- Detail Resolution
- The ability to display two structures situated close together as separate images
- **Higher Frequency:**
  - Better resolution
  - Lower penetrability
  - Higher absorption
- **Lower Frequency:**
  - Poor resolution
  - Higher penetrability
  - Lower absorption

TWO COMPONENTS OF SPATIAL RESOLUTION

1.) AXIAL RESOLUTION

- Longitudinal, Linear, Depth or Range
- The ability to distinguish two objects parallel to the ultrasound beam
- Depends upon the spatial pulse length and wavelength
- **Short Spatial Pulse Length:** good axial resolution
- **Longer Spatial Pulse Length:** poor axial resolution

2.) LATERAL RESOLUTION

- Azimuthal, Transverse, Angular or Horizontal
- The ability to distinguish two objects perpendicular to the ultrasound beam
- Depends upon the beam diameter
- **Smaller Beam Width:** better lateral resolution
- **Larger Beam Width:** poor lateral resolution

CONTRAST RESOLUTION

- The ability of the imaging system to differentiate between body tissue and display them as different shades of gray
- Optimized by using the correct overall gain

TEMPORAL RESOLUTION

- Frame Rate
- The ability of the imaging system to display events which occurs at different times as separated images
- **Higher Frame Rate:** better temporal resolution

ULTRASOUND INTERACTIONS AND ATTENUATIONS

ATTENUATION

- Decrease in the intensity and amplitude of the ultrasound waves as they pass through tissues

8.) MIRROR IMAGE ARTIFACT

- Caused by specular reflection of the beam at a large smooth interface
- **Often seen in:**
  - Fluid-air interface
  - Diaphragm

9.) DOUBLE IMAGE ARTIFACT

- Caused by refraction of the beam
- **Often occur at:**
  - Rectus abdominis muscle
- **Prevention/Elimination:**
  - Move the transducer slightly to one side to avoid the junction of rectus abdominis muscle

10.) EQUIPMENT-GENERATED ARTIFACT

- Caused by incorrect use of the equipment control