

Learner workbook

81 workplace cases and method lessons / 169 pages. Select a chapter or use PDF bookmarks. Online links open the related lesson.

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Learner workbook

Write, calculate, compare and plan a small test.

OPEX LEARNING RESOURCES / FICTIONAL TEACHING CASES

Use these blank practice sheets to make your reasoning visible. Complete the selected case first; consult the separate answer key afterwards.

13 workplace cases and 68 detailed method lessons. One habit: make the condition clear, choose a useful test and verify the response.

Use this resource with the individual OPEX sample reports and the separate teaching cards. Existing case figures are authored examples. Additional calculations are marked new fictional exercises. Blank records must be completed from an actual authorized observation or a clearly labelled role-play.

Evidence stays separate. A generated image, posted checklist or filled training sheet does not establish a completed improvement, safe operation or a Sustain score.

Read the case, use the practice, then take one bounded next step with the people doing the work. Preserve approved work, privacy and technical controls.

[Open the OPEX example library](#) | [Open the training library](#)

Choose a case and declare the evidence

BLANK LEARNER RECORD / no completed observations or achieved results supplied

Learner / group / date

Record who is completing the exercise.

Selected case and customer purpose

Write the case ID and the outcome you want to understand.

Data status

Circle or write: existing synthetic case / new fictional exercise / authorized actual observation.

Scope and controls

Define the task/request, boundary, permissions and required local controls.

Prediction and learning question

What do you expect, what could challenge it, and what decision will the evidence support?

Stop the recurring leak

8D + cause verification

BLANK CASE WORKSHEET / MANUFACTURING-8D

Your task: Separate containment, correction and verified corrective action.

D0-D2 / scope, team and problem

Define product family, defect, period, count and accountable roles.

D3 / interim containment

Bound suspect material and name release authority; do not invent a technical test.

D4 / occurrence and escape

Write one possible occurrence cause and one possible escape cause.

D5-D6 / permanent action and effectiveness

State the evidence needed before selection, the pilot and later validation.

D7-D8 / recurrence prevention and closure

Name the standard/related work to review and the evidence required before closure.

Explain before checking the answer: A fixture association is visible. Is that enough to select permanent corrective action?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Make referrals ready

A3 thinking + administrative gemba

BLANK CASE WORKSHEET / HEALTHCARE-A3

Your task: Build an A3 whose proposed countermeasure follows from the observed gap.

Purpose and current condition

State the administrative customer need and the 62/100 readiness gap.

Target and balance

Separate the 90% readiness goal, 2-business-day goal and reopened-case ceiling.

Analysis: observed vs possible

Write one observation, one explanation and one unknown.

Countermeasure and bounded trial

Describe one-channel test and the prediction.

Follow-up and decision

Name measures, owner, review point and retain/revise criteria.

Explain before checking the answer: Which A3 link is missing if the team proposes a new intake form without observing rework?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Send the right shipment

DMAIC + measurement + control

BLANK CASE WORKSHEET / LOGISTICS-DMAIC

Your task: Define an error-containing shipment, use patterns to choose a test and write a reaction plan.

Define / unit and customer need

Specify one shipment and what qualifies as a counted error.

Measure / recording rule

State denominator, period, duplicate handling and classification check.

Analyze / clue and test

Use the location association to propose a fair comparison.

Improve / bounded trial

Predict a result and specify what stays comparable.

Control / signal, owner, response

Track error and throughput; define investigation/escalation without invented control limits.

Explain before checking the answer: If one shipment has two errors, can it be counted twice in the 4% shipment measure?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Find it. Use it. Reset it.

6S + routine + replenishment

BLANK CASE WORKSHEET / HOSPITALITY-6S

Your task: Turn an organized pantry into a usable reset and replenishment routine.

Find, use and return

Describe the chosen item, its identified home and correct return condition.

Clean and inspect

Name a visible abnormal condition and the response owner.

Reset standard

Write opening/handover steps and an exception response.

Repeated checks

Define what, when and who records a missed reset and verifies recovery.

Replenishment rule

Define usable on-hand, on-order, backlog, trigger, quantity and pack rule.

Explain before checking the answer: What would distinguish a completed tidy-up from evidence of Sustain?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. **Case**

Shorten the handoffs

Lean + VSM + office flow

BLANK CASE WORKSHEET / SERVICES-VSM

Your task: Map waiting, processing and information returns across the whole request route.

Customer and boundary

Define request family, start, finish and required decisions.

Current route

Use the map grid to record queues, touch time and information returns.

Future-state hypothesis

State one release/readiness change and why it may reduce total waiting.

Pilot record

Define arrival, start, completion, return and quality fields.

Learning decision

State how you would know waiting was removed rather than moved.

Explain before checking the answer: Does 36 minutes of touch time mean 36 minutes of customer value?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Make tomorrow ready

Daily management + gemba + escalation

BLANK CASE WORKSHEET / CONSTRUCTION-DAILY-MANAGEMENT

Your task: Run a short huddle that produces a verified response to a real constraint.

Yesterday / plan versus actual

Record due and completed counts without changing the denominator.

Today / current readiness

Name the commitment, completion condition and missing prerequisite.

Tomorrow / constraint removal

Assign the owner, due point and evidence needed.

Escalation / receiving response

State the trigger, receiving leader and expected response.

Verification / close or reopen

Record who checks effect and what happens if the condition persists.

Explain before checking the answer: When is an issue closed: when an owner is assigned, or when the response is verified?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Make the morning easier

6S through a small PDCA experiment

BLANK CASE WORKSHEET / CAFE-RESET

Your task: Run one bounded PDCA test and teach the reset to another shift.

Plan / prediction

Choose one shelf/task, define start/finish and predict the change.

Do / small trial

Name scope, people, period and existing handling controls.

Check / observations

Use the ten-task sheet; compare time, wrong selections and refill effort.

Act / decision

Explain keep, adapt or abandon and the next test.

Teach-back / repeat

Write three reset steps and ask a colleague to demonstrate the exception response.

Explain before checking the answer: The shelf looks better but no one timed the task. Which part of the cycle is still missing?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Give the request a clear next step

Office management + ownership + pull

BLANK CASE WORKSHEET / OFFICE-HANDOFF

Your task: Trace five requests and make the next owner, readiness and blocked work visible.

Request family and counted transfer

Define start/finish and what counts as a handoff.

Ready and accepted completion

Write entry/exit conditions and required decisions.

Visible ownership

Use the five-request trace; name next owner and receiving acknowledgement.

Capacity and blocked work

Define the proposed pull/ageing rule and escalation; do not invent a universal WIP limit.

Small trial and review

Choose one change and check completion, rework and effort.

Explain before checking the answer: Does putting every incoming request into In progress create flow?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. **Case**

A tool room ready for the next job

Tool readiness + clean/inspect/respond

BLANK CASE WORKSHEET / CNC-TOOL-ROOM

Your task: Connect a tool-return standard and authorized condition observation to a verified response.

Tool readiness

State identity, status and correct ready/hold home.

Observe normal and abnormal

Record fact, time/condition and unknowns; avoid diagnosing from the photograph.

Authorized operator check

State only trained accessible-area checks and the boundary.

Maintenance response

Name receiving role, required response and work/reference record.

Verify recurrence

Define comparable operating conditions, observation window and result field.

Explain before checking the answer: Where should a tool go if its identity is known but its verification status is uncertain?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Give the press area a clear reset

Preparation readiness + TPM/OEE

BLANK CASE WORKSHEET / EXTRUSION-PRESS

Your task: Separate preparation readiness from changeover time, then explain equipment losses using declared boundaries.

Preparation boundary

Define search start/finish and identify what remains technical changeover.

Ready/hold kit

Record job/die identity, required item, verification and missing-item response.

Equipment condition record

Note condition, trend, open defect, work due and accountable role.

Response and verification

Separate operator care from authorized maintenance and define follow-up.

Loss question

Use the OEE worksheet; choose a loss question, not an unsupported diagnosis.

Explain before checking the answer: Does meeting the 4-minute search goal prove a 4-minute changeover?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Make the welding bay ready to work

Kit standard + quality at source

BLANK CASE WORKSHEET / FABRICATION-WELDING

Your task: Design and test a kit identity cue and an abnormality response at the source.

Requirement and error

Define correct fixture/consumable identity and one wrong/missing condition.

Proposed prevention or detection

Describe the cue/check and label what it is intended to do.

Challenge test

Predict success and an example that could defeat the mechanism.

Abnormal response

Write hold/help/verification/release responsibilities.

Follow-through

Record repeat checks and the learning decision; preserve approved welding controls.

Explain before checking the answer: How does a shaped fixture location differ from a final visual inspection?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Keep the assembly line ready for the next frame

Part readiness + synchronized flow + yamazumi

BLANK CASE WORKSHEET / WINDOW-ASSEMBLY

Your task: Connect consumption, replenishment information and verified parts; test a work-balance hypothesis.

Consumption and signal

Name item, pack, signal trigger and how the request returns upstream.

Verified refill

Define responding owner, correct material and full-lane response.

Work definition

Separate component-search time, human work content, cycle and takt.

Balance hypothesis

Use the yamazumi sheet; transfer only E4 and list feasibility checks.

Release rhythm

Use the heijunka sheet; connect agreed mix to pull and replenishment.

Explain before checking the answer: Which arrow carries the request to replenish, and which carries the parts?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

A clearer start for every cut order

Stock identity + FIFO + SMED

BLANK CASE WORKSHEET / SAW-CUTTING

Your task: Keep stock identity through FIFO and distinguish safe external preparation from controlled change work.

Stock/FIFO rule

Define identity, entry, exit, capacity and oldest-item/exception rule.

Return decision

Separate identified usable return, unresolved hold and authorized scrap.

Observe the change

Define last-good to first-good boundary; list task and current machine state.

Internal/external proposal

Identify only safely authorized external preparation; record who decides.

Verify first good output

Name technical acceptance owner and checks; keep trial duration unfilled.

Explain before checking the answer: What happens when the FIFO lane is full?

Use a separate sheet for evidence or calculations. Results stay unverified until actual checks support them. [Case](#)

Turn a hypothesis into a test

BLANK CAUSE-TEST CARD / supports 8D, A3, DMAIC and fabrication

Observation and conditions

What was seen/measured? Include unit, denominator, period and relevant context.

Possible explanation and prediction

If this explanation is useful, what should happen under the test?

Comparison and measurement

What will stay comparable? What is varied? How is the result recorded?

Contrary evidence

What result would challenge the explanation? What alternatives remain?

Result, decision and next test

Leave future results blank until observed. Name the owner and next review.

Observe ten comparable tasks

BLANK TIMING RECORD / use for a new trial; do not invent history behind a case summary

Task boundary and conditions

Start event / finish event / units / task family / operator or shift conditions

Task	Elapsed time + unit	Wrong/missing item?	Condition / exception

Summary and comparison

Report complete sample, chosen summary, exceptions and balancing measure.

Decision and next check

What do the observations support? What is still unknown?

Trace five requests

BLANK REQUEST RECORD / use extra copies for additional transfers within a request

Family, boundary and counted handoff
Define arrival, accepted completion, required decisions and a counted transfer.

Request ID	Next owner / transfer reason	Arrival / work / finish times	Wait, rework, acknowledgement

Whole-route pattern
Where did work wait or return? Which control must remain?

Proposed test and balance
What small change will you try, and how will you check completion and rework?

Map work, waits and information returns

BLANK ROUTE MAP / service or physical flow within a defined family

Customer and boundary
Name start, finish, required outcome and clock/calendar convention.

Stage / owner	Queue time + unit	Touch time + unit	Return / release signal

Current total and unknowns
Convert units consistently. Identify estimates versus actual measurements.

Future hypothesis and verification
Record one change, predicted mechanism, actual pilot data needed and quality/workload balance.

Explain equipment losses with OEE

NEW FICTIONAL EXERCISE / blank calculation and interpretation sheet

Declared input	Value
Planned production time / run time	450 / 360 min
Ideal cycle / total count	0.5 min per unit / 600 units
First-pass good count	570 units; excludes reworked output

Calculate availability, performance and quality

Write each formula, units, numerator and denominator.

Calculate OEE and cross-check

Multiply factors and compare with first-pass-good x ideal cycle / planned time.

Reconcile equivalent minutes

Identify stopped, speed-loss, quality-loss and fully productive minutes.

Interpret and choose the next question

Which evidence would distinguish possible causes? Why is this not measured press-case OEE?

Balance identified work elements

NEW FICTIONAL EXERCISE / 400 net minutes and 300 units demand; no measured case cycle time

ID / element	Seconds	Current station
E1 / Position frame	30	1
E2 / Prepare corner kit	25	1
E3 / Confirm fixings	20	1
E4 / Return empty tote	10	1
E5 / Prepare seal kit	25	2
E6 / Check component identity	20	2
E7 / Record job reference	20	2
E8 / Check frame readiness	30	3
E9 / Confirm kit identity	20	3
E10 / Acknowledge handoff	10	3

Proposed change: move only E4, returning the empty tote, from station 1 to 2. Keep every other assignment and duration. Actual feasibility remains unverified.

Takt and station totals

Calculate takt, current totals, proposed totals and conserved total work.

Stack the IDs and challenge the move

Sketch element stacks on the blank chart page that follows. List precedence, walking, access, skill, machine-overlap and quality checks.

Learning decision

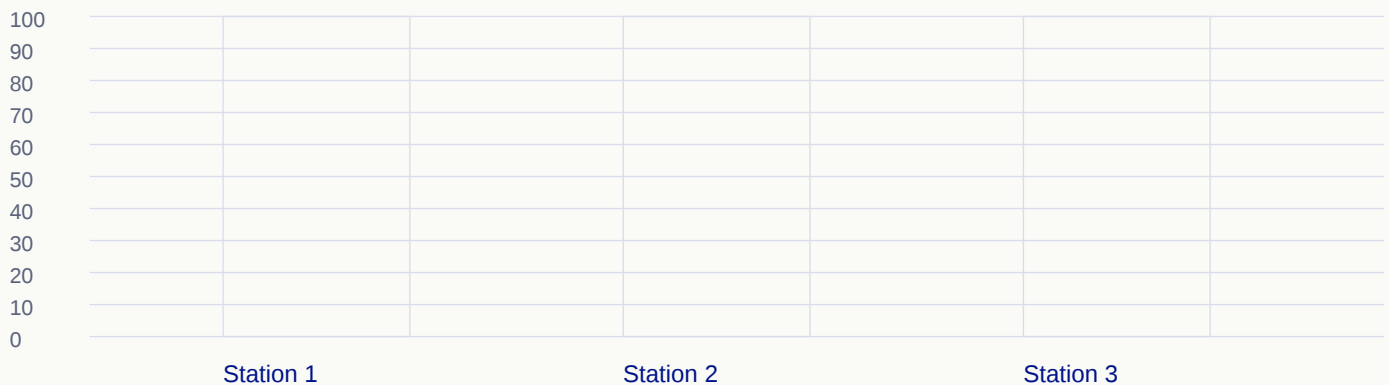
Why are bars below takt insufficient to claim stable performance or a staffing change?

Draw the yamazumi before and proposed trial

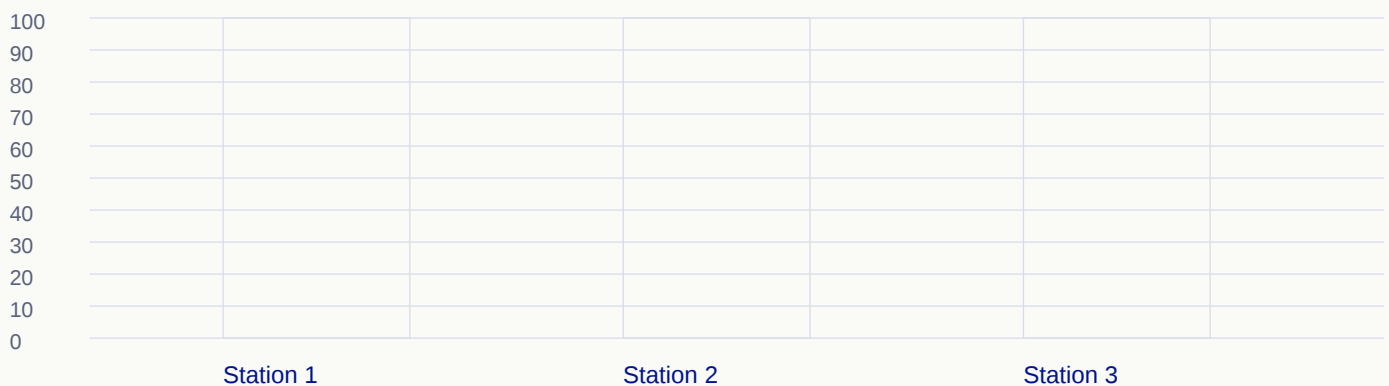
BLANK ELEMENT-STACK CHART / use the ten fictional element IDs from the preceding sheet

Mark the takt line, stack every element ID with its duration and show only the proposed E4 transfer. Keep the same scale for both charts.

CURRENT ASSIGNMENT / SECONDS



PROPOSED ASSIGNMENT / SECONDS



Total work / takt / transfer check

Identify any omitted or duplicated element and explain the proposed change.

What could make the transfer infeasible?

Record constraints that must be tested before accepting the new method.

Act on a declared min-max rule

NEW FICTIONAL EXERCISE / continuous review; no pack-rounding constraint in this exercise

Input / rule	Value
Usable on-hand / confirmed on-order	34 /6 units
Unfilled demand / backlog	0 units
Reorder trigger	Inventory position at or below 40
Target maximum	70 units

Inventory position

Write the formula including usable stock, confirmed orders and unfilled demand.

Order decision

Is the trigger met? What additional quantity restores position to the maximum?

Challenge the settings

What demand, lead-time, variation, expiry or pack-policy information is needed locally?

Response and next verification

Who authorizes/refills, how is identity checked and how are duplicate orders avoided?

Level release at a visible pitch

NEW FICTIONAL EXERCISE / 400 net minutes, 300 units; demand 180 A and 120 B

Assume a feasible 6-unit pack and a repeating A-A-B-A-B sequence. Setup and capacity must support the mix. Work from the 80-second takt you calculated; do not independently push every station.

Pitch and one sequence

Calculate minutes per pack and time/units in five release slots.

Ten repeats

Calculate A/B pack counts, A/B units, total units and total release time.

Draw the release sequence

Mark product, pack size and time for each of five slots; repeat only if assumptions hold.

Link to replenishment

Which downstream use authorizes upstream refill? What happens if material or capacity is not ready?

Check the boundary

Why does leveling not authorize unwanted output or conceal actual demand variation?

Separate elapsed time from work effort

NEW FICTIONAL OFFICE EXERCISE / blank scheduling calculation

Six ready requests; three sequential stages; one dedicated specialist per stage; 2 minutes per request at each stage. All requests arrive at time 0. No setup, travel, defects, rework or variability. Specialists can work concurrently.

Transfer policy	First complete	Last complete	Person-minutes

Row 1: transfer all six together. Row 2: transfer one request whenever it is ready.

Sketch three specialist lanes

Mark when each stage can start and finish under both transfer policies.

Explain the difference

Which waiting is reduced? Is any processing effort removed?

Challenge the assumptions

What real office conditions, controls and priority exceptions could change the result?

Take one learning cycle back to work

BLANK TRANSFER PLAN / agree the trial with the responsible local team

Purpose and one bounded change

What customer/workplace gap will you address?

Prediction and observation plan

What do you expect and how will you measure it?

People, controls and response

Who owns the trial, who must agree, and what makes you stop or escalate?

Review point and receiving partner

Agree date/condition, evidence to bring and who will challenge the reasoning.

What happened / what next

Complete only after the test. Retain, adapt or abandon with a reason.

Practise with a changed case

The busy office with an incomplete order

Separate fictional case: a quotation team drafts 30 quotes for 24 customer requests. Only 18 complete quotes can be issued; six lack approved freight information. A manager suggests another drafting shift.

Evidence	Value
Requests due	24
Draft documents	30
Complete issued quotes	18
Missing freight approvals	6

Your task

1. Calculate the customer gap and identify which local measure is misleading.
2. Draw the missing information handoff and name its response owner.
3. Propose a small test and two outcome checks before adding drafting capacity.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

The busy office with an incomplete order

Customer outcome and gap

Material or information dependency

Quality/approval condition

Trial prediction and owner

Observed result / next decision

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A different weekly pattern

Fictional warranty desk: arrivals are 12 per day, releases are 0, 0, 20, 20, 20, and sustainable capacity is 15 per day. There is no initial backlog.

Day	Release
Monday	0
Tuesday	0
Wednesday	20
Thursday	20
Friday	20

Your task

1. Calculate end-of-day queues from Wednesday through Friday.
2. Distinguish actual arrivals from internal release and explain the overburden risk.
3. Propose a test using the 12-per-day arrival pattern and state what still requires observation.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different weekly pattern

Daily arrivals and releases

Capacity assumption

Queue at each day end

Proposed rule and exception

Quality and workload evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed demand and measured order

Separate fictional case: 360 net minutes, 240 required units; five observed process intervals are 82, 88, 94, 86 and 90 seconds. Order K is accepted Monday at 09:00 and completes Tuesday at 15:00. Use elapsed calendar hours.

Input	Value
Net time / demand	360 min / 240 units
Observed intervals	82, 88, 94, 86, 90 sec
Order K start	Monday 09:00
Order K finish	Tuesday 15:00

Your task

1. Calculate takt and the sample mean cycle interval.
2. Calculate the declared order lead time.
3. Explain why the five observations do not prove reliable capacity against demand.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed demand and measured order

Net-time conversion

Takt and units

Observed intervals and mean

Order boundary and elapsed time

What remains unverified

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Four requests with a longer step

Separate fictional simulation: four requests, three dedicated workers, each step takes three minutes. All requests are ready at zero and the same no-travel/no-variation assumptions apply.

Input	Value
Requests	4
Stages	3
Time per stage	3 min
Staffing	One dedicated worker per stage

Your task

1. Draw both the full-batch and immediate-transfer schedules.
2. Calculate first completion, last completion and person-work for each.
3. Explain why combining all work under one person invalidates the overlap calculation.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Four requests with a longer step

Request/stage start and finish

First completion

Last completion

Person-minutes

Staffing and feasibility assumptions

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Two requests and one duplicate

New fictional case: card W11 and card W12 each request eight clips K8 for cell D1. A photocopy of W11 arrives in the same collection batch. Container H31 and H32 each hold eight verified K8 with P31/P32; H33 holds eight K8 on quality hold.

Input	Status
W11	Outstanding; 8 K8
W12	Outstanding; 8 K8
Copy of W11	Same identity; not another authorization
H31 / H32	Eligible; P31 / P32 attached
H33	HOLD; P33 controlled

Your task

1. Complete a trace for the two valid deliveries and their replacement signals.
2. Calculate the authorized replacement quantity and identify the duplicate handling.
3. Explain what changes if H32 becomes held before exchange.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Two requests and one duplicate

Request identity and validity

Selected container / quality status

Returned production signal

Authorized quantity with units

Blocked request, owner and next evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A larger limit with an apparent empty lane

Separate fictional case: active limit four, with S1 and S2 progressing and S3/S4 blocked. S5 is ready. S2 later completes with accepted output.

State	Evidence
Initial active work	2 progressing + 2 blocked
Limit	4, including blocked
Ready	S5
Later event	S2 accepted complete

Your task

1. Decide whether S5 may start at the initial review.
2. Show the count before and after S2 completes and S5 is pulled.
3. Name one useful blocker response and one unacceptable way to make a slot.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A larger limit with an apparent empty lane

Counted states and limit

Admission decision

Real completion evidence

Blocker owner / next check

Exception, if any

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

An A/B pattern with another pack size

Separate fictional line: 360 net minutes, demand for 80 A and 160 B, four units per pack. Test the repeated pattern A, B, B.

Input	Value
Net time / demand	360 min / 240 units
Pack size	4 units
Proposed pattern	A, B, B

Your task

1. Calculate takt and pitch.
2. Calculate the required repeats and each product total.
3. Name the operating evidence required before approving the sequence.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

An A/B pattern with another pack size

Takt with units

Pitch with units

Pattern quantity and repeats

A/B reconciliation

Feasibility evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Choose the connection for a repair service

Separate fictional repair center: unique customer instruments wait for an off-site calibration slot. Standard packing inserts are consumed repeatedly. Final label verification occurs beside packing and can receive one completed instrument at a time.

Route	Condition
Repair > calibration	Unique units; no immediate transfer
Inserts > packing	Repeat consumption
Verification > packing	Adjacent and ready for single units

Your task

1. Choose a provisional connection for each route and explain why.
2. Define a full-queue response for the unique instruments.
3. State one fact that would make you reconsider each choice.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Choose the connection for a repair service

Identity and variety

Feasible direct connection

Sequence or replenishment rule

Limit and full response

Evidence that could change the design

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Audit a chart for another cell

Separate fictional cell specifies takt 75 seconds and three standard units: two at the machine and one at the exit position. Its draft chart shows two units in total, reports cycle as 75 without observations, and omits return travel.

Requirement	Draft problem
Stock	Machine 2 + exit 1; drawing shows 2 total
Takt	75 sec/unit
Cycle	Copied as 75; no measurement
Movement	Return path absent

Your task

1. Correct the stock count and timing labels.
2. List the missing route and operating evidence.
3. Explain what must happen before the revised drawing becomes the taught method.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Audit a chart for another cell

Stock by location / total

Takt versus measured cycle

Complete operator route

Required checks and response

Revision and demonstration evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Another machine and task pair

Separate fictional model: load 8 seconds, automatic process 24 seconds after loading, separate task 16 seconds during automatic operation, unload 6 seconds. No walking is included and overlap is declared permitted for the desk exercise.

Activity	Duration
Load	8 sec
Automatic	24 sec
Separate manual task	16 sec
Unload	6 sec

Your task

1. Draw the resource lanes and label all start/finish times.
2. Calculate manual content, automatic duration, operator waiting and elapsed sequence time.
3. State two real-world facts that could invalidate the proposed overlap.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Another machine and task pair

Common time origin

Resource lane intervals

Manual / automatic / waiting totals

Elapsed completion

Unverified access or task readiness

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Demand changes before approval

Separate fictional planning exercise using the same E1-E10 durations: net time remains 400 minutes but demand rises to 320 units. E4 remains the only provisionally movable element. A trial then observes E4 taking 12 seconds at operator 2 instead of 10, with all other supplied elements unchanged.

Changed input	Value
Net time	400 min
Demand	320 units
Original allocation	85 /65 /60 sec
Paper transfer	E4:10 sec from 1 to 2
Trial E4 at 2	12 sec; other elements unchanged

Your task

1. Calculate the new takt and paper-proposal totals/margins.
2. Recalculate operator 2 and total work under the 12-second observation.
3. Decide what can be concluded and specify the next trial evidence.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Demand changes before approval

Takt calculation with units

Before and proposed element stacks

Trial change and revised totals

Constraint/quality checks

Adopt, adapt or stop with evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A print configuration change

Separate fictional printer changeover has five steps: stop, obtain verified job artwork, perform the approved stopped setup, produce a proof and obtain proof acceptance. The team proposes obtaining artwork before the stop and removing proof acceptance.

Proposal	Evidence
Artwork preparation before stop	May be feasible; verification required
Stopped setup	Approved stopped condition required
Proof acceptance removed	No authority supplied
Measured durations	Not available

Your task

1. Classify the candidate external preparation and retained internal work.
2. Correct the proposed sequence without deleting the acceptance boundary.
3. Write what must be measured to support an improvement claim.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A print configuration change

Start/finish definition

Internal/external classification

Readiness evidence

Accepted first output

Comparable timing record

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Another item with an inaccurate total

Separate fictional pantry item: 18 usable sachets, six damaged sachets and 24 confirmed on order. Prior refill delays are one and three working days, with consumption of 10 and 28 sachets during those intervals.

Input	Value
Usable / damaged	18 / 6 sachets
Incoming	24 sachets
Delay/consumption pairs	1 day / 10; 3 days / 28

Your task

1. Reconcile available-now stock and state what the 48-item sum conceals.
2. Explain why "keep 28" is not a fully supported service policy.
3. Name the next evidence and a record-control check.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Another item with an inaccurate total

Stock by eligibility/status

Complete delay boundary

Paired consumption

Service and order constraints

Parameter decision and owner

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A bag-size change for fasteners

Separate fictional route: part F9 has a recorded 25 fasteners per bag. Approved new packaging contains 30. A replenishment instruction still says four bags, intended as 100 pieces.

Input	Value
Old pack	25 pieces/bag
Approved new pack	30 pieces/bag
Old route quantity	4 bags; intended 100 pieces

Your task

1. Calculate what four new bags deliver and the difference from the old intent.
2. List the dependent route fields that need review.
3. Explain why choosing three or four bags is an owner decision rather than an automatic rounding rule.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A bag-size change for fasteners

Identity and approval evidence

Old/new pack quantities

Pieces delivered versus intent

Stock/handling/trigger effects

Revised instruction and receipt check

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A labeling confirmation fails

Separate fictional packing line: unit P24 has an unreadable verification result. P20 is the last unit with confirmed acceptance; P21-P24 have been produced since. An operator resets the light.

Input	Value
Last verified unit	P20
Signal unit	P24
Intervening units	P21, P22, P23, P24
Display status	Reset; no verification result

Your task

1. Identify the potentially affected range without calling all items defective.
2. Write the next response and restart evidence.
3. Explain why the reset alone cannot release the range.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A labeling confirmation fails

Observed condition and identity

Last verified boundary

Potentially affected units

Authorized verification/disposition

Operator feedback and recurrence check

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Prevent a missing washer

Separate fictional assembly uses a fixture pocket intended to prevent the next step unless a washer is present. A camera alternative flags a missing washer but only shows a message; downstream release is unaffected.

Option	Declared behavior
Fixture interlock	Intended to prevent next step without washer
Camera	Detects absence; warning only
Current validation	Present-washer case passed

Your task

1. Classify the intended mechanisms and state what is still unproven.
2. Write challenge cases for an absent washer and a control fault.
3. Explain whether the warning-only camera establishes prevention of escape.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Prevent a missing washer

Defined error and escape point

Mechanism classification

Expected / actual challenge result

Fault-state response

Scope and retest trigger

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

An unsigned handoff

New fictional office case: four handoff records lack receiver acknowledgment. The sender says the receiver forgot; the receiver says the notification never arrived. No delivery log has been checked.

Evidence	Supplied status
Four missing acknowledgments	Observed
Notification sent	Sender assertion only
Notification received	Unknown
Receiver forgot	Hypothesis, not verified

Your task

1. Separate observed facts from hypotheses.
2. Write a test that distinguishes notification failure from acknowledgment failure.
3. Explain what result would challenge your preferred explanation.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

An unsigned handoff

Specific gap and expected handoff

Causal claim / status

Prediction under each explanation

Test and evidence source

Revised claim / next action

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Choose the work that remains

New fictional dispatch team: a missing printer roll stops labels, and the approved replenishment procedure restores printing. Records show no earlier roll shortage. Meanwhile address errors occur every Friday despite repeated rework, and the team wants to reduce a reliably met two-day dispatch standard to one day.

Case	Supplied evidence
Printer roll	First recorded shortage; known refill procedure
Address errors	Five Friday recurrences; cause untested
Faster dispatch	Current 2-day standard met; new 1-day aim
Ambiguous complaint	Customer says late; promised date not recorded

Your task

1. Assign the initial learning route for each case and justify it using the reference condition.
2. State what would change your choice for the printer-roll case.
3. Write the next owner/evidence handoff for the recurring address errors.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Choose the work that remains

Case / current reference

Observed gap or unknown

Immediate response

Learning route and why

Evidence that could change the route

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Same percentage, different burden

New fictional comparison: team C has 12 error-containing cases among 240 and D has 8 among 160 in one week under a shared definition.

Team	Error cases	All cases
C	12	240
D	8	160

Your task

1. Calculate each rate and the combined rate.
2. Explain whether the counts alone justify claiming C performs worse.
3. Specify one useful next breakdown and its required fields.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Same percentage, different burden

Numerator definition / period

Rate calculation with denominator

Comparison and limitation

Next stratum / fields

Focused observation owner

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A spreadsheet beside the queue

New fictional office visit: an analyst checks a private-looking spreadsheet before assigning requests. It contains skill availability absent from the queue screen. Its access permissions and update ownership are unknown.

Observed / known	Unknown
Spreadsheet consulted before assignment	Who maintains it?
Queue screen omits skill availability	What approved source should provide it?
Assignment needs a qualified receiver	Is the spreadsheet accurate and appropriately accessible?

Your task

1. Write two observations and two interpretations to avoid.
2. Ask a question that reveals the decision the spreadsheet supports.
3. Define support and return evidence without endorsing uncontrolled data handling.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A spreadsheet beside the queue

Observed sequence

Question / colleague explanation

Unanswered accuracy or access issue

Approved support owner

Return observation and decision

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

An office reminder has not changed the handoff

New fictional service team: owner Mara installed a reminder for request handoff. At review, two requests still lack a receiving acknowledgment. Mara says she can make the reminder larger. The receiving team has never agreed who confirms receipt, and its supervisor has not joined the trial.

Fact	Evidence
Target	Each handoff has an identified receiver and acknowledgment
Implemented	Reminder posted
Observed	Two requests without acknowledgment
Missing prerequisite	Receiving role agreement
Leader authority	Can convene the other supervisor; cannot invent results

Your task

1. Write two coaching questions that expose prediction versus observation.
2. Complete a commitment naming owner, leader support, trial and review evidence.
3. State the response if the other supervisor again does not provide the agreed support.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

An office reminder has not changed the handoff

Current condition / predicted change

Owner's next experiment

Leader's support commitment

Review time and evidence

Overdue or failed-prerequisite response

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A partly successful response

New fictional team planned 15 complete referrals and has 11. Three await a receiving acknowledgment; one has incomplete information. At review, two acknowledgments arrive and are verified; the third and the incomplete case remain unresolved.

State	Count
Plan / initial actual	15 / 11
Acknowledgment blockers	3
Incomplete information	1
Verified newly ready	2

Your task

1. Reconcile initial and revised gaps.
2. Write separate remaining actions with receiving owners and evidence.
3. Explain why sent reminders are not closure.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A partly successful response

Plan / actual / gap

Blocked identities and category

Owner / accepted support

Review time

Verified change / remaining gap

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Two teams promise the same specialist

New fictional organization aims to shorten onboarding while retaining complete setup. IT proposes a daily access clinic; training proposes daily induction at the same time, both requiring one specialist. Neither proposal accounts for existing support work.

Commitment	Dependency
IT clinic	Same specialist at 09:00
Training induction	Same specialist at 09:00
Existing support	Must continue; capacity unknown
Purpose	Earlier complete onboarding, not partial setup

Your task

1. Identify the unresolved tradeoff and missing evidence.
2. Propose a bounded contribution agreement with owner and capacity decision.
3. Choose measures that detect a misleading speed improvement.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Two teams promise the same specialist

Purpose / current gap

Proposed means and assumptions

Capacity or cross-team conflict

Agreed trial / work deferred

Review measures and upward feedback

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A checklist and a different obstacle

New fictional intake team wants every trial request to contain a usable due date. Five of eight initially do. A checklist is predicted to make all eight complete. The trial produces six usable dates; the other two customers have not supplied one.

Stage	Count / fact
Current	5 of 8 usable dates
Prediction	8 of 8 after checklist
Actual	6 of 8
Remaining 2	Customer date not supplied

Your task

1. Write the prediction/actual gap and what was learned.
2. Propose a next bounded experiment addressing the remaining obstacle.
3. State one tempting but unsupported success claim.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A checklist and a different obstacle

Challenge / target condition

Current evidence

Obstacle and prediction

Actual result / learning

Next experiment and review point

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Teach a controlled document check

New fictional task: a colleague must retrieve the approved instruction for task T6. Two files have similar names: a current controlled revision and an obsolete copy. The approved process requires checking status/revision before use and reporting a missing current copy.

File / condition	Status
T6 controlled reference	Current; revision shown by authority
T6 old download	Obsolete; not for use
Current copy unavailable	Use escalation route; do not guess

Your task

1. Write a short job breakdown with important steps, key points and reasons.
2. Describe what the learner must demonstrate and explain.
3. State the response if the learner selects the right file by memorized screen position only.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Teach a controlled document check

Important step

Key point

Reason

Observed learner demonstration

Follow-up and help route

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

The tool shelf passes only before the shift

New fictional tool station: the reference requires identified tools in ready locations and held tools segregated. A morning photo meets the reference. At shift end one tool is unlabelled in ready stock and the next shift cannot identify its status.

Observation	Fact
Morning	Reference met at handover
Shift end	One unlabelled tool in ready stock
Next shift	Status unknown
Proposed claim	Sustained because morning photo passed

Your task

1. Write a condition history separating initial reset from later performance.
2. Define the response to the uncertain tool and its owner.
3. Specify what evidence would support an improved sustain routine.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

The tool shelf passes only before the shift

Date / shift / condition

Reference and deviation

Action / receiving owner

Comparable later verification

What changed in the routine

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

The guard window is clean, but the mark returns

New fictional case: trained operator Dev checks the exterior viewing window of enclosed unit U7. The reference is a clear window with no fresh smear. The approved check permits external observation and cleaning only when the local procedure allows it. A recurring internal smear is visible after two documented external cleans; no abnormality ticket exists.

Fact	Status
Point	U7 exterior viewing window; reference NC-U7
History	Two external cleans; internal smear reappears
Authority	External approved care only
Proposal from colleague	Open the enclosure and wipe inside
Missing	Technical owner and comparable verification record

Your task

1. Complete the observation/handover without naming an untested cause.
2. Explain the response to the proposed enclosure access.
3. Define the evidence that would support closure or trigger further investigation.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

The guard window is clean, but the mark returns

Asset / point / reference / time

Observed fact versus hypothesis

Permitted immediate response

Receiving technical owner / acknowledgment

Comparable verification and feedback to standard

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A repeated alarm after an inspection

New fictional asset Q5 has two repeat alarms after a scheduled inspection. The record states the inspection was completed, but the normal-condition measurement and return test are missing. A supervisor concludes the interval is too long.

Evidence	Status
Two alarms	Recorded; conditions need comparison
Inspection completed	Tick present
Condition measurement	Missing
Return test	Missing
Long interval cause	Unverified proposal

Your task

1. Separate execution, task suitability and interval questions.
2. Draft the next work-review record and required return evidence.
3. Specify how later effectiveness differs from immediate functional verification.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A repeated alarm after an inspection

Required function / event definition

Existing task and mechanism

Execution evidence gap

Authorized investigation/work prerequisites

Return and recurrence review evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Reconcile a different shift

New fictional record: 480 planned minutes, 400 run minutes, 800 total units, 750 first-pass good and an approved ideal cycle of 0.4 min/unit. Twenty failed units are later recovered; do not change the original first-pass count.

Input	Value
Planned / run	480 / 400 min
Total / first-pass good	800 / 750 units
Ideal cycle	0.4 min/unit
Later recovered	20; separate disposition

Your task

1. Calculate availability, performance, quality and OEE.
2. Calculate all three equivalent-time losses and reconcile to planned time.
3. Explain the effect of later recovery and one limit of the OEE interpretation.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Reconcile a different shift

Defined time/count scope

Factors with numerator and denominator

Time waterfall and units

First-pass versus recovery record

Next loss evidence / investigation owner

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Seal appearance and a dirty guide

New fictional packaging case: a guide surface has visible residue and some seals fail the approved appearance criterion. After authorized restoration, the guide passes its condition check, but one representative test package still fails. No evidence about incoming material variation has been reviewed.

Record	Supplied fact
Guide condition before	Residue observed
Product before	Appearance defects on identified packages
Guide after	Approved condition verified
Product after	One representative test fails
Alternative	Incoming material variation not reviewed

Your task

1. Write the hypothesized condition-to-defect mechanism without declaring it proven.
2. Record separate condition and output decisions after restoration.
3. Choose the next evidence needed and explain what must remain open.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Seal appearance and a dirty guide

Product characteristic / approved reference

Equipment condition / approved reference

Mechanism and alternative

Condition versus output verification

Next owner / recurrence and control review

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed constraint in a service route

Separate fictional route: intake 50, technical review 32 and approval 40 requests per day; demand 45. A verified review improvement raises technical review to 46.

Stage	Before > after
Intake	50 > 50/day
Technical review	32 > 46/day
Approval	40 > 40/day
Demand	45/day

Your task

1. Identify the initial and new constraint hypotheses.
2. Calculate the modeled delivery gap before and after.
3. Name one supporting policy that should change and explain why more review capacity may no longer help.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed constraint in a service route

System boundary and demand

Comparable capacities

Initial/current hypothesis

Supporting release/response rule

Next observation or investment decision

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

The slowest stage still has spare capacity

Separate fictional route: X, Y and Z can effectively process 18, 15 and 20 units per hour for the declared mix. Current demand is 12 per hour; a second planning scenario raises demand to 18.

Input	Value
X / Y / Z	18 / 15 / 20 units/hour
Current demand	12/hour
Changed demand	18/hour

Your task

1. State whether Y is binding against current demand under the model.
2. Identify the first internal hypothesis and gap under changed demand.
3. Name two observations needed before deciding an equipment investment.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

The slowest stage still has spare capacity

Comparable rate basis

Demand boundary

Slowest versus binding distinction

Observed loss states

Provisional decision

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A different release lead and delayed start

New fictional schedule: K11 is due at the validated constraint at 13:00 and K12 at 13:40. The release-to-drum lead is 100 minutes, including 40 minutes nominal preparation/travel and 60 minutes protection. K11 actually starts upstream at 11:50 rather than its planned release.

Input	Value
K11 drum start	13:00
K12 drum start	13:40
Total release lead	100 min =40 nominal +60 protection
K11 actual upstream start	11:50
New K11 ready estimate	13:10, after another disruption

Your task

1. Calculate planned releases and nominal ready times for both jobs.
2. At 11:50, calculate K11's remaining protection if nominal 40-minute preparation holds.
3. Assess the later 13:10 estimate and record the response without releasing unrelated work.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different release lead and delayed start

Job / drum appointment

Release-time calculation

Nominal ready time and protective allowance

Changed estimate / threatened gap

Blocking owner and authorized schedule response

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Two high-consumption jobs with different readiness

Separate fictional queue: K1 is high consumption but missing accepted material, K2 is high consumption and ready, K3 is increasing consumption and ready. The same highest-eligible policy applies. Recent recurring causes are missing material, missing material, drawing change and missing material.

Job / log	Status
K1	High; material not accepted
K2	High; ready
K3	Increasing; ready
Recent causes	Material, material, drawing, material

Your task

1. Select the next eligible job and the parallel response.
2. Choose a recurring issue to investigate without claiming a proven cause.
3. State what cannot be calculated from the supplied qualitative zones.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Two high-consumption jobs with different readiness

Status and readiness

Eligible dispatch

Blocked-job response owner

Recurring evidence

Missing numeric/policy information

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A rate preference meets a minimum commitment

Separate fictional one-constraint exercise: C has price 120, truly variable cost 50 and 14 constraint-minutes per unit; D has price 105, cost 45 and six minutes. Available constraint time is 120 minutes. At least six C are committed; at most eight D can be sold. All units are indivisible and both products have sufficient eligible inputs.

Input	Value
C	120 – 50; 14 min/unit; minimum 6 units
D	105 – 45; 6 min/unit; demand cap 8
Constraint availability	120 min
Model limits	One constraint; no additional expense effects supplied

Your task

1. Calculate both rates.
2. Allocate the six committed C first, then calculate how many D fit.
3. Reconcile time and contribution and explain why simply scheduling eight D first can violate the commitment.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A rate preference meets a minimum commitment

Contribution and rate

Minimum commitments / demand caps

Integer quantities

Constraint minutes used

Contribution versus full profit

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

An integration project with a different join

Separate fictional project: C and D are logically independent and need one test technician. E needs a separate analyst. Final review requires C, D and E. Policy gives C priority before D. No durations are provided.

Task	Resource / dependency
C	Technician; project ready
D	Same technician; project ready
E	Separate analyst; project ready
Final review	Requires C, D and E
Priority	C before D

Your task

1. Draw logical links and the distinct resource-order link.
2. Show where an independent E feeder joins and where protection decisions belong.
3. List what is missing before a delivery date or buffer size can be calculated.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

An integration project with a different join

Logical prerequisites

Resource lane and ordering

Feeder join

Project/feeding protection purpose

Missing timing and uncertainty basis

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Weekly approval versus daily response

Separate fictional office: one manager wants all approval reviews on Friday to use specialist time efficiently; another wants daily decisions to meet customer response promises. Both seek correct, timely commitments. A proposal schedules a short daily review of complete cases, with preparation handled separately.

Element	Case evidence
Need A	Use limited approval expertise responsibly
Need B	Respond within agreed customer window
Actions	Weekly batch / daily review
Candidate injection	Ready cases; short protected daily decision slot

Your task

1. Write the objective, two needs and conflicting actions.
2. Name an assumption that the proposal could challenge.
3. Specify evidence for both needs and an unwanted effect to check.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Weekly approval versus daily response

Shared objective

Need/action distinction

Assumption and evidence

Injection prediction

Dual-need and unwanted-effect checks

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Choose an office improvement from the evidence

Separate fictional claims route: intake 20, validation 12 and authorization 16 cases per day; demand 15. Validation repeatedly waits for missing customer documents. Proposal A makes intake faster; proposal B tests a complete-document readiness check with a named support response.

Input	Value
Intake / validation / authorization	20 / 12 / 16 cases/day
Demand	15/day
Recurring issue	Missing documents at validation
Alternatives	Faster intake / readiness-and-response trial

Your task

1. Identify the first constraint hypothesis and modeled gap.
2. Explain what each method's questions add to the readiness trial.
3. Specify system checks and a finding that would make you revise the proposal.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Choose an office improvement from the evidence

Customer boundary and rates

Observed work difficulty

Constraint/supporting-policy question

Single trial rule

Outcomes and disconfirming evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Select evidence for three different decisions

New fictional case: a clinic has appointment-delay minutes, delay categories and two proposed explanations. The supervisor asks for a distribution, the largest time burden and a way to test explanations.

Request	Available record
Typical spread	Twenty ordered delay measurements
Largest burden	Delay category and minutes for each event
Explanation	Two staff suggestions; no tests yet

Your task

1. Choose a view for each request and identify the input it needs.
2. State one conclusion that would be unjustified from each view.
3. Explain why a category with fewer events could lead a time-based ranking.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Select evidence for three different decisions

Decision question

Unit and window

Chosen tool

Permitted conclusion

Next evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Reconcile a different receipt

New fictional receipt: 40 covers are inspected. A has scratch+burr, B has scratch, C has missing label, D has burr+missing label. The other 36 have no recorded fault.

Affected ID	Faults
A	Scratch, burr
B	Scratch
C	Missing label
D	Burr, missing label

Your task

1. Calculate nonconforming-unit percentage and nonconformities per inspected unit.
2. Prepare category totals and prove that every mark is counted.
3. State how an uninspected cover would affect the denominator.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Reconcile a different receipt

Inspected population

Distinct affected IDs

Category tally

Two labelled calculations

Uncertainty or amendment

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed ranking with a tie

New fictional week: scratches 12, burrs 18, missing labels 6, other 4. Each event belongs to one category. Recovery minutes per event remain 2, 5, 10 and 30 for this exercise only.

Category	Count
Scratch	12
Burr	18
Missing label	6
Other	4

Your task

1. Order the frequency bars and calculate all cumulative percentages.
2. Calculate the separate recovery-minute totals and identify the largest burden.
3. Write one defensible priority statement without claiming a cause.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed ranking with a tie

Declared basis and window

Sorted counts

Cumulative calculation

Separate time calculation

Priority and remaining evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Assign a new small set exactly once

New fictional widths are 9.80,9.90,9.95,10.00,10.05,10.10,10.15 and 10.20 mm. Use the same four bins and endpoint convention.

Bin	Learner task
[9.80,9.90)	Count values
[9.90,10.00)	Count values
[10.00,10.10)	Count values
[10.10,10.20]	Count values

Your task

1. Assign every value and reconcile the total.
2. Explain why 10.10 and 10.20 belong where you place them.
3. Name the records needed before making a stability claim.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Assign a new small set exactly once

Assigned values

Bin counts

Total reconciliation

Boundary explanation

Missing sequence evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A different scatter does not support the same story

New synthetic pairs are (1,6),(2,4),(3,7),(4,5). A presenter sorts responses into 4,5,6,7 while leaving settings 1,2,3,4 and claims a steady increase.

Setting	Actual paired response
1	6
2	4
3	7
4	5

Your task

1. Restore the correct paired points.
2. Explain exactly what the sorting operation changed.
3. Propose one contextual field and one next comparison before claiming cause.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different scatter does not support the same story

Observation pair

Actual plotted point

Unsupported claim

Rival explanation

Evidence needed

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed two-group comparison

New fictional records show line C with 3 nonconforming of 30 and line D with 8 of 160. Product mix is still unknown.

Line	Nonconforming	Inspected
C	3	30
D	8	160

Your task

1. Calculate each rate and the pooled rate.
2. Explain why the mean of the two percentages is not the pooled fraction.
3. State the next evidence needed before attributing the difference to line performance.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed two-group comparison

Group numerator and denominator

Rates

Pooled calculation

Comparability checks

Bounded conclusion

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Build a rival explanation for missing labels

New fictional issue: labels are missing from some cartons. The team proposes an empty label reel or a scanner that fails to detect missing labels. Supplied facts are a reel-change timestamp and three retained carton IDs; no test has been run.

Item	Supplied fact
Reel change	Recorded at 14:20
Cartons	Three retained IDs; exact times to retrieve
Scanner test	Not performed

Your task

1. Distinguish a possible occurrence cause from a possible escape cause.
2. Design one observation or authorized test for each with a predicted contrary outcome.
3. State how many causes are currently verified.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Build a rival explanation for missing labels

Observed effect

Occurrence hypothesis

Escape hypothesis

Predicted evidence

Contrary outcome and status

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Classify four new records

New fictional records contain one service duration per completed case, six measurements collected across different machines, multiple faults over varying inspected cable lengths, and pass/fail counts from a fixed 50-unit sample.

Record	Design issue
Service duration	One observation at each completion
Six measurements	Mixed machines in one proposed subgroup
Cable faults	Known varying length
Pass/fail	Fixed n=50

Your task

1. Choose a candidate or explain why the sampling design must be repaired first.
2. State the relevant denominator or subgroup rationale.
3. Name a conclusion that choosing the chart does not establish.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Classify four new records

Data definition

Time/subgroup/exposure

Candidate

Assumption gap

Response owner

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Which line was crossed?

New fictional process C measures length. Its approved baseline has center 20.00 mm and limits 19.80-20.20 mm. Specifications are 19.90-20.10 mm. The exercise again uses only the beyond-limit rule and supplies baseline validity.

Time-order observation	Length
1	20.05 mm
2	20.15 mm
3	20.25 mm
4	19.95 mm

Your task

1. Classify each observation for specification conformance and a beyond-limit signal.
2. Write the response for observations 2 and 3; explain why their chart decisions differ.
3. State one conclusion this small set cannot support.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Which line was crossed?

Observation / measured value

In or outside specification

In or outside statistical limits

Response owner and next evidence

Unproven conclusion / required history

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Recalculate from a different supplied baseline

New fictional process uses $n=5$, historical grand mean 30.00 mm and $Rbar$ 0.40 mm. A later subgroup has mean 30.30 mm and range 0.70 mm. Use the same $n=5$ constants.

Given	Value
Grand mean	30.00 mm
$Rbar$	0.40 mm
Later mean / range	30.30 mm / 0.70 mm

Your task

1. Calculate both sets of limits.
2. Read range before mean and identify any beyond-limit signal.
3. Explain whether individual parts may be released from this chart alone.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Recalculate from a different supplied baseline

Constants and baseline source

Range calculation

Mean calculation

Signal record

Missing release authority

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A different baseline and sequence

New fictional process has historical mean 5.00 mm and MRbar .0564 mm. Later readings are 5.00,5.04,4.98,5.20 mm. Use d2=1.128 and MR constant 3.267.

Input	Value
Historical parameters	Mean 5.00; MRbar .0564 mm
Later sequence	5.00,5.04,4.98,5.20 mm
Constants	1.128 and 3.267

Your task

- 1. Compute individuals and MR limits.
- 2. Calculate the three adjacent ranges and identify signals.
- 3. Explain why sorting the readings would corrupt the result.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different baseline and sequence

Ordered pairs

Absolute differences

Historical limit calculation

Signals

Authorized next evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A signal at the larger sample size

New observation under the supplied $\bar{p}=.10$ baseline: 36 nonconforming units among 200 inspected. A colleague proposes dividing by 100 because that was yesterday's amount.

Given	Value
Nonconforming	36
Inspected	200
Historical $\bar{p}$	.10

Your task

1. Calculate the fraction and applicable limits.
2. Identify whether the point exceeds the stated upper limit.
3. Explain why this is neither 36% nor an automatic product-disposition instruction.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A signal at the larger sample size

Actual n

Fraction

Sample-specific limits

Signal statement

Response and missing authority

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A new high-rate observation

Under supplied $\bar{u}$ bar .5 per m^2 , a new inspection finds 68 blemishes in 80 m^2 . In the separate fixed-exposure c process, a new count is 20.

Process	New observation
u	68 blemishes /80 m^2
c	20 blemishes at the same fixed exposure

Your task

1. Calculate the u rate and compare its applicable limits.
2. Compare the c count with its supplied limits.
3. State why these are not two estimates of the same process baseline.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A new high-rate observation

Event definition

Exposure

Rate or count

Applicable limit

Bounded response

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A failed check and one unlocated serial

New fictional event: serial 200 is the last verified acceptable checkpoint and serial 235 fails. Serial 201-210 are packed but not shipped; 211-220 are at downstream inspection; 221-234 are at the cell. Serial 235 was removed for the failing check and its present location is not yet recorded.

Range / checkpoint	Declared status
200	Last verified acceptable
201-210	10 packed
211-220	10 downstream
221-234	14 at cell
235	Failed sample; location unrecorded

Your task

1. Define and count the initial interval.
2. Reconcile located and unlocated units and assign the missing-location follow-up.
3. Explain why a passing restart sample cannot close this event.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A failed check and one unlocated serial

Initial interval and assumption

Location / serial range / unique count

Unlocated exposure and receiving owner

Process verification record

Product disposition authority and remaining evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed supplied distribution

New synthetic stable-normal parameters are mean 10.02 mm, sigma .025 mm and the same 9.90-10.10 mm specifications.

Parameter	Value
Mean	10.02 mm
Sigma	.025 mm
LSL / USL	9.90 /10.10 mm

Your task

1. Calculate Cp and Cpk and identify the limiting side.
2. Explain why a real unstable dataset should not receive the same interpretation.
3. Name the authority needed for a pass/fail decision.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed supplied distribution

Assumptions and evidence

Tolerance width

Two mean-to-limit distances

Indices

Decision boundary

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Reconcile a changed set of components

New supplied estimates are repeatability SD .006 mm, reproducibility SD .008 mm and total SD .050 mm. A trainee reports combined SD .014 mm.

Component	Supplied SD
Repeatability	.006 mm
Reproducibility	.008 mm
Total	.050 mm

Your task

1. Calculate combined gauge SD using variances.
2. Calculate the two labelled percentages.
3. Identify one missing study-design and one missing fitness consideration.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Reconcile a changed set of components

Component squares

Combined variance and SD

Denominator labels

Design scope

Decision limitation

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A new matrix with different class sizes

New fictional pass:30 reference-bad items yield 27 rejected and 3 accepted;10 reference-good items yield 8 accepted and 2 rejected.

Reference class	Rejected	Accepted
Bad	27	3
Good	2	8

Your task

1. Calculate overall agreement and each conditional error rate.
2. Explain why overall agreement alone hides the poorer good-item result.
3. State what remains unknown about repeatability.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A new matrix with different class sizes

Reference group counts

Correct cells

False-accept calculation

False-reject calculation

Next study question

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Repair a different incomplete row

New fictional OP30 checks hole diameter against an approved example range 5.00-5.10 mm. The row only says "inspect periodically; operator signs".

Field	Current entry
Characteristic	Hole diameter 5.00-5.10 mm
Frequency	Periodically
Record	Signature only
Reaction	Blank

Your task

1. Identify the missing operational fields without inventing a universal sampling rate.
2. Draft an actual-value record and abnormality/restart responsibilities.
3. Explain which linked sources must be reviewed if the requirement changes.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Repair a different incomplete row

Requirement revision

Method authority

Sampling rationale

Actual observation record

Containment/restart/disposition owners

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A different check with missing identity

New fictional station criterion is 12.00-12.20 mm. A reading 12.24 mm is written on scrap paper without lot identity; downstream containers have already moved.

Evidence	Value or status
Criterion	12.00-12.20 mm
Reading	12.24 mm
Identity	Missing from the note
Downstream	Containers moved; trace needed

Your task

1. Identify the abnormality and preserve the evidence.
2. Describe immediate permitted response and how to resolve the identity/exposure gap.
3. Separate restart evidence from product disposition.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different check with missing identity

Actual value and criterion

Identity reconstruction

Known/uncertain exposure

Escalation owner

Restart and release records

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A different process failure chain

New fictional packing process can select the wrong label file, apply a wrong product label and cause a customer to receive misidentified contents. A final scan is proposed but not installed.

Fact or proposal	State
Wrong label file	Potential cause
Final scan	Proposed detection/control concept
Verification	Not performed

Your task

1. Write distinct cause, mode and effect statements.
2. Separate a prevention action from detection of the resulting label condition.
3. Define verification and document updates without inventing ratings.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A different process failure chain

Function and receiver

Cause/mode/effect

Existing/proposed control

Action owner

Verification evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Two closed tasks and one consequential gap

New fictional launch has closed packaging review and operator training, but the measurement method for a critical characteristic remains unresolved. The dashboard says 2 of 3 actions complete.

Action	Status
Packaging review	Closed with evidence
Training	Delivered and recorded
Measurement method	Fitness unresolved

Your task

1. Calculate the completion fraction and explain its limit.
2. Map the unresolved method to downstream validation claims.
3. Write a gate decision record that requests the required authority without inventing approval.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Two closed tasks and one consequential gap

Scope/revision

Evidence dependency

Open risk

Decision owner

Conditions and next review

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed tool after an earlier decision

New fictional part K16 revision D has a retained customer decision for tool T1. The supplier moves production to T2, completes internal checks and uploads a new folder; no customer change decision is supplied.

Item	State
Existing decision	K16/D using T1
Change	Production moved to T2
Internal checks	Completed
Customer change requirements/decision	Must be established

Your task

1. Identify why the old decision may not cover the new scope.
2. List the evidence and authority to retrieve before claiming authorization.
3. Write a truthful status statement.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed tool after an earlier decision

Part/process identity

Change description

Applicable requirement

Evidence gap

Current decision status

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A new split with an unexplained gap

New input lot L91 has 240 units split 160 and 80. Recorded outputs are 150 shipped, 60 WIP and 20 scrapped. A rework log mentions ten units but does not identify their current status.

Evidence	Quantity
Input	240
Shipped / WIP / scrap	150 / 60 / 20
Rework mention	10; status/location unresolved

Your task

1. Reconcile the known quantities and identify the gap.
2. Explain why the rework mention is not automatically an additional completed disposition.
3. List the identity/location evidence needed to close the trace.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A new split with an unexplained gap

Starting lot

Path quantities

Known statuses

Unresolved quantity/identity

Owner and next evidence

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A changed audit week

New fictional week has 12 planned checks, 9 completed and 3 findings. One finding was marked closed after an email, with no later observation.

Item	Count/status
Planned	12
Completed	9
Findings	3
Closed-by-email item	No effectiveness evidence

Your task

1. Calculate completion and finding rate with labelled denominators.
2. Write an objective finding and a verification plan for the premature closure.
3. Explain what the percentages do not establish.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A changed audit week

Observation evidence

Completion calculation

Finding-rate calculation

Immediate response

Later verification

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A missing run segment

New fictional job J311 references the correct approved procedure, but a required portion of its run record is missing. An operator remembers that the run was normal.

Evidence	Status
Job/procedure identity	Matches
Run record	Required segment missing
Operator recollection	Normal run recalled
Technical disposition	Not supplied

Your task

1. Identify what is established and what remains missing.
2. Write a bounded escalation without inventing process limits or a disposition.
3. Describe the later system verification needed after the record-capture fix.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A missing run segment

Job and scope

Missing evidence

Known product status

Authorized owner

Future verification

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Another site, another missing link

New fictional case: North site prepares a defined NDT scope. A South-site status document is available. Job ND71 has an equipment identifier, but the record does not link the person performing the work to the applicable qualification evidence. An optional pre-assessment has identified the gap; no formal North accreditation decision is supplied.

Input	Supplied fact
Requested scope	North site; defined NDT process
Available status document	South site only
Job ND71	Equipment identified; personnel-evidence link missing
Preparation activity	Optional pre-assessment completed
Missing authority	No North accreditation decision supplied

Your task

1. Write a scope/status statement that does not overclaim.
2. Complete the gap row with owner, missing evidence and verification requirement.
3. Explain why neither the South document nor the pre-assessment closes the North issue.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Another site, another missing link

Site / process / customer scope

Applicable authority and revision reference

Job-specific evidence gap

Action owner and verification evidence

Preparation status versus verified accreditation status

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A reminder was sent but no due event occurred

New fictional NCR action adds an escalation owner. After two weeks the team reports no overdue gauges, but none became due in that period.

Evidence	Status
System change	Owner assigned and workflow configured
Elapsed period	Two weeks
Relevant due events	Zero
Claim	Effectiveness proven

Your task

1. Distinguish implementation evidence from effectiveness evidence.
2. Design a bounded verification using relevant opportunities or an approved challenge.
3. State a truthful current closure status without inventing a mandatory deadline.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A reminder was sent but no due event occurred

Cause-action link

Implemented evidence

Verification opportunity

Observed result

Remaining decision

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Correct a misleading launch slide

New fictional slide says "Certified to IATF 16949 sixth edition; ISO/TS remains current; new standard effective mid-2027." No certification record is supplied.

Slide claim	Evidence available
Sixth edition standard	Rules 6 publication only
ISO/TS current	Official replacement history
Mid 2027 effective	Indicative publication plan
Certified	No scoped status evidence

Your task

1. Rewrite each claim to match the supplied authoritative status.
2. Identify which certification evidence is missing.
3. Define a future source-review action without inventing a transition deadline.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Correct a misleading launch slide

Claim

Correct authority

Published/planned status

Missing scope evidence

Owner/review trigger

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

Change the setpoint and compare the functions

New fictional simulation has setpoint 60, reading 63 and the same error convention. A learner proposes an actuator command of -3 and says a control-chart signal confirms that command.

Input	Value
Setpoint	60
Measured value	63
Error convention	Setpoint minus measurement
Control law	Not supplied

Your task

1. Calculate the error with units.
2. Explain why an actuator command remains unknown.
3. Draw separate feedback and SPC paths and identify where a disturbance acts.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

Change the setpoint and compare the functions

Reference and measurement

Error sign/units

Missing control law

Physical feedback path

Statistical monitoring branch

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.

Practise with a changed case

A result close to an upper limit

New fictional report gives 10.095 mm with expanded uncertainty 0.020 mm. The product upper specification is 10.100 mm, but coverage information and the applicable decision rule are absent.

Input	Value/status
Result	10.095 mm
Expanded uncertainty	0.020 mm
Upper specification	10.100 mm
Decision rule and coverage	Missing

Your task

1. Calculate the numerical result $\pm$ uncertainty interval.
2. Explain why comparing only 10.095 with 10.100 does not resolve the stated decision problem.
3. List the evidence and authority needed next without inventing a guard band.

Use the next page to record your reasoning before reading the answer.

Your practice worksheet

A result close to an upper limit

Result and units

Interval arithmetic

Coverage information

Applicable rule

Authorized decision

Complete your reasoning before turning to the answer. Use the separate learner workbook for group practice.