Cognitive verbs and constructing responses

The verb tells you what thinking to show

A cognitive verb is not an instruction about response length. It identifies the kind of thinking the response must make visible.

Instruction	Thinking to show	Useful self-check
Recognise or identify	Select the correct feature, fact or category.	Did I name the requested thing precisely?
Explain	Connect cause, mechanism and result.	Did I show how or why?
Determine	Reach a conclusion from supplied information.	Is my conclusion supported by the scenario or calculation?
Justify	Prove why a choice or conclusion suits this context.	Did I connect evidence to the claimed benefit or consequence?
Evaluate	Judge quality against relevant criteria.	Did I make and support a judgment?
Symbolise	Use the requested conventions to represent relationships.	Did I use the correct form and labels?

> **Avoid the definition dump:** a memorised definition may provide background knowledge, but it does not automatically answer the specific scenario or verb.

Same topic, different demand

Consider a booking system that stores passwords as readable text.

1. **Recognise** the main confidentiality vulnerability.
2. **Explain** how the vulnerability could affect users.
3. **Recommend** and **Justify** a suitable refinement.

Check your answer

1. The system stores readable passwords.
2. If the database is accessed without authorisation, the passwords are directly exposed and may also be used to enter users' other accounts.
3. Store a salted cryptographic hash for each password because it supports verification without retaining the original password in readable or decryptable form. This reduces direct disclosure if password records are stolen.

Read the whole instruction

Questions often combine a cognitive verb with a quantity, content focus, source and response form.

> **Evaluate** the interface to identify **two** useability principles that may cause errors. **Justify** each response using **evidence from the scenario**.

Turn that instruction into a checklist before writing:

- two different principles
- a judgment about each principle
- specific interface evidence for each
- an explanation of how each feature causes an error for the user.

Completing only the first verb leaves the reasoning unfinished. “Safety and effectiveness” identifies two principles but does not evaluate or justify them.

Decompose the instruction

Analyse the following instruction and write a four-item response checklist.

> **Recommend** one new system feature and one new hardware component that improve pedestrian safety. **Justify** both recommendations.

Check your answer

- Recommend one system feature.
- Explain how that feature improves pedestrian safety in the scenario.
- Recommend one hardware component.
- Explain how that component enables or improves the safety outcome.

Use evidence, not invented assumptions

Scenario evidence is the bridge between knowledge and a response. Select a detail, interpret its significance and connect it to the requested concept.

A useful chain is:

> **Because** [specific evidence], [event or mechanism] could [result], **which means** [consequence connected to the requested concept].

Worked example

A maintenance app lists jobs using random video file names and geographic coordinates. Workers recognise jobs by street name and report delays finding the correct record.

> **Weak:** The app has poor effectiveness because it is confusing.

Evidence-based: Because the list uses file names and coordinates rather than the street names workers recognise, they must translate each location before selecting a record. This delays successful job identification, so the interface has poor effectiveness for the stated task.

Relevant inference or invention?

A community app runs on one server and must remain accessible during an emergency.

Determine which statement is supported by the scenario.

1. The server will definitely fail because it is ten years old.
2. A failure of the only server could make the app unavailable when residents need it.
3. The developer forgot to install antivirus software.

Check your answer

Statement 2 is supported. The single server is evidence of a single point of failure, and emergency access establishes the consequence. The server's age and antivirus state were not supplied.

Explain by connecting cause and effect

An explanation reveals a relationship. It usually needs more than a description of separate facts.

Response move	Example for MFA
Name the relevant feature	MFA requires evidence from more than one authentication factor.
Show the mechanism	After a password, the user supplies a code from a registered authenticator app.
Connect to the result	A stolen password alone is insufficient, reducing unauthorised account access.

Words such as *because*, *therefore*, *so* and *which causes* can make reasoning visible, but the logic matters more than the connector.

Upgrade a description

The statement “A checksum is recalculated after transmission” describes an action. **Explain** how a checksum supports data integrity during transmission.

View a sample solution

The sender calculates a checksum from the data and sends it with the transmission. The receiver recalculates the checksum from the received data and compares the values. A mismatch reveals that the data changed or was corrupted, allowing it to be rejected or retransmitted rather than treated as accurate.

Justify a choice in context

A justification proves why a conclusion or recommendation is suitable. It should connect:

1. the scenario need, vulnerability or criterion
2. the specific choice
3. how the choice works
4. the resulting benefit, risk reduction or trade-off.

> **Test your justification:** Could the same sentence be pasted into almost any scenario? If so, it probably needs more specific evidence.

Worked comparison

A school app gives students, visitors and administrators identical access to personal records.

Recommendation only: Use role-based access control.

Recommendation with justification: Use role-based access control because the three user groups require different functions. Restrict visitors to public information, students to their own records and administrators to authorised management tasks. This applies least privilege and reduces unauthorised disclosure or alteration of personal data.

Choose and justify

A clinic must send patient results across an untrusted network. Staff need to read the original results at the destination.

Recommend either encryption or hashing as the main protection for the transmitted content, then **Justify** your choice and explain why the other option is insufficient by itself.

View a sample solution

Use encryption in transit because authorised staff must recover the original patient results while preventing an interceptor from reading them. Encryption transforms the results into ciphertext that requires the appropriate key to decrypt, protecting confidentiality across the untrusted network. A hash can help detect a changed message but is one-way and does not hide a transmitted plaintext result.

Evaluate against a criterion

Evaluation requires a judgment, not merely a list of strengths and weaknesses. Name or infer the relevant criterion, test the evidence against it and reach a conclusion.

> **Criterion:** what good performance means. **Evidence:** what the stimulus or result shows. **Judgment:** the extent to which the criterion is met. **Refinement:** a change that addresses the identified gap, when requested.

Worked evaluation

Criterion: A booking search should return the correct room within two seconds.

Evidence: Test 1 returned the correct room in 1.2 seconds. Test 2 returned the correct room in 3.8 seconds when 200 bookings existed.

Evaluation: The search is accurate in both tests but only partially meets the criterion because its response exceeds two seconds with the larger dataset. Indexing the searched database field should be investigated and the same large-data test repeated.

Make the judgment explicit

A mobile interface must allow outdoor workers to find a job without internet access. A test shows that previously opened jobs remain available offline, but unopened jobs display a blank screen.

Evaluate the interface against the criterion and **Recommend** a refinement.

View a sample solution

The interface only partially meets the criterion. Cached jobs can be found offline, but a worker cannot access any unopened job, so successful task completion depends on earlier use. Download the assigned job list and essential location details while connected, show when the data was last synchronised and provide a clear offline status rather than a blank screen.

Recommend a feasible refinement

A recommendation should address the diagnosed problem. “Make it more secure” or “improve the interface” does not say what must change.

Problem	Weak recommendation	Specific recommendation
Users accidentally delete records.	Make deletion safer.	Replace immediate deletion with archive and a time-limited undo action.
One server causes an availability risk.	Buy better hardware.	Use a replicated service with automatic failover and test recovery.
A shared administrator account hides responsibility.	Add passwords.	Give staff individual accounts, least-privilege roles and attributable audit logs.

Feasible does not mean perfect or unlimited. Consider the scenario's time, data, users, hardware, connectivity and existing components.

Symbolise in the requested form

Some responses communicate through conventions rather than prose. The verb and the named form both matter.

- **DFD:** use Gane–Sarson entities, numbered processes and stores, labelled directional flows, and valid connections.
- **Pseudocode:** use ordered, unambiguous logic with meaningful names and complete control structures.
- **Annotated mock-up:** show interface elements and explain their purpose, behaviour and connection to criteria.
- **Data dictionary or specification:** use the requested fields, types, formats, constraints and examples consistently.

> **Correct ideas in the wrong form may remain unclear:** prose describing a DFD does not symbolise one, and a polished screen without annotations may not explain how criteria are addressed.

Choose the response form

Match each demand to the main response form.

1. **Symbolise** data movement between a customer, payment process and orders store.
2. **Develop** an algorithm that totals valid sensor readings.
3. **Symbolise** and **Explain** interface features for reporting an error.

Check your answer

1. A data-flow diagram using the required notation.
2. Pseudocode showing input, validation, iteration, total and output.
3. An annotated interface mock-up that shows the controls and explains their behaviour and purpose.

Plan, write and check

Before writing

1. Box the cognitive verb or verbs.
2. Underline the quantity, topic and scenario limits.
3. Circle the requested response form or convention.
4. List the evidence and make a checklist for compound demands.

While writing

1. Lead with the requested conclusion, feature or judgment.
2. Use precise subject terminology.
3. Connect evidence to a mechanism and consequence.
4. Keep each part traceable to the instruction.

Before finishing

1. Tick every demand, quantity and required source.
2. Remove repetition that adds no reasoning.
3. Check diagram, pseudocode or table conventions.
4. Confirm that pronouns such as *it* have an unambiguous meaning.

Independent practice: event-alert system

A community event app sends severe-weather alerts. Consider this evidence:

- Alerts are displayed only as red text at the bottom of the home screen.
- Every volunteer uses one shared administrator account.
- Weather data is updated every 30 minutes.
- The criterion states that a severe warning must be visible and announced within five minutes of receipt.
- In a test, a warning arrived from the weather service at 14:02 and appeared in the app at 14:28. No sound or notification was produced.

On paper, complete all three responses.

1. **Evaluate** the alert interface against accessibility and the timing criterion. Use evidence to support both judgments.
2. **Determine** one confidentiality or integrity risk created by the account design and **Justify** your conclusion.
3. **Recommend** two specific refinements: one for the alert interface and one for account access. **Justify** each recommendation.

View a sample solution

1. The interface has weak accessibility because severity is communicated only with red text, which some users may not distinguish, and the bottom-screen position may be

missed. It also fails the timing criterion: the warning received at 14:02 appeared at 14:28, a delay of 26 minutes rather than no more than five minutes, and was not announced.

2. The shared administrator account creates an integrity risk because any volunteer can change alert data and the action cannot be reliably attributed to an individual. Incorrect or malicious changes may therefore be harder to detect and investigate.
3. Use an interruptive alert containing a warning symbol, text heading and optional sound or device notification, triggered when the warning is received rather than at the next 30-minute refresh. Multiple visual and audio cues improve accessibility and allow the five-minute criterion to be met. Replace the shared account with individual authenticated accounts and role-based permissions so volunteers receive only necessary access and actions can be attributed, reducing unauthorised changes.

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