ABR | American Board of Radiology

Writing Items for the ABR

Content Editing Division

Item Objectives

Focused

- Each item should focus on one concept.

Clear

- Each item should be straightforward, easy to interpret, and unambiguous.

Concise

- Each item should include only information necessary to answer the question.

Item Components

- Stem = Background + situational information + images/diagrams/tables + question
- Options = **KEY** (correct answer) + 3 or 4 **DISTRACTORS** (incorrect answers)

4 or 5 total options per item are preferred
3 options are acceptable for items with only 3 plausible choices

Acronyms

- Clarity in content; no chance of misinterpretation
- The ABR has a list of acronyms that are acceptable to use without expansion.
- If an acronym is not on the list, spell it out on first use.
- Example: Instead of ML, use mediolateral (ML).

Stem Attributes

- Linear delivery of information
- Complete, clear question
- Focus on a single concept
- Positively worded format
- Objectively worded structure

Linear Delivery of Information

Background + situational information + request for answer

A 7-year-old girl is treated for . . .

+ One year later, she presents with . . .

+ What is the most appropriate next imaging exam?

Cases should be written in present tense, when possible.

Linear Delivery of Information

Background + situational information + request for answer

INCORRECT:

What is the probability that a child will have a defect due to induced genetic damage to the ovum if the mother gets pregnant 30 days after receiving an ovarian dose of 110 mGy from two CT scans of the pelvis?

CORRECT:

A woman has two CT scans of the pelvis and receives an ovarian dose of 110 mGy. Thirty days later, she becomes pregnant. What is the probability that the child will have a defect due to induced genetic damage to the ovum?

Linear Delivery of Information

Linear examples without extensive background:

Situational information (include image, if any) + question

A lamp is placed 3 m in front of a concave mirror with a 1-m focal length. How far in front of the mirror will reflected light converge?

Complete, Clear Question

Stems should be complete sentences ending with a question mark.

INCORRECT:

- Kerma:
- The dose-rate constant:

CORRECT:

- What does kerma measure?
- What is the definition of the dose-rate constant?

Why? Because the stem has to pass the “cover test.”

Complete, Clear Question

What is the “cover test”?

If options are covered, the stem should have sufficient information for the test-taker to predict the answer without having to look at the option list.

Focus on a Single Concept

If asked:

Which of the following statements describes electron capture radioactive decay?

-or-

Beta-emissions typically have:

Could you predict the correct answer if the options were covered?

Focus on a Single Concept

Unfocused stem (with mixed options):

Which of the following statements describes electron capture radioactive decay?

A. It triggers a proton-neutron transformation.* (process)
B. The atomic number remains the same. (chemistry)
C. It occurs in a neutron-rich unstable parent nucleus. (location)
D. It most commonly occurs with the capture of an L-shell electron. (process)

Focus on a Single Concept

The key from the previous example: It triggers a proton-neutron transformation.

New stem: In electron capture radioactive decay, what type of transformation occurs?

A. Proton-neutron*
B. Neutron-proton
C. β^-
D. β^+

Positively Worded Items

- Items should ask for the correct answer, not the incorrect answer.
- Avoid negatively worded items:
  - They do not pass the cover test.
  - Negatively worded items should only be used for adverse events, differential diagnoses, or techniques that could cause harm.

    For example:

    Which MRI sequence should **NOT** be used in a patient with a hip implant?

Objectively Worded Items

All items should be objectively written, based on fact and not opinion.

INCORRECT:

A CT technologist informs you that she saw a ring artifact on the daily QC test. What would you do first?

CORRECT:

A daily QC test for CT shows a ring artifact. What is the most appropriate next step?

Option Attributes

- Same category
- Same part of speech
- Similar in length and structure
- Plausible to some degree
- Supported by medical research
  - At least one credible reference is required to support the key.

Same Category

INCORRECT: Mixed options

Which of the following about receiving a package containing radioactive materials is true?

A. Does not have to be monitored for contamination (requirement)
B. If received after normal working hours, must be monitored no later than 3 hours from the start of the next working day (requirement)
C. Conduct external survey using an ionization chamber (technique)
D. Perform a wipe test using absorbent paper and counting the swabs in a CsI well counter (technique)

Same Category

Create two focused items:

- If received after normal working hours, a package containing radioactive material must be monitored how soon after the start of the next work day?
- What is the most appropriate technique for testing a package containing radioactive materials?

Same Part of Speech

The options should all be in the same part of speech. For example:

What is the most appropriate next step in management?

INCORRECT:

A. Obtain a radiograph
B. Performing MRI
C. Observation
D. The patient should be sent home.

CORRECT:

A. Radiography
B. MRI
C. Observation
D. Discharge

Similar Length and Structure

In television viewing of fluoroscopic images, what ensures that the electron scanning beams in the camera and monitor are synchronized?

A. Digital detectors such as charge-coupled devices that provide a direct readout of electrical charge
B. Transmission channel
C. Camera control unit
D. Image storage device

Plausible to Some Degree

- A feasible option for consideration by the unprepared or underprepared test-taker
- A rational and logical *wrong* answer the test-taker might guess if no choices were provided
- A real thing; no invented terms or phrases

Things to Avoid

- Multiple and overlapping parts
- Overlapping numerical ranges
- Pairs

Multiple and Overlapping Parts

INCORRECT:

For ultrasound harmonic abdominal imaging, which of the following combinations of transmit/receive center frequency values is the most appropriate?

A. 6 MHz/6 MHz

B. 4 MHz/4 MHz

C. 2 MHz/4 MHz*

D. 2 MHz/3 MHz

Multiple and Overlapping Parts

CORRECT:

For ultrasound harmonic abdominal imaging, with a transmit center frequency of 2 MHz, what is the most appropriate receive center frequency?

A. 2 MHz

B. 4 MHz*

C. 6 MHz

D. 8 MHz

Overlapping Numerical Ranges

What is the effective radiation dose of a CT scan of the head?

INCORRECT:

A. 0.5 to 1 mSv
B. 1 to 5 mSv
C. 5 to 10 mSv
D. 10 to 15 mSv
E. 15 to 20 mSv

CORRECT:

A. 0.5 to 0.9 mSv
B. 1 to 4 mSv
C. 5 to 9 mSv
D. 10 to 14 mSv
E. 15 to 19 mSv

Pairs

INCORRECT:

Cyclotrons accelerate ions by using which of the following?

A. Pulsed electric fields*
B. Pulsed magnetic fields
C. Standing waveguide
D. Microwaves

Pairs

CORRECT:

Cyclotrons accelerate ions by using which of the following?

A. Pulsed electric fields*
B. Pulsed magnetic fields
C. Standing waveguide
D. Traveling waveguide

Summary

- Keep it focused
- Make it linear
- Use complete sentences and end with a question
- Ask for the correct answer
- Keep options balanced and similar
- Spell out acronyms and abbreviations

Item Writer Resources

- Item Format Reference Sheet – quick overview of ABR item format
- Accepted Acronyms and Abbreviations
- Item Writers' Guide – in-depth reference with detailed instructions and additional examples

These resources and a copy of this presentation are available from your exam developer. Also, feel free to contact Editing if you have any questions.

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Thank You!

Questions? Contact Editing staff at Editing@theabr.org