

Advanced Philosophy of Science and Logic

Philosophy Of Science · Answer Key · 25 Questions

1. Which theorem by Kurt Gödel demonstrates that in any consistent formal system capable of basic arithmetic, there are true statements that cannot be proven within that system?

A) Incompleteness Theorem

- B) Completeness Theorem
- C) Compactness Theorem
- D) Fixed-point Theorem

2. In the context of the philosophy of physics, what does the 'Bell's Theorem' prove regarding local hidden variable theories?

A) They are compatible with quantum mechanics

B) They are logically impossible under local realism

- C) They are proven to be the fundamental structure of space
- D) They resolve the measurement problem

3. The 'Hard Problem of Consciousness', as coined by David Chalmers, primarily argues that physicalism fails to account for which phenomenon?

A) Neural firing patterns

B) Qualia

- C) Synaptic plasticity
- D) The function of the prefrontal cortex

4. Which principle states that for any physical theory, the laws of physics are the same in all inertial frames of reference?

A) Principle of Relativity

- B) Equivalence Principle
- C) Heisenberg Uncertainty Principle
- D) Pauli Exclusion Principle

5. In epistemology, what is the 'Gettier problem' specifically designed to challenge?

A) The reliability of sensory input

B) The justified true belief account of knowledge

- C) The coherence theory of truth
- D) The existence of objective reality

6. According to the 'Church-Turing thesis', what is the nature of a function that is 'effectively calculable'?

A) It can be computed by a Turing machine

B) It is solvable only by human cognition

C) It is non-algorithmic

D) It requires infinite time to compute

7. Which philosophical position asserts that the fundamental constituents of reality are not matter or energy, but rather information?

A) Panpsychism

B) Digital Physics

C) Vitalism

D) Logical Positivism

8. In thermodynamics and information theory, what does 'Landauer's Principle' establish as the minimum energy required to erase one bit of information?

A) $kT \ln 2$

B) $h \cdot \text{frequency}$

C) mc^2

D) Boltzmann constant

9. What is the central claim of 'Quinean Holism' regarding empirical verification?

A) Individual statements can be tested in isolation

B) Our beliefs about the external world face the 'tribunal of sense experience' as a corporate body

C) Mathematics is separate from the physical world

D) All synthetic statements are analytic

10. Which experiment famously demonstrated that the wave-like or particle-like behavior of light depends on whether an observer is present?

A) Michelson-Morley experiment

B) Double-slit experiment

C) Stern-Gerlach experiment

D) Cavendish experiment

11. The 'Tarski's Undefinability Theorem' proves that truth within a language cannot be defined by what?

A) The language itself

B) A metalanguage

C) Formal logic

D) Syntactic axioms

12. Which philosophical view, championed by Bas van Fraassen, argues that science aims to provide theories that are 'empirically adequate' rather than necessarily true?

A) Scientific Realism

B) Constructive Empiricism

C) Logical Atomism

D) Instrumentalism

13. In neurophilosophy, what does the 'Libet experiment' challenge regarding human agency?

A) The existence of free will

B) The capacity for linguistic abstraction

C) The neuroplasticity of the brain

D) The role of the cerebellum

14. What is the 'No-Communication Theorem' in quantum mechanics?

A) States that quantum states cannot be used for superluminal communication

B) States that quantum information is local

C) States that entanglement does not exist

D) States that measurement is subjective

15. Which logical fallacy assumes that because a property is true for the parts of a whole, it must be true for the whole itself?

A) Fallacy of Composition

B) Fallacy of Division

C) Equivocation

D) Ad Hominem

16. What concept describes the limit beyond which an event cannot be observed by an outside observer in general relativity?

A) Event Horizon

B) Planck Length

C) Singularity

D) Ergosphere

17. Which philosopher proposed that scientific progress occurs through 'paradigm shifts' rather than a linear accumulation of knowledge?

A) Karl Popper

B) Thomas Kuhn

C) Imre Lakatos

D) Paul Feyerabend

18. In the philosophy of language, what is the 'Reference' of a name, as distinguished from its 'Sense' by Gottlob Frege?

A) The object to which the name points

- B) The way the object is presented
- C) The syntactic structure
- D) The psychological state of the speaker

19. The 'Problem of Induction', as formulated by David Hume, addresses which logical limitation?

A) The inability to justify the assumption that the future will resemble the past

- B) The impossibility of deductive reasoning
- C) The non-existence of causal laws
- D) The subjectivity of mathematical constants

20. Which scientific principle suggests that the most likely explanation for a set of data is the one with the fewest assumptions?

A) Occam's Razor

- B) Hanlon's Razor
- C) Hitchens's Razor
- D) Newton's Flaming Laser Sword

21. What is the primary focus of 'Mereology' within analytic philosophy?

A) The study of parts and their wholes

- B) The study of moral agency
- C) The study of temporal perception
- D) The study of linguistic tokens

22. Which theorem states that in a closed system, entropy can never decrease over time?

A) Second Law of Thermodynamics

- B) First Law of Thermodynamics
- C) Third Law of Thermodynamics
- D) Zeroth Law of Thermodynamics

23. In quantum field theory, what is the 'Vacuum State'?

A) A state with zero energy

B) The state with the lowest possible energy

- C) A state devoid of all quantum fields
- D) An imaginary state with infinite energy

24. What does 'Functionalism' in the philosophy of mind posit about mental states?

A) They are defined by their functional role rather than their physical makeup

B) They are identical to brain states

C) They are non-physical substances

D) They are purely linguistic constructs

25. The 'EPR paradox' was intended to demonstrate that quantum mechanics is:

A) Incomplete

B) The final theory of physics

C) Deterministic

D) Consistent with local realism