

MULTIPLE CHOICE

PHYSICS - MIXED EXAM - ANSWER KEY

PROPOSED FOR REVIEW - questions are the author's verbatim Q&A; distractors are auto-selected from other answers in the same bank and must be checked by a subject-matter reviewer (a distractor could coincidentally be correct). Not authoritative assessment content.

1. True or False? Pulse repetition frequency is related only to depth of view among routine imaging controls.

- A. False
- B. True**

2. What artifact has the same appearance as incorrect TGC settings?

- A. Focal enhancement**
- B. Comet tail
- C. Slice thickness artifact
- D. Mirror image artifact

3. What logarithmic unit is commonly used to express changes in amplitude?

- A. Decibels (dB)**
- B. Pascals (Pa)
- C. Watts (W)
- D. Hertz (Hz)

4. Which instruments have the highest potential for transmitting infection?

- A. Instruments that penetrate the skin or mucous membranes**
- B. Noncritical instruments that contact intact skin only
- C. External probes that never contact patients
- D. Display monitors used for viewing images

5. Which two characteristics create a long spatial pulse length?

- A. Many cycles in the pulse and short periods
- B. Few cycles in the pulse and high frequencies
- C. Few cycles in the pulse and short wavelengths
- D. Many cycles in the pulse and long wavelengths**

6. During inspiration, does venous return to the heart increase or decrease?

- A. Remain unchanged
- B. Increase**
- C. Decrease
- D. Stop

7. What does the term nonlinear behavior mean?

- A. Irregular, uneven, or disproportionate**
- B. Proportional, symmetrical, or even
- C. Archived, stored, or displayed
- D. Binary, digital, or discrete

8. What are the forms of energy associated with blood?

- A. Viscous, frictional, and inertial energy
- B. Plug, parabolic, and turbulent energy
- C. Thermal, acoustic, and optical energy
- D. Pressure, kinetic, and gravitational energy**

9. Can the sonographer adjust amplification?

- A. No

B. Yes

10. With oblique incidence, what is the total percentage of sound reflected plus sound transmitted?

A. 100%

B. 0%

C. 50%

D. 200%

11. What happens to sound speed when a material becomes stiffer?

A. Sound speed stays the same

B. Sound speed becomes zero

C. Sound speed decreases

D. Sound speed increases

12. What is the shape of a vein if the transmural pressure is low?

A. Dumbbell shaped

B. Round

C. Straight-walled and rigid

D. Oval and fully distended

13. How many kilometers are in 2,000 meters?

A. 200 km

B. 20 km

C. 2 km

D. 0.2 km

14. What is the third function of the receiver?

A. Compensation

B. Demodulation

C. Reject

D. Compression

15. Is the real world known as analog or digital?

A. Analog

B. Digital

C. Binary

D. Pixel-based

16. What uses pins that are parallel to the sound beam?

A. Axial resolution

B. Registration accuracy

C. Lateral resolution

D. Slice thickness

17. What does directly related mean?

A. When both variables are multiplied to equal 1

B. When one variable changes and the other stays constant

C. When one variable increases, the other decreases

D. When one variable increases, the other increases

18. When are contrast harmonics created?

A. During digital storage

B. During reflection

C. During PACS archiving

D. During transmission only

19. What are other terms for focal length?

A. Far field or Fraunhofer zone

B. Focal depth or near zone length

C. Focal point or focus

D. Beam diameter or aperture

20. What mnemonic lists common alternate names for axial resolution?

- A. LARRD: longitudinal, axial, range, radial, depth
- B. CARD: contrast, axial, radial, depth
- C. LARD: lateral, axial, range, Doppler
- D. LATA: longitudinal, angle, temporal, axial

21. Which region is noise more likely to affect?

- A. Only the focal zone
- B. Low-level hypoechoic regions
- C. Bright echogenic areas
- D. Only regions deep to bone

22. How is frequency related to propagation speed in a given medium?

- A. Always equal
- B. Unrelated
- C. Directly related
- D. Inversely related

23. What does the term phased array mean?

- A. Single active element
- B. Multi-focus or adjustable
- C. Mechanical only
- D. Fixed single focus

24. Cubic meters are units of what quantity?

- A. Area
- B. Frequency
- C. Volume
- D. Length

25. What units are used to measure volume?

- A. Linear units
- B. Frequency units
- C. Square units
- D. Cubic units

26. What does the metric prefix hecto mean?

- A. Thousand
- B. Ten
- C. Hundredth
- D. Hundred

27. What are multiple ultrasound pulses called?

- A. Wall filter or scale
- B. Gain or compression
- C. Pulse length or period
- D. Packet or ensemble

28. In scientific notation, what value range is represented by a positive exponent?

- A. Less than 1
- B. Exactly 0
- C. Greater than or equal to 10
- D. Between 1 and 10

29. What is the second function of the receiver?

- A. Demodulation
- B. Compensation
- C. Amplification
- D. Compression

30. How is reflector depth calculated from go-return time in soft tissue?

- A. Go-return time divided by 1.54 mm/microsecond, then multiplied by 2
- B. 1.54 mm/microsecond multiplied by go-return time, multiplied by 2
- C. 1.54 mm/microsecond multiplied by go-return time, divided by 2
- D. 1.54 mm/microsecond divided by go-return time

31. Is higher or lower spatial resolution associated with a higher pixel density?

- A. Higher spatial resolution**
- B. Unchanged spatial resolution
- C. No spatial resolution
- D. Lower spatial resolution

32. How many hertz are in 6 MHz?

- A. 6,000,000 Hz**
- B. 600,000 Hz
- C. 6,000 Hz
- D. 60,000 Hz

33. Which transducer frequency creates lower Doppler shifts?

- A. Higher pulse repetition frequency
- B. Lower frequency transducer**
- C. Higher frequency transducer
- D. Lower wall filter setting

34. What happens to PRP when the depth of view is deep?

- A. PRP equals frequency
- B. PRP is zero
- C. PRP is short
- D. PRP is long**

35. What are the two different forms of magnification?

- A. Pre and post compensation
- B. Read and write magnification**
- C. Analog and digital magnification
- D. Axial and lateral magnification

36. During inspiration, does venous flow in the legs increase or decrease?

- A. Reverse direction
- B. Increase
- C. Decrease**
- D. Remain unchanged

37. True or False? The resistive index (RI) helps in the diagnosis of arterial stenosis.

- A. False
- B. True**

38. During which process is a reflected sound pulse converted into electricity?

- A. Transmission
- B. Refraction
- C. Reception**
- D. Display storage

39. What happens to temporal resolution with shallow imaging?

- A. It becomes unrelated to frame rate
- B. It decreases because PRP becomes longer
- C. It degrades
- D. It improves**

40. What pulse characteristic determines axial resolution?

- A. Pulse repetition frequency
- B. Receiver gain
- C. Beam steering angle
- D. Pulse length**

41. What is the total pulse travel distance for a reflector depth of 3 cm?

- A. 6 cm**
- B. 3 cm
- C. 1.5 cm
- D. 9 cm

42. What are the units for flow?

- A. Any volume divided by time, such as liters/min
- B. Any frequency divided by time, such as Hz/s
- C. Any pressure divided by area, such as mmHg/cm²
- D. Any distance divided by time, such as cm/s

43. What mnemonic is used for lateral resolution?

- A. ALARA
- B. LATA
- C. PRF
- D. SPL

44. What units are used to measure area?

- A. Square units
- B. Linear units
- C. Cubic units
- D. Frequency units

45. What type of numbers are associated with computer devices?

- A. Real-world numbers
- B. Analog numbers
- C. Digital numbers
- D. Continuous numbers

46. What term means echo-free?

- A. Isoechoic
- B. Hypoechoic
- C. Anechoic
- D. Hyperechoic

47. True or False? When density decreases and stiffness is unchanged, sound speed decreases.

- A. False
- B. True

48. What units are used for half-value layer thickness?

- A. W/cm²
- B. dB/cm
- C. Hertz
- D. Units of length, such as cm

49. True or False? There are no bioeffects associated with ultrasound having characteristics typical of those in diagnostic ultrasound.

- A. False
- B. True

50. What does phased array mean?

- A. Adjustable or multiple focusing
- B. Mechanical steering only
- C. No focusing
- D. Fixed single focusing