

Physics of the Human Body

Physics · Answer Key · 20 Questions

1. What is the primary physics principle behind how an MRI (Magnetic Resonance Imaging) scanner creates images of internal body structures?

- A) Doppler effect using sound waves
- B) Nuclear magnetic resonance**
- C) X-ray diffraction
- D) Photoelectric effect

2. The propagation of a nerve impulse along an axon is best described by which physical phenomenon?

- A) Capillary action
- B) Diffusion driven by concentration gradients
- C) Wave propagation along a conductor**
- D) Osmosis

3. The pressure difference that drives blood flow through the circulatory system is most analogous to which physical concept?

- A) Surface tension
- B) Gravitational potential energy
- C) Electric potential difference**
- D) Viscosity

4. When you feel warmth from the sun on your skin, what is the primary mode of heat transfer involved?

- A) Conduction
- B) Convection
- C) Radiation**
- D) Evaporation

5. The process of hearing involves the conversion of sound wave energy into electrical signals in the inner ear. This conversion is a form of:

- A) Mechanical to thermal energy conversion
- B) Electrical to magnetic energy conversion
- C) Mechanical to electrical energy conversion**
- D) Thermal to chemical energy conversion

6. What physical principle explains why a person floats more easily in saltwater than in freshwater?

A) Archimedes' principle

B) Bernoulli's principle

C) Newton's third law

D) Pascal's principle

7. The bending of light as it passes from air into the cornea and lens of the eye is an application of which physics law?

A) Law of conservation of energy

B) Snell's Law

C) Ohm's Law

D) Boyle's Law

8. The strength of bones is often described in terms of their ability to withstand force. This relates to which mechanical property of materials?

A) Elasticity

B) Viscosity

C) Tensile strength

D) Compressive strength

9. What physical force is primarily responsible for the adhesion of water molecules to the surface of capillaries in plants, aiding in water transport?

A) Electrostatic repulsion

B) Magnetic attraction

C) Van der Waals forces

D) Gravitational pull

10. The diffusion of oxygen from the alveoli in the lungs into the bloodstream is governed by:

A) Active transport

B) Pressure gradients

C) Centrifugal force

D) Electromagnetic induction

11. The mechanism of breathing, specifically the expansion and contraction of the chest cavity, is a demonstration of:

A) Rotational dynamics

B) Oscillatory motion

C) Linear motion

D) Static equilibrium

12. When a doctor uses a stethoscope, they are listening to the sounds produced by the body. This involves the transmission of:

- A) Electromagnetic waves
- B) Pressure waves (sound waves)**
- C) Light waves
- D) Kinetic energy

13. The electric potential difference across a cell membrane, crucial for nerve and muscle function, is known as:

- A) Membrane resistance
- B) Membrane capacitance
- C) Membrane potential**
- D) Membrane conductance

14. What physical property of the blood is directly related to its resistance to flow through blood vessels?

- A) Density
- B) Viscosity**
- C) Surface tension
- D) Compressibility

15. The formation of bone and the healing of fractures involve mechanical stresses. This phenomenon is an example of:

- A) Magnetism
- B) Piezoelectricity**
- C) Thermodynamics
- D) Optics

16. The process of ultrasound imaging relies on the reflection of high-frequency sound waves. This is an application of:

- A) Refraction
- B) Diffraction
- C) Reflection**
- D) Interference

17. The sensation of touch involves the detection of pressure and vibration. These are forms of:

- A) Electromagnetic radiation
- B) Mechanical stimuli**
- C) Chemical reactions
- D) Thermal energy

18. The equilibrium of posture and balance is maintained by a complex interplay of sensory input and muscular responses, which can be understood through principles of:

- A) Quantum mechanics
- B) Thermodynamics
- C) Statics and dynamics**
- D) Relativity

19. The concept of homeostasis, maintaining a stable internal environment, often involves feedback loops that regulate physical parameters like temperature and pH.

This relates to:

- A) Chaos theory
- B) Systems of equations
- C) Thermodynamics and equilibrium**
- D) Fluid dynamics

20. The human eye can adjust its focus for objects at different distances. This ability is primarily due to the change in curvature of the lens, a process governed by the physics of:

- A) Diffraction
- B) Interference
- C) Refraction**
- D) Polarization