



# Radiography ARRT

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## Practice Questions

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### 1. What is the accepted normal resting adult heart rate range?

- A. 20-40 beats per minute
- B. 40-60 beats per minute
- C. 60-100 beats per minute
- D. 100-140 beats per minute

### 2. Which exposure factor is the primary controller of receptor exposure (image brightness or density)?

- A. Kilovoltage (kVp)
- B. Source-to-image distance
- C. Milliampere-seconds (mAs)
- D. Focal spot size

### 3. The particle in the atomic nucleus that carries a positive charge is the:

- A. Electron
- B. Proton
- C. Neutron
- D. Photon

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### 4. The ALARA principle directs that radiation exposure be kept:

- A. As high as the equipment allows
- B. As low as reasonably achievable
- C. At the regulatory maximum
- D. Constant for all patients



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**5. The plane that divides the body into anterior and posterior halves is the:**

- A. Sagittal plane
- B. Coronal (frontal) plane
- C. Transverse plane
- D. Oblique plane

**6. The longest and strongest bone in the human body is the:**

- A. Humerus
- B. Tibia
- C. Femur
- D. Radius

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**7. Quality control in radiography refers primarily to:**

- A. Scheduling patients efficiently
- B. Routine testing to verify equipment performs within established limits
- C. Ordering supplies
- D. Billing accuracy

**8. Barium sulfate and iodinated agents are examples of which type of contrast media?**

- A. Negative contrast
- B. Positive contrast
- C. Neutral contrast
- D. Paramagnetic contrast

**9. Which value represents a normal adult resting respiratory rate?**

- A. 4-6 breaths per minute
- B. 12-20 breaths per minute
- C. 28-34 breaths per minute
- D. 40-60 breaths per minute

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**10. Increasing kVp while holding receptor exposure constant generally produces an image with:**

- A. Higher (shorter-scale) contrast
- B. Lower (longer-scale) contrast
- C. No change in contrast
- D. Increased quantum mottle

**11. The number of protons in an atom's nucleus determines its:**

- A. Mass number
- B. Number of neutrons
- C. Atomic number (element identity)
- D. Ionization energy only

**12. The three cardinal rules of radiation protection are time, distance, and:**

- A. Filtration
- B. Collimation
- C. Shielding
- D. Beam quality

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**13. The midsagittal plane divides the body into:**

- A. Superior and inferior halves
- B. Anterior and posterior halves
- C. Equal right and left halves
- D. Proximal and distal halves

**14. How many bones make up the normal adult human skeleton?**

- A. 186
- B. 206
- C. 226
- D. 306

**15. Exposure reproducibility tests verify that:**

- A. Different machines match each other
- B. Higher kVp gives more contrast
- C. Repeated identical settings produce consistent output
- D. Filtration is adequate



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**16. Air and carbon dioxide used to distend a structure are examples of:**

- A. Negative (radiolucent) contrast
- B. Positive contrast
- C. Ionic contrast
- D. Barium-based contrast

**17. On a blood pressure reading, the systolic value represents pressure during which cardiac event?**

- A. Ventricular relaxation
- B. Ventricular contraction
- C. Atrial filling
- D. Coronary perfusion

**18. By the 15% rule, increasing kVp by 15% has approximately the same effect on receptor exposure as:**

- A. Doubling the mAs
- B. Halving the mAs
- C. Tripling the mAs
- D. No change in mAs

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**19. X-rays and visible light are both forms of:**

- A. Electromagnetic radiation
- B. Particulate radiation
- C. Sound energy
- D. Thermal conduction

**20. Of the three cardinal protection principles, which is generally the most effective at reducing operator dose?**

- A. Distance
- B. Time
- C. Shielding
- D. Filtration



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**21. In the anatomic position, the term 'distal' means:**

- A. Farther from the point of attachment or origin
- B. Closer to the midline
- C. Toward the head
- D. Toward the front

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**22. The carpal bone that most commonly fractures and lies on the radial (thumb) side of the wrist is the:**

- A. Scaphoid
- B. Pisiform
- C. Hamate
- D. Triquetrum

**23. Exposure linearity testing evaluates output consistency when:**

- A. mA stations are changed while keeping mAs constant
- B. Only kVp changes
- C. The grid is removed
- D. SID is doubled

**24. Compared with high-osmolality ionic contrast, low-osmolality nonionic iodinated agents generally have:**

- A. A higher rate of adverse reactions
- B. Greater toxicity
- C. A lower incidence of adverse reactions
- D. No iodine content

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**25. Which action is the single most effective means of preventing the spread of infection in health care?**

- A. Proper hand hygiene
- B. Wearing a surgical cap
- C. Using sterile gloves for every patient
- D. Daily equipment dusting



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**26. An exposure uses 200 mA and 0.1 second. What is the mAs?**

- A. 2 mAs
- B. 10 mAs
- C. 20 mAs
- D. 200 mAs

**27. Compared with visible light, x-rays have:**

- A. Lower energy and longer wavelength
- B. Higher energy and shorter wavelength
- C. The same energy
- D. Lower frequency

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**28. If an operator at 2 meters from a source receives a certain exposure, moving to 4 meters changes the exposure to:**

- A. One-half
- B. One-fourth
- C. Twice
- D. Four times

**29. A PA projection means the central ray enters the:**

- A. Anterior surface and exits posteriorly
- B. Posterior surface and exits anteriorly
- C. Lateral surface
- D. Inferior surface

**30. The bony landmark formed by the lateral end of the scapula that articulates with the clavicle is the:**

- A. Coracoid process
- B. Glenoid fossa
- C. Acromion
- D. Spine of the scapula



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## Answer Key & Explanations

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**1. C — 60-100 beats per minute**

A normal resting adult pulse is 60-100 beats per minute. Below 60 is bradycardia and above 100 is tachycardia.

**2. C — Milliampere-seconds (mAs)**

mAs controls the quantity of x-rays produced and is the primary controller of receptor exposure; kVp mainly affects contrast and penetration.

**3. B — Proton**

Protons carry a positive charge and reside in the nucleus along with neutral neutrons; electrons orbit and are negative.

**4. B — As low as reasonably achievable**

ALARA (As Low As Reasonably Achievable) is the guiding philosophy to minimize dose to patients, staff, and the public.

**5. B — Coronal (frontal) plane**

The coronal or frontal plane divides the body into front (anterior) and back (posterior) portions.

**6. C — Femur**

The femur (thigh bone) is the longest, strongest, and heaviest bone in the body.

**7. B — Routine testing to verify equipment performs within established limits**

Quality control is the systematic testing and monitoring of equipment to ensure it meets performance standards and produces consistent image quality.

**8. B — Positive contrast**

Barium and iodine are positive (radiopaque) contrast agents that attenuate the beam and appear white on the image.

**9. B — 12-20 breaths per minute**

Normal adult respiration is about 12-20 breaths per minute; newborns breathe much faster.

**10. B — Lower (longer-scale) contrast**

Higher kVp increases scatter and beam penetration, producing more shades of gray, which is lower, longer-scale contrast.

**11. C — Atomic number (element identity)**

The atomic number equals the proton count and defines which element the atom is.

**12. C — Shielding**

Minimizing time, maximizing distance, and using shielding are the three cardinal principles of external radiation protection.



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**13. C — Equal right and left halves**

The midsagittal (median) plane passes vertically through the midline, separating the body into equal right and left halves.

**14. B — 206**

The adult skeleton normally contains 206 bones; infants have more, which fuse during growth.

**15. C — Repeated identical settings produce consistent output**

Reproducibility confirms that the same set of exposure factors yields the same radiation output each time, typically within plus or minus 5%.

**16. A — Negative (radiolucent) contrast**

Gases such as air and CO<sub>2</sub> are negative contrast agents; they are radiolucent and appear dark, often used in double-contrast studies.

**17. B — Ventricular contraction**

Systolic pressure (the higher number) is measured during ventricular contraction, when blood is ejected into the arteries.

**18. A — Doubling the mAs**

A 15% increase in kVp roughly doubles receptor exposure, equivalent to doubling mAs; to maintain exposure the mAs is then halved.

**19. A — Electromagnetic radiation**

X-rays and visible light are electromagnetic radiation, differing in energy, wavelength, and frequency.

**20. A — Distance**

Because intensity falls with the square of distance, increasing distance is the most effective and easiest way to reduce occupational dose.

**21. A — Farther from the point of attachment or origin**

Distal indicates a location farther from the trunk or point of origin of a structure; proximal is nearer.

**22. A — Scaphoid**

The scaphoid, on the radial side of the proximal carpal row, is the most frequently fractured carpal bone.

**23. A — mA stations are changed while keeping mAs constant**

Linearity checks that radiation output per mAs remains consistent across different mA and time stations producing the same mAs.

**24. C — A lower incidence of adverse reactions**

Low-osmolality nonionic agents are associated with fewer adverse reactions and are preferred, especially in higher-risk patients.

**25. A — Proper hand hygiene**

Hand hygiene (washing or alcohol-based rub) is recognized by the CDC as the most effective single measure to reduce health-care-associated infection.

**26. C — 20 mAs**

$mAs = mA \times time = 200 \times 0.1 = 20 \text{ mAs}$ .



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**27. B — Higher energy and shorter wavelength**

X-rays have far shorter wavelengths and higher frequencies than visible light, giving them much greater energy and penetrating ability.

**28. B — One-fourth**

Inverse square law: doubling the distance from 2 m to 4 m reduces intensity to  $(2/4)^2 = 1/4$  of the original.

**29. B — Posterior surface and exits anteriorly**

In a posteroanterior (PA) projection the beam enters the posterior surface and exits the anterior surface.

**30. C — Acromion**

The acromion process articulates with the clavicle to form the acromioclavicular joint.



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