Deductive Reasoning

Deductive logic is a process where you draw specific conclusions from general premises.

Deductive logic boils down to this:

If the premises are true and the logic is sound, the conclusion must also be true.

Example: If you know that "All science books are on the top shelf and all top shelf books are blue," then it must be true that "All science books are blue." You're applying deductive reasoning to reach a conclusion that must be true based on the given premises. Deductive logic is a process where you draw specific conclusions from general premises.

In the Selective School Test, logical deduction questions are often written in the form of: "**must be true**" OR **"must not be true"** OR **"whose reasoning is correct?"**

MUST BE TRUE

"Based on the above information, which one of the following must be true?"

"Which one of the following statements must be true?"

"Which one of the following statements is true?"

"If this is true, which one of these sentences must also be true?"

MUST BE FALSE/CANNOT BE TRUE

"Given the information above, which one of the following cannot be true?"

WHOSE REASONING IS CORRECT?

"If the information in the box is true, whose reasoning is correct?

Above, are real stems used in past Selective papers.

Now, let's discuss these various questions types.

"Must Be True" questions are based on information in the stimulus or the direct result of combining statements in the stimulus.

Look for the answer choice that would 100%, beyond all shred of a doubt, be true.

In answer options, be wary of new information that is not clearly in the stimulus.

Correct answer choices for "Must Be True" Questions:

1. Paraphrased answers: These are answers that restate a portion of the stimulus in different terms. When these answers mirror the stimulus, they are correct. These include logically equivalent statements, such as the contrapositive of conditional statements.

2. Combined responses: are derived from merging two or more pieces of information from the text.

Incorrect answer choices "Must Be True" Questions:

1. Outside of scope: Exaggerated answers which take information from the stimulus and then stretch that information to make a broader statement that is not supported by the stimulus.

2. Introduces extra information: Presents new information that has not been mentioned in the stimulus.

3. Could be True (Possible but not certain): Answer choices that may occur or are likely to occur, but are not certain to occur, can not be 100% true. Therefore, they are incorrect answer choices.

4. Reverse Causality: This answer type is a common trap and seems like a good option because it contains familiar elements from the stimulus. However, it rearranges those elements to create a new, unsupported statement. Just because X causes Y, that does not mean that Y causes X.

Strategies for Effective Deductive Reasoning 

1. Stick to the Given Information:
In deductive logic, it's crucial to base your conclusions solely on the information provided, without adding assumptions or external knowledge.

2. Determine validity: Assess whether a conclusion logically follows from a given set of statements.

3. Find the Contrapositive in Conditional Statements:
If you are given a conditional logic statement (If X then Y), translate it into the contrapositive form (If not Y then not X).

4. Identify logical indicators:
Familiarise yourself with key terms and connectives such as "and," "or," "not," "if-then," "unless", etc.

5. Diagram arguments:
If you are lost, consider using appropriate diagrams such as conditional chains, Venn Diagram or truth tables. You don't always need to diagram logical statements. Only do so, if you need clarity.

6. Use counterexamples:
Consider using counterexamples to test the validity of a statement by providing cases that contradict it.

7. Unproven≠False:
If something hasn't yet been proven, that doesn't mean it's false. It just means it hasn't been proven yet.

DRILL: DEDUCTIVE REASONING: MUST BE TRUE & MUST BE FALSE

1. A software engineer must master three programming languages: Java, Python, and C++, in order to be considered for the position at TechCorp. The engineer can be considered even if they lack experience, provided that they have created a comprehensive portfolio that displays their coding capabilities. Additionally, if an engineer fails the coding test during the interview, they can retake it only once.

Which one of the following statements must also be true?

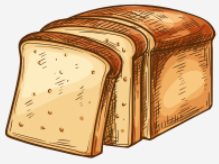
A. Sarah has mastered three programming languages and is an experienced software engineer, so she will be offered an interview at TechCorp.

B. Anyone who has experience and mastery of Java, Python, and C++ will always be considered for the position.

C. The only way for an engineer without experience to be considered for the position at TechCorp is by mastering Java, Python, C++, and creating a comprehensive portfolio.

D. Jack has failed his second attempt on the coding test, but he has mastered three programming languages, so he may still be eligible for a position at TechCorp.

2. **Statements**:
All sourdough bread is made with a natural yeast starter.
Some rye bread is made with a natural yeast starter.
No gluten-free bread is made with a natural yeast starter.



Conclusions:
1: Some rye bread can be sourdough bread.
2: No gluten-free bread being rye bread is a possibility.

Which of the following conclusions logically follows?

A. Only Conclusion 1 follows.
B. Only Conclusion 2 follows.
C. Both Conclusion 1 and 2 follow.
D. Neither Conclusion 1 nor Conclusion 2 follows

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3. In January, twelve new restaurants opened in Bondi.
Six of these were Italian eateries, four were seafood restaurants, and two were vegan cafés.

By December, eight of these restaurants were still operating. Of the remaining, five were Italian eateries.

Which statement must be true?

A. Only one of the seafood restaurants closed
B. At least one of the closed restaurants was a seafood restaurant.
C. The city's residents prefer Italian eateries over seafood restaurants.
D. Only one of the vegan cafés remained open.

4. At the Australian Open, matches involving top-ranked players are always scheduled in the main arenas and are the most attended. For a match to be highly attended, it must involve a top-ranked player.

If all of the statements above are true, which one of the following must also be true?

A. Matches that are scheduled in the main arenas always involve top-ranked players.

B. If a match is poorly attended, it must be missing the involvement of a top-ranked player.

C. The attendance of matches at the Australian Open depends only on the ranking of the players.

D. If a match does not involve a top-ranked player, the main arena will not be highly attended.

5. During a meteor shower, it's common to see multiple shooting stars per hour. However, if there is heavy cloud cover, the meteor shower and shooting stars are not visible.

If this is true, which one of these statements cannot be concluded?

A. There was a meteor shower, but no shooting stars were visible due to heavy clouds.

B. Multiple shooting stars were seen, so there must have been a meteor shower.

C.Heavy clouds were present, but shooting stars were visible.

D. There were no clouds, and a meteor shower was visible.

ANSWERS:
1. C
2. C
3. B
4. D
5. C