased blur on an image of a restless patient. Which action would best improve image sharpness?
    a. Increase kVp
    b. Increase exposure time
    c. Use a smaller focal spot
    d. Use higher mA with shorter time
    e. use orthostatic breathing technique

41. The primary disadvantage to the stationary anode is that it
    a. is too big
    b. heats up too quickly during x-ray production
    c. uses tungsten
    d. all of the above

42. The principal difference between an automatic exposure and a manual technique, is the method by which:
    a. The exposure is started
    b. The kilovoltage is selected
    c. The exposure is terminated
    d. The current is expressed on the filament

43. Electron interactions at the inner-shell of the target atoms produce _____ radiation.
    a. gamma
    b. Bremsstrahlung
    c. characteristic
    d. Compton
    e. Coherent

44. The efficiency of x-ray production increases as _____ increases.
    a. Target atomic number (Z)
    b. kVp
    c. time
    d. mA
    e. both A and B

45. A digital radiograph appears noisy (quantum noise), but anatomy is visible and contrast is acceptable. Which technical factor most likely caused this appearance?
    a. Low mAs
    b. Excessive kVp
    c. Incorrect window level
    d. Short SID

46. Diagnostic x-rays are positioned on the electromagnetic spectrum between:
    a. Infrared and visible light
    b. Microwaves and radio waves
    c. Ultraviolet radiation and gamma rays
    d. Visible light and infrared

47. A new focused radiographic grid has been installed in the table Bucky of a radiographic unit. The first test image taken shows a drastic loss of signal on the left and right sides of the imaging system. The most likely cause is:
    a. An excessive mAs settig
    b. An upside down cassette
    c. An upside down grid
    d. A tube that is angled along the table

48. An exam uses 100 mA at 0.50 s. Due to motion, you want to reduce exposure time to 0.10 s, while keeping the same mAs. What mA should be used?
    a. 300 mA
    b. 400 mA
    c. 500 mA
    d. 1000 mA

49. During an AP scapula examination, the ribs and pulmonary markings are sharply visible and are obscuring the scapula. Which exposure time would be most appropriate to improve visualization of the scapula on a repeat image?
    a. 0.05 - 0.1 sec
    b. 0.3 - 0.5 sec
    c. 3 -4 s
    d. 100-500 ms

50. The lower radiographic contrast that is seen on a radiographic image obtained following an increase in the size of the exposure field is primarily related to the:
    a. Increased amount of scattered radiation produced in the tissue
    b. Increased quality of the x-rays in the beam
    c. Decreased penetration of the photons in larger fields
    d. Increased absorption of the photons by peripheral tissues

51. An exposure is made at 400 mA and 0.10 s. The radiographer wants to use 0.20 s but keep the same mAs. What new mA should be selected?
    a. 100 mA
    b. 200 mA
    c. 300 mA
    d. 800 mA

52. The energy of a characteristic photon depends on:
    a. The difference between two electron shell binding energies
    b. How close the electron comes to the nucleus
    c. The total number of electrons striking the anode
    d. The exposure time selected

53. Milliampere-seconds is the product of mA and time. Any combination of mA and time producing equivalent mAs values should produce equivalent exposures . This process is known as _____.
    a. Inverse square law
    b. 15% rule
    c. mAs reciprocity.
    d. 30% rule
    e. Direct square law

54. In a modern x-ray tube, the positively-charged electrode that serves as the target for the electron stream is called the:
    a. Primary filament of the cathode
    b. Input phosphor of the signal plate
    c. Focal tract of the rotating anode
    d. Output phosphor of the photocathode

55. Anatomically programmed radiography (APR) is a system in which the radiographer selects
    a. AEC settings
    b. mAs and kVp settings
    c. preset settings based on the part being imaged
    d. preset settings based on the size of the patient

56. With digital imaging using AEC, if an AP thoracic spine is imaged using 100 kVp instead of 80 kVp, the brightness in the area of interest is _____ and the contrast is _____. (Assume all other factors are appropriate.)
    a. darker; higher
    b. unchanged; higher
    c. lighter; lower

d. unchanged; lower

57. Kilovoltage peak (kVp) should be chosen:
    a. to provide the least contrast possible.
    b. to provide penetration.
    c. for the type and amount of contrast desired.
    d. for the type of imaging plate phosphor.

58. Which adjustment will result in the greatest increase in beam intensity (quantity) at the image receptor?
    a. Doubling the mA
    b. Doubling the SID
    c. Doubling the OID
    d. Reducing kVp by 15%

59. When a long object-to-image receptor distance cannot be avoided, a reduction in the amount of size distortion appearing in the radiographic image can be accomplished by:
    a. The use of a larger focal spot size
    b. A reduction in the amount the tube is angled
    c. An increase in the source-to-image receptor distance
    d. A radiation in the size of the collimator opening

60. If a 12:1 ratio grid is used in a procedure that previously used no grid and 4 mAs, how much mAs should be used with the grid?
    a. 0.33 mAs.
    b. 1.25 mAs.
    c. 20 mAs.
    d. 48 mAs.

61. Deciding to use a grid for a radiographic examination requires use of
    a. increased SID
    b. decreased SID
    c. increased mAs
    d. decreased mAs

62. The primary purpose of the focusing cup n the cathode assembly is to:
    a. Narrow and direct the electron stream toward the focal spot
    b. Increase x-ray energy
    c. Produce characteristic radiation
    d. Control rotor speed

63. A dual focus tube has two:
    a. anodes.
    b. filaments.
    c. rotors.
    d. stators.

64. The factors that affect x-ray quantity are:
    1. kilovoltage.
    2. mAs
    3. mA
    a. 1 and 2
    b. 1 and 3
    c. 2 and 3
    d. 1, 2, and 3

65. With digital imaging using AEC, if an AP thoracic spine is imaged with the C cell , the brightness in the area of interest is _____ and the exposure time is _____. (Assume all other factors are appropriate.)
    a. light; long
    b. light; short
    c. appropriate; appropriate
    d. appropriate; long

66. Place the following in order for the formation of a polyenergetic diagnostic x-ray beam:

    1. *Filament emits a cloud of electrons (space charge)*
    2. *Electrons accelerate across the tube at high kVp*
    3. *Both Bremsstrahlung and characteristic photons are produced*
    4. *A polyenergetic x-ray beam exits the tube through the window*

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

67. With digital imaging using AEC, if an AP Right (R) shoulder is imaged with the C cell , the brightness in the area of interest is _____ and the exposure time is _____. (Assume all other factors are appropriate.)
    a. light; long
    b. light; short
    c. appropriate; appropriate
    d. appropriate; long

68. If the mA is 600 and exposure time is 10 ms, how can the mAs be doubled?
    a. increase the mA to 1200
    b. increase the time to 20 ms
    c. increase the mAs to 12 mAs
    d. all of the above

69. Scatter radiation increases as _____ increases.
    a. photoelectric absorption
    b. field size
    c. filtration
    d. contrast

70. Which of the following is the most critical aspect of successfully performing an examination using AEC?
    a. Centering the anatomy of interest over the detector
    b. Using the right mA
    c. Using the right kVp
    d. Setting the best back-up time
    e. Using positive density setting (+3)

71. These can be adjusted to increase or decrease the amount of radiation needed to terminate the exposure using AEC
    a. mAs readout
    b. Back-up time
    c. Minimum response time
    d. Density controls

72. Patient dose increases when:

1. Changing from a higher to a lower grid ratio
2. Changing from a lower to a higher grid ratio
3. Using Air-Gap technique

a. 1 & 2 only
b. 1 & 3 only
c. 2 & 3 only
d. 1, 2, & 3

73. Which change will produce the greatest increase in beam quality while also increasing beam quantity?
a. Increasing mA
b. Increasing exposure time
c. Increasing kVp
d. Increasing SID

74. Changing from an 12:1 grid to a 6:1 grid, along with making the appropriate adjustments, will result in:
1. Decreased patient dose
2. An image with increased contrast
3. Using less mAs
a. 1 & 2 only
b. 1 & 3 only
c. 2 & 3 only
d. 1, 2, & 3

75. Which of the following devices can be used to reduce the amount of scattered radiation produced in a patient measuring 36 centimeters?
a. A stationary anode x-ray tube
b. A radiographic grid
c. A smaller focal spot
d. A higher speed image receptor
e. Copper filter

76. When the radiographer has the opportunity to set the back-up time, it should be approximately _____ of the expected exposure time
a. 50%
b. 150%
c. 350%
d. 600%

77. An exposure requires 64 mAs, and the radiographer selects 400 mA.What exposure time is needed?
a. 0.08 s
b. 0.12 s
c. 0.16 s
d. 0.20 s

78. The cathode:
a. includes a focusing cup
b. provides electrons for x-ray production
c. includes filaments
d. all of the above

79. What mA should be selected to produce 16 mAs using a 0.04 exposure time?
a. 128 mA.
b. 200 mA.
c. 400 mA.
d. 800 mA.

80. A radiograph of the abdomen demonstrates involuntary motion caused by bowel peristalsis (involuntary contractions). Which of the following factors will best eliminate this problem during the repeat exposure?
a. Decrease SID.

b. Turn patient into prone position rather than supine.
c. Use higher kV.
d. Decrease exposure time.

81. A technologist obtained an EI of 200 using 1 mAs. The Target EI is 400.To reach the target on the next exposure, what should the new mAs be?
a. 0.5 mAs
b. 1 mAs
c. 2 mAs
d. 4 mAs

82. Which of the following is not a type of interaction between x-radiation and biologic matter?
a. Compton scattering
b. Bremsstrahlung
c. Photoelectric absorption
d. all of the above

83. Which of the following factors has the greatest negative impact on SNR?
a. Excessive kV
b. Collimation
c. Insufficient mAs
d. Long SID

84. Using a lower mA station during an AEC examination results in
a. reduced patient exposure
b. increased exposure time
c. decreased exposure time
d. A and B

85. Which component directly releases electrons during thermionic emission?
a. Rotor
b. Focusing cup
c. Filament
d. Stator

86. Bremsstrahlung x-rays are produced by _____ at the target.
a. outer shell excitation
b. slowing electrons
c. K-shell interactions
d. L-shell interactions

87. A change in the width of the window of a digital display is most closely related to a change in the:
a. Size distortion in the image
b. Noise level of the image
c. Contrast of the image
d. Digital density or brightness of the image

88. To maintain the same exposure to the IR, if the SID is increased, the mAs must be
a. decreased
b. increased
c. left the same
d. doubled

89. When imaging the abdomen, changing from 10 × 12 collimation to 14 × 17 collimation requires_____ to maintain the SNR.
a. an increase in kVp
b. a decrease in kVp

c. an increase in mAs
d. a decrease in mAs

90. Which of the following exposure factors produces the same amount of remnant radiation as does 20 mAs at 70 kVp?
a. 10 mAs @ 70 kVp.
b. 10 mAs @ 80 kVp.
c. 40 mAs @ 60 kVp.
d. B and C.

91. Which of the following will result in the lowest patient dose?
a. low kVp and high mAs
b. high kVp and low mAs
c. high mAs and short SID
d. low kVp and long exposure time
e. long exposure time and short SID

92. The reduction of noise and quantum mottle in a radiographic image is most easity accomplished through the use of a:
a. Higher mAs value
b. Higher kilovoltage peak value
c. Shorter exposure time value
d. Longer source-to-image receptor distance

93. Phototimer AEC detectors are usually exit-type devices because
a. the x-rays must exit the patient to get to the detectors
b. the x-rays must exit the grid to get to the detectors
c. the x-rays must exit the image receptor to get to the detectors

94. Increasing kVp while keeping mAs constant will:
a. Decrease beam intensity (quantity)
b. Increase beam intensity (quantity)
c. Have no effect on intensity
d. Only affect image contrast

95. A numerical value that is representative of the amount of radiation that strikes the digital image receptor is termed:
a. algorithm.
b. variance.
c. signal-to-noise ratio (SNR).
d. exposure indicator.

96. If the back-up time is set by the equipment, the exposure time should end when the mAs reaches
a. 100
b. 400
c. 600
d. 1000

97. A technologist performs an AP lumbar spine radiograph using a fixed digital radiography (DR) system with automatic exposure control (AEC). The selected technical factors include 85 kVp, 320 mA, use of a grid, a medium-speed image receptor (correct one), and the two outer AEC detectors (A and B). The patient is of average build and properly positioned supine. The density setting is at 0 (neutral). Collimation is adequate, and there are no artifacts or external devices present. What will happen?
a. EI will be higher
b. EI will be lower
c. Patient exposure will be higher
d. Exposure time will be longer

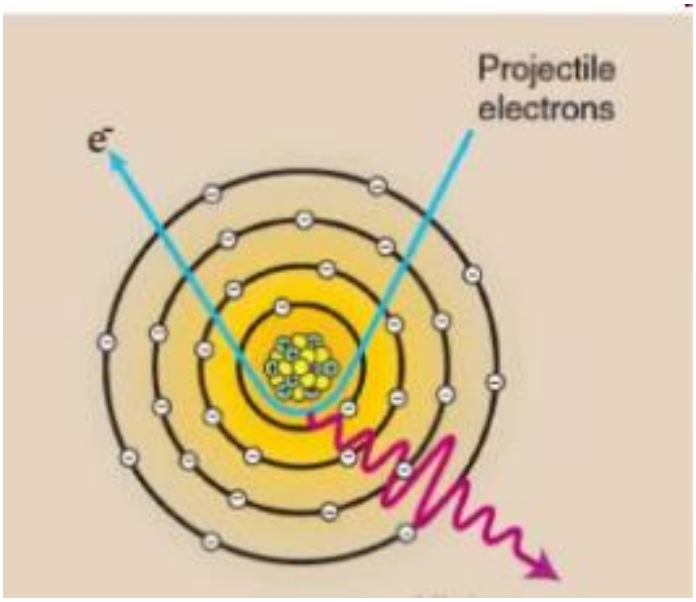
98. All of the following are functions of the tube housing EXCEPT:
a. Preventing leakage radiation

b. Providing electrical insulation
c. Containing oil for heat dissipation
d. Increasing the quantity of Bremsstrahlung radiation

99. With digital imaging using AEC, if an AP thoracic spine is imaged using 110 kVp instead of 80 kVp, the EI _____ and the patient exposure is _____. (Assume all other factors are appropriate.)
a. higher; higher
b. unchanged; higher
c. lower; lower
d. appropriate; higher

100.

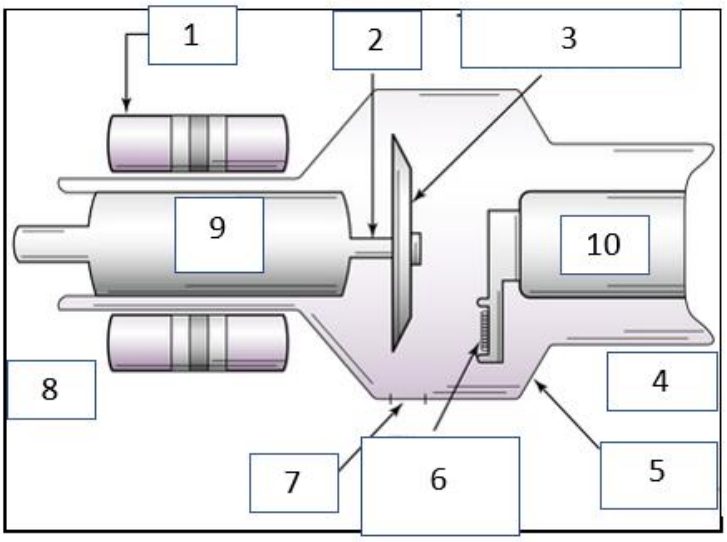
Image 129
Interaction



Pertaining to the image labeled 129, what type of electron interaction in the X-ray tube target is being illustrated?
a. Compton scatterin
b. Photoelectric effect
c. Bremsstrahlung radiation
d. Characteristic radiation

101.

Figure 2
X-ray Tube

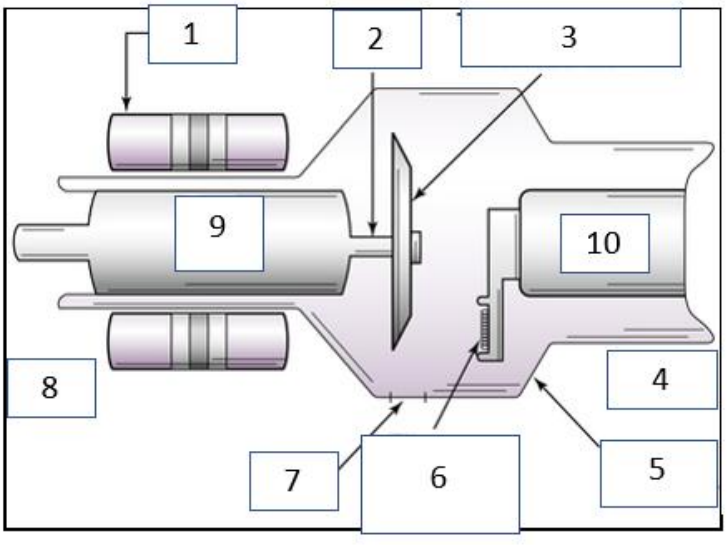


Pertaining to figure 2, which of the following is marked with **# 9**?

a. Focusing cup
b. Anode stem
c. Rotor
d. Target
e. Cathode filament

102.

Figure 2
X-ray Tube

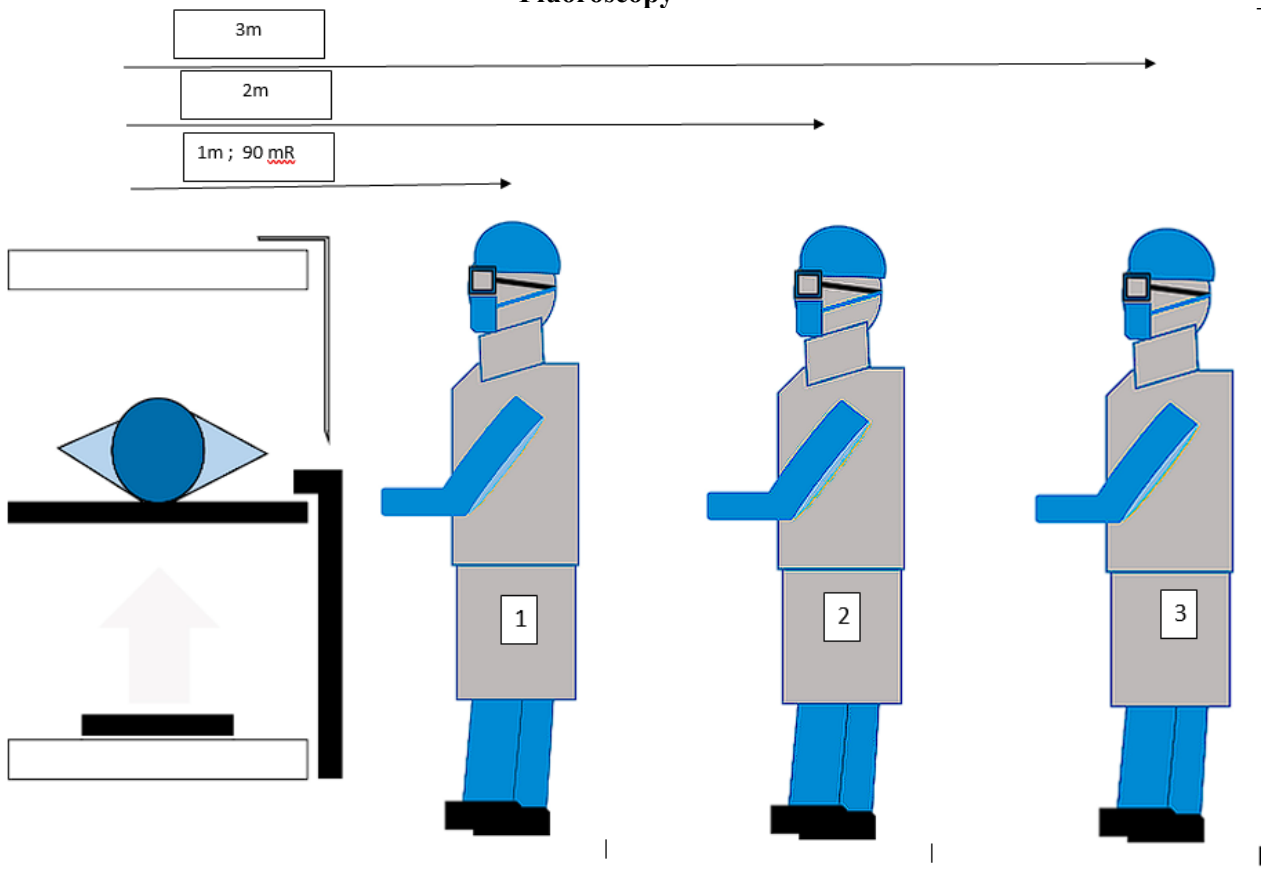


Pertaining to figure 2, which of the following is marked with **# 2**?

a. Focusing cup
b. Anode stem
c. Rotor
d. Target
e. Cathode filament

103.

Figure 23
Fluoroscopy

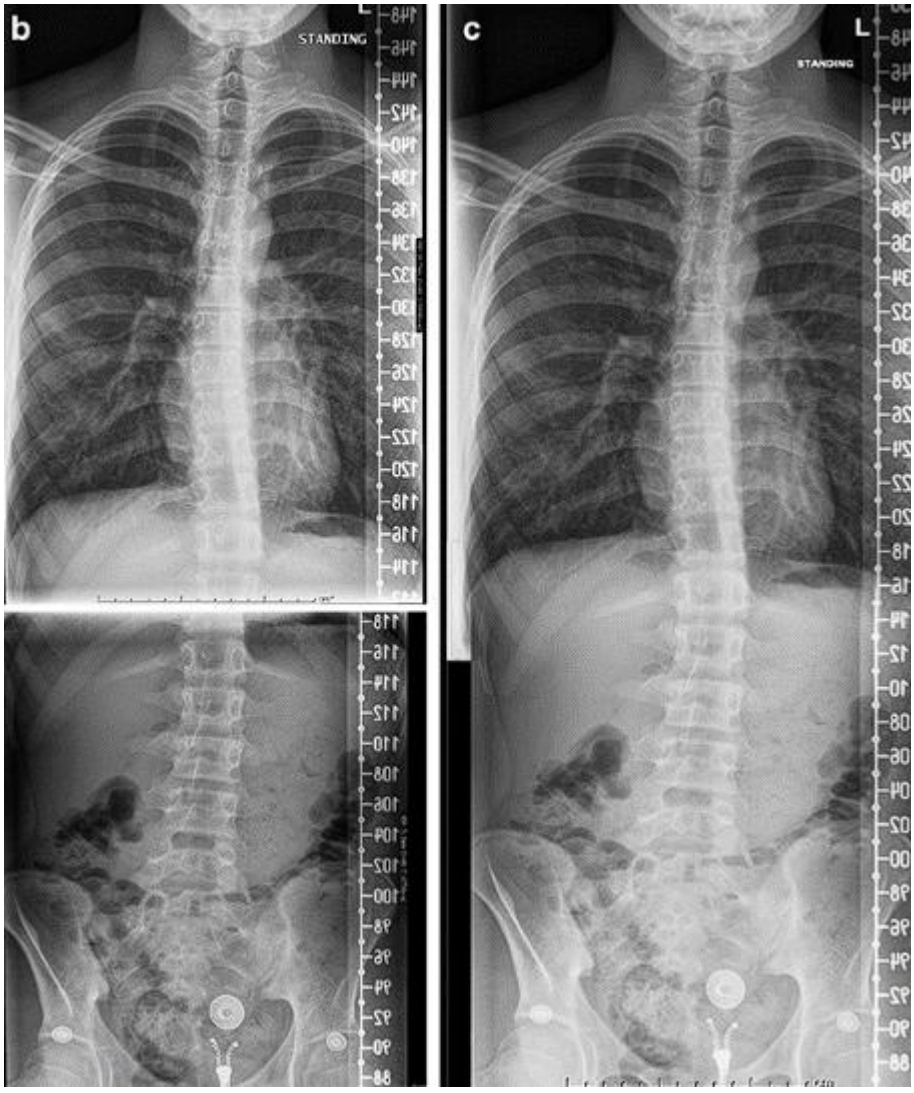


Regarding Figure 23, which illustrates fluoroscoping procedure. What is the level of radiation exposure experienced by radiographer **#3**?

a. 45 mR
b. 360 mR
c. 180 mR
d. 10 mR
e. 810 mR

104.

Figure 3
Postprocessing

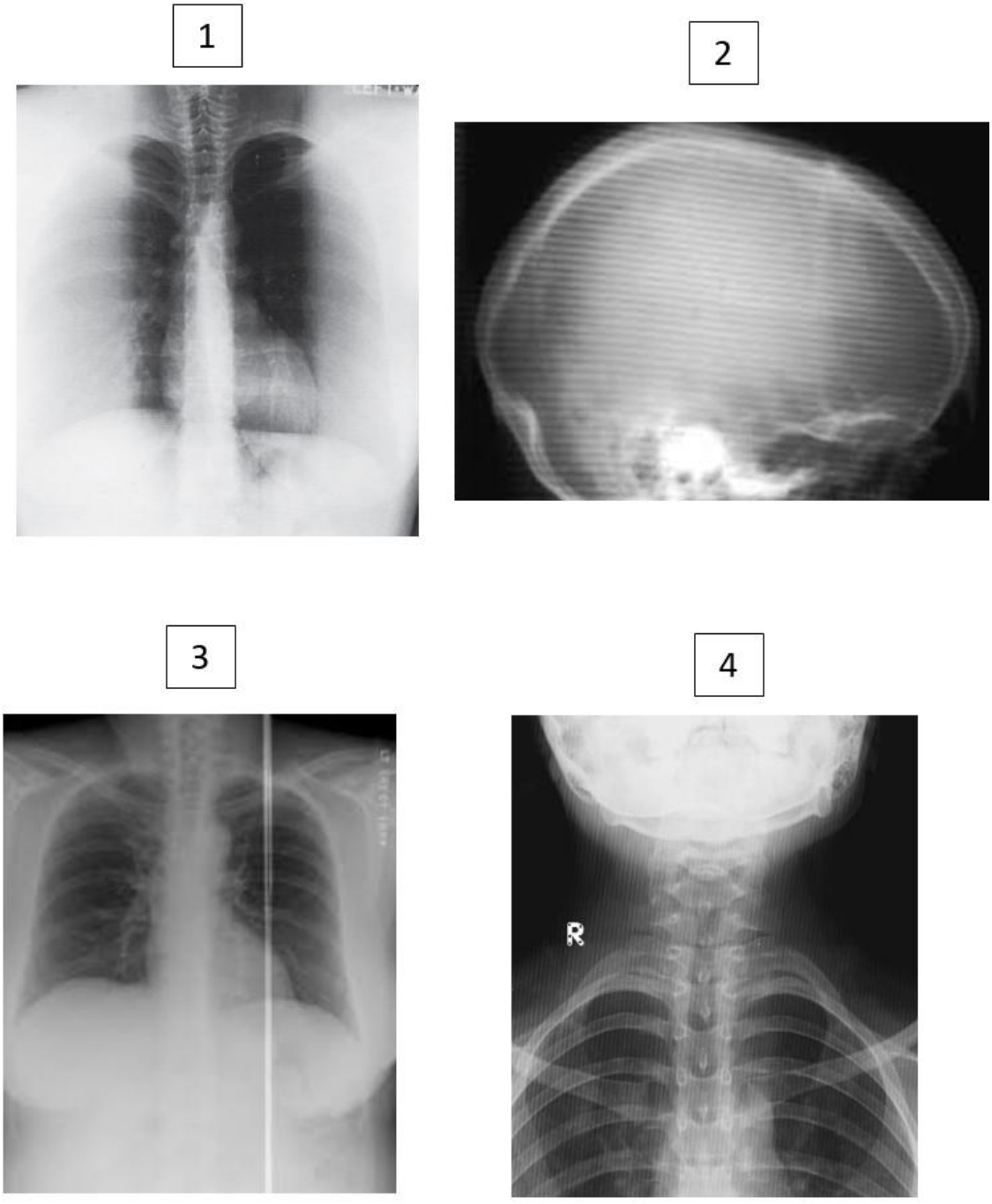


Pertaining to the figure 3, which postprocessing manipulation technique is illustrated in the image?

a. scoliosis integration
b. binning
c. stitching
d. adding
e. synthesizing

105.

Figure 111
Errors and Artifacts

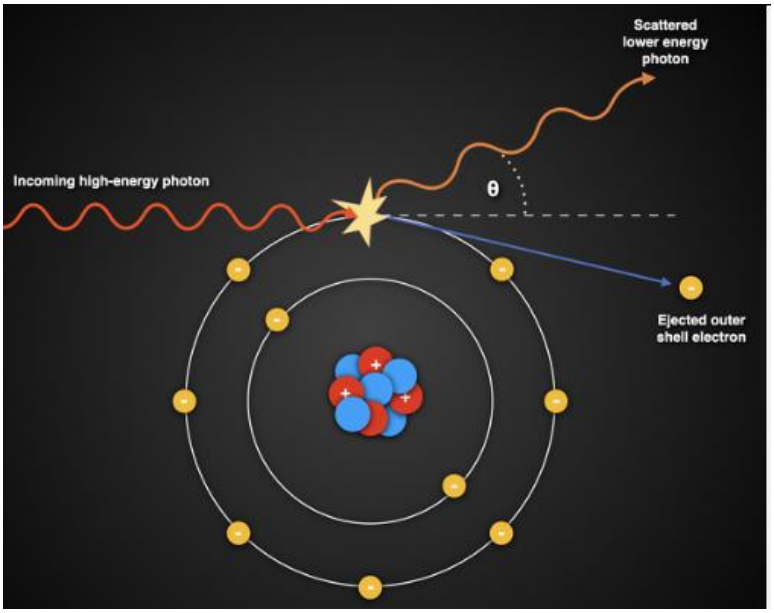


Which image in Figure 111 demonstrates the result of placing a focused grid upside down?

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

106.

Figure 333

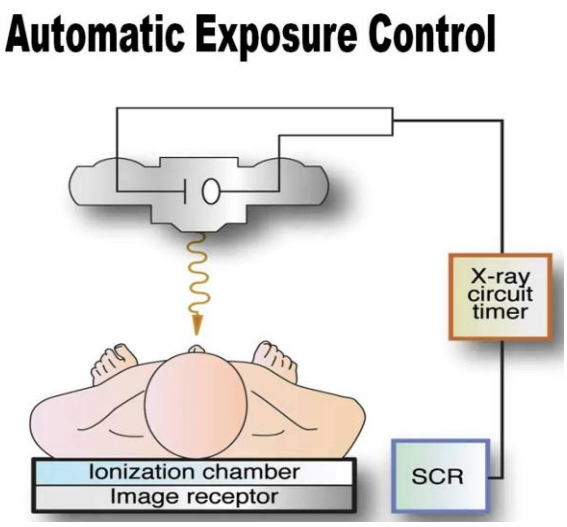


What type of interaction of X-rays with matter is demonstrated in the figure above?

a. Photoelectric Effect
b. Compton Interaction
c. Bremsstrahlung
d. Coherent (Rayleigh) Scattering
e. Photodisintegration

107.

Figure 113



The AEC system illustrated in Figure 113 is referred to as

a. Entry-type system
b. Exit-type system
c. Ballistic system
d. Phototimer system

108.

Figure 166

Lateral T-spine

What technique was used to achieve the appearance of blurred ribs and pulmonary markings in the lateral thoracic spine image?

a. High mA and short exposure time
b. Low mA and long exposure time
c. High kVp and short exposure time
d. Low kVp and long exposure time
e. Short SID and long OID

109.

Figure 6
Artifact

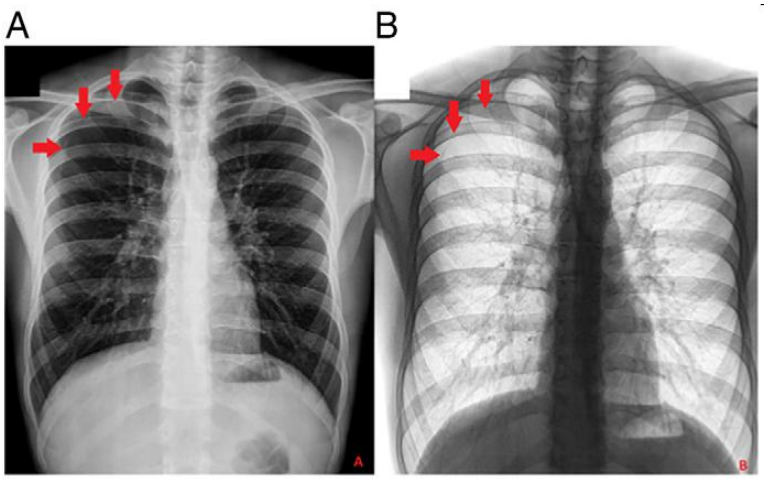
Pertaining to the figure 6 , answer the following question.

The hight brigtness radiographic artifacts seen over the thoraco-lumbar region in this radiograph represents:

a. An arterial stent in the abdominal aorta
b. Post cholesystectomy staples
c. IVC filter
d. a bra clips

110.

Figure 3
Postprocessing



Pertaining to the figure 3, which postprocessing manipulation technique is illustrated in the image?

a. windowing
b. pixel interpolation
c. contrast inversion
d. sharpening
e. synthesizing

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Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1
2. ANS: B
   In that mAs = mA × exposure time (in seconds), 50 × 4 = 200 mAs.

   PTS: 1 REF: 119 OBJ: 4
3. ANS: C PTS: 1
4. ANS: D PTS: 1
5. ANS: D
   Milliampere-seconds is the product of mA and time. Any combination of mA and time producing equivalent mAs values should produce equivalent exposures and therefore densities. This process is known as mAs reciprocity.

   PTS: 1 REF: p. 72
6. ANS: A PTS: 1
7. ANS: D
   Lowering kVp increases patient dose and increases image contrast.

   PTS: 1 DIF: Moderate REF: page 187-188
   OBJ: List three factors that contribute to scatter radiation.
8. ANS: D PTS: 1 REF: Page 100
9. ANS: C PTS: 1
10. ANS: C PTS: 1
11. ANS: B PTS: 1
12. ANS: D PTS: 1
13. ANS: C
    An SID of 72 inches is typically used with chest imaging to reduce magnification. An SID of 90 inches would further reduce magnification, but it is not a standard SID.

    PTS: 1 REF: 127 OBJ: 9
14. ANS: C
    To decrease the exposure to the IR by a factor of 2, the kVp must be reduced by 15%; 15% of 100 is 15, so 100 minus 15 is 85 kVp.

    PTS: 1 REF: 122 OBJ: 8
15. ANS: A
    In that the detector cannot differentiate scatter from transmitted radiation, the excess scatter will cause the exposure to terminate too soon.

    PTS: 1 REF: 194 OBJ: 4
16. ANS: C PTS: 1
17. ANS: C
    The entrance-type detector is positioned immediately in front of the IR.

    PTS: 1 REF: 189 OBJ: 2

18. ANS: C PTS: 1
19. ANS: B
Exposure technique charts are pre-established guidelines used by the radiographer to select standardized manual or AEC exposure factors for each type of radiographic examination.

PTS: 1 REF: 197 OBJ: 12
20. ANS: B
The vacuum removes all of the air so gas molecules will not interfere with the production of x-rays. When the electrons strike the target, x-ray photons are produced; however, less than 1% of this production is actually x-rays; the remaining 99%+ is heat.

PTS: 1 REF: p. 67
21. ANS: C
When using a digital imaging system, changing from 8 × 10 collimation to 14 × 17 collimation would result in no change in brightness (computer will adjust) and decreased contrast (due to increased scatter production).

PTS: 1 OBJ: 2
22. ANS: E
Milliampere-seconds is the product of mA and time. Any combination of mA and time producing equivalent mAs values should produce equivalent exposures and therefore densities. This process is known as mAs reciprocity.

PTS: 1 REF: p. 72
23. ANS: A PTS: 1
24. ANS: B PTS: 1
25. ANS: C PTS: 1
26. ANS: D
The back-up time is a safety mechanism to keep both the patient and the tube from excessive exposures when the AEC is not operating correctly.

PTS: 1 REF: 191 OBJ: 2
27. ANS: A
If the distance is increased by a factor of 2 (doubled), the beam intensity will be one fourth ($1/2^2$) of the original.

PTS: 1 REF: 126 OBJ: 10
28. ANS: C PTS: 1
29. ANS: E PTS: 1
30. ANS: A PTS: 1
31. ANS: D PTS: 1 REF: 42-43
32. ANS: B PTS: 1
33. ANS: D PTS: 1
34. ANS: B
Whether set by the radiographer or inherent in the equipment, the back-up time is the longest time the exposure can go on when using AEC.

PTS: 1 REF: 191 OBJ: 2
35. ANS: E PTS: 1 REF: 48
36. ANS: B PTS: 1
37. ANS: C
If the distance is increased by a factor of 2 (doubled), the beam intensity will be one fourth ($1/2^2$) of the original.

PTS: 1 REF: 126 OBJ: 10

38. ANS: C PTS: 1

39. ANS: D

This invisible image is called the latent image. After the latent image has been processed, a visual image appears. The latent image can be chemical alterations to a film emulsion, or stored electron traps in CR imaging, or atomic disturbances in a DR detector. All are considered latent images.

PTS: 1 REF: p. 69

40. ANS: D PTS: 1

41. ANS: B

Because it does move, heat builds up very quickly with a stationary anode.

PTS: 1 REF: 52 OBJ: 4

42. ANS: C PTS: 1

43. ANS: C

Electron interactions at the inner-shell of the target atoms produce characteristic radiation.

PTS: 1 DIF: Moderate REF: page 125
OBJ: Identify characteristic and bremsstrahlung x-rays.

44. ANS: E

The efficiency of x-ray production increases as kVp increases.

PTS: 1 DIF: Moderate REF: page 125
OBJ: Discuss the interactions between projectile electrons and the x-ray tube target.

45. ANS: A PTS: 1
46. ANS: C PTS: 1
47. ANS: C PTS: 1
48. ANS: C PTS: 1
49. ANS: C PTS: 1
50. ANS: A PTS: 1
51. ANS: B PTS: 1
52. ANS: A PTS: 1
53. ANS: C PTS: 1
54. ANS: C PTS: 1

55. ANS: C

APR presents the radiographer with preset exposure factors based on the anatomy being imaged.

PTS: 1 REF: 194 OBJ: 5

56. ANS: D PTS: 1 REF: 197 OBJ: 9

57. ANS: B PTS: 1 REF: 71
OBJ: Discuss the selection of technical factors for density, contrast, and penetration.

58. ANS: A PTS: 1
59. ANS: C PTS: 1

60. ANS: C

Adding a 12:1 ratio grid requires five times the mAs (based on the grid conversion factor). Adding a grid or increasing grid ratio always requires more mAs.

PTS: 1 REF: 131 OBJ: 13

61. ANS: C
Adding a grid to a procedure, or increasing the grid ratio, requires additional mAs.

PTS: 1 REF: 131 OBJ: 12
62. ANS: A PTS: 1
63. ANS: B PTS: 1
64. ANS: D PTS: 1 REF: Page 78
65. ANS: C
If the centering is 3 inches to the right of the spine, the lungs are superimposing the detector. Because the detector is terminating the exposure when enough radiation exits the lungs, the exposure is short. However, because the computer adjusts the brightness, it will be appropriate.

PTS: 1 REF: 191 OBJ: 9
66. ANS: B PTS: 1
67. ANS: C
If the centering is 3 inches to the right of the spine, the lungs are superimposing the detector. Because the detector is terminating the exposure when enough radiation exits the lungs, the exposure is short. However, because the computer adjusts the brightness, it will be appropriate.

PTS: 1 REF: 191 OBJ: 9
68. ANS: D
Doubling the mA, time, or mAs results in the same outcome.

PTS: 1 OBJ: 4
69. ANS: B
Scatter radiation increases as field size increases.

PTS: 1 DIF: Moderate REF: page 188
OBJ: List three factors that contribute to scatter radiation.
70. ANS: A
The AEC detector will terminate the exposure based on the set amount of radiation exiting the anatomy directly in front of it. If that anatomy is not the anatomy of interest, the exposure will be wrong.

PTS: 1 REF: 192 OBJ: 2
71. ANS: D
Density controls change the exposure time by a specific amount.

PTS: 1 REF: 191 OBJ: 2
72. ANS: C
Any time a grid is used, there is additional exposure needed; changing from a lower to a higher ratio grid also requires additional exposure.

PTS: 1 OBJ: 13
73. ANS: C PTS: 1
74. ANS: B
Increasing grid ratio will require additional mAs, resulting in a higher patient dose. It will also do a better job of cleaning up the scatter radiation, resulting in an image with higher, or a shorter scale, of contrast.

PTS: 1 OBJ: 12

75. ANS: B PTS: 1
76. ANS: B
When the radiographer has the opportunity to set the back-up time, it should be approximately 150% of the expected exposure time.

PTS: 1 REF: 191 OBJ: 2
77. ANS: C PTS: 1
78. ANS: D
The cathode includes filaments and focusing cup, and produces the electrons for x-ray production.

PTS: 1 OBJ: 7
79. ANS: C
If mAs = mA × seconds, mA = mAs/seconds, or 32/.04, which equals 800 mA.

PTS: 1 REF: 119 OBJ: 4
80. ANS: D PTS: 1 REF: 43
81. ANS: C PTS: 1
82. ANS: B PTS: 1
83. ANS: C PTS: 1 REF: 50
84. ANS: B
Lowering the mA does not affect the mAs (and patient exposure) but does result in an increase in exposure time so the detector has time to reach its preset level.

PTS: 1 REF: 190 OBJ: 2
85. ANS: C PTS: 1
86. ANS: B
Bremsstrahlung x-rays are produced by slowing electrons at the target.

PTS: 1 DIF: Moderate REF: page 127
OBJ: Identify characteristic and bremsstrahlung x-rays.
87. ANS: C PTS: 1
88. ANS: B
If the SID is increased, the beam intensity and radiation reaching the IR is decreased. To maintain the original exposure to the IR, the mAs must be increased.

PTS: 1 REF: 126 OBJ: 10
89. ANS: D
To compensate for the reduction of scatter radiation reaching the IR, the mAs must be increased.

PTS: 1 REF: 141 OBJ: 3
90. ANS: D
Fifteen percent of 70 kVp is approximately 10 kVp. Therefore using 10 mAs (one half of the mAs) at 80 kVp and using 40 mAs (two times the mAs) at 60 kVp produces the same amount of remnant radiation.

PTS: 1 REF: 122 OBJ: 8
91. ANS: B PTS: 1
92. ANS: A PTS: 1
93. ANS: C

Exit-type detectors are located behind the IR, requiring the radiation to exit the IR before interacting with the detectors.

PTS: 1 REF: 188 OBJ: 2

94. ANS: B PTS: 1
95. ANS: D PTS: 1 REF: 49
96. ANS: C

600 mAs is the most a patient should receive during an AEC examination. This is far, far beyond the mAs appropriate for producing a radiograph, but if the AEC is not working properly, it is at least a stopping point.

PTS: 1 REF: 191 OBJ: 2

97. ANS: B PTS: 1
98. ANS: D PTS: 1
99. ANS: D

Increasing the kVp does not affect the brightness because the detector still waits for the preset level to be reached. However, the increase in kVp results in lower mAs, reducing patient exposure.

PTS: 1 REF: 197 OBJ: 9

100. ANS: C PTS: 1
101. ANS: C PTS: 1
102. ANS: B PTS: 1
103. ANS: D PTS: 1
104. ANS: C PTS: 1
105. ANS: A PTS: 1
106. ANS: B PTS: 1
107. ANS: A PTS: 1
108. ANS: B PTS: 1
109. ANS: D PTS: 1
110. ANS: C PTS: 1