

Answer Key: When Reason Meets Reality: 10th Grade Logic & Critical Thinking Challenge

Sophomores sharpen their analytical edge by synthesizing complex arguments and evaluating the structural integrity of formal and informal inferences.

1. In the context of categorical logic, if the statement 'No cephalopods are vertebrates' is true, what can we definitively conclude about the statement 'Some cephalopods are vertebrates'?

Answer: B) It is necessarily false.

According to the Square of Opposition, 'No S is P' (E-statement) and 'Some S is P' (I-statement) are contradictories; if one is true, the other must be false.

2. A deductive argument can be 'valid' even if all of its premises are factually false.

Answer: A) True

Validity refers only to the logical structure (if the premises were true, the conclusion must follow). A valid argument with false premises is simply 'unsound.'

3. A lawyer argues: 'If we allow students to use tablets in class, they will eventually stop reading books, literacy rates will plummet, and our civilization will collapse.' This reasoning is an example of a(n) _____ fallacy.

Answer: C) Slippery Slope

The slippery slope fallacy occurs when one assumes a relatively small first step will inevitably lead to a chain of related (and usually negative) events without providing evidence for that causality.

4. Analyze the following: 'If the economic policy is successful, unemployment will drop. Unemployment has dropped. Therefore, the policy was successful.' This represents which formal fallacy?

Answer: C) Affirming the Consequent

The structure 'If P then Q; Q; therefore P' is invalid because Q could have been caused by factors other than P, making it the fallacy of Affirming the Consequent.

5. In formal logic, the rule _____ states that if we have a conditional 'If P then Q' and we are given 'not Q', we can validly conclude 'not P'.

Name: _____

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Answer: C) Modus Tollens

Modus Tollens (denying the consequent) is a valid argument form: $P \rightarrow Q, \neg Q, \text{ therefore } \neg P$.

6. Inductive arguments are evaluated based on their 'strength' and 'cogency' rather than 'validity' and 'soundness.'

Answer: A) True

Inductive reasoning deals with probability. An argument is 'strong' if the premises make the conclusion likely, and 'cogent' if it is strong and the premises are actually true.

7. Suppose a historian uses carbon dating and stylistic analysis of pottery to determine the age of a ruin. What primary mode of reasoning are they utilizing?

Answer: A) Abductive reasoning (inference to the best explanation)

Abductive reasoning involves looking at a set of data or 'effects' and seeking the most plausible explanation (or 'cause') that accounts for the evidence.

8. A politician argues that we should ignore a scientist's report on urban planning because the scientist once received a speeding ticket. This is a(n) _____ attack.

Answer: B) Ad Hominem

Ad hominem (to the man) shifts the focus from the merits of the argument to the character of the person presenting it.

9. Which of the following describes a 'sound' argument?

Answer: C) An argument that is valid and all of its premises are true.

Soundness requires two criteria: the argument must be logically valid (correct structure) AND the premises must be objectively true.

10. In a Disjunctive Syllogism, if we are given 'Either the tectonic plates are shifting or the sensor is broken' and we prove the sensor is functional, we must conclude the plates are shifting.

Answer: A) True

Disjunctive Syllogism follows the form 'P or Q; not Q; therefore P.' By eliminating one possibility, the remaining one must be true in a valid logical structure.