

## Chapter 01: Introduction

### Kremkau: Sonography Principles and Instruments, 9th Edition

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#### MULTIPLE CHOICE

1. Diagnostic ultrasound transducers generate a \_\_\_\_\_ of sound into the body.
  - a. wave
  - b. pulse
  - c. frequency
  - d. Doppler

ANS: B

Diagnostic ultrasound transducers generate the ultrasound pulses and receive the returning pulses.

REF: p. 2                      OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

2. The brightness of the dot corresponds to the \_\_\_\_\_ of the returning echo.
  - a. location
  - b. speed
  - c. strength
  - d. angle

ANS: C

The brightness of the dot corresponds to the echo strength, producing what then is known as a gray-scale image.

REF: pp. 2-5                      OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

3. A rectangular image display is seen when using a \_\_\_\_\_ transducer.
  - a. sector
  - b. vector
  - c. convex
  - d. linear

ANS: D

Pulses (scan lines) travel from different points parallel with each other, displaying a rectangular image.

REF: p. 5                      OBJ: Describe the image formats used in sonography.  
TOP: Pulse wave

4. The location of each dot corresponds to the \_\_\_\_\_ of the echo to return.
  - a. strength
  - b. time
  - c. pulse
  - d. frequency

ANS: B

The location of each dot corresponds to the anatomic location of the echo-generating structure.

REF: p. 5                    OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

5. The method by which each pulse originates from the same starting point is called a \_\_\_\_\_ image.
- sector
  - linear
  - convex
  - none of the above

ANS: A

A sector image results when each pulse originates from the same starting point and subsequent pulses going out in different directions.

REF: p. 5                    OBJ: Describe the image formats used in sonography.  
TOP: Pulse wave

6. Sonographic images are composed of many \_\_\_\_\_.
- crystals
  - scan lines
  - focal points
  - frequency shifts

ANS: B

Sonographic images are composed of many scan lines (pulses).

REF: p. 7                    OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

7. Echoes produced by \_\_\_\_\_ objects have different \_\_\_\_\_ than the pulses sent into the body.
- stationary; frequencies
  - stable; directions
  - moving; frequencies
  - moving; echoes

ANS: C

Echoes produced by moving objects have different frequencies than the pulses sent into the body.

REF: p. 7                    OBJ: Explain how the Doppler effect is applied to sonography.  
TOP: Doppler ultrasound

8. Doppler ultrasound measures the movement of \_\_\_\_\_.
- tissue
  - blood
  - A and B
  - none of the above

ANS: C

Doppler ultrasound is used in detecting and measuring tissue motion and blood flow.

REF: p. 7

OBJ: Explain how the Doppler effect is applied to sonography.

TOP: Doppler ultrasound

9. Quantitative data are determined by which Doppler display?
- Color imaging.
  - Power imaging.
  - B-mode (gray-scale, or brightness) imaging.
  - Spectral imaging.

ANS: D

Doppler information is applied to loudspeakers for audible evaluation and to the spectral display for quantitative analysis.

REF: p. 8

OBJ: List the ways in which Doppler information is presented.

TOP: Doppler ultrasound

10. The Doppler effect is a change in echo \_\_\_\_\_.
- frequency
  - strength
  - amplitude
  - direction

ANS: A

The Doppler effect is a change in frequency caused by moving objects.

REF: p. 7

OBJ: Explain how the Doppler effect is applied to sonography.

TOP: Doppler ultrasound

11. Vertical parallel scan lines are seen with which transducer format?
- vector.
  - convex.
  - linear.
  - curvilinear.

ANS: C

A linear transducer generates vertical parallel scan lines.

REF: p. 5

OBJ: Describe the image formats used in sonography.

TOP: Pulse wave

12. A gray-scale ultrasound image is the visible counterpart of a/an \_\_\_\_\_.
- frequency shift
  - spectral display
  - invisible object
  - electronic wave

ANS: C

An ultrasound image is the visible counterpart of an invisible object, produced in an electronic instrument by the interaction of ultrasound with the object.

REF: pp. 1-2      OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

13. A \_\_\_\_\_ scan is shaped like a slice of pie.
- sector
  - convex
  - linear
  - curvilinear

ANS: A  
A sector image is shaped like a slice of pie.

REF: p. 5      OBJ: Describe the image formats used in sonography.  
TOP: Pulse wave

14. Sonography is medical anatomic imaging using a \_\_\_\_\_ technique.
- starting point
  - pulse echo
  - vertical parallel
  - transducer instrument

ANS: B  
Anatomic imaging with ultrasound is accomplished by the pulse-echo principle.

REF: p. 2      OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

15. Three-dimensional imaging requires many adjacent tissue \_\_\_\_\_ to build the image.
- moving objects
  - frequency shifts
  - cross-sections
  - ultrasound pulses

ANS: C  
Three-dimensional, or volume, imaging requires scanning the ultrasound through many adjacent two-dimensional tissue-cross-sections to build up a three-dimensional volume of echo information.

REF: p. 7      OBJ: Describe the image formats used in sonography.  
TOP: Pulse wave

#### TRUE/FALSE

1. One pulse of ultrasound generates a single scan line as it travels through tissue.

ANS: T  
One line of echo information (pulse) is equal to one scan line.

REF: p. 5      OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

2. Pulsed ultrasound transducers can generate only ultrasound pulses.

ANS: F

The transducer generates the ultrasound pulses and receives the returning echoes.

REF: p. 2                    OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: Pulse wave

3. The Doppler effect is caused by a difference in the depth of two moving objects.

ANS: F

The Doppler effect is a change in frequency caused by moving objects.

REF: p. 7                    OBJ: Explain how the Doppler effect is applied to sonography.  
TOP: Doppler ultrasound

4. Animals have applied ultrasound to detect and capture prey.

ANS: T

Bats, dolphins, and other animals use ultrasound to detect, locate, determine motion of, and capture prey; to avoid obstacles; to detect and avoid predators; and to court mates.

REF: p. 1                    OBJ: Explain the fundamental principle used in sonographic imaging.  
TOP: General ultrasound physics

5. Color Doppler imaging is superimposed on a gray-scale image.

ANS: T

Rapid scanning and processing of the Doppler data enable color-coded presentation of Doppler information to be superimposed on a gray-scale anatomic image.

REF: pp. 7-8                OBJ: Explain how the Doppler effect is applied to sonography.  
TOP: Doppler ultrasound