

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. What does audible mean?

- A. Above 20 kHz only
- B. Unable to be heard
- C. Able to be heard**
- D. Below 20 Hz only

2. In which type of material does sound generally travel fastest?

- A. Liquids
- B. Solids**
- C. Gases
- D. Vacuum

3. The lower the frequency, the what kind of wavelength?

- A. Longer**
- B. Unchanged
- C. Shorter
- D. Zero

4. What transforms the electrical signal from the transducer so it is suitable for display?

- A. The receiver**
- B. The pulser
- C. The backing material
- D. The matching layer

5. True or False? -10 dB has the same meaning as attenuating 10 dB.

- A. True**
- B. False

6. What type of beam steering does a mechanical transducer have?

- A. Mechanical steering**
- B. Electronic steering
- C. Vector steering
- D. No steering

7. What Q-factor is associated with a longer pulse?

- A. Lower Q-factor
- B. Higher Q-factor**
- C. No Q-factor
- D. Q-factor equal to intensity

8. What describes the accuracy of a system when placing reflections at the correct depth parallel to the sound beam?

- A. Horizontal calibration
- B. Range accuracy**
- C. Dead zone
- D. Lateral resolution

9. What are the units and typical range of sine values used for ultrasound refraction angles?

- A. Unitless, from 0 to 1**
- B. Measured in rays, from 0 to 1
- C. Measured in degrees, from 0 to 90
- D. Measured in hertz, from 1 to 10

10. What is the ability of the system to place echoes in a correct horizontal position?

- A. Horizontal calibration**
- B. Vertical depth calibration
- C. Registration accuracy
- D. Axial resolution

11. Which three acoustic variables are commonly used to describe a sound wave?

- A. Period, frequency, and wavelength
- B. Pressure, density, and distance**
- C. Reflection, refraction, and attenuation
- D. Power, intensity, and amplitude

12. How is slice thickness artifact reduced?

- A. Thinner imaging planes**
- B. Thicker imaging planes
- C. Lower frame rate
- D. Wider elevational beam thickness

13. Which sequence ranks these intensities from smallest to largest?

- A. SPTA < SATA < SPTP < SPPA
- B. SPPA < SPTP < SATA < SPTA
- C. SPTP < SPPA < SPTA < SATA
- D. SATA < SPTA < SPPA < SPTP**

14. What is processing of a reflected signal before storage called?

- A. Read magnification
- B. Preprocessing**
- C. Archiving
- D. Postprocessing

15. What is the best way to minimize patient exposure when you are optimizing image quality?

- A. Use maximum output power and minimum amplification
- B. Keep output power fixed at the highest setting
- C. Increase output power before adjusting gain
- D. Use minimum output power and maximum amplification**

16. What are the units for compression?

- A. Hertz (Hz)
- B. Decibels (dB)**
- C. Microseconds
- D. Watts per square centimeter

17. What are the units of speed?

- A. Time divided by distance, such as s/cm
- B. Frequency divided by time, such as Hz/s
- C. Distance squared, such as cm²
- D. Distance divided by time, such as cm/s**

18. What is another term for imaging depth?

- A. Sector width
- B. Near-zone length
- C. Depth of view**
- D. Dynamic range

19. Does power mode detect color Doppler direction?

- A. Yes
- B. No**

20. What is the creation of an image from sound reflections twice the frequency of the transmitted sound called?

- A. Fundamental imaging
- B. Harmonic imaging**
- C. Pulse inversion
- D. Contrast resolution

21. Does upward movement of the diaphragm increase or decrease venous flow in the legs?

- A. Stop it
- B. Leave it unchanged
- C. Decrease
- D. Increase**

22. Within the far zone, what happens to the beam?

- A. It ends at the focus
- B. It stays the same width
- C. It spreads out (diverges)**
- D. It becomes narrower

23. How many milliliters are in 6 liters?

- A. 60 mL
- B. 600 mL
- C. 0.006 mL
- D. 6,000 mL**

24. What do changes in transducer output affect?

- A. Only image depth
- B. Only lateral resolution
- C. Only display size
- D. Overall brightness of the image**

25. What type of flow exists when flow is aligned and parallel?

- A. Reverberant flow
- B. Laminar flow**
- C. Turbulent flow
- D. Aliased flow

26. How is an image created with multiple foci at different depths?

- A. The acoustic lens is moved during reception
- B. Multiple sound beams must be sent down each scan line**
- C. The receiver gain is increased after each frame
- D. One sound beam is sent for the entire image

27. What are the units of amplification?

- A. MHz (megahertz)
- B. cm (centimeters)
- C. Hz (hertz)
- D. dB (decibels)**

28. Are small pixels associated with low or high pixel density?

- A. Low contrast resolution
- B. Low bit depth
- C. High pixel density**
- D. Low pixel density

29. What happens to pulse repetition frequency when the sample volume is deep?

- A. It becomes equal to transducer frequency
- B. It is unrelated to imaging depth
- C. It is high
- D. It is low**

30. As sound travels through tissue, what happens to the beam?

- A. It becomes weaker**
- B. It becomes a display pixel

- C. It becomes stronger
- D. It becomes unchanged

31. How is reverberation artifact oriented relative to the sound beam's main axis?

- A. Only within the focal zone
- B. Randomly oriented
- C. Perpendicular
- D. Parallel**

32. What happens to Rayleigh scattering when frequency increases?

- A. It becomes zero
- B. It remains unchanged
- C. It decreases
- D. It increases**

33. What type of material is PZT?

- A. A coupling gel
- B. Man-made**
- C. A display phosphor
- D. Found in nature

34. What pulse characteristic determines axial resolution?

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

35. What does the metric prefix mega mean?

- A. Thousand
- B. Billion
- C. Millionth
- D. Million**

36. What type of scattering occurs when ultrasound interacts with red blood cells?

- A. Rayleigh scattering**
- B. Total internal reflection
- C. Refraction
- D. Specular reflection

37. True or False? With a linear sequential array, all of the crystals are fired at the same time.

- A. False**
- B. True

38. What term describes random, disorganized, chaotic redirection of sound?

- A. Amplification
- B. Specular reflection
- C. Scattering**
- D. Absorption

39. How are pulse repetition frequency (PRF) and pulse repetition period (PRP) related?

- A. Inversely related**
- B. Equal
- C. Directly related
- D. Unrelated

40. What does Doppler shift depend upon?

- A. Pixel density
- B. Display persistence
- C. Output power
- D. Blood cell velocity**

41. What creates and controls the electrical signals sent to the transducer to create sound pulses?

- A. Storage and scan converter
- B. Compressor and demodulator
- C. Receiver and display
- D. Pulser and beam former**

42. What are the most common clinical Doppler devices?

- A. Nonimaging only
- B. Omnidirectional
- C. Bidirectional**
- D. Unidirectional

43. What artifact resembles a ladder?

- A. Shadowing
- B. Refraction
- C. Comet tail
- D. Reverberation**

44. What is the equation for total attenuation?

- A. Total attenuation = frequency / wavelength
- B. Total attenuation = duty factor x PRP
- C. Total attenuation = intensity x area
- D. Total attenuation = attenuation coefficient x distance**

45. When are contrast harmonics created?

- A. During digital storage
- B. During transmission only
- C. During reflection**
- D. During PACS archiving

46. Can the data stored in the scan converter be changed between the writing process and the reading process?

- A. No
- B. Yes**

47. What happens to pulse repetition frequency when the sample volume is shallow?

- A. It is high**
- B. It is unrelated to depth
- C. It becomes zero
- D. It is low

48. Does an AIUM 100 mm test object have attenuation properties?

- A. No**
- B. Yes

49. How are frame rate and line density related?

- A. Unrelated
- B. Inversely related**
- C. Directly related
- D. Equal to each other

50. What archives the ultrasound studies?

- A. Receiver
- B. Beam former
- C. Storage**
- D. Pulser