Physics of the Human Body and Health

Physics · Answer Key · 8 Questions

1. What is the approximate speed of an electrical signal (nerve impulse) along a myelinated axon in the human nervous system?

A) 1-5 meters per second
B) 10-50 meters per second
C) 50-120 meters per second
D) 0.1-1 meter per second

2. The pressure difference required to overcome the resistance in blood flow through the systemic circulation is primarily maintained by which organ?

A) Lungs
B) Kidneys
C) Heart
D) Brain

3. During normal breathing, what is the primary force driving air out of the lungs (exhalation)?

A) Active contraction of diaphragm
B) Elastic recoil of the lungs and chest wall
C) Contraction of intercostal muscles
D) Suction created by the diaphragm

4. What is the approximate dielectric constant of cell membranes, which is crucial for their electrical properties?

A) 2-5
B) 50-100
C) 2-10
D) 200-500

5. The phenomenon of Brownian motion, caused by the random bombardment of molecules, is directly relevant to which physiological process?

A) Muscle contraction
B) Blood clotting
C) Diffusion of molecules across cell membranes
D) Bone growth

6. What is the primary mechanism by which ultrasound waves are used for medical imaging (sonography)?

A) Absorption of transmitted waves
B) Reflection and scattering of emitted waves
C) Refraction of incident waves
D) Diffraction around tissue structures

7. The resting membrane potential of a typical neuron is approximately:

A) +30 mV
B) -70 mV
C) 0 mV
D) +70 mV

8. The process of osmosis, crucial for maintaining cell volume and fluid balance, is the net movement of solvent molecules across a selectively permeable membrane due to a difference in:

A) Pressure
B) Temperature
C) Concentration of solute
D) Electrical charge