# Chapter 01: Introduction
# Kremkau: Sonography Principles and Instruments, 9th Edition

**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.
   a. sector
   b. linear
   c. convex
   d. 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 _____.
   a. crystals
   b. scan lines
   c. focal points
   d. 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.
   a. stationary; frequencies
   b. stable; directions
   c. moving; frequencies
   d. 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 _____.
   a. tissue
   b. blood
   c. A and B
   d. 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?
   a. Color imaging.
   b. Power imaging.
   c. B-mode (gray-scale, or brightness) imaging.
   d. 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 _____.
    a. frequency
    b. strength
    c. amplitude
    d. 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?
    a. vector.
    b. convex.
    c. linear.
    d. 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 _____.
    a. frequency shift
    b. spectral display
    c. invisible object
    d. 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.
    a. sector
    b. convex
    c. linear
    d. 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.
    a. starting point
    b. pulse echo
    c. vertical parallel
    d. 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.
    a. moving objects
    b. frequency shifts
    c. cross-sections
    d. 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