Chapter 17- Harmonics Study Guide

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ frequency is the frequency of sound created by the transducer and transmitted in to the body.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ frequency is twice the fundamental frequency .
3. Harmonic frequency sound waves arise from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ behavior.
4. Two forms of harmonics are important in diagnostic sonography: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ harmonics and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ harmonics.
5. As a sound wave travels in the body, a miniscule amount of energy is converted from the fundamental frequency to the harmonic frequency. This conversion creates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ harmonics during transmission.
6. It has been discovered that sound waves travel at slightly uneven speeds through soft tissue. It travels \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through compressions and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through rarefactions.
7. A sound beam travelling at different speeds through its different parts is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ behavior.
8. The use of harmonics increases the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ratio.
9. Harmonic images have **more/less** distortion.
10. Tissue harmonics are not created at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ depths.
11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ harmonics is an imaging technique specifically designed to utilize harmonic reflections, which are distortion free, while eliminating distorted fundamental reflections.
12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ interference occurs when the fundamental frequency of the 2 pulses combine during pulse inversion harmonics.
13. And \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ interference occurs when the harmonic frequencies of the 2 pulses combine.
14. One disadvantage of pulse inversion harmonics is that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pulses are required to create each image.
15. Because the amount of time required to create a frame is increased, the frame rate will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ resolution is reduced.
16. List three of the five requirements for contrast agents:

1.

2.

3.

1. Contrast agents, also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bubbles are gas bubbles encapsulated in a shell.
2. True or False? Contrast agents are made to perfectly mimic the acoustic fingerprint of blood and tissue.
3. These microbubbles behave in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ manner, because the expand more than they contract.
4. When these bubbles are exposed to high pressure sound waves they will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. The lower the frequency of a sound wave the **higher/lower** the Mechanical Index (MI) will be.
6. True or False? Contrast harmonics are created during reflection.
7. Harmonics are created in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, not in the transducer or receiver.
8. If the second harmonic has a frequency of 4 MHz, what is the fundamental frequency?
9. If the fundamental frequency is 4 MHz, what is the harmonic frequency?
10. True or false? Contrast agents must be metabolically inert.
11. True or false? There is a large impedance difference between contrast agents and soft tissue.