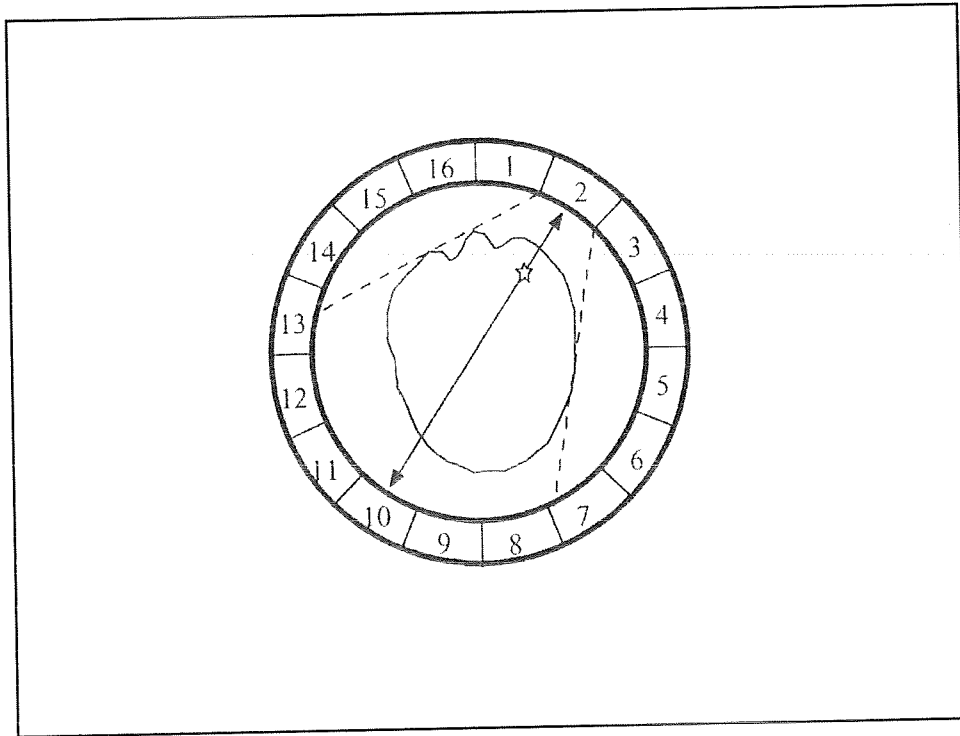


Tfy-99.4280 Medical Imaging Methods

Problems for examination on August 29, 2008

1. Positron Emission Tomography is an efficient imaging tool in current cancer diagnostics. Explain the physical and technical working principle of a PET scanner. How does it identify the cancer cells?
2. Compare core strengths and weaknesses of ultrasound, CT, MRI and PET in most important medical imaging applications.
3. Name two modern imaging modalities which do not require use of contrast agents to simultaneously generate anatomical images of blood vessels and measure the blood flows inside. Explain the physical working principles they are based on.
4. You would like to apply an ultrasonic imaging device for measuring the volume of a spherical cyst (cavity filled with water) inside muscle tissue. What are the related challenges due to the physical laws defining reflection and refraction ultrasound.
5. Sketch the Radon transform $p(r,\phi)$ of function $f(x,y)$ for $\phi = 0 \rightarrow 360^\circ$ for an object made of lead and having a cross-section with shape of capital letter Z. In which imaging method is this transform used and why?

- **The attached selected lecture material is at your disposal**
- **You may answer in English, Finnish or Swedish**



Sound wave reflection and transmission

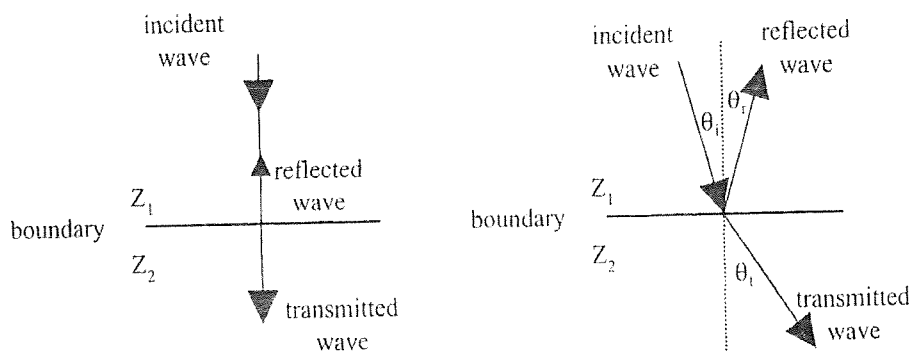


Fig 3.3. /Webb

