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Syllogisms: four proposition types and Venn diagram method

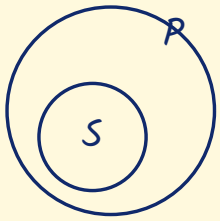
Read the four proposition types

Euler-style basic relations (modern logic)

'Some' means at least one, not 'some but not all'.
x marks a required member.
All / no alone do not assert existence.
For I / O, only x is asserted; other regions may be empty.

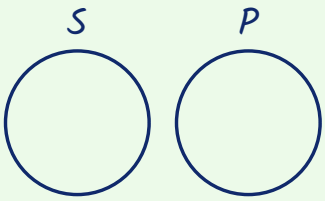
Next: trace witnesses and compare allowed relation diagrams.
Follow any explicit nonempty-class convention in the exam.

A: All S are P.



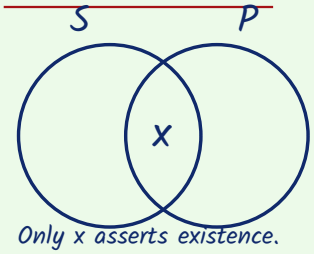
Every S belongs to P.
S may equal P.
No member is guaranteed to exist.

E: No S are P.



S and P share no members.
Neither class is required to exist.

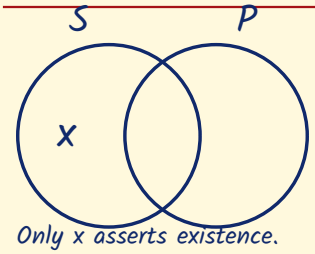
I: Some S are P.



Only x asserts existence.

x is in both S and P.
At least one common member exists.

O: Some S are not P.



Only x asserts existence.

x is in S, outside P.
At least one S is not P.

Worked example

Some lamps are blue. Does 'Some blue things are lamps' follow?

Step 1: The given x lies in both the lamp set and the blue set.
Step 2: Swapping the set names does not move this member.

Answer: Yes: at least one blue thing is a lamp.

Common trap

'Some' does not mean 'some but not all'.

Quick check: modern logic

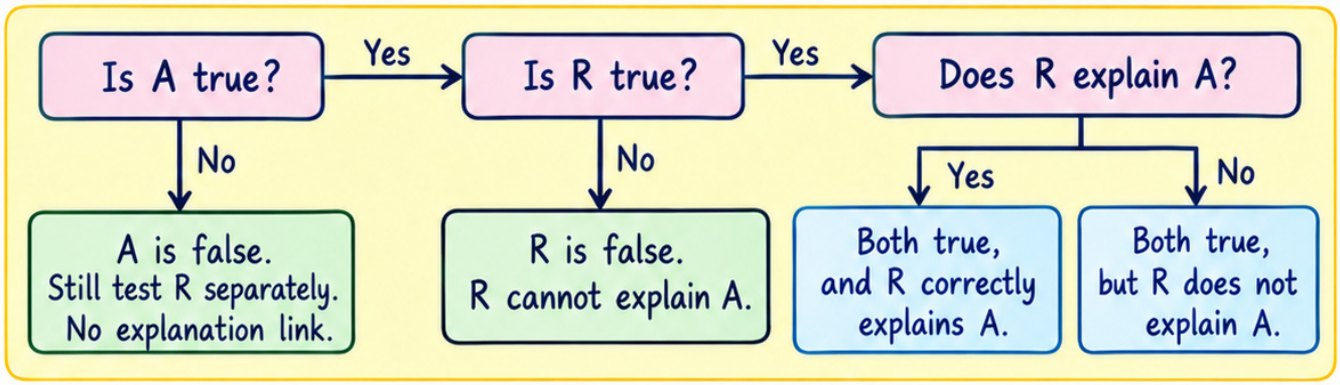
From 'All lamps are blue' alone, must any lamp exist?

Answer: No.
Existence needs an additional premise.

Assertion and Reason: truth and correct explanation

Test truth before the explanatory link

For Assertion and Reason, make two separate truth judgements first. If both are true, ask whether the reason actually explains the assertion. A shared topic or an associated fact is not enough. Follow the answer-code scheme printed in the question; some schemes include both-false and others do not. Use a reason as an explanation only when the logical connection is established. The explanation works for every integer k, including zero and negative values; checking selected multiples would not prove it. A merely related true fact needs another logical link to explain this assertion.



Worked example

A: Every integer divisible by 6 is divisible by 3.
R: Since 6 = 3 x 2, every number 6k equals 3(2k), with k an integer.
Assess A and R.

Step 1 Divisibility by 6 means the integer can be written as 6k.

Step 2 R rewrites it as an integer multiple of 3.

Step 3 That proves exactly the divisibility claimed in A.

Answer:
Both are true, and R correctly explains A.

Let an integer be divisible by 6.
So it can be written as 6k, where k is an integer.

$6k = 3(2k)$

↓

This is an integer multiple of 3.
Hence it is divisible by 3.

Common trap

Do not choose 'explains' merely because both sentences contain the same numbers.

Quick check

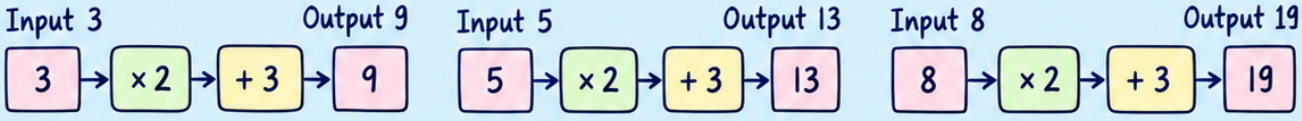
If R instead said '6 is an even number', would that alone explain A?

Check answer:
No. Being even alone does not establish divisibility by 3.

Input-output: operation-based machine patterns

Apply the same operation to every entry

- Operation-based machines change values rather than merely move items.
- Test a proposed rule on every available input-output pair.
- Separate per-entry transformations from operations involving neighbouring entries or positions.
- When a rule is explicitly stated, retain its order of operations and do not replace it with another rule that happens to match one example.
- Use brackets when substituting a negative input: for $n = -2$, the output is $2(-2) + 3 = -1$.
- The inverse calculation subtracts three before dividing by two. Reversing that order would not undo the original function.
- A forward substitution should confirm any recovered input before it is accepted.
- For eleven, doubling then adding three returns twenty-five.



$$f(n) = 2n + 3$$

A machine independently replaces each number n by $2n + 3$.
Find the output for 3, 5, 8.

STEP 1: For 3: $2 \times 3 + 3 = 9$.

STEP 2: For 5: $2 \times 5 + 3 = 13$.

STEP 3: For 8: $2 \times 8 + 3 = 19$.

ANSWER: 9, 13, 19.

Common trap

Each output uses its own input, not the previous output.

Quick check

Which input produces 25?

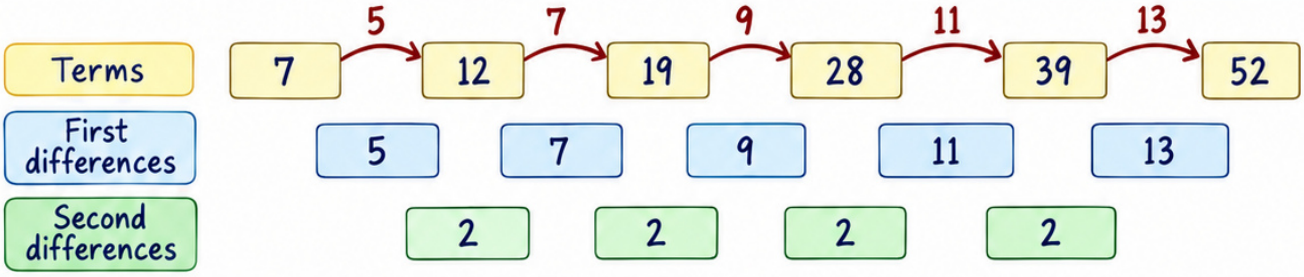
CHECK ANSWER: 11, because $\frac{(25 - 3)}{2} = 11$.

Number series: difference-based patterns

Write the difference row before guessing

For an additive series, subtract each term from the next and inspect the differences. A constant first difference gives an arithmetic progression. If the gaps vary, inspect how those gaps change. Keep subtraction in the same forward direction throughout. A finite list admits many mathematical extensions; an exam asks for its intended simple pattern, not a proof that no other continuation exists. Prefer a rule that explains every displayed transition and use any stated rule family or answer options to resolve ambiguity. The same gap rule can work backward: subtract 5 from 12 to recover 7. A missing interior term should satisfy both its incoming and outgoing gaps. Agreement from both sides is stronger evidence than extending only the visible left-hand portion.

Worked example: Continue using consecutive odd-number gaps starting with 5: 7, 12, 19, 28, 39, ?.



Step 1: Differences are 5, 7, 9, 11.
Step 2: They increase by 2, so the next difference is 13.
Step 3: Add to the last term: 39 + 13 = 52.
Answer: 52.

Common trap: Do not add the next odd number to the wrong earlier term; each gap joins consecutive terms.

Quick check: Using the same rule, what follows 52?
Check answer: 67, because the next gap is 15.

Conditional letter-digit and symbol coding

Apply the base table before the exception

- Conditional coding combines a base substitution table with special rules.
- First identify the relevant condition from the original input, unless the question says to inspect an intermediate code.
- Write the ordinary code, then apply the specified exception exactly once.
- Do not invent a condition for unmentioned cases.
- If several exceptions can apply, their priority must be defined.
- Distinguish replacing a character from inserting an extra one: a replacement keeps the code length unchanged.
- Inputs starting with a consonant retain their first ordinary code even if a later letter is a vowel.
- The condition concerns the first position specifically, not the presence of any vowel anywhere in the word.

Base table

A	B	C	D	E
1	2	3	4	5

Rule for the exception

If the original word begins with a vowel, replace only its first code with #.

Otherwise use the base code.

Worked example: Encode ABE

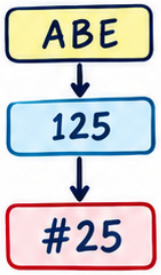
Input word: A B E

Step 1: The ordinary code is 125.

Step 2: The original first letter A is a vowel.

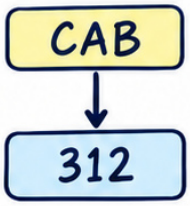
Step 3: Replace the first digit, not add a new token: 125 becomes #25.

Answer: #25.



Another input: Encode CAB

Input word: C A B



First letter C is a consonant, so no exception. Code remains unchanged.

Common trap

The exception is tested on the input letter, not on the numeric code after substitution.

Quick check

Encode CAB under the same rule.

Check answer: 312.

Basic relationship terms and family tree notation

Use a legend that preserves unknown information

Represent people by labelled nodes and relationships by explicit edges.

A parent-to-child arrow points downward; a separate horizontal link denotes spouses.

Use M, F or ? beside a label for stated male, female or unspecified gender in these exercises.

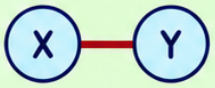
Do not infer gender from a name, occupation or position on the diagram.

Keep biological, adoptive and step relationships distinct if the question distinguishes them.

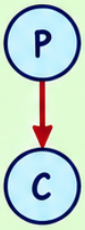
A sibling relationship does not always mean full siblings; when shared parents are needed, the problem must provide that information.

A legend is essential because family-tree symbols are not universal.

Legend



Horizontal link denotes spouses (married partners).



Parent-to-child arrow points downward.

M = stated male
F = stated female
? = unspecified gender

Worked example

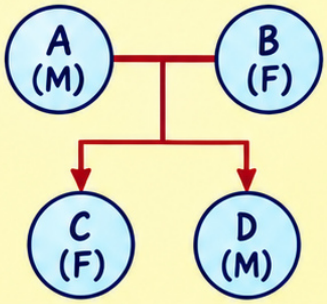
A is male and B female. They are spouses and the parents of C, a daughter, and D, a son. How is C related to D, and B to C?

STEP 1: C and D share both stated parents.

STEP 2: C is female, so C is D's sister.

STEP 3: B is the female parent of C, so B is C's mother.

ANSWER: C is D's sister; B is C's mother.



A and B are the parents of both C and D.

Common trap

A spouse link alone does not establish that both spouses parent every child shown elsewhere.

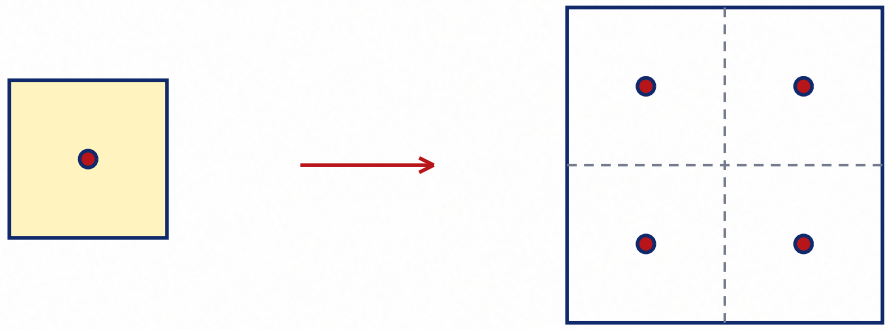
Quick check

How is D related to A?

CHECK ANSWER: D is A's son.

Unfold in the reverse order of the folds

Each fold reflects the folded part across a crease. To locate punched holes after opening, reverse the folding order and reflect every current hole across the crease being opened. A hole strictly away from all creases normally produces two copies for each independent half-fold, provided the copies remain distinct. Count layers only after confirming the fold geometry. Draw the creases and retain the same sheet orientation. Do not rotate the opened sheet merely to make it resemble an answer option, unless rotation is explicitly allowed.



Folded upper-left quarter

4 distinct holes

Worked example: A square is folded right over left, then bottom over top. One small hole is punched strictly inside the folded quarter, away from creases and outer edges. How many separate holes appear when fully opened?

Step 1: Open the horizontal fold: one hole reflects into two.
Step 2: Open the vertical fold: both reflect into two more.
Step 3: All four positions are distinct under the stated interior condition.

Answer: Four holes, symmetric about both crease lines.

Common trap: Unfolding reverses the order of folds, even if the final count happens to be the same.

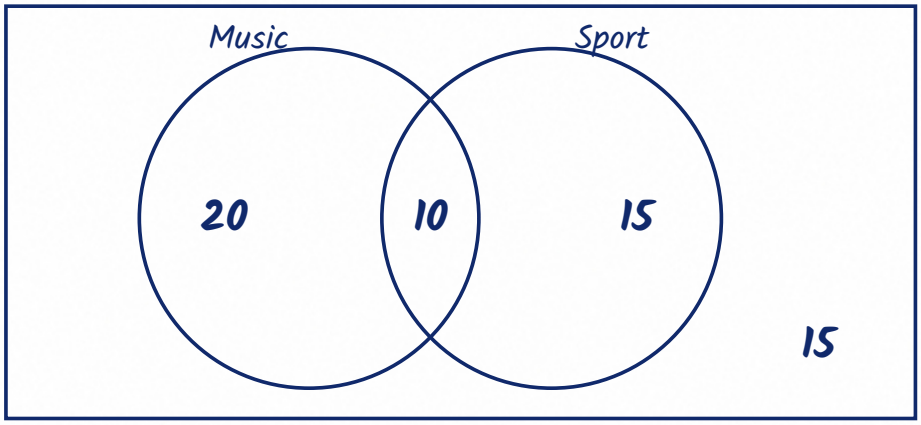
Quick check: How many holes would one such half-fold produce?

Check answer: Two.

Venn diagrams: reading regions and numerical set problems

Subtract the overlap once when counting the union

For two finite sets, the union size is|A|+|B|-|A intersect B|. Adding the two set totals counts every overlap member twice, so subtract the overlap once. Exactly one set means the two exclusive regions together, which equals|A|+|B|-2|A intersect B|. Neither equals the total universe minus the union. Keep inclusive set totals separate from exclusive region counts, and check that every region is nonnegative. The question's universe must contain all counted people before using a neither calculation. As a final audit, add the four disjoint region counts: 20+10+15+15=60. This checks that neither overlap nor outside members were lost or counted twice.



Universe 60; union 45; exactly one 35

Worked example: Among 60 people, 30 are in Music, 25 in Sport and 10 in both. Find at least one club, exactly one club and neither club.

Step 1: Union=30+25-10=45.
Step 2: Exactly one=30+25-2 × 10=35.
Step 3: Neither=60-45=15.

Answer: At least one 45; exactly one 35; neither 15.

Common trap: Do not write 30 in the Music-only region; 30 includes the ten in both.

Quick check: How many are in Music but not Sport?

Check answer: 20.

Calendar: repetition of calendars

Matching calendars need the same start and the same year type

Two complete Gregorian years have identical date-to-weekday calendars only if their 1 January weekdays match and both are common years or both are leap years. Matching the opening weekday alone is insufficient because an extra February day shifts every later date. To search for a repeat, accumulate the one-day or two-day shifts contributed by each completed year. Stop only when the total shift is a multiple of 7 and the candidate's leap status matches the original. 'Next' means no earlier candidate meets both conditions; verify intervening years rather than merely finding one future match.

Candidate	Cumulative shift	1 January	Type
2026	1	Thursday	Common
2027	2	Friday	Common
2028	3	Saturday	Leap
2029	5	Monday	Common
2030	6	Tuesday	Common
2031	7	Wednesday	Common

2031 matches 2025: Wednesday start + common year

Worked example: What is the next year after 2025 with the same complete Gregorian calendar as 2025?

Step 1: 2025 is a common year beginning on Wednesday.
Step 2: Shifts through the completed years 2025–2030 total 1+1+1+2+1+1=7.
Step 3: 2031 also is common; no earlier candidate has the matching start and type.

Answer: 2031.

Common trap: Calendar repetition is not always after a fixed six-year or eleven-year gap.

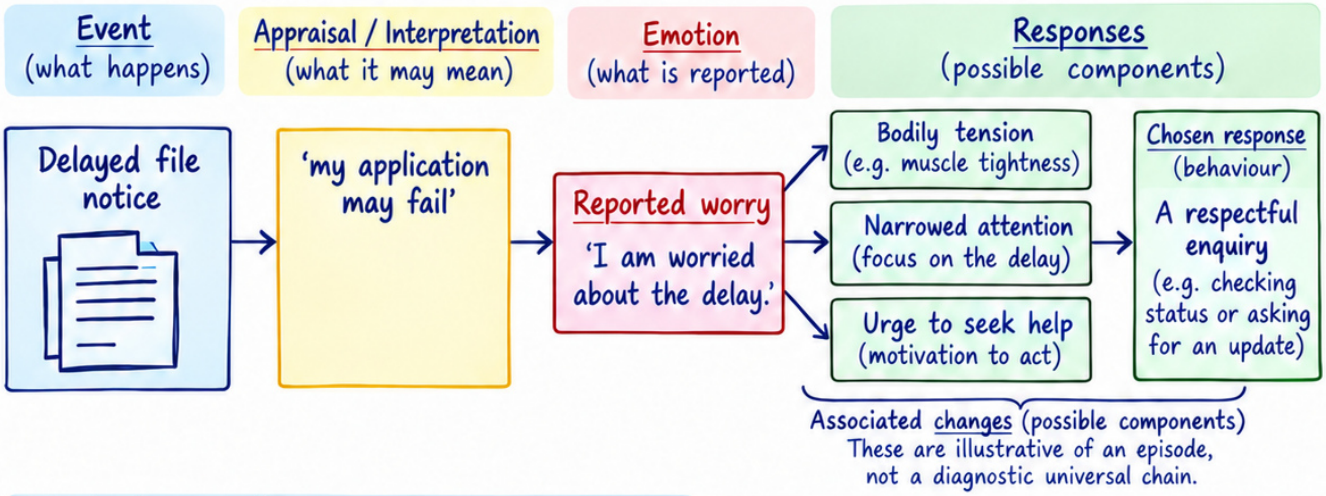
Quick check: Why is a total shift of seven acceptable?

Check answer: It returns 1 January to the same weekday.

Emotions: meaning and components

Separate the event, the emotion and the response

- An emotion is an episode involving coordinated changes in experience, appraisal, bodily activity, expression and readiness to act.
- Different theories emphasise different components; no single visible sign reveals the entire episode.
- A situation may be interpreted as a threat, loss, opportunity or unfairness, and that appraisal can influence the resulting emotion.
- Feeling angry is not identical to shouting: the feeling and the chosen behaviour must be distinguished.
- In an administrative case, first describe what is observed, then ask what the person reports and what the context suggests.
- Treat an inferred emotion as a hypothesis, not a diagnosis or a fact about character.



Worked example

An applicant says, 'I am worried about the delay,' while repeatedly checking a receipt. Which element is directly reported: emotion, motive or dishonesty?

Step 1: The applicant explicitly names worry.

Step 2: Receipt checking is observable behaviour, not proof of a hidden motive.

Step 3: The statement provides no evidence of dishonesty.

Answer: Emotion: worry.

Common trap

Do not convert a tense gesture into a certain claim about honesty or intent.

Quick check

Is feeling anger the same as behaving aggressively?

Answer: No; an emotion and a behavioural response are distinct.

Social intelligence: Thorndike and Goleman's model

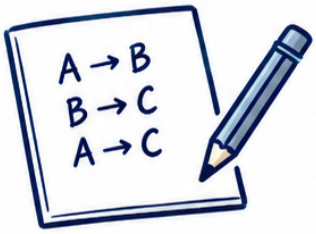
Social intelligence: understanding people in context

Thorndike discussed social intelligence in 1920 as an ability concerning understanding people and acting wisely in relationships. Distinguish this historical idea from abstract reasoning with symbols and mechanical work with objects. The categories describe different task demands; they do not prove that a person belongs to one permanent intelligence type. Social effectiveness also needs an ethical boundary: understanding another person is not permission to manipulate them. In a case question, identify what the person must understand and what action follows.

Abstract reasoning with symbols

↓

Solve relation using symbols



Mechanical work with objects (tools)

↓

Assemble mechanism



Interpersonal situation (social intelligence)

↓

Understand concern

↓

Appropriate response



Worked example

A technician can repair a printer but repeatedly gives unclear instructions to new colleagues. Which task demand needs attention when coordinating the team?

Step 1 Printer repair mainly concerns the mechanism.

Step 2 Coordination requires checking what colleagues understand and adapting explanations.

Step 3 One difficulty does not establish low overall intelligence or a fixed personality label.

Answer: The interpersonal or social demand of coordination.

Common trap

Technical competence, popularity and ethical judgement are different. Neither charm nor a test score automatically establishes all three.

Quick check

Does being quiet prove weak social intelligence?

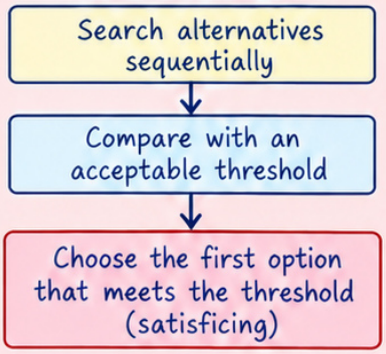
Answer: No. Quietness alone does not show how someone understands or responds to others.

Decision-making models and group techniques

Bounded rationality, incrementalism and mixed scanning

Simon's bounded-rationality account recognises limited information and processing capacity. Satisficing searches for an option meeting an accceptable threshold rather than proving a global maximum. Lindblom's incremental approach emphasises limited comparisons and successive adjustments. Etzioni's mixed scanning combines broad directional consideration with more detailed, incremental work. These are distinct accounts, not three names for careless guessing. The relevant model depends on how alternatives are searched and how the decision is structured.

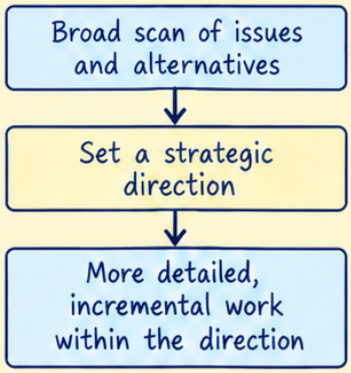
Simon: bounded rationality and satisficing



Lindblom: incremental approach

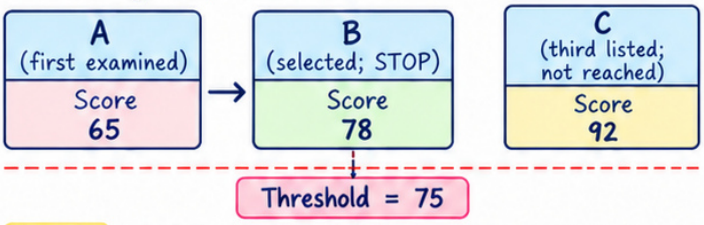


Etzioni: mixed scanning



Worked example: sequential satisficing

A simplified search examines A, B and C in that order and stops at the first score at least 75. Scores are 65, 78 and 92. Which is selected, and does that prove it has the highest possible score?



Step 1: A fails the threshold.

Step 2: B reaches it, so the stated search stops.

Step 3: C's higher listed score shows that satisfying the threshold differs from maximising this list.

Answer: B is selected; it is not the maximum-scoring listed option.

Key points from the example

- The search stops at the first option meeting the acceptable threshold (B with 78).
- A later option (C with 92) can have a higher score but is not selected.
- Satisficing finds an option that meets the threshold, not a global maximum.

Common trap

Satisficing still requires an acceptance criterion. Do not treat it as choosing randomly or ignoring all standards.

Quick check

Which model explicitly combines broad direction with incremental detail?

Answer: Etzioni's mixed scanning.

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