MRI ARRT

Free Practice Test — 30 Real Exam-Style Questions

with full answer key & explanations

Unlock the full bank of 751 questions
+ unlimited timed mock exams + mistake book

Practice on the web: https://certs.theorypractice.app/mri-arrt
$2.99 / week · $6.99 / month · cancel anytime

What you unlock: all 751 questions • unlimited timed mock exams • mistake book • instant explanations

Also on iOS & Android — and watch the full Q&A walkthrough on YouTube @CertsQuizPrep

Practice Questions

Try all 30 first, then check the answer key at the back.

1. Which lobe of the brain is primarily responsible for processing visual information?

A. Occipital lobe
B. Frontal lobe
C. Parietal lobe
D. Temporal lobe

2. What element is the basis of most MRI contrast agents?

A. Gadolinium
B. Iodine
C. Barium
D. Iron oxide

3. Which type of MRI magnet uses liquid helium to maintain superconductivity?

A. Superconducting magnet
B. Permanent magnet
C. Resistive magnet
D. Hybrid magnet

4. Which screening form item is MOST critical to review before allowing a patient into the MRI scanner room?

A. Insurance coverage information
B. Previous CT scan history
C. Presence of any ferromagnetic implants
D. Patient's dietary restrictions

5. The unit of magnetic field strength (B0) used to express MRI main field strength is the:

A. Tesla
B. Gauss
C. Weber
D. Ampere

6. Which MRI sequence is most commonly used as the primary workhorse for brain imaging due to its excellent soft-tissue contrast?

A. T2-weighted FSE
B. T1-weighted GRE
C. Diffusion-weighted imaging
D. MR angiography

7. In a conventional spin-echo (SE) sequence, which two RF pulses define the sequence?

A. 90° excitation followed by 180° refocusing
B. 180° inversion followed by 90° excitation
C. 45° excitation followed by 90° refocusing
D. 90° excitation followed by 90° refocusing

8. Zone I in the ACR MR safety zoning model refers to which area?

A. General public areas outside the MR environment
B. The MR control room
C. The patient holding/screening area
D. The magnet room

9. On a sagittal MRI brain image, the central sulcus separates which two lobes?

A. Temporal and parietal
B. Occipital and parietal
C. Frontal and parietal
D. Frontal and temporal

10. How do gadolinium-based contrast agents (GBCAs) primarily affect MRI signal on T1-weighted images?

A. They decrease T1 signal
B. They increase T1 signal (positive enhancement)
C. They only affect T2 signal
D. They have no effect on T1 images

11. Which magnet type produces a magnetic field by passing electrical current through copper or aluminum wire windings at room temperature?

A. Superconducting magnet
B. Resistive magnet
C. Permanent magnet
D. Cryogenic magnet

12. A patient states they have a pacemaker. What is the most appropriate initial action?

A. Check the device model and obtain approval before proceeding
B. Proceed with the scan at 1.5T only
C. Scan the patient without contrast
D. Perform the scan at lowest possible SAR settings

13. The main static magnetic field (B0) in a superconducting MRI system is produced by:

A. Permanent magnets at room temperature
B. Resistive copper wire coils
C. Superconducting niobium-titanium wire cooled with liquid helium
D. Gradient coils driven by amplifiers

14. Which MRI sequence is the gold standard for detecting acute cerebral ischemia (stroke) within the first few hours?

A. T1-weighted imaging
B. FLAIR
C. Diffusion-weighted imaging (DWI)
D. Gradient echo

15. Which artifact is effectively eliminated by the 180° refocusing pulse in a spin-echo sequence?

A. Motion artifact
B. Aliasing (wrap) artifact
C. Chemical shift artifact
D. Magnetic field inhomogeneity dephasing

16. Which MR zone serves as the interface between the general public and the MR environment, where patient screening typically begins?

A. Zone I
B. Zone III
C. Zone II
D. Zone IV

17. CSF produced in the lateral ventricles flows into the third ventricle through which structure?

A. Cerebral aqueduct
B. Foramen of Luschka
C. Foramen of Magendie
D. Foramen of Monro

18. What is the primary route of elimination for most extracellular gadolinium-based contrast agents in patients with normal renal function?

A. Biliary excretion
B. Pulmonary excretion
C. Renal (glomerular filtration)
D. Hepatic metabolism

19. Shimming of an MRI magnet is performed primarily to:

A. Increase gradient slew rate
B. Reduce RF power deposition
C. Cool the superconducting coils
D. Improve magnetic field homogeneity

20. A patient with significant claustrophobia is scheduled for a brain MRI. What non-pharmacological intervention should be tried FIRST?

A. Reschedule for an open MRI system
B. Allow the patient to enter the bore feet-first and use a mirror or prism glasses
C. Administer oral midazolam before the scan
D. Place the patient prone to reduce awareness of the bore

21. The Larmor frequency describes the rate at which hydrogen protons:

A. Emit radiofrequency pulses
B. Precess around the main magnetic field
C. Relax back to equilibrium
D. Align anti-parallel to B0

22. FLAIR (Fluid Attenuated Inversion Recovery) suppresses which tissue signal to improve lesion visibility?

A. Fat
B. CSF
C. White matter
D. Gray matter

23. In a gradient echo (GRE) sequence, how is the echo generated?

A. By a 180° refocusing RF pulse
B. By a series of 90° pulses
C. By reversing the frequency-encoding gradient polarity
D. By applying a spin-lock pulse

24. According to ACR guidance, the MR control room (where the operator console sits) is classified as which zone?

A. Zone I
B. Zone II
C. Zone III
D. Zone IV

25. On axial MRI, the cerebral aqueduct (of Sylvius) connects which two structures?

A. Third ventricle to fourth ventricle
B. Lateral ventricle to third ventricle
C. Fourth ventricle to central canal
D. Lateral ventricle to subarachnoid space

26. Which chemical structure is used to chelate gadolinium in MRI contrast agents to reduce its toxicity?

A. Albumin
B. Dextran
C. Phospholipid
D. Ligand (chelate)

27. Field homogeneity in clinical MRI scanners is typically specified in parts per million (ppm) over a defined DSV. A 1.5 T system rated at 1 ppm over a 50 cm DSV means the field varies by no more than:

A. 1.5 µT
B. 15 µT
C. 150 µT
D. 1500 µT

28. Before starting an MRI examination, the technologist should instruct the patient to:

A. Hold their breath for the entire scan
B. Keep their eyes open at all times
C. Avoid blinking during image acquisition
D. Lie still and squeeze the call bulb if they experience discomfort

29. At thermal equilibrium in a strong magnetic field, a slight excess of hydrogen protons aligns:

A. Perpendicular to B0
B. Anti-parallel to B0
C. Parallel (low-energy state) to B0
D. Randomly with no net magnetization

30. When imaging a patient with suspected multiple sclerosis, which additional plane is most important to obtain with FLAIR in order to detect callosal lesions?

A. Axial
B. Coronal
C. Oblique axial
D. Sagittal

Answer Key & Explanations

1. A — Occipital lobe
The occipital lobe, located at the posterior of the brain, contains the primary visual cortex (V1) and is the main processing center for visual input from the retina.

2. A — Gadolinium
Gadolinium (Gd^{3}■) is a paramagnetic lanthanide used in most MRI contrast agents because its seven unpaired electrons strongly shorten T1 relaxation time. Iodine and barium are used in X-ray/CT, not MRI.

3. A — Superconducting magnet
Superconducting magnets are cooled with liquid helium to near absolute zero (≈4 K), allowing current to flow without resistance and maintaining the strong static field. Permanent and resistive magnets do not require cryogens.

4. C — Presence of any ferromagnetic implants
Ferromagnetic implants can be displaced or heated by the MRI magnetic field, posing a serious safety risk. Screening for metallic implants is the highest priority before MRI.

5. A — Tesla
Tesla (T) is the SI unit for magnetic flux density (B0). While Gauss is also used (1 T = 10,000 G), clinical MRI field strengths are standardly expressed in Tesla.

6. A — T2-weighted FSE
T2-weighted fast spin-echo (FSE) provides excellent contrast between gray matter, white matter, and CSF, making it the standard sequence for brain pathology detection. T1 is better for anatomy, while DWI and MRA serve specialized roles.

7. A — 90° excitation followed by 180° refocusing
A conventional SE sequence uses a 90° pulse to tip magnetization into the transverse plane, then a 180° refocusing pulse to rephase spin dephasing caused by field inhomogeneities, producing a spin echo at time TE.

8. A — General public areas outside the MR environment
Zone I is the unrestricted area accessible to the general public, such as waiting rooms and corridors outside the MR department.

9. C — Frontal and parietal
The central sulcus (Rolandic fissure) runs in the coronal plane and forms the boundary between the frontal lobe anteriorly and the parietal lobe posteriorly.

10. B — They increase T1 signal (positive enhancement)
GBCAs are T1 shortening agents; they cause positive (bright) enhancement on T1-weighted images by reducing the longitudinal relaxation time of nearby water protons.

11. B — Resistive magnet
Resistive magnets use room-temperature wire coils carrying current. They dissipate significant electrical energy as heat and are limited to lower field strengths compared to superconducting designs.

12. A — Check the device model and obtain approval before proceeding
Pacemakers may be MR-conditional, MR-unsafe, or MR-safe. The specific model must be identified and evaluated against MRI conditions before proceeding.

13. C — Superconducting niobium-titanium wire cooled with liquid helium
Superconducting MRI magnets use niobium-titanium alloy wire cooled to ~4 K with liquid helium, which achieves zero electrical resistance and allows persistent current without ongoing power input.

14. C — Diffusion-weighted imaging (DWI)
DWI detects restricted diffusion caused by cytotoxic edema in acute stroke as early as minutes after onset, far earlier than T1 or T2 changes appear. FLAIR becomes positive later (typically after 4-6 hours).

15. D — Magnetic field inhomogeneity dephasing
The 180° refocusing pulse reverses the phase dispersion caused by static magnetic field inhomogeneities (B0 inhomogeneity), eliminating T2* dephasing effects and leaving only true T2 decay in SE images.

16. C — Zone II
Zone II is the reception and screening area where patients transition from public access to the controlled MR environment; initial screening questionnaires are completed here.

17. D — Foramen of Monro
The interventricular foramina of Monro (foramina of Monro) connect each lateral ventricle to the midline third ventricle, allowing CSF to flow between these chambers.

18. C — Renal (glomerular filtration)
Extracellular GBCAs are eliminated almost entirely by glomerular filtration, with the majority excreted within 24 hours in patients with normal renal function.

19. D — Improve magnetic field homogeneity
Shimming uses small ferromagnetic inserts (passive shim) or correction coils carrying current (active shim) to correct field inhomogeneities in the DSV (diameter of spherical volume), improving image uniformity and spectral resolution.

20. B — Allow the patient to enter the bore feet-first and use a mirror or prism glasses
Feet-first positioning and visual aids such as prism glasses help the patient maintain eye contact with the room outside the bore, reducing claustrophobic anxiety without medication.

21. B — Precess around the main magnetic field
The Larmor frequency ($\omega_0 = \gamma \cdot B0$) is the precession frequency of hydrogen nuclei spinning around the B0 axis. It is this frequency that must match the RF pulse frequency to achieve resonance.

22. B — CSF
FLAIR uses an inversion pulse timed to null the CSF signal (long T1), allowing periventricular lesions such as MS plaques to be visualized without being obscured by bright CSF on standard T2 images.

23. C — By reversing the frequency-encoding gradient polarity
In GRE sequences there is no 180° refocusing pulse; instead the frequency-encoding gradient is first applied in one direction (dephasing) then reversed (rephasing) to form a gradient echo, which is sensitive to T2* rather than T2.

24. C — Zone III
Zone III contains the MR control room. Access is restricted to MR personnel because the 5-gauss line may extend into this area and ferromagnetic objects could be attracted toward Zone IV.

25. A — Third ventricle to fourth ventricle
The cerebral aqueduct is a narrow CSF channel running through the midbrain tegmentum, linking the third ventricle superiorly to the fourth ventricle inferiorly.

26. D — Ligand (chelate)
Free gadolinium ion is highly toxic; it is chelated by a ligand (e.g., DTPA, DOTA) to form a stable complex that allows safe administration while retaining paramagnetic properties.

27. A — 1.5 µT
1 ppm of 1.5 T = 1.5 × 10■■ × 1.5 T = 1.5 µT. Understanding ppm calculations is important for evaluating scanner specifications.

28. D — Lie still and squeeze the call bulb if they experience discomfort
Providing the patient with a call bulb and clear instructions for its use empowers them to signal distress, improving safety and comfort throughout the exam.

29. C — Parallel (low-energy state) to B0
Slightly more protons occupy the lower-energy parallel state than the anti-parallel state, creating a small net longitudinal magnetization (Mz) aligned with B0 that forms the basis of the MRI signal.

30. D — Sagittal
Sagittal FLAIR is critical for detecting 'Dawson's fingers' — periventricular MS plaques that orient perpendicular to the corpus callosum — which are a hallmark finding and are best seen in the sagittal plane.

Ready to pass?

Unlock the full MRI ARRT bank, every explanation, and unlimited timed mock exams.

Scan to start practising
https://certs.theorypractice.app/mri-arrt

Watch the full video walkthrough on YouTube @CertsQuizPrep