VCE Visual Communication Design Units 1 & 2

Chapter 7 — Visualising environments

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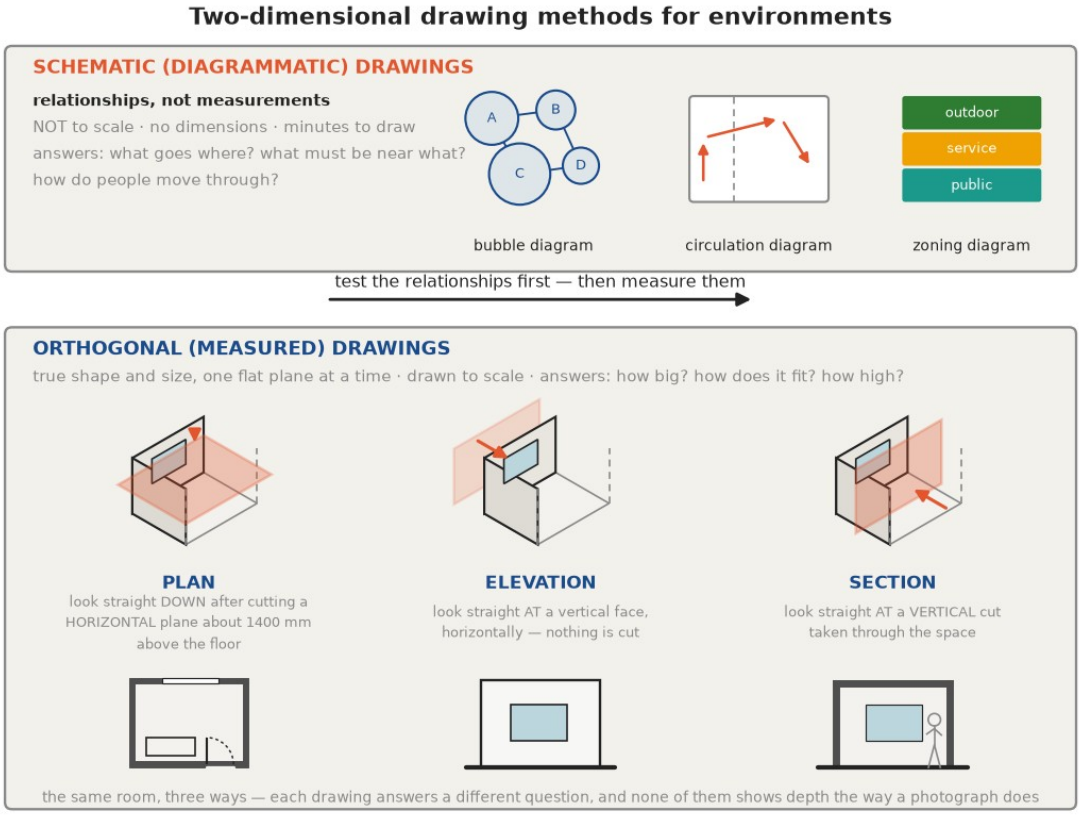
Chapter 7 Visualising environments — 7A Two-dimensional methods — schematic & plan views

Theory

Unit 2 Outcome 1 asks you to present an **environmental design solution** — a space to live, work or play in, rather than a message or an object. A space is the one kind of design outcome you cannot pick up and turn over, and you certainly cannot photograph one that does not exist yet. Every decision about it has to be made first on a flat sheet. This subtopic covers the **two-dimensional drawing methods** that do that work: **schematic drawings, plans and elevations**, together with the **section**, which belongs with them.

Chapter 7B then adds the methods that show a space in three dimensions (planometric, perspective, model-making), and 7C adds the technical conventions used when the drawings become documentation.



Two-dimensional methods fall into two families, and the commonest mistake in this outcome is to confuse them.

Family 1 — schematic drawings. A **schematic** (or *diagrammatic*) drawing is a rapid, deliberately loose drawing that shows the **relationships** between the parts of a space — not their appearance and not their size. It is **not drawn to scale** and it carries **no dimensions**. That is not sloppiness; it is the point. A schematic costs minutes, so you can test six arrangements in an afternoon and throw five of them away. A measured plan costs hours, so testing arrangements in plan is expensive and slow. Schematic drawings therefore belong at the front of the **Develop** stage, where divergent thinking needs to be cheap.

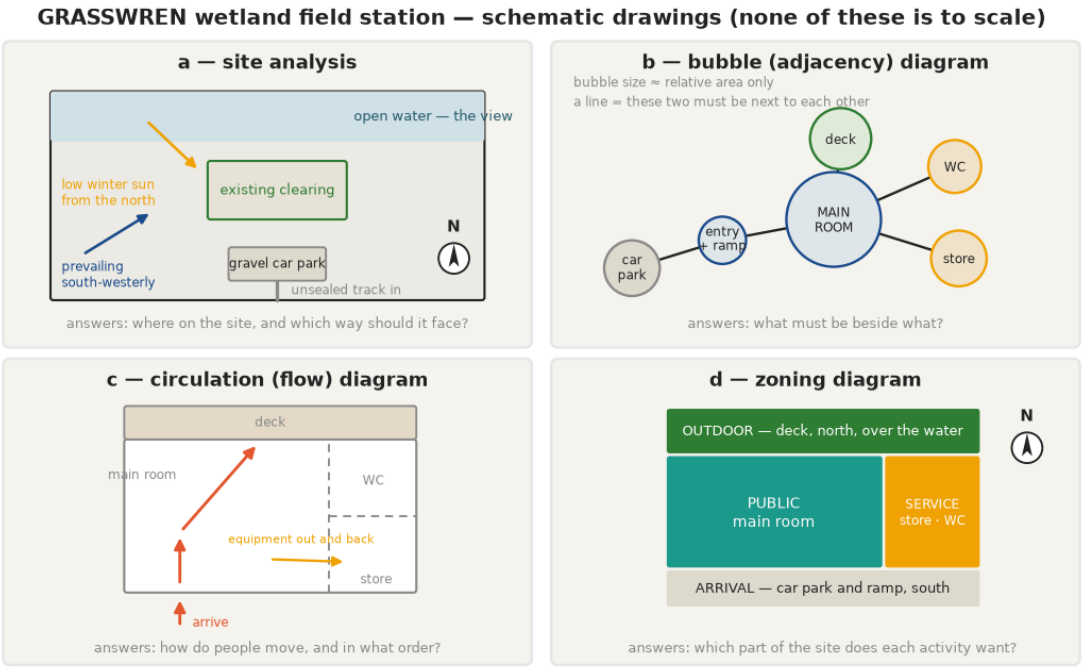
Four types do most of the work:

Schematic drawing	What it shows	The question it answers
Site analysis diagram	The site outline with everything acting on it: north, sun path, prevailing wind, noise, views, access, slope, existing trees and structures.	*Where on the site, and which way should it face?*

Schematic drawing	What it shows	The question it answers
Bubble (adjacency) diagram	One bubble per activity or space, sized loosely to suggest relative area, with a line joining any two that must be next to each other.	*What must be beside what?*
Circulation (flow) diagram	Arrows tracing the route people take through the space, in the order they take it.	*How do people move, and in what order?*
Zoning diagram	The site or footprint divided into bands — public / service / private / outdoor, or noisy / quiet, or sun / shade.	*Which part of the site does each activity want?*

Everything in this subtopic is worked against one original project, **GRASSWREN**.

Entry	What the brief says
Client	GRASSWREN Wetland Reserve, a volunteer-run coastal reserve in south-west Victoria.
Communication need	Environments — a small field station on a cleared area about 20 m back from the water's edge.
Purpose	To shelter up to 20 people for a survey briefing, to store survey equipment securely, and to give a sheltered place from which to observe the wetland.
Context	A flat, exposed site facing north over open water; the prevailing wind is a south-westerly; access is by an unsealed track to a gravel car park on the south side.
Users	Volunteers aged roughly 15–80, visiting school groups, and at least one wheelchair user among the regular volunteers.
Design criteria	**1.** one room that seats 20 for a briefing; **2.** an uninterrupted view north over the water from seated eye height; **3.** step-free access from the car park to every space; **4.** the equipment store lockable and separate from the public room; **5.** a footprint no larger than 9 m × 6 m, so the building sits inside the existing clearing.



Read the four GRASSWREN schematics as a sequence. The site analysis says the view and the winter sun are both to the north and the arrival is from the south, so the building should open north and turn its back to the south-westerly. The bubble diagram says the main room must touch the entry, the deck, the store and the WC — it is the hinge of the whole plan. The circulation diagram says a volunteer arrives from the south, passes through the main room and ends on the deck, while equipment makes a short return trip to the store. The zoning diagram bands the site from north to south: the outdoor zone — the deck — takes the northern edge over the water, the public room and the service spaces share the middle band with the store and the WC gathered on its east side so they can be shut away from the room, and the arrival zone sits on the south where the car park is. None of these drawings is measured and none of them is wasted: together they decide the shape the measured plan will take.

> **Watch-out — a schematic is not a plan.** A bubble diagram carries no dimensions, no scale and no wall thicknesses; a plan carries all three. Writing "1:50" under a bubble diagram, or dimensioning a bubble, says you have not understood what the drawing is for. Equally, calling a measured floor plan a "schematic" throws away the accuracy you spent hours earning.

Family 2 — orthogonal drawings. In an **orthogonal** (or *orthographic*) drawing your line of sight is at 90° to the surface being drawn, so nothing recedes and no lines converge. Every edge that lies in the plane of the view is drawn at its **true length**, and the whole drawing can therefore be **measured**. That is the trade: you give up the lifelike look of a perspective and you get a drawing you can set out, cost and build from. Three orthogonal views are used for environments — the **plan** (looking straight down), the **elevation** (looking straight at a vertical face) and the **section** (looking straight at a vertical cut).

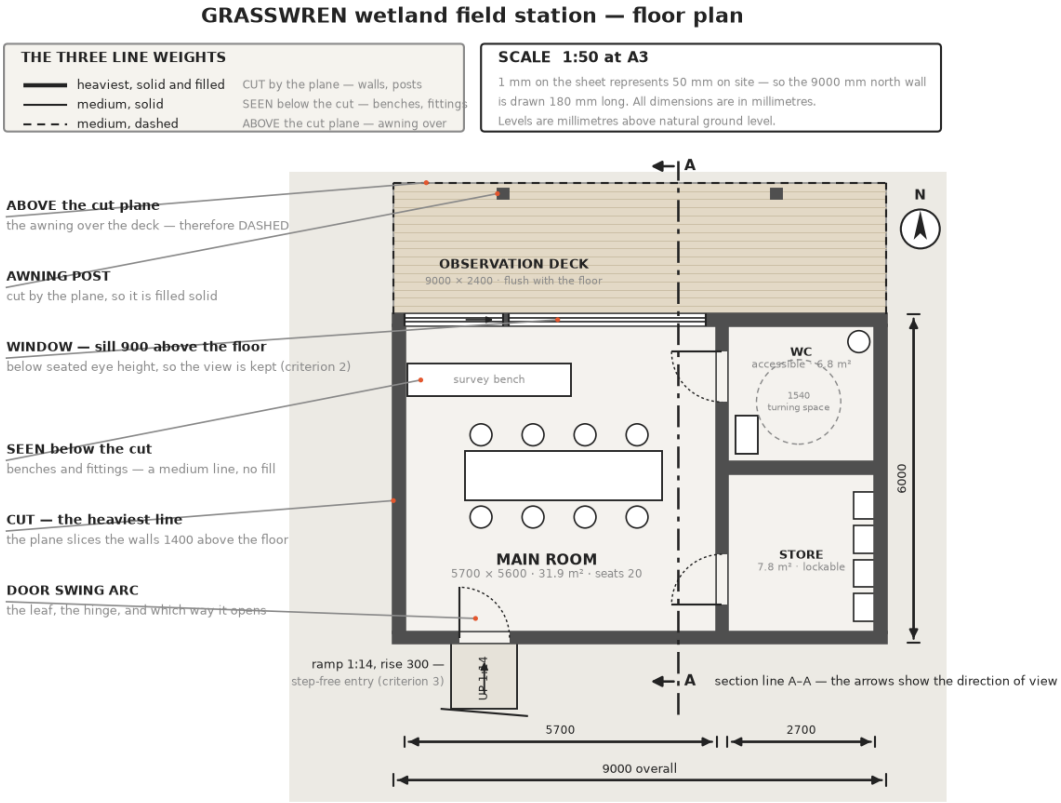
The plan and its cutting plane. A **floor plan** is not simply "the view from above" — it is a **horizontal section**. Imagine slicing the building through with a horizontal plane about **1400 mm above the floor**: high enough to pass through the doors and most windows, low enough to run beneath any overhead cupboards, bulkheads and the roof. Lift the top half off and look straight down at what is left. That one idea decides how every line on the plan is drawn:

- anything **cut** by the plane — walls, columns, posts — takes the **heaviest** line, and is usually filled in solid (this filling is called **poché**);
- anything **seen below** the cut — benches, fittings, furniture, floor finishes — takes a **medium** line and is left unfilled;
- anything **above** the cut plane — an awning, a roof overhang, a bulkhead, a mezzanine — is drawn **dashed**, because at the level you cut it is not there at all.

A **site plan** applies the same idea at a larger extent and a smaller scale. It looks down on the whole site — boundaries, setbacks, the roof of the building, paths, planting, levels and the north point — rather than into one building.

Scale. Every orthogonal drawing must carry a **scale**: a ratio between a length on the drawing and the same length in reality. **1:50** means that one millimetre on the sheet stands for fifty millimetres on site, so the drawing is fifty times smaller than the thing it describes.

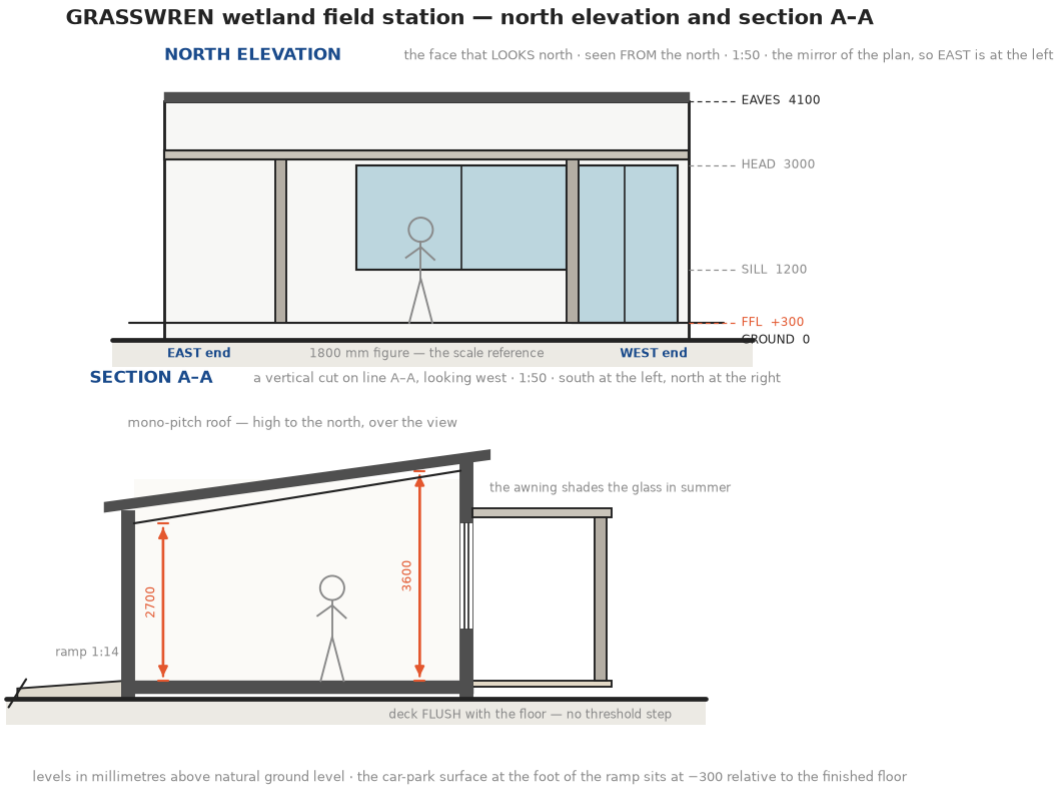
- Australian practice draws from a set of preferred ratios: 1:1, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:1000.
- Typical use — a construction **detail** at 1:5 or 1:10; a **floor plan** at 1:50 or 1:100; a **site plan** at 1:200 or 1:500.
- 1:20 is a **larger** scale than 1:100: more sheet is spent per metre of building, so more detail can be shown. The bigger the second number, the smaller the drawing.
- **Choose a scale by calculating, not by guessing.** Divide the real length by the second number of the ratio and check that the result fits the sheet with room left for dimensions and notes. The GRASSWREN building is 9000 mm long; at 1:50 it is drawn 9000 ÷ 50 = 180 mm long and 6000 ÷ 50 = 120 mm deep, which sits comfortably on an A3 sheet (420 × 297 mm).
- Write the scale **and the sheet size** on the drawing — "1:50 at A3" — because a photocopy or a screen changes the size but not the label.
- Work in **millimetres** throughout, and say so on the sheet.



The GRASSWREN floor plan above shows the whole convention working at once. The 200 mm walls are cut and filled solid; the briefing table, stools, survey bench and store shelving are seen below the cut and drawn in a medium line; the awning over the deck is above the cut plane and is dashed, while its two posts are cut by the plane and so are filled solid like the walls. Each door shows a **swing arc** — the leaf, the hinge and the direction it opens — and the north wall shows a window symbol with the glass drawn as thin lines inside the wall reveal. The plan also carries the things that make it usable by someone else: a **north point**, room names with areas, the overall and internal dimensions, the **section line A–A** with arrows showing the direction of view, and the scale. (Chapter 7C sets out the full technical conventions, including how documentation drawings comply with the Australian Standards.)

The elevation. An **elevation** is the view you get looking horizontally, straight at a vertical face. Nothing is cut. It shows what a plan cannot: **heights, proportion, the size and position of openings, materials, and how the building meets the ground**. An elevation is named for the direction the face **looks** — the *north elevation* is the face that looks north — or for the street it fronts (*Beach Road elevation*), and it is drawn as someone standing outside that face sees it, so the north elevation is the building seen **from the north, looking south**. Two things make the heights readable: a strong **ground line**, and either a set of **levels** or a **human figure** drawn at the same scale.

The section. A **section** is the view of a vertical cut taken through the space. It shows what neither the plan nor the elevation can: **ceiling heights, floor and ground levels, changes of level, the thickness of the construction, and the relationship between inside and outside**. A section is located by a **section line** drawn on the plan — a chain line with an arrow at each end pointing the way you look — and it is labelled to match (A–A, B–B). Anything the plane cuts is drawn with the heaviest line; anything seen beyond the cut is drawn lighter.



The north elevation above is the building seen from out over the water, looking back at it, so it runs the opposite way round to the plan: the sliding door, which sits at the west end of the north wall on the plan, falls at the **right** of the elevation, and the east end of the building at the left. Section A–A is cut on the line marked on the plan, with the arrows pointing west, so the section is drawn with south at the left and north at the right. Only now can you check criterion 2: the window sill sits 900 mm above the finished floor, which is below a seated person's eye height, so the view over the water survives when twenty people sit down. Only now can you see that the roof rises to the north over the glazing, that the awning shades that glazing in summer, and that the deck is flush with the internal floor so there is no threshold step to defeat criterion 3. Levels are written relative to a stated datum: the finished floor sits at +300 above natural ground, and the car-park surface at the foot of the ramp sits at −300 relative to that finished floor.

Working the three views together. Lay the elevation out in line with the plan and project the widths straight across — that is how you guarantee the two drawings agree about where a window starts. Watch which side of the building you are standing on while you do it. On a north-up plan the **south** elevation reads the same way round as the plan, west at the left, because you and the plan face that wall from the same side; the **north** elevation is taken from the opposite side, so it is the plan's mirror image and **east** falls at the left. Project the widths, then check the order of the openings against the plan before you ink anything. Heights carry the same way between the section and the elevation. Because the views are projections of one building, an error shows up as a disagreement between two drawings, which is exactly what the discipline is for. Always **label** each view, because the layout alone does not tell a reader which face they are looking at.

The process is iterative. Two-dimensional drawing is not a one-way street from schematic to plan. When the measured plan shows that a zone will not fit — the store swallows the room the briefing table needed, say — the right move is to go back to the bubble and zoning diagrams and re-arrange cheaply, not to shave millimetres off a drawing that is already wrong in principle. Looping back is the design process working.

Manual and digital methods. Either is acceptable in this outcome, and most designers use both.

	Manual	Digital
Schematic drawings	Marker or soft pencil on layout paper; tracing-paper overlays on a printed site outline; torn-paper zoning.	Stylus sketching on a tablet, each diagram on its own layer so overlays can be switched on and off.
Measured plans, elevations, sections	Set square, scale rule and fineliner on cartridge or tracing paper; a printed grid underlay; different pen widths for the three line weights.	Vector or CAD drawing set out at full size and printed to a chosen scale; line weights set by layer; one change to a wall updates every view.
What each is good for	Fast, cheap, no start-up cost, and easy to draw over. Ideal while decisions are still moving.	Accurate, editable and reusable; measures and areas can be read off. Ideal once decisions are settling.

Annotating a two-dimensional drawing. The study design asks for *appropriate design terminology used in evaluative annotations*. An evaluative annotation carries three things — a **strength**, a **limitation** and a **next action** — each written in design terminology and each pointed at a numbered design criterion. "It looks good" is a preference; "the 900 mm sill sits below seated eye height, so the view is held from every seat (criterion 2)" is an evaluation, because it names a feature, states an effect and identifies the criterion it satisfies.

Reading the elements and principles in a plan. A plan is still a piece of visual language. **Line** does the technical work (the three weights); **shape** is the footprint and the void of each room; **scale** and **proportion** are read by comparing rooms with each other and with a human figure; **balance** is read in the symmetry or asymmetry of the layout; **hierarchy** is read in which space is largest, most central or most glazed; and **figure–ground** is the reading of solid wall against open space. Being able to name these is what lets you *analyse* a plan rather than merely describe it.

> **Watch-out — a plan is not a bird's-eye view.** In a plan the line of sight is at 90° to the floor everywhere, so opposite walls of a rectangular room are drawn exactly the same length. If the far wall of your "plan" is shorter than the near wall, you have drawn a perspective by accident, and nothing on it can be measured.
>
> **Watch-out — the scale is a ratio, and it must be written down.** A drawing without a stated scale cannot be measured by anyone else, so it is not a plan — it is a sketch. Write "1:50 at A3" on the sheet, and remember that 1:20 is a *larger* scale than 1:100.
>
> **Watch-out — dashed means above the cut plane.** An awning, a roof overhang, a bulkhead or a mezzanine drawn as a solid line reads as a wall standing on the floor. Dash it.
>
> **Watch-out — one line weight makes a plan unreadable.** If the walls, the furniture and the paving pattern are all drawn with the same pen, the reader cannot tell what is structure and what is a chair. Use at least three weights: cut, seen, and light detail.
>
> **Watch-out — label and orient every view.** Every plan needs a north point; every elevation needs a name; every section needs a matching section line with arrows on the plan. Without them the reader has to guess which face they are looking at, and a guess is not documentation.
>
> **Units 3 & 4 preview — beyond the Units 1&2 study design.** In Units 3 and 4 environmental work is taken further in two directions that are outside this subtopic and are not assessed in the questions below. First, a fuller **documentation set** may be produced, including drawings such as a **reflected ceiling plan** (the ceiling drawn as if mirrored in the floor, used to set out lighting and services) and a **finishes plan**, issued as a numbered, revised drawing register. Second, plans and elevations are **analysed as design examples** in a written examination — you are asked to name the aesthetic a spatial layout creates and to explain how the designer's element and principle choices build it. Do not use the reflected ceiling plan, the documentation register or the written analysis of a supplied design example in the questions below; in Units 1 and 2 you **produce** the two-dimensional drawings, and you annotate your own work.

Worked examples

Example 1 — scaffolded

*Using the GRASSWREN brief, produce a **site analysis diagram** and a **bubble diagram** for the field station, and state what each one settles. (6 marks)*

Working	Comment
Site analysis — step 1: draw the site boundary and put the north point on it. Sketch the rectangular cleared area with the open water along the north edge and the gravel car park and unsealed track entering from the south.	A site analysis starts with orientation, because on an environmental project almost every later decision follows from which way is north.
Step 2: overlay everything that acts on the site. Add an arrow for the low winter sun coming from the north, an arrow for the prevailing south-westerly, a note marking the best view (north, over the water), the arrival point (south) and the outline of the existing clearing the footprint must sit inside.	"Produce" means the drawing must actually carry the information. Each overlay comes straight out of the brief's **context** row — that is the evidence the diagram is a response to *this* site and not a generic one.
What it settles: the building should open north to the view and the winter sun, present a closed face to the south-westerly, and be entered from the south where people arrive.	Name the decision the diagram produced. A diagram that settles nothing has not earned its place in the folio.
Bubble diagram — step 1: list the spaces from the brief. Car park (external), entry and ramp, main room, equipment store, accessible WC, observation deck.	The bubbles come from the *communication need* and the *criteria*, not from imagination. Six named spaces, no more.
Step 2: draw one bubble per space, sized loosely by relative area, and join with a line every pair that must be adjacent: car park–entry, entry–main room, main room–deck, main room–store, main room–WC.	Size is *relative* only, and the lines carry the whole meaning of the diagram. Do NOT dimension the bubbles and do NOT write a scale on it — that is the classic error.
What it settles: the main room is the hinge of the plan — it touches four of the five other spaces — so it must be the largest and most central space, with the service spaces gathered on one side of it so that criterion 4 (a lockable store, separate from the public room) can be met.	Again, state the decision. This is also the reasoning that the measured plan will have to honour.

Example 2 — scaffolded

Set out the GRASSWREN floor plan as a measured orthogonal drawing on an A3 sheet. State the scale you would use and justify it, and explain which elements you would draw heavy, light and dashed. (6 marks)

Working	Comment
Choose the scale by calculating. The footprint is 9000 × 6000 mm (criterion 5). At 1:50 it is drawn 9000 ÷ 50 = 180 mm by 6000 ÷ 50 = 120 mm; A3 is 420 × 297 mm, so the plan fits with ample room for dimension strings, room labels and notes. At 1:20 it would be 450 × 300 mm and would not fit at all. **∴ 1:50 at A3.**	A justified scale needs the arithmetic. "1:50 because it's a normal plan scale" earns nothing; "180 × 120 mm on a 420 × 297 sheet" earns the mark.
Set out the envelope, then the internal divisions. Draw the 9000 × 6000 external rectangle, then the 200 mm wall thickness inside it, then the north–south partition and the partition that splits the east block into the store and the WC.	Work from the largest dimension inward — the same crating logic used for objects. Errors made in the envelope multiply into every room.
Decide what the cutting plane meets. The plane sits about 1400 mm above the floor. It cuts the external walls, both partitions and the two awning posts, so all of these are drawn with the **heaviest** line and filled solid.	This is the examinable idea: the line weight is not a style choice, it is a statement about what the plane met.
Everything below the cut takes a medium line: the briefing table and stools, the survey bench, the store shelving, the WC fittings and the deck boards.	Say both halves. Students routinely draw the awning solid, which makes it read as a wall standing on the deck.

Working	Comment
Everything above the cut is **dashed**: the awning over the deck.	
Add the openings and their symbols. Punch the entry door, the store door and the WC door out of the walls and draw each with its **swing arc**; punch the sliding door and the viewing window out of the north wall and draw the glass as thin lines inside the reveal.	A door drawn as a plain gap tells the reader nothing about which way the leaf sweeps — and the swing eats floor space that a clearance may need.
Finish with the information that makes it usable: north point, room names and areas, overall dimension 9000 and internal dimensions 5700 and 2700, the section line A–A with arrows, and the note "1:50 at A3 · all dimensions in millimetres".	The last step is what separates a plan from a sketch. The model drawing is the **GRASSWREN floor plan** figure above.

Example 3 — unscaffolded

Explain the difference between a schematic drawing and a floor plan, and state where each is used in the VCD design process. (4 marks)

A **schematic drawing** is a rapid diagrammatic drawing that records the **relationships** between the parts of a space — which activities must be adjacent, how people move through, which zone wants which part of the site. It is not drawn to scale and carries no dimensions, so nothing on it can be measured; its value is that it costs minutes, which is what lets a designer test and discard many arrangements. A **floor plan** is an orthogonal drawing taken as a horizontal section about 1400 mm above the floor and drawn **to a stated scale**, so every length on it is a true measurement of the building reduced by a fixed ratio, and its line weights record what was cut, what is seen below the cut and what is above it. Schematic drawings therefore sit at the front of the **Develop** stage, driving divergent thinking, and the floor plan sits later in **Develop** and into **Deliver**, once enough has been settled to be worth measuring. ∴ the two are not competing versions of the same drawing: the schematic decides *what the arrangement should be*, and the plan tests whether that arrangement will actually fit.

Example 4 — unscaffolded

With reference to the GRASSWREN drawings, explain what the section shows that the plan and the north elevation cannot, and describe how a reader knows where the section was taken. (6 marks)

A plan is a horizontal projection, so every height on it collapses to nothing: the GRASSWREN plan can tell a reader that the main room is 5700 × 5600 mm and that the north wall is glazed, but it cannot say how high the glazing is, how high the ceiling is, or whether the deck is level with the floor. An elevation adds heights but only on one outside face: the north elevation shows that the window head sits 3000 mm above ground and that the eaves reach 4100 mm, but it says nothing about what happens behind that face. **Section A–A** cuts vertically through the building and shows the two of them at once — the internal ceiling height rising from 2700 mm at the south wall to 3600 mm at the north wall, the finished floor level 300 mm above natural ground, the thickness of the floor structure and the walls, and the way the interior meets the exterior at the deck. That last point is the one the brief turns on: the section is the only drawing that proves the deck is flush with the internal floor, so there is no threshold step to defeat criterion 3, and the only drawing that proves the 900 mm sill sits below seated eye height, so criterion 2 survives when twenty people sit down. A reader knows where the cut was taken because a **section line** is drawn on the plan — a chain line running right across the building, labelled **A** at each end, with an arrow at each end pointing the way the viewer looks. Here the arrows point west, so the section is drawn with south at the left and north at the right, and the label on the section, **SECTION A–A**, matches the label on the plan. ∴ the section is not an optional extra drawing; it is where the vertical half of the design is decided and checked *(6 marks: what the plan cannot show, what the elevation cannot show, what the section adds, the criteria it tests, and the section-line convention including direction of view).*

Practice questions

Scaffolded

Q1. (a) Name the three orthogonal drawings used to visualise an environmental design, and state the direction you look in each. *(3 marks)* (b) State which of the three is a **horizontal** section. *(1 mark)* (c) State one thing that is true of every orthogonal drawing but not of a perspective. *(1 mark)*

Q2. Using the GRASSWREN floor plan: (a) State what the notation "1:50" means. *(1 mark)* (b) The north wall is 9000 mm long. Calculate its drawn length at 1:50, and then at 1:100. *(2 marks)* (c) State which of **1:20** and **1:100** is the larger scale, and explain what a designer gains by choosing it. *(2 marks)*

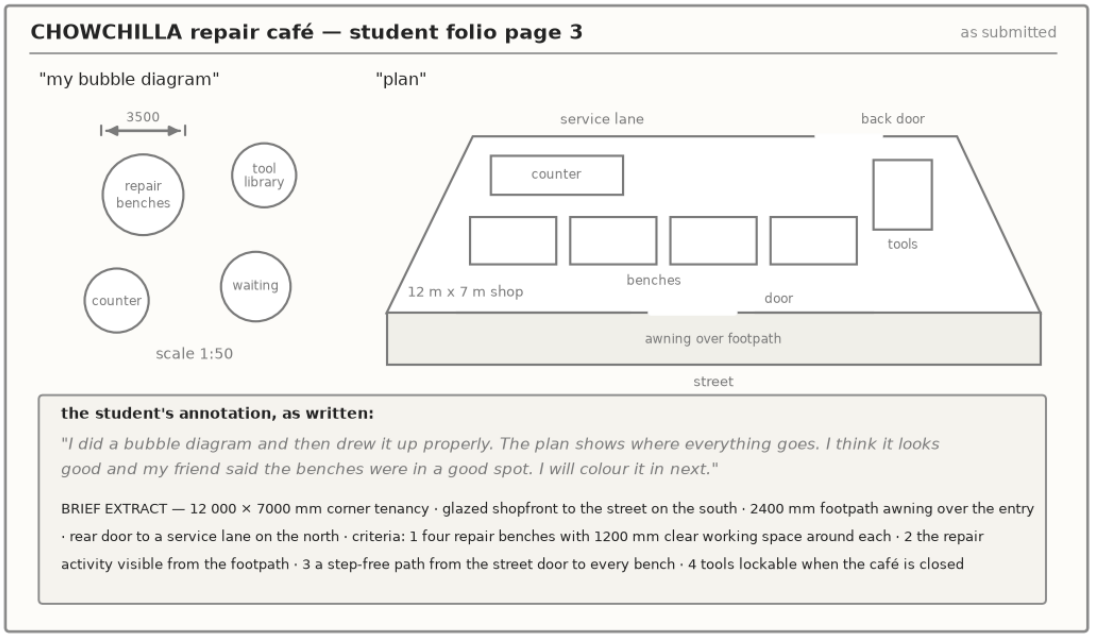
Q3. (a) Define a **schematic drawing**. *(1 mark)* (b) State two things a schematic drawing must **not** carry. *(2 marks)* (c) A bubble diagram carries no dimensions. Explain what it can still tell a designer about the **size** of a space, and state what it cannot. *(2 marks)*

Q4. (a) State the line weight or line type used in a plan for each of: something cut by the plane; something seen below the cut; something above the cut plane. *(3 marks)* (b) Explain what happens to a reader's understanding when a plan is drawn with a single line weight. *(2 marks)*

Q5. (a) State two things an elevation shows that a plan cannot. *(2 marks)* (b) Explain how an elevation is named. *(1 mark)* (c) Identify two things that must appear on an elevation before its heights can be read. *(2 marks)*

Q6. (a) Name two schematic drawing types other than a bubble diagram. *(2 marks)* (b) For each, state the question it answers. *(2 marks)* (c) Explain why a schematic drawing is drawn quickly and loosely rather than neatly. *(2 marks)*

Unscaffolded



Questions 7–23 refer to the CHOWCHILLA repair café student folio page shown above, unless otherwise stated.

Q7. A measured plan has to carry through what the brief and the designer's own schematic work have already settled. Identify **three** things settled in the CHOWCHILLA brief or in the student's bubble diagram that the plan fails to carry, and for each state the correction. *(6 marks)*

Q8. The student has drawn the rear wall of the tenancy shorter than the shopfront wall. Explain what the student has actually produced, and why nothing on it can be measured. *(4 marks)*

Q9. The footpath awning has been drawn with a solid line. State the convention that applies and describe how the awning should appear on the plan. *(3 marks)*

Q10. The student's bubble diagram carries a dimension and the note "scale 1:50", and no lines join the bubbles. Explain why each of these is a fault, and describe what a correct bubble diagram for CHOWCHILLA would carry instead. *(5 marks)*

Q11. Produce a written description of a **circulation diagram** for CHOWCHILLA, naming in order the movements it would show and the arrows you would draw. *(4 marks)*

Q12. The student's plan carries no north point and no stated scale. Explain what each omission costs the reader. *(4 marks)*

Q13. Both doors on the plan are drawn as plain gaps. Describe how a door should be drawn on a plan, and explain why this matters for design criteria 1 and 3. *(4 marks)*

Q14. Distinguish between a **site plan** and a **floor plan**, and state a suitable scale for each if they were drawn for CHOWCHILLA on an A3 sheet. *(4 marks)*

Q15. Describe where you would locate a section through the CHOWCHILLA tenancy and how you would mark it on the plan, and state **two** things that section would show that the plan cannot. *(4 marks)*

Q16. Name the elevation the student should draw first for CHOWCHILLA and justify the choice against the design criteria. *(3 marks)*

Q17. Rewrite the student's annotation as an **evaluative annotation** for the CHOWCHILLA plan, referring to at least two of the design criteria. *(4 marks)*

Q18. Explain why two-dimensional drawing for environments is described as **iterative**, and describe one situation in the CHOWCHILLA project that would send the designer back from the plan to a schematic drawing. *(4 marks)*

Q19. Describe **one manual** and **one digital** method the student could use to produce a measured plan of the CHOWCHILLA tenancy, and state one advantage of each. *(4 marks)*

Q20. *(Using the GRASSWREN floor plan.)* Explain how the design principles of **scale** and **hierarchy** can be read from a floor plan, referring to evidence in the drawing. *(4 marks)*

Q21. *(New scenario.)* **LOGRUNNER LANEWAY** is a service laneway 6000 mm wide and 25 000 mm long, running between a two-storey brick warehouse on the west and a row of single-storey shops on the east. It is to become a shaded pocket park with seating, planting and a rainwater tank. The ground falls 900 mm from the north end to the south end. The design criteria are: **1.** step-free for the full length; **2.** shade over at least half the seating at midday in summer; **3.** a 3000 mm wide clear path kept open for firefighting access; **4.** the surface drains to a tank at the south end. Produce a written plan of the two-dimensional drawings you would prepare, naming at least **five** drawings and, for each, its type, its scale where one applies, and what it would show. *(8 marks)*

Q22. *(LOGRUNNER.)* Explain which two-dimensional drawing would best show the 900 mm fall along the laneway and why a plan cannot show it. Then select a scale for a site plan of the laneway on an A3 sheet, justifying the choice with a calculation. *(5 marks)*

Q23. Evaluate the student's CHOWCHILLA folio page against what the Develop stage of the VCD design process requires of two-dimensional drawing. *(6 marks)*

Answers

Q1. (a) Plan — straight down; elevation — horizontally at a vertical face; section — at a vertical cut. (b) The plan. (c) Every edge in the plane of the view is true length, so it can be measured (no convergence). **Q2.** (a) 1 mm on the drawing represents 50 mm on site. (b) 180 mm at 1:50; 90 mm at 1:100. (c) 1:20 — more sheet is spent per metre, so more detail can be drawn. See solutions. **Q3.** (a) A rapid diagrammatic drawing showing relationships between spaces, not to scale and without dimensions. (b) Any two of: a scale, dimensions, wall thicknesses, true shapes. (c) Relative area only — it ranks the spaces; it cannot say whether any of them fits. See solutions. **Q4.** (a) Cut = heaviest solid (usually filled); seen below = medium solid; above = dashed. (b) See solutions. **Q5.** (a) Any two of: heights, proportion, position and size of openings, materials, how the building meets the ground. (b) By the direction the face looks (or the street it fronts). (c) A ground line, plus levels or a human figure at the same scale. **Q6.** (a) Any two of: site analysis, circulation (flow), zoning, adjacency matrix. (b) See solutions. (c) See solutions. **Q7.** Any three of: the waiting area named in the bubble diagram is missing from the plan; the plan carries no dimensions and its one size is written in metres, not millimetres; nothing shows the tool store as lockable (criterion 4). See solutions. **Q8.** A perspective (a bird's-eye view), not a plan — see solutions. **Q9.** It is above the cut plane, so it is drawn dashed (with its posts, if any, filled solid). **Q10.** A schematic is not to scale, so a dimension and a scale note are both meaningless on it, and without link lines the diagram records no adjacencies. See solutions. **Q11.** Public route: along the footpath → in through the street door → counter → waiting area. Separately, in a second colour and not crossing the public route: a volunteers' loop between the repair benches and the tool library, and a rear arrow from the benches to the service-lane door. See solutions. **Q12.** No north point = orientation and sun/shade cannot be checked; no scale = nothing can be measured. See solutions. **Q13.** A break in the wall, the leaf, the hinge and a quarter-circle swing arc. See solutions. **Q14.** Site plan = looking down on the whole site including the roof; floor plan = a horizontal section through one building. Floor plan 1:50 (accept 1:100 where the calculation is shown); site plan 1:200 (accept 1:500 where the calculation is shown). **Q15.** A section across the tenancy from the shopfront to the rear wall, marked with a chain line and arrows and labelled A–A. See solutions. **Q16.** The **south** elevation — the shopfront that faces the street (criterion 2). See solutions. **Q17.** Strength + limitation + next action, in design terminology, tied to numbered criteria — see solutions. **Q18.** Testing a schematic arrangement in plan can show it will not fit, sending the designer back to the bubble or zoning diagram. See solutions. **Q19.** Manual: scale rule, set square and fineliner on tracing paper. Digital: vector or CAD drawing set out full size and printed to scale. See solutions. **Q20.** Scale is read by comparing rooms with a human figure and with each other; hierarchy is read in which space is largest, most central and most glazed. See solutions. **Q21.** See fully-worked solutions for a model plan of seven drawings; five correctly typed drawings earn full marks. **Q22.** A longitudinal section along the laneway (accept a long elevation of one wall, justified); a plan is a horizontal projection so heights collapse. Scale 1:100 — see solutions. **Q23.** Not yet meeting the stage: schematic work is undeveloped and the plan is not a measurable orthogonal drawing. See solutions.

Fully-worked solutions

Q1. (a) The **plan** — the line of sight is straight **down**; the **elevation** — the line of sight is **horizontal**, straight at a vertical face; the **section** — the line of sight is horizontal, straight at a **vertical cut** taken through the space *(1 mark each).* (b) The **plan**, which is a horizontal section taken about 1400 mm above the floor. (c) In an orthogonal drawing the line of sight is at 90° to the plane of the view, so no lines converge and every edge lying in that plane is drawn at its **true length** — which is why the drawing can be measured. *(Accept: nothing is foreshortened; opposite walls of a rectangular room are drawn the same length.)*

Q2. (a) **1:50** is a ratio: one millimetre measured on the drawing represents fifty millimetres of the real building, so the drawing is fifty times smaller than the thing it describes *(1 mark).* (b) At 1:50, 9000 ÷ 50 = **180 mm**. At 1:100, 9000 ÷ 100 = **90 mm** *(1 mark each).* (c) **1:20** is the larger scale. The smaller the second number of the ratio, the less the building is reduced, so more sheet is spent on every metre of it: the 9000 mm north wall is drawn 450 mm long at 1:20 against only 90 mm at 1:100. What the designer gains is **detail** — wall build-ups, fittings, door swings and clearances can be drawn and dimensioned at 1:20 where at 1:100 they would close up into a single line. The cost is sheet: at 1:20 the GRASSWREN plan measures 450 × 300 mm and no longer fits A3, which is why 1:20 is kept for details and 1:50 used for the whole plan *(1 mark for naming 1:20, 1 mark for the gain explained).*

Q3. (a) A **schematic** (diagrammatic) drawing is a rapid drawing that records the **relationships** between the parts of a space — adjacency, movement and zoning — rather than their appearance or their size; it is not drawn to scale and carries no dimensions *(1 mark).* (b) Any two of: a **scale**, **dimensions**, **wall thicknesses**, **true shapes**, construction information *(1 mark each).* (c) The bubbles are drawn **sized loosely by relative area**, so the diagram ranks the spaces

against one another: it says that the main room is far bigger than anything else and that the store and the WC are of the same order, which is enough to settle which space should be central and which can be pushed to an edge. What it **cannot** say is anything measurable — a bubble drawn twice as wide as another is not twice its area, and no bubble states whether the space it stands for will actually fit inside the 9 m × 6 m footprint criterion 5 allows. That question belongs to the measured plan, which is exactly why a bubble is never dimensioned *(2 marks: relative size ranked + no measurable size).*

Q4. (a) Cut by the plane — the **heaviest** continuous line, usually filled solid (poché); seen below the cut — a **medium** continuous line, unfilled; above the cut plane — a **dashed** line *(1 mark each).* (b) The line weights are the code that tells a reader what each shape *is*. With a single weight, the external wall, a workbench and a paving pattern all look identical, so the reader cannot tell structure from furniture, or a solid enclosure from a line drawn on the floor. The drawing then has to be explained in words, which defeats its purpose: a plan exists so that someone who was not there when it was drawn can read the space unaided *(2 marks: what the weights encode + the consequence for the reader).*

Q5. (a) Any two of: **heights** (sill, head, eaves, ridge); **proportion** of the face; the **size and position of openings**; **materials and finishes**; how the building **meets the ground** *(1 mark each).* (b) An elevation is named for the direction the face **looks** — the *north elevation* is the face that looks north — or for the street or space it fronts *(1 mark).* (c) A clearly drawn **ground line**, and either a set of **levels** (for example FFL +300, eaves 4100) or a **human figure drawn at the same scale**, so the reader has a reference against which the heights mean something *(1 mark each).*

Q6. (a) Any two of: **site analysis diagram**, **circulation (flow) diagram**, **zoning diagram**, **adjacency matrix** *(1 mark each).* (b) Site analysis — *where on the site, and which way should it face?* Circulation — *how do people move, and in what order?* Zoning — *which part of the site does each activity want?* Adjacency matrix — *which pairs of spaces must, may or must not be next to each other? (1 mark for two answered correctly, 2 marks for both matched to the drawing named in (a)).* (c) The speed is the method. A loose drawing takes minutes, so a designer will make ten of them and discard nine; a neat one takes an hour, so the designer makes one and then defends it because of the time already invested in it. Drawing loosely also keeps the drawing honestly diagrammatic — a tidy, ruled bubble diagram starts to look measured, and readers (including the designer) begin to treat positions and sizes on it as decisions when they are not *(2 marks).*

Q7. *(Any three; 1 mark for the omission identified, 1 mark for the correction.)*

1. **The waiting area is missing from the plan.** The student's own bubble diagram names four spaces — repair benches, tool library, counter and waiting — but the plan carries only the first three. The two drawings disagree, and the space a visitor occupies while the repair is done has quietly been lost between them. *Correction:* draw the waiting area on the plan, set where it does not block the footpath's view of the repair benches (criterion 2) — or revise the bubble diagram, if the decision has genuinely changed.
2. **The plan carries no dimensions, and the one size written on it — "12 m × 7 m" — is in metres.** A plan is a measured drawing: without dimensions the 1200 mm clear working space criterion 1 requires cannot be set out or checked, and mixing metres into a project whose brief is written in millimetres invites a factor-of-a-thousand error. *Correction:* dimension the drawing in millimetres — 12 000 × 7000 overall, the position and length of the bench run, and the 1200 mm clearances — and note "all dimensions in millimetres" on the sheet.
3. **Nothing on the plan shows the tool store as securable.** Criterion 4 requires the tools to be lockable when the café is closed, but "tools" is drawn as an open box exactly like a bench, so the criterion cannot be checked anywhere on the drawing. *Correction:* draw the tool store as an enclosure with its own wall and a door — leaf, hinge and swing arc — and note the lock, so that the drawing answers the criterion instead of leaving it to be assumed.

Accept also: any other requirement of the brief or decision of the bubble diagram that the plan leaves unrecorded, provided the correction offered is a change to the drawing.

Q8. The student has drawn a **bird's-eye perspective**, not a plan. In a plan the line of sight is at 90° to the floor at every point, so parallel walls stay parallel and opposite walls of a rectangular tenancy are drawn exactly the same length. Here the side walls converge toward the rear, which is what happens when a viewer looks down *into* a space from a single point — the further something is, the smaller it is drawn. The consequence is that the drawing has no single scale: 1 mm near the shopfront stands for a different real distance than 1 mm at the rear wall, so no length on it can be converted back to a real measurement, and the 1200 mm clear space required around each bench by criterion 1

cannot be checked anywhere on the drawing. It is a picture of the space rather than a measurement of it *(4 marks: named as a perspective, the orthogonal rule stated, the loss of a single scale, and a consequence tied to a criterion).*

Q9. The convention is that a floor plan is a **horizontal section** taken about 1400 mm above the floor: anything cut by that plane is drawn heaviest and filled, anything seen below it is drawn in a medium line, and anything **above** it is drawn **dashed**. The footpath awning is overhead cover, well above the cutting plane, so it must be drawn as a dashed rectangle projecting 2400 mm from the shopfront — with any supporting posts, which *are* cut by the plane, filled solid like the walls. Drawn solid as it is now, the awning reads as a walled enclosure on the footpath rather than as cover overhead *(3 marks: the cut-plane rule, the correct dashed treatment including the projection, and the misreading it prevents).*

Q10. *The dimension.* A schematic drawing is not drawn to scale, so a "3500" written across a bubble is not a measurement of anything — the bubble was placed by hand to show a relationship, and its width carries no information. Writing a dimension on it invites the reader to treat a relationship diagram as a measured drawing. *The scale note.* "Scale 1:50" claims that every length on the drawing is fifty times smaller than reality. Nothing on a bubble diagram was set out that way, so the note is simply untrue and would mislead anyone who tried to measure from it. *The missing lines.* The lines between bubbles are the content of the drawing: each one says "these two spaces must be next to each other". Without them the page is four labelled circles in arbitrary positions and records no adjacency decision at all, which is the one thing the diagram exists to do. *What a correct CHOWCHILLA bubble diagram would carry:* one bubble for each space named in the brief — street entry, counter, waiting area, repair benches, tool library, rear lane door — sized loosely to suggest relative area; a line joining every pair that must be adjacent (entry–counter, counter–waiting, waiting–repair benches, repair benches–tool library, tool library–rear door); no dimensions, no scale and no wall thicknesses; and a short note of the decision it settles — that the repair benches must sit against the shopfront so the activity is visible from the footpath (criterion 2) *(5 marks: each of the three faults explained, plus a described correct diagram with bubbles, adjacency lines and the absence of measurement).*

Q11. *(Model — accept any coherent sequence drawn from the brief.)* The circulation diagram would be a loose outline of the tenancy carrying arrows in the order a visitor uses the space. **Arrow 1:** along the footpath under the awning and in through the street door — drawn heaviest, because it is the route almost every visitor takes. **Arrow 2:** from the door to the **counter**, where the broken item is handed over and booked in. **Arrow 3:** from the counter to the **waiting area**, where the public route ends. Criterion 2 puts the repair activity on show to the footpath, so the waiting area is placed in sight of the benches but set back from the glazing, where seated visitors do not screen that view. **Arrow 4:** a short return loop between the **repair benches** and the **tool library**, drawn in a second colour because it is the volunteers' movement, not the public's, and it must not cross the public route. **Arrow 5:** a rear arrow from the benches to the **service-lane door**, for deliveries and waste. I would also shade the path that must stay step-free from the street door to every bench, so criterion 3 is visible as a movement decision rather than a construction one *(4 marks: an ordered public route, a separate service or volunteer route, arrows tied to the named spaces, and at least one criterion carried by the diagram).*

Q12. *No north point.* A plan with no north point cannot be checked against anything about the site. The CHOWCHILLA brief turns on orientation: the glazed shopfront is on the **south**, which in Australia receives very little direct sun, so the benches against that glazing get soft, even daylight rather than glare — while the sunny side of the tenancy is the rear wall on the **north**, which is the service lane and has only one small door in it. Without a north point a reader cannot tell which edge of the drawing is the street, cannot judge how much daylight reaches the repair benches, and cannot confirm that the plan matches the brief at all. *No stated scale.* A drawing without a scale cannot be measured by anyone but the person who drew it. The clear working space of 1200 mm required around every bench (criterion 1) cannot be verified, the benches cannot be ordered or built to fit, and a builder or a volunteer reading the drawing has no way of converting a length on the sheet back into a length in the shop. Without a scale the drawing is a sketch of an arrangement, not a plan of one *(4 marks: 2 for each omission — what is lost, tied to the CHOWCHILLA brief).*

Q13. A door on a plan is drawn as a **break in the wall** the width of the opening, with the **leaf** shown as a line at right angles to the wall, the **hinge** at one end of the opening, and a light **quarter-circle arc** swept from the hinge through the leaf to show the direction of swing. This matters for **criterion 1** because a swinging leaf occupies floor space: a 920 mm leaf sweeps a quarter-circle of roughly 0.66 m², and if that arc falls inside the 1200 mm clear working space around a repair bench, the clearance the brief requires does not really exist. It matters for **criterion 3** because a step-free path is only useful if it is also unobstructed — a door that opens across the route, or that a wheelchair user cannot

pull open because there is no space beside the handle, breaks the accessible path even though the floor itself is level. Drawing the swing is what makes both of these checkable on the drawing rather than discoverable on site *(4 marks: the drawing convention in full, plus a consequence tied to each named criterion).*

Q14. A **floor plan** is a horizontal section cut about 1400 mm above the floor of one building or tenancy, looking down at what is left; it shows the internal walls, rooms, fittings and openings, and it is where internal dimensions are checked. A **site plan** is a view looking straight down on the **whole site** — boundaries and setbacks, the **roof** of the building rather than its interior, paths, paving, planting, levels and access — and it is where the building's position and its relationship to its surroundings are checked. Both are orthogonal and both carry a north point, but they answer different questions and are therefore drawn at different scales. For CHOWCHILLA on A3 (420 × 297 mm): the 12 000 × 7000 mm tenancy at **1:50** is drawn 240 × 140 mm, which fits with room for dimensions and notes — so **1:50** for the floor plan. The site plan must also take in the footpath, the awning, the street and the service lane, perhaps 40 × 30 m; at **1:200** that is 200 × 150 mm and fits comfortably — so **1:200** for the site plan. *(Accept 1:100 for the floor plan or 1:500 for the site plan where the calculation is shown and the choice is justified.) (4 marks: a congruent two-sided distinction + a justified scale for each.)*

Q15. I would take the section **across** the tenancy, running from the shopfront on the south to the rear wall on the north, and cut it through one of the repair benches and the entry door so that the section passes through the parts of the space the brief is about. On the plan it would be marked with a **chain line** running right across the drawing, with an **arrow at each end pointing the direction of view** and a label (**A**) at each end, and the section drawing itself would be titled **SECTION A–A** to match. Two things the section would show that the plan cannot: **(i) heights** — the floor-to-ceiling height of the tenancy, the height of the shopfront glazing and the height of the awning above the footpath, which together decide whether a person on the footpath can actually see the repair activity inside (criterion 2); and **(ii) levels** — whether the footpath, the door threshold and the shop floor are at the same level or whether there is a step at the entry, which is exactly what criterion 3 turns on. Also accept: the working height of the benches relative to a seated or standing user; the relationship between the awning and the sun angle *(4 marks: a justified location, the marking convention including direction of view, and two things the plan cannot show).*

Q16. The **south elevation** — the shopfront that faces the street. It is named for the direction the face looks, and the brief puts the glazed shopfront on the south. It should be drawn first because it carries the two decisions the brief is most anxious about: **criterion 2** requires the repair activity to be visible from the footpath, and only an elevation can show how much of the shopfront is glazed, how high the glass sits above the footpath and whether the awning cuts off the sightline into the shop; and it is the face every passer-by and every prospective visitor actually sees, so it carries the project's public identity *(3 marks: the elevation correctly named and oriented + a justification tied to a stated criterion).*

Q17. *Model rewrite:* "The four repair benches are set in a row against the glazed shopfront, so the repair activity is on show to anyone on the footpath — the strongest response in the layout to criterion 2, and the reason the benches were not pushed to the rear where the services are easier. Its limitation is that the row leaves too little space between the bench ends and the entry route to hold the 1200 mm of clear working space criterion 1 requires, and the entry door swing — which has not been drawn at all — would eat into that gap again; the step-free route to the two eastern benches (criterion 3) is therefore not yet proved. Next step: redraw the plan at 1:50 with the door swings shown, dimension the clearance around each bench, and if 1200 mm cannot be held for all four, test a three-bench row with the fourth bench turned end-on in a bubble diagram before redrawing." *(4 marks: a strength and a limitation, both in design terminology and both tied to numbered criteria, plus a specific next action; the original annotation's faults — an unsupported preference and a second-hand opinion — replaced by evidence.)*

Q18. Two-dimensional drawing is **iterative** because each drawing tests the one before it, and a failed test is information rather than a defeat: what the designer learns while measuring sends them back to re-decide something they had settled diagrammatically, and the loop runs again with better knowledge. In CHOWCHILLA the clearest trigger is a **clearance failure discovered in plan**. The bubble diagram happily puts four repair benches against the shopfront, because a bubble has no size; but drawn at 1:50 in a 12 000 × 7000 mm tenancy, four benches in a row with 1200 mm of clear working space around each — and with the entry door swing taken out of the same floor — will not fit alongside the counter and the waiting area. No amount of redrawing that plan will fix an arrangement that is wrong in principle. The designer therefore returns to the **bubble and zoning diagrams** and tests cheaper alternatives — benches in two short rows, the counter moved to the rear, the tool library taken off the floor and onto a wall — before setting out the measured plan again. ∴ the loop back to the schematic is the process working: the plan did its job by

proving the arrangement wrong early *(4 marks: iteration defined as drawings testing one another + a specific CHOWCHILLA trigger + the drawing returned to + why looping back is correct).*

Q19. Manual — set out with a scale rule and set square in fineliner on tracing paper. The student fixes the scale (1:50), sets out the 12 000 × 7000 mm envelope as 240 × 140 mm, rules the wall thicknesses, and works the three line weights with three pen widths, laying tracing paper over the drawing to test alternative bench layouts without redrawing the shell. *Advantage:* it is immediate and costs nothing, and overlays make it easy to compare two layouts side by side while the decisions are still moving. **Digital — a vector or CAD drawing set out at full size and printed to scale.** The student draws the tenancy at its real dimensions, assigns line weights by layer (walls, fittings, over-the-cut) and prints at 1:50 to A3. *Advantage:* it is accurate and editable — moving a wall updates every dimension, clearances around each bench can be measured directly on screen to check criterion 1, and the same file produces the elevation and section without re-measuring. *(4 marks: one manual and one digital method described as procedures, with an advantage stated for each; no marks for naming software alone, since a program is a medium and not a method.)*

Q20. Scale in a plan is read by comparison, because a plan has no depth cues of its own. On the GRASSWREN plan the main room is labelled 5700 × 5600 mm and holds a 3600 × 900 mm briefing table with eight stools around it; the WC beside it carries a dashed 1540 mm turning space. Set against those known human dimensions, the reader can tell at a glance that the main room is a room for a group and the store is a room for one person to step into — the drawing communicates size through the relationship between the spaces and the human-scaled objects in them, which is exactly what the principle of scale does. **Hierarchy** is read in which space the layout ranks first. The main room is by far the largest (31.9 m² against 7.8 and 6.8), it is the only space every other space opens off, and it takes the whole of the glazed north wall; the store and the WC are small, closed and pushed into the east corner. A reader therefore knows without being told that the main room is the primary space, the deck is secondary, and the service rooms are tertiary — the plan establishes a visual and spatial order just as a poster establishes a reading order *(4 marks: each principle defined in spatial terms and supported by specific evidence from the drawing).*

Q21. *(Model plan — accept any set of at least five drawings, correctly typed, with a scale where one applies and a stated content.)*

Schematic drawings — Develop, divergent, none to scale.

1. **Site analysis diagram.** The laneway outline with the two-storey warehouse marked on the west and the single-storey shops on the east; north; the sun's path, with the shadow the two-storey warehouse throws east across the laneway through the afternoon and the sun running straight down the middle of the laneway from the north at midday; the two street entries at each end; the direction of fall (north to south); the existing downpipes and the position of the proposed tank. *Shows:* where the shade already is, which decides where seating can go for criterion 2, and which end the water runs to for criterion 4.
2. **Zoning diagram.** The 6000 mm width divided along its length into bands — a 3000 mm through-path band that must stay clear for criterion 3, a seating and planting band along the east side, which the two-storey warehouse opposite shades through the afternoon, and a service pocket at the south end for the tank. *Shows:* that criterion 3 and the seating can coexist only if the seating is kept out of the central band, and that midday shade (criterion 2) will have to be built rather than borrowed from the walls.
3. **Circulation diagram.** Arrows for the through movement (north entry to south entry, both directions), the shop staff's short movements out of their rear doors, and the emergency-access route that must never be blocked. *Shows:* which parts of the laneway are movement and which are dwelling.

Orthogonal drawings — Develop into Deliver, all to scale.

4. **Site plan at 1:100.** The whole laneway drawn 60 × 250 mm on A3: boundaries, the two building walls, the 3000 mm clear path dimensioned, the seating and planters, the tank, the paving falls and spot levels at each end, and a north point. *Shows:* that criterion 3 is met along the full length, and where every element sits.
5. **Longitudinal section at 1:100** (a section taken along the length of the laneway, marked A–A on the site plan). *Shows:* the 900 mm fall from north to south as a measurable gradient, the levels at each end, the seating and the tank against that falling ground, and therefore whether criterion 1 is satisfied without steps.
6. **Cross-section at 1:50** (marked B–B, taken across the laneway). *Shows:* the two-storey wall on the west against the single-storey shops on the east, the height of the shade structure, and the 3000 mm clear width in relation to both — the drawing that proves criteria 2 and 3 together.

7. **East elevation at 1:100** — the warehouse wall on the west side of the laneway, which is the face that *looks* east into it, with the shade structure, the planting and the seating drawn against it. *Shows:* the main wall as a user standing in the laneway experiences it, and how the new work is fixed to an existing building.

(8 marks: at least five drawings named; each correctly classified as schematic or orthogonal; a scale given for every orthogonal drawing and none given for the schematics; a stated content for each; and the set tied to the LOGRUNNER criteria rather than listed generically.)

Q22. The 900 mm fall is a **vertical** dimension, and a plan is a **horizontal projection** — the line of sight is straight down, so every height collapses into the sheet and cannot be drawn at all. A plan can only *note* levels, as spot levels or contour lines, which is a written annotation rather than a drawn measurement. The drawing that shows the fall is a **longitudinal section** (a long section) taken along the 25 000 mm length of the laneway: it draws the ground profile falling from the north end to the south end, with the level at each end marked, so the gradient can be measured straight off the drawing and checked against criterion 1. The fall of 900 mm over 25 000 mm is a gradient of 25 000 ÷ 900 ≈ **1:28**, gentler than 1:20, so the laneway can be graded as a continuous step-free path and no ramp or landing is needed. *(Accept a long elevation of one laneway wall, which also shows the ground line falling, provided the answer explains that the section additionally shows the seating and structures cut against that profile.)* **Scale.** The laneway is 6000 × 25 000 mm and A3 is 420 × 297 mm. At 1:50 it would be drawn 25 000 ÷ 50 = 500 mm long, which does not fit the sheet at all. At 1:100 it is 25 000 ÷ 100 = 250 mm by 6000 ÷ 100 = 60 mm, which fits the long side of A3 with room for dimensions and a title. At 1:200 it would be only 125 × 30 mm — it fits, but it wastes most of the sheet and halves the detail that can be read. **∴ 1:100 at A3** *(5 marks: the plan's limitation explained by projection, the correct drawing named with a reason, the gradient calculated, and a scale chosen with the arithmetic shown).*

Q23. The folio page **does not yet meet what the Develop stage requires** of two-dimensional drawing, although it is not without merit. Its one genuine strength is sequence: the student has worked diagrammatically before drawing up, which is the right order, and the bubbles do name the four main activities from the brief.

Everything else falls short, in both families of drawing. The **schematic work** records no relationships at all — no lines join the bubbles, so no adjacency has been decided, and there is no site analysis, no zoning and no circulation diagram, which means the orientation of the shopfront, the sun on the south glazing and the movement of visitors past the counter have never been tested. Worse, the diagram has been given a dimension and a scale note, which shows the two families have been confused: a relationship diagram is being treated as a measurement.

The **orthogonal work** is not orthogonal. The side walls converge, so the drawing is a bird's-eye perspective with no single scale, and nothing on it — least of all the 1200 mm clear working space criterion 1 requires — can be checked. There is one line weight, so the reader cannot tell the cut walls from the benches; the footpath awning is drawn solid instead of dashed, so it reads as an enclosure; the doors are gaps with no leaf or swing arc, so their effect on the clearances and on the step-free route is invisible; and there is no north point, no scale and no section line, so the drawing cannot be measured, oriented or extended into the vertical dimension the brief also depends on.

The **annotation** compounds the problem: "I think it looks good" and a friend's approval are preferences, not evaluations, so the page records no reasoning, no strength, no limitation and no next action, and no criterion is mentioned anywhere.

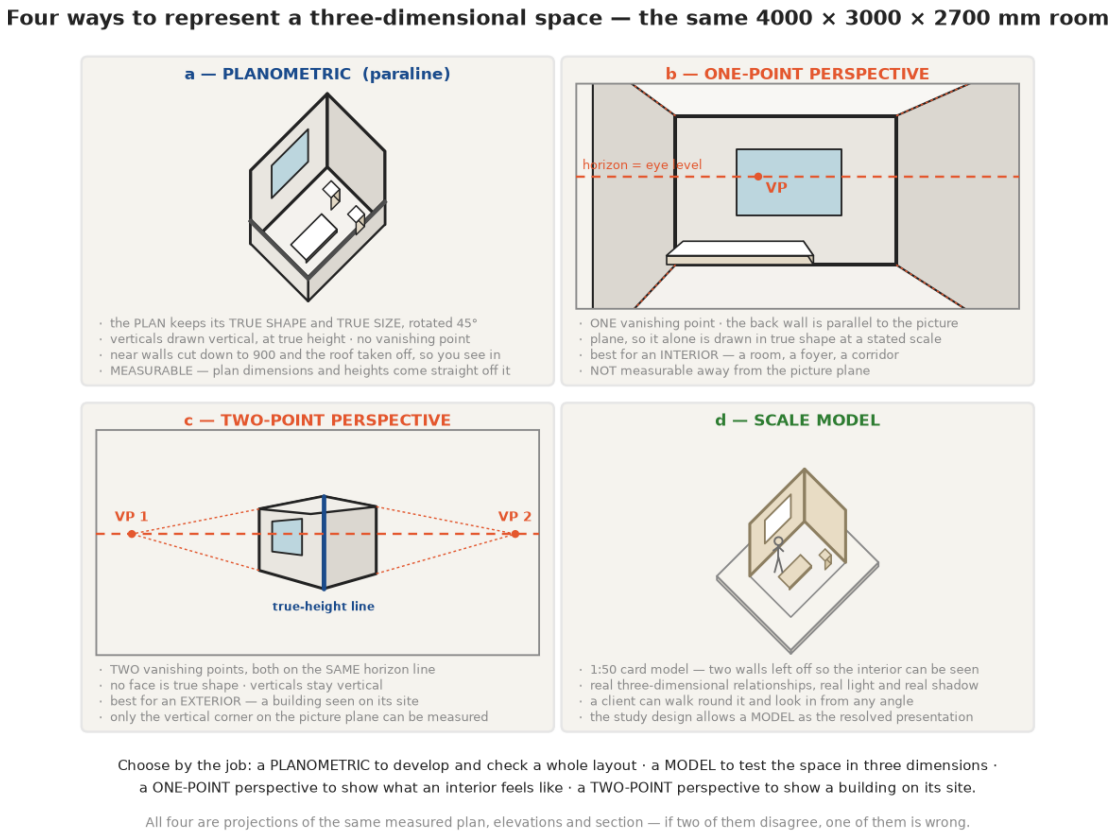
∴ what the student holds is one untested arrangement, not a set of drawings that has decided anything. To meet the stage they would need to re-run the schematic work with linked bubbles, a site analysis and a circulation diagram; redraw the tenancy as a true rectangle at a stated scale (1:50 at A3 gives 240 × 140 mm) with three line weights, dashed over-the-cut work, door swings, a north point and a section line; and annotate each drawing with a strength, a limitation and a next action tied to the four numbered criteria *(6 marks: strengths and limitations, specific evidence from both halves of the page, the requirements of the stage applied to both families of drawing, and an overall judgement with a stated remedy).*

Chapter 7 Visualising environments — 7B Planometric & perspective drawing of spaces

Theory

Chapter 7A gave you the flat drawings — schematics, plans, elevations and sections. They are accurate, and between them they can settle almost every dimension in a building. What they cannot do is show anyone what the space will be **like**. A plan is a horizontal section 1400 mm above the floor; nobody has ever stood in one. A client looking at a floor plan of the room they are paying for very often cannot picture it at all.

This subtopic covers the methods that close that gap: the **three-dimensional** methods for representing spaces and structures — **planometric drawing**, **perspective drawing** (one-point and two-point), and **model-making**. They are the drawings you take to a client, and they are also the drawings in which you first discover that your own layout does not work.



Two families, one test. Every three-dimensional drawing method belongs to one of two families, and there is a single question that sorts them:

> *Do parallel edges on the real space stay parallel on the page, or do they converge?*

- In a **paraline** drawing they stay **parallel**. There is **no vanishing point**. Because measurements along the drawing's axes are kept true, a paraline drawing **can be measured**. The paraline system used for environments is the **planometric**.
- In a **perspective** drawing they **converge** to **vanishing points** on a **horizon line**. The drawing matches what an eye actually sees, at the cost of measurability: apart from one special line, **nothing on a perspective can be measured**.

Everything in this subtopic is worked against one original project, **PITTA**.

Entry	What the brief says
Client	PITTA Branch Library, an inner-suburban public

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	library.
Communication need	Environments — convert the disused single-storey brick store at the rear of the library into a quiet reading room opening onto the reader's courtyard.
Purpose	To give up to ten readers a quiet place to work, to house the local-history collection, and to connect the library to the courtyard it has never used.
Context	An existing 1930s brick store: external 9100 × 6100 mm with 350 mm solid brick walls, so 8400 × 5400 mm internally; ceiling 2700 mm above the finished floor; parapet 3200 mm. The north wall faces the courtyard; the library door is in the south wall. The site is flat.
Users	Readers from about 8 to 90, including a regular reader who uses a wheelchair and a weekly children's reading group.
Design criteria	**1.** seating for at least ten readers — a reading table for four and a window seat for six; **2.** every seated reader (eye height 1200 mm) can see into the courtyard; **3.** 3000 mm of shelving for the local-history collection, with the top shelf no higher than 2100 mm; **4.** a step-free route at least 1000 mm wide from the library door to the courtyard door; **5.** the existing brick shell retained, including its 2700 mm ceiling.

The resolved design puts a 4200 mm glazed opening (sill 450, head 2550) in the north wall with a window seat 450 mm high beneath it, a 920 mm glazed door to the courtyard, the shelving 400 mm deep along the east wall, a 2400 × 1000 mm reading table with its top at 740 mm, and a Ø1200 mm round table for the children's group at the west end.

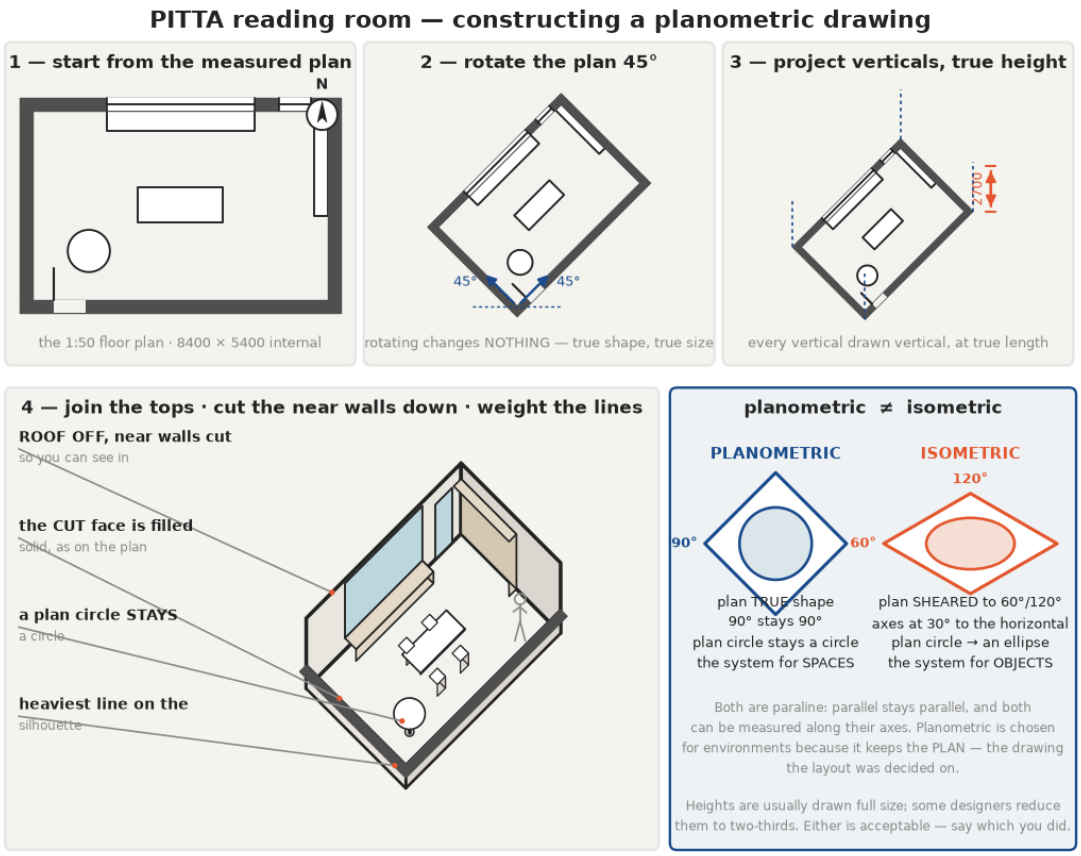
Planometric drawing. A **planometric** — also called a **plan oblique**, and loosely an *axonometric* — is built directly on the floor plan. The plan is **rotated on the page**, usually to **45°** (or to **30°/60°** when you want to favour one wall direction), and then verticals are projected straight up from every corner and drawn at **true height**.

The defining property follows from that description: **rotating a plan does not change it.** The plan keeps its **true shape** and its **true size**, right angles stay right angles, and the walls stay parallel. So in a planometric drawing:

- every **plan** dimension can be measured straight off the drawing;
- every **height** can be measured straight off the drawing;
- a **circle in the plan stays a circle** — it does not become an ellipse;
- there is **no vanishing point** anywhere, and nothing converges.

That combination is what makes the planometric the natural three-dimensional drawing for environments. It is the only one that carries the plan — the drawing on which the whole layout was decided — up into the third dimension without damaging it.

The viewpoint is high and aerial, a "doll's-house" view looking down into the space, so the **cut-away** is standard practice: take the roof off, and cut the two walls nearest the viewer down to about 900 mm (or leave them off altogether) so the interior is visible. Anything the cut passes through is filled solid, exactly as it is on the floor plan.



Constructing a planometric.

1. **Start from the measured plan**, drawn or traced at a stated scale.
2. **Rotate the plan** to 45° (set square) or 30°/60°. Nothing about it changes.
3. **Project verticals** up from every corner of every wall, fitting and piece of furniture.
4. **Measure the true heights** up those verticals — wall 2700, sill 450, head 2550, shelf 2100, table 740, seat 450 — and mark each one.
5. **Join the tops** with lines parallel to the plan edges below them.
6. **Cut away** what blocks the view: the roof off, the near walls down.
7. **Weight the lines** — heaviest on the outer silhouette, medium on the edges between visible faces, lightest on surface detail — then erase the construction lines.

Heights: full size or reduced? Verticals are usually drawn **full size**, which is what makes the drawing measurable in all three directions. Some designers reduce heights to **two-thirds** so a tall space looks less stretched. Either is acceptable — but say on the drawing which you have done, because a reader who measures a two-thirds drawing without being told will get every height wrong.

> **Watch-out — a planometric is not an isometric.** In an **isometric** the two receding axes are drawn at 30° to the horizontal and the plan is **sheared** into a 60°/120° rhombus, so plan angles are no longer true and a plan circle becomes an **ellipse** (major axis 1.22 × the diameter, minor 0.71 ×). In a **planometric** the plan is merely **rotated**, so 90° stays 90° and a circle stays a circle. Isometric is the paraline system for **objects** (Chapter 5A); planometric is the paraline system for **spaces**. Drawing your room at 30°/30° and calling it a planometric throws away the one property you chose the method for.

Perspective drawing. A perspective is built on three ideas.

1. The picture plane. Imagine a sheet of glass held upright between you and the space, and the view traced onto it. Anything that actually **touches** that glass is drawn at **true scale**; everything behind it is drawn smaller, and everything in front larger. This is why a perspective is not measurable in general — and why the parts that lie in the picture plane *are*.

2. The horizon line. The **horizon line (HL) is your eye level**, and it runs right across the drawing. It is a **design decision**, not a default:

- **1600 mm** — a standing adult; the usual working eye level.
- **1200 mm** — a person seated at a table, and also, near enough, an adult using a wheelchair, whose eye sits at roughly 1100–1300 mm.
- **900 mm** — a young child.

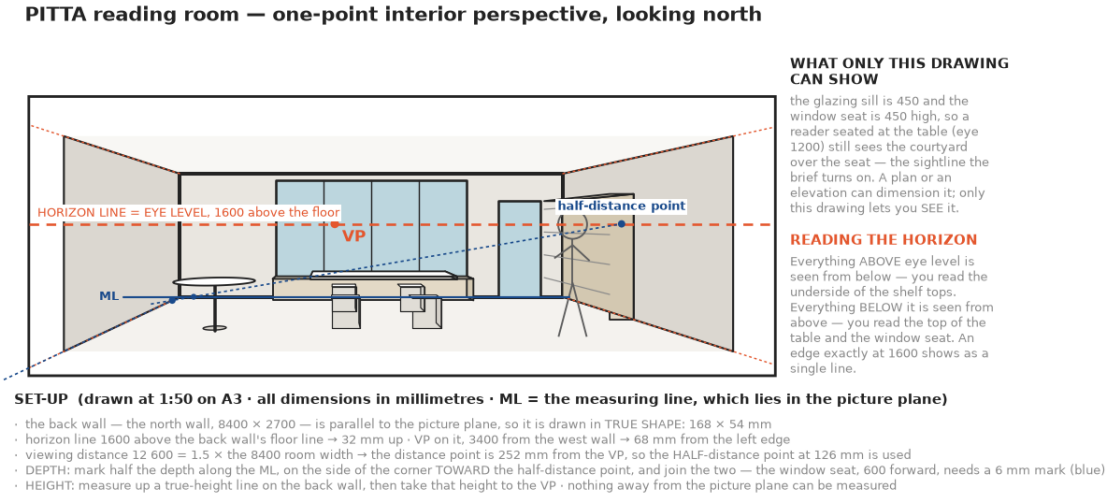
Once the horizon is set, it also tells you what the viewer can see. **Everything above eye level is seen from below** (you read the underside of a shelf, a bulkhead, an awning). **Everything below eye level is seen from above** (you read the top of a table, a bench, a window seat). An edge exactly at eye level shows as a **single line**. If your drawing shows the top of a 2400 mm wall while the horizon is at 1600 mm, the drawing contradicts itself.

3. Vanishing points. Each set of parallel horizontal edges that recedes from the viewer converges to its own **vanishing point (VP)**, and every VP for a horizontal direction sits **on the horizon line**. How many you need depends on how the space is turned in front of you.

	One-point (parallel) perspective	**Two-point (angular) perspective**
The set-up	One face of the space is **parallel to the picture plane** — usually the back wall of a room.	The viewer stands at a **corner**; no face is parallel to the picture plane.
Vanishing points	**One**, on the horizon.	**Two**, both on the **same** horizon.
What is true shape	The back wall — drawn to a stated scale.	Nothing. Only the vertical corner touching the picture plane is true (the **true-height line**).
Verticals	Vertical.	Vertical.
Best for	**Interiors** — a room, a foyer, a corridor, a laneway looking along it.	**Exteriors** — a building seen on its site; also an interior corner.
Set-up cost	Fast.	Slower, and easy to distort.

(A **three-point** perspective adds a third VP above or below so that verticals converge too. It is used to dramatise a tall building looked up at or down on, and is rarely needed for the small, single-storey spaces in this course.)

The true-height line. This is the single most useful rule in perspective drawing. The only line you may measure on is a line **lying in the picture plane** — in a one-point interior, the back wall and its edges; in a two-point exterior, the near vertical corner. Every other height in the drawing is found by measuring on the true-height line and then **taking that height to a vanishing point**. Measure a height anywhere else and it is wrong, because it has already been foreshortened.



Getting depth right in a one-point interior. The back wall is easy — it is true shape at a stated scale. The hard part is deciding how far forward things sit. Two exact constructions do it.

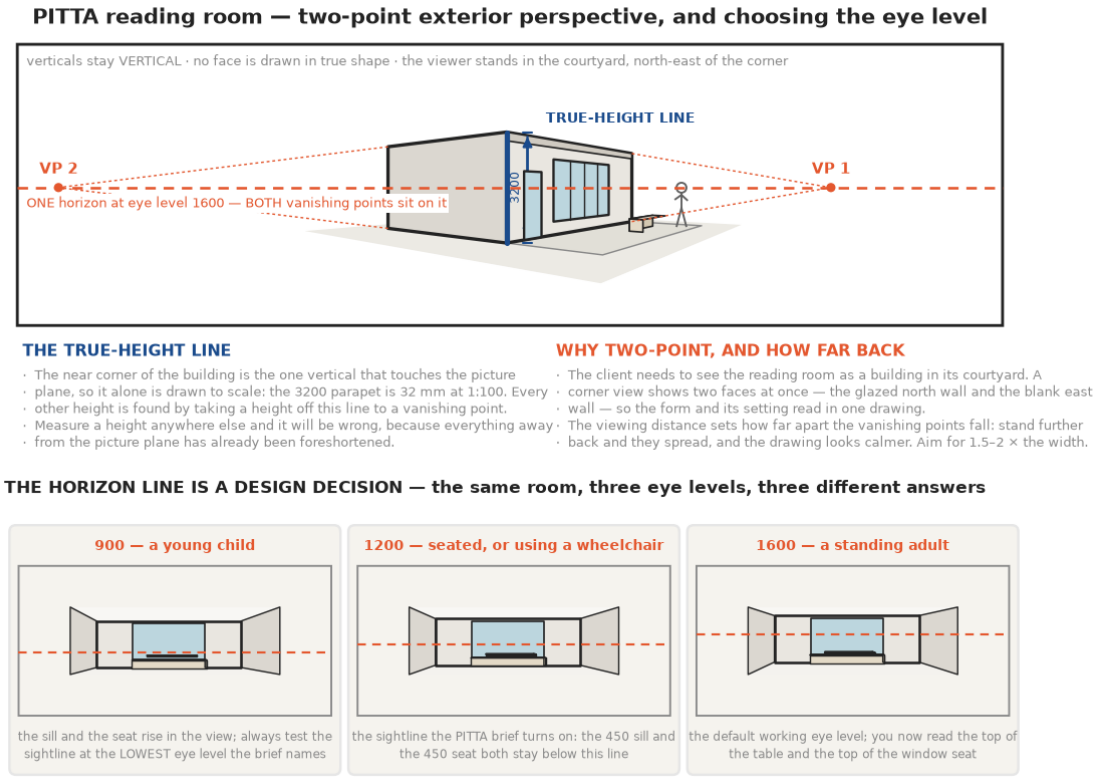
The distance-point (measuring-point) method. Put the picture plane on the back wall, so the back wall's floor line is a **measuring line** drawn at true scale. Mark the **distance point** on the horizon, at a distance from the VP equal to your **viewing distance** at the same scale. To place a point *t* millimetres in front of the back wall, on the receding line that starts at a base-line point **A**: measure *t* (at scale) along the measuring line from A — **on the side of A toward the distance point** — and join that mark to the distance point. Where that line crosses A's receding line, **produced forward of the back wall**, is the depth you wanted.

Both of those directions follow from where the picture plane was put. Because it is on the back wall, the whole room lies **in front** of it, so every depth is found on the near-side extension of the receding line, and the mark goes toward the distance point rather than away from it. (Set the picture plane in front of the subject instead, with the depths behind it, and the mirror image of the rule applies: the geometry is identical, the two sides are simply swapped. Say which set-up you are using before you mark anything.)

If the distance point falls off the sheet, which it usually does, use the **half-distance point** (half the viewing distance from the VP) and mark **half** the depth instead.

The diagonal method. Once any rectangle is drawn in perspective, its two diagonals cross at that rectangle's **perspective centre**, so a line through that crossing halves the rectangle exactly. Repeat to get quarters. To add an *equal* bay beyond a finished one — paving, columns, a run of shelving — draw a line from the near corner on one side, through the mid-point of the far edge, to the receding edge on the **other** side; where it lands is the far corner of the next bay.

How far back should the viewer stand? The viewing distance controls how violently the drawing flares. Keep the drawn area within roughly a **60° cone of vision**, which in practice means standing back about **1.5 to 2 times the width of the space**. For an 8400 mm room that is 12 600–16 800 mm — further than the room is deep, so the viewpoint ends up notionally outside the box. That is normal and correct; a viewer standing inside a small room produces a drawing so distorted that it misleads the client rather than informing them.



Setting up a two-point exterior. Choose the corner you want the viewer to stand near and put the **picture plane through it**, so that corner becomes the true-height line. Rule **one** horizon at the chosen eye level. Place the two

vanishing points on it, well apart. Draw the true-height line to scale, take its top and bottom to both VPs, and cut the two visible faces off with verticals. Verticals stay vertical throughout.

> **Watch-out — one horizon, and keep the vanishing points apart.** Both VPs must sit on the **same** horizon line: two horizons means two eye levels in one drawing, which is impossible, and the two faces of the building will not meet correctly. And VPs placed close together are the classic student distortion — the space folds up into a wedge and the corner looks like the prow of a ship. As a working rule keep the two VPs at least about **twice the drawn width of the object** apart, which usually means running them off the edges of the sheet onto a strip of tape.

Model-making. The study design lets an environmental design solution be presented as **either a model or documentation drawings**, so model-making is a resolution method, not just a hobby.

- **Physical models.** Card, foam-board, balsa, corrugated board, clear acrylic or acetate for glazing, and found materials for landscape. Built to a stated scale — **1:100** for a whole site, **1:50** for a single room, **1:20** for a detail. At 1:50 the PITTA reading room is a 168 × 108 mm footprint with 54 mm walls, and the 350 mm brick becomes 7 mm of card.
    - a **massing model** tests only the block form and where it sits;
    - a **sectional or open-top model** takes a wall or the roof off so the interior can be seen;
    - a **presentation model** is finished, with materials, planting and figures at scale.
- **Digital models.** A three-dimensional CAD or modelling program builds the space as a digital solid. Planometric, one-point, two-point and section views can then be generated from it automatically and to any eye level, and the sun can be set for a given date and time.

What a model tells you that no drawing can. A drawing shows one viewpoint that you chose; a model shows every viewpoint at once, including the ones you did not think of. You can put your eye down to the table and check a sightline directly, walk round it with the client, shine a lamp through it to see where the shadows fall at a given time of year, and hand it to someone who cannot read a plan. A model also makes proportion honest: a room that looked generous in plan can look mean in card. Its costs are time, and the fact that it is slow to change once built.

Choosing the method. No method is best; each answers a different question.

Method	Measurable?	Viewpoint	The question it answers	Where it sits in the process
Planometric	Yes — plan and heights	High, aerial, no vanishing point	*Does the whole layout work in three dimensions?*	Develop
One-point perspective	Only in the picture plane	Inside the space, at a chosen eye level	*What will it feel like to be in here, and what can I see?*	Develop → Deliver
Two-point perspective	Only the true-height line	Outside, at a corner	*What will it look like as a building on its site?*	Deliver
Physical model	Yes, by scale	Every viewpoint at once	*Do the three dimensions really work — sightlines, light, proportion?*	Develop → Deliver
Digital 3D model	Yes	Any, generated	*Can I test many viewpoints and produce the other drawings from one source?*	Develop → Deliver

Rendering and annotating a three-dimensional drawing. Rendering (Chapter 5B) is what turns a line drawing into a description of surfaces and light: a consistent light direction, tone across each face, cast shadows on the floor and

ground, and material indication on the brick, glass and timber. Keep the light direction the same in every drawing of the same project.

Annotation is what turns a picture into evidence. An **evaluative annotation** carries a **strength**, a **limitation** and a **next action**, each written in design terminology and each pointed at a numbered design criterion. “It looks realistic” is a preference. “The 450 sill sits below a 1200 mm seated eye height, so the courtyard stays visible from every seat at the table (criterion 2)” is an evaluation, because it names a feature, states an effect, and identifies the criterion it satisfies.

Reading the elements and principles in a three-dimensional view. These drawings are still visual language. **Form** is the element that only appears once you leave two dimensions — the solid volume of the building and the void of the room. **Line** does the technical work through its three weights. **Tone** and **texture** arrive with rendering. **Scale** is read by comparing the space with a human figure drawn at the same scale, which is why every presentation drawing should carry one. **Proportion** is read in the relationship between the height, width and depth of the volume. **Hierarchy** is read in which space or opening dominates the view. **Figure–ground** is read as solid against void. Naming these is what lets you *analyse* a three-dimensional drawing instead of merely describing it.

Watch-out — a paraline drawing has no vanishing point. The moment two wall lines converge in your planometric, you have drawn a bad perspective by accident, and nothing on it can be measured. Rule the receding lines parallel with a set square and check them against each other.

Watch-out — a perspective has no scale. Writing “1:50” under a perspective is a contradiction: a scale is a single fixed ratio between the drawing and reality, and a perspective deliberately uses a *different* ratio at every depth. State the **eye level** and the **viewpoint** instead — “one-point, eye level 1200, looking north from 12 600 back on the line 3400 from the west wall” — because those are what the drawing actually depends on. The viewpoint you write down has to be the one you actually constructed: it is fixed by where you put the vanishing point and how far back you stood, so read it off your own set-up rather than naming a door you like the sound of.

Watch-out — measure only on the true-height line. In a two-point drawing the only vertical you may put a ruler on is the corner that touches the picture plane. Every other vertical stands at a greater depth, so it is drawn smaller by a ratio the sheet nowhere states; a **receding** horizontal edge is worse again, because its ratio keeps changing along its length. Either way the number you read is neither the real height nor the height at the stated scale.

Watch-out — say what eye level you used. A perspective without a stated eye level cannot be checked against the brief. A sightline criterion is only met at a stated height, and the drawing that appears to prove it at 1600 mm may fail at 1200 mm.

Watch-out — cut the near walls away, don’t just leave them out silently. In a planometric, show the cut faces filled solid at the level you cut them, exactly as the floor plan does. A room whose walls simply stop reads as a room with no walls.

Watch-out — three line weights, or the drawing is unreadable. Heaviest on the outer silhouette, medium on the edges between visible faces, lightest on surface detail. One weight throughout turns a three-dimensional drawing back into a flat wire diagram.

Units 3 & 4 preview — beyond the Units 1&2 study design. Units 3 & 4 name three further terms for the geometry you have just set up by hand. The **station point** is where the viewer stands; the **picture plane** is the imaginary vertical sheet of glass between the viewer and the subject, on which the image is traced; the **ground line** is where that plane meets the ground. They are only names for decisions you have already made directly on the sheet — the viewpoint, the sheet of glass, and the back wall’s floor line — so meeting them now costs you nothing later. A perspective can also be built as a **measured projection from a plan and an elevation**, with the plan laid above a picture-plane line, the station point marked below it, and sight lines dropped where they cross; **neither study design requires that construction, and neither unit teaches it.** In Units 1 and 2 you set the horizon, the vanishing points and the viewing distance directly on the sheet and find depths by the distance-point or diagonal method, as taught above. Do not use station points, picture-plane lines or plan projection in the questions below.

Worked examples

Example 1 — scaffolded

*Produce a **planometric drawing** of the PITTA reading room. State and justify the scale and sheet size, describe the construction sequence, and explain what you would cut away and why. (6 marks)*

Working	Comment
Step 1 — choose the scale by calculating. Rotated 45°, the external 9100 × 6100 footprint spans (9100 + 6100) × cos 45° = 10 748 mm across the page and the same up it, plus the 3200 mm parapet: **10 748 wide × 13 948 high**. At 1:50 that is 215 × 279 mm; A3 is 420 × 297 mm, so it fits only just, with no room for annotations. At 1:100 it is 107 × 139 mm — safe, but the furniture becomes hard to read. **∴ 1:50 at A2** (594 × 420 mm), which leaves room for a title block and evaluative annotations.	A justified scale needs the arithmetic. Note that a rotated plan is **wider than the building**: students who size the sheet from 9100 × 6100 run off the edge every time.
Step 2 — start from the measured plan. Trace the 1:50 floor plan: the 8400 × 5400 internal rectangle inside 350 mm walls, with the glazed opening (x 2100–6300), the courtyard door, the library door, the shelving, the window seat, the reading table and the round table.	The planometric is *built on* the plan, not drawn freehand beside it. Everything already decided in 7A carries straight through.
Step 3 — rotate the plan 45° with a set square. Nothing about it changes: the room is still 8400 × 5400, the corners are still 90°, and the Ø1200 round table is still a **circle**.	This is the examinable property. Rotating is an exact operation — it is why a planometric can still be measured, and why circles survive.
Step 4 — project the verticals straight up from every corner, and mark the true heights on them: walls **2700**, parapet **3200**, glazing sill **450** and head **2550**, shelving **2100**, table top **740**, window seat **450**.	Verticals are drawn *vertical* and at *full length*. If you reduce heights to two-thirds, write that on the drawing.
Step 5 — join the tops with lines parallel to the plan edges beneath them, and complete each fitting as a box on its plan footprint.	"Parallel" is the whole method. Check every receding line against its partner with the set square — one converging pair and the drawing is no longer paraline.
Step 6 — cut away. Take the **roof off**, and cut the **south and west walls** — the two nearest the viewer — down to **900 mm**, filling each cut face solid.	Cut the *near* walls, chosen from the rotation you used: after a 45° rotation the south-west corner is the lowest point on the page, so the south and west walls are the ones in the way. Fill the cut face, exactly as the plan does.
Step 7 — weight the lines and add a figure. Heaviest on the outer silhouette, medium between visible faces, lightest on the floor finish and shelf lines; erase the construction lines; add a 1800 mm figure at the same scale.	Line weight is what makes the drawing read as solid. The figure is what makes the *scale* readable, since a planometric has no perspective depth cues.
What it settles: every criterion that is about **layout** — the 1000 mm route from the library door past the table to the courtyard door (criterion 4), the 3000 mm of shelving at 2100 mm high (criterion 3), and the ten seats (criterion 1) — can be measured directly off this one drawing.	Finish by naming what the drawing decided. A drawing that settles nothing has not earned its place in the folio. The model drawing is the figure above.

Example 2 — scaffolded

*Set up a **one-point interior perspective** of the PITTA reading room looking north to the courtyard. State the eye level and viewing distance you would use and why, describe how you would find one depth and one height, and state which design criterion the drawing tests. (6 marks)*

Working	Comment
Step 1 — put the picture plane on the back wall and draw it in true shape. Looking north, the back wall is the north wall: 8400 × 2700. At **1:50** that is **168 × 54 mm**.	One-point works because one face is parallel to the picture plane. Say which face, and say the scale — it applies to that face and to nothing else.
Step 2 — set the eye level. Rule the horizon **1600 mm** above the back wall's floor line → **32 mm** up. I would also redraw the view at **1200 mm**, because criterion 2 is about a *seated* reader.	The horizon is a decision, not a default. Naming the eye level is what makes the drawing checkable against the brief.
Step 3 — place the VP. On the horizon, **3400 mm** from the west wall → **68 mm** from the left edge of the back wall. Off-centre, so the view feels like standing slightly to one side rather than staring down the axis.	Centring the VP gives a stiff, symmetrical view. Off-centre reads naturally — and it is still one-point, because only one face is parallel to the picture plane.
Step 4 — draw the four rays from the VP out through the four corners of the back wall and on to the edges of the sheet. These are the floor, ceiling and side-wall lines.	The rays *are* the room. Everything else is built between them.
Step 5 — set the viewing distance and mark the measuring point. Use **12 600 mm ≈ 1.5 × the 8400 mm room width**, which keeps the cone of vision near 60°. At 1:50 the distance point is 252 mm from the VP — off the sheet — so use the **half-distance point at 126 mm**.	The viewing distance is what stops the drawing flaring into a fish-eye. Quoting the 1.5–2 × rule and then doing the division is what earns the mark.
Step 6 — find a depth. The window seat's front edge is **600 mm** in front of the north wall. On the measuring line (the back wall's floor line) mark **half** of 600 ÷ 50 = **6 mm** from the west corner, on the side **toward** the half-distance point, and join the mark to the half-distance point. Where it crosses the west wall's floor ray — produced forward of the back wall — is the seat's front edge. Repeat with a **32 mm** mark for the table's near edge, 3200 mm forward.	This is the exact construction, not an estimate. The mark goes toward the measuring point because the picture plane is on the back wall, so the whole room lies in front of it. State too that halving the mark is the price of using the half-distance point — otherwise every depth comes out doubled.
Step 7 — find a height. For the 740 mm table top: measure **740 ÷ 50 = 14.8 mm** up a **true-height line** on the back wall, take that point to the **VP**, and read the height where the ray meets the table's depth line.	Heights migrate from the picture plane to their depth *along a ray to the VP*. Measuring 14.8 mm anywhere else on the sheet is meaningless.
Step 8 — resolve and annotate. Draw the glazing (sill 450, head 2550), the window seat, the shelving with its four shelf lines, the tables and chairs and a seated figure; weight the lines; label "one-point, eye level 1600 (and 1200), looking north from 12 600 back on the line 3400 from the west wall" — and **no scale note**.	A perspective carries an eye level and a viewpoint, never a scale. The viewpoint must be the one actually constructed: Steps 3 and 5 fixed it at 3400 from the west wall and 12 600 back, so those are the numbers that go on the label. That single line is the difference between a drawing a marker can check and one they cannot.
The criterion it tests: **criterion 2**. The sill is 450 and the window seat is 450 high, so at a 1200 mm seated eye level the courtyard is visible over the seat from every place at the table. The plan can dimension that; only this drawing shows it.	Name the criterion. This is also the answer to "why draw a perspective at all when you already have a plan and a section".

Example 3 — unscaffolded

Distinguish between a planometric drawing and a two-point perspective drawing of the same building, and explain when each is the better choice on an environmental design project. (4 marks)

A **planometric** is a **paraline** drawing: the floor plan is rotated on the page — usually 45° — and verticals are projected up at true height, so parallel edges stay parallel, there is **no vanishing point**, and both the plan dimensions

and the heights can be measured straight off the sheet. Because the plan is only rotated and not distorted, right angles stay right angles and a circle in the plan stays a circle. A **two-point perspective** instead **converges** the two sets of horizontal edges to **two vanishing points** on a single horizon line set at eye level; verticals stay vertical, no face is drawn in true shape, and the only line that can be measured is the **true-height line** — the vertical corner that touches the picture plane. Planometric is therefore the better choice while a designer is **developing** the layout, because it is the drawing you can still check a 1000 mm route or a 2100 mm shelf against, and because it shows the whole arrangement at once from above. Two-point perspective is the better choice for **delivering** the resolved concept to a client or a community group, because a corner view shows two faces of the building on its site the way a person standing there would see it. ∴ the planometric is a drawing you *test* with, and the perspective is a drawing you *persuade* with — and no single drawing can be both, because measurability and lifelikeness are the two halves of the same trade.

Example 4 — unscaffolded

Explain how the position of the horizon line changes what a perspective drawing communicates, and describe what a physical scale model shows that no drawing can. (6 marks)

The **horizon line is the viewer's eye level**, so choosing where to rule it is choosing whose experience of the space the drawing reports. A horizon at **1600 mm** gives a standing adult's view; at **1200 mm** it gives the view of someone seated at a table, and of an adult using a wheelchair, whose eye sits at about the same height; at **900 mm** it gives the view of a young child. The line also governs what is visible: everything **above** the horizon is seen from below, so the viewer reads the *undersides* of shelves and bulkheads, while everything **below** it is seen from above, so they read the *tops* of tables, benches and window seats — and an edge exactly at eye level collapses to a single line. In the PITTA reading room this is not a stylistic choice but a test: criterion 2 requires a seated reader to see into the courtyard, and the drawing only proves it when the horizon is ruled at the seated 1200 mm, because the 450 mm sill and the 450 mm window seat both fall below that line. Drawn at 1600 mm the same design looks generous; drawn at 900 mm for the children's group it may not pass at all. ∴ a perspective without a stated eye level cannot be checked against a brief, and a designer working for diverse users tests the **lowest** eye level the brief names, not the most flattering one.

A **physical scale model** does something none of these drawings can, because a drawing fixes one viewpoint that the designer chose. A model at 1:50 — the reading room as a 168 × 108 mm card footprint with 54 mm walls and a removable roof — offers **every** viewpoint at once, including the ones the designer never thought to draw: you can lower your eye to table height and check the sightline directly, walk round it with the librarian, and look in from the courtyard door. It also lets you test **light** honestly, by shining a lamp from the angle of the low winter sun and seeing where the shadow of the parapet actually falls. And it makes **proportion** truthful in a way plans resist — a room that reads as generous at 1:50 on paper can feel mean when it is a real volume you are looking into. Finally, a model communicates to people who cannot read drawings, which on a community project is most of the audience. Its costs are time and inflexibility: once the card is cut, changing the layout means building it again *(6 marks: eye level defined and linked to specific user heights; the above/below rule; the choice tied to a named criterion; at least two things a model uniquely provides; a limitation).*

Practice questions

Scaffolded

Q1. (a) State the single test that distinguishes a **paraline** drawing from a **perspective** drawing. *(1 mark)* (b) Name the paraline system used for **spaces** and the paraline system used for **objects**. *(2 marks)* (c) State which of the two families can be measured, and why. *(2 marks)*

Q2. Using the PITTA reading room (external 9100 × 6100 mm, parapet 3200 mm): (a) State two things that remain **true** in a planometric drawing. *(2 marks)* (b) Calculate the width and height of a 45° planometric of PITTA on the page at **1:100**. *(2 marks)* (c) State what happens to a circle drawn in the plan, and explain why. *(2 marks)*

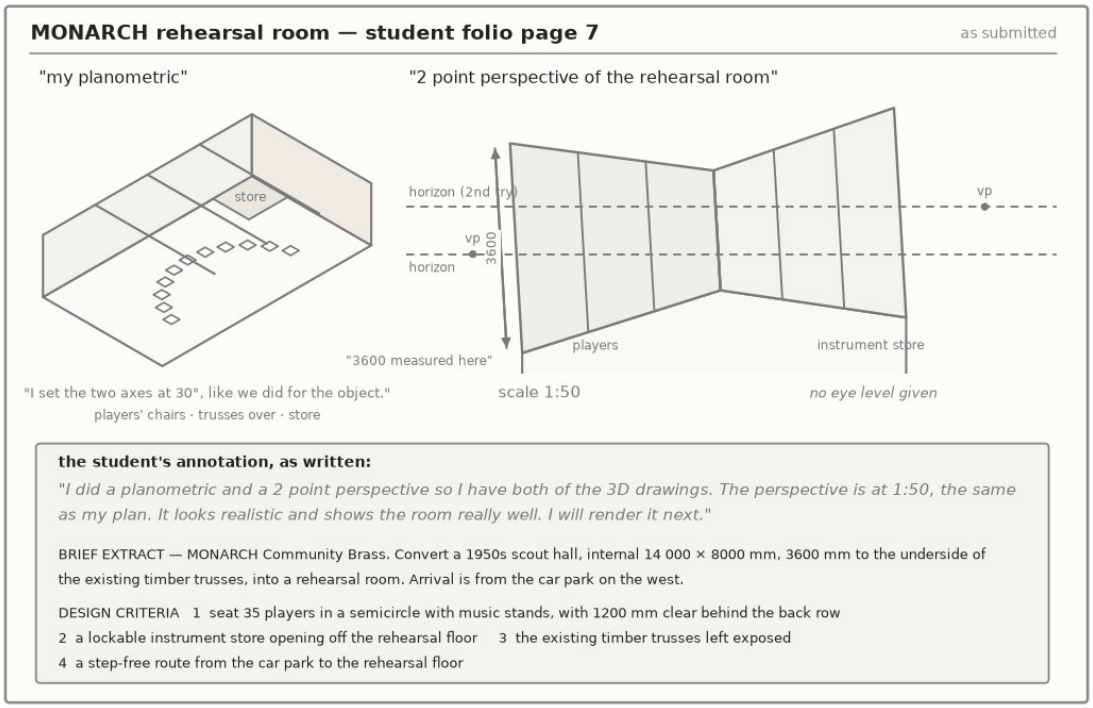
Q3. The horizon line: (a) State what the horizon line represents in a perspective drawing. *(1 mark)* (b) Give a suitable eye level for a standing adult and for a person seated at a table. *(2 marks)* (c) Explain what it means, for the viewer, that an edge is drawn **above** the horizon line. *(2 marks)*

Q4. A one-point interior perspective: (a) State which face of the room is drawn in true shape, and why. *(2 marks)* (b) State how many vanishing points there are and where they sit. *(1 mark)* (c) Explain why a designer would choose one-point rather than two-point for a reading-room interior. *(2 marks)*

Q5. A two-point exterior perspective: (a) State where the two vanishing points must sit in relation to each other. *(1 mark)* (b) Define the **true-height line** and state where it is found. *(2 marks)* (c) Explain what goes wrong in the drawing if the two vanishing points are placed too close together. *(2 marks)*

Q6. Model-making: (a) Name two materials suitable for a physical scale model of a small building. *(2 marks)* (b) Distinguish between a **massing model** and a **sectional model**, and state what each is used to test. *(2 marks)* (c) State one advantage of a **digital** three-dimensional model over a card one. *(2 marks)*

Unscaffolded



Questions 7–20 refer to the MONARCH rehearsal-room student folio page shown above, unless otherwise stated.

Q7. Identify **three** faults across the student's two drawings and, for each, state the correction. *(6 marks)*

Q8. The student has labelled the first drawing a planometric but has set both axes at 30°. Identify what has actually been produced, describe how a marker can tell at a glance, and explain what the student has lost. *(4 marks)*

Q9. The perspective carries **two** horizon lines, one through each vanishing point. Explain why this cannot be correct and describe its effect on a reader of the drawing. *(4 marks)*

Q10. The 3600 mm ceiling height has been dimensioned on the **far vertical edge** of the left-hand wall, not on the near corner. Explain why that measurement is meaningless, and describe where the height should have been measured and how it should have been carried to the rest of the drawing. *(4 marks)*

Q11. *(New situation.)* A designer has drawn the first bay of a paved courtyard in one-point perspective and needs three further bays of exactly the same depth running away from it. Describe the **diagonal method** that gives them, and state why the method is exact rather than an estimate. *(3 marks)*

Q12. The student has written "scale 1:50" under the perspective. Explain why a perspective drawing cannot carry a scale, and state what the drawing should be labelled with instead. *(4 marks)*

Q13. No eye level is stated anywhere on the page. Explain what this omission costs, with reference to at least **two** of the MONARCH design criteria. *(4 marks)*

Q14. Produce a written specification of a **cut-away planometric** of the MONARCH rehearsal room: state the rotation you would use and why, the heights you would project, what you would cut away, and what the drawing would settle. *(5 marks)*

Q15. Both of the student's drawings are made with a single line weight. Describe the three line weights a three-dimensional drawing should carry and explain what a reader loses without them. *(3 marks)*

Q16. Rewrite the student's annotation as an **evaluative annotation** for the MONARCH drawings, referring to at least two of the design criteria. *(4 marks)*

Q17. MONARCH's committee needs to approve the design, and the band's conductor needs to check that 35 players will fit. Select the most appropriate three-dimensional method for **each** of those two purposes and justify each choice. *(4 marks)*

Q18. Describe **one manual** and **one digital** method the student could use to produce the two-point perspective, and state one advantage of each. *(4 marks)*

Q19. *(Using the PITTA drawings.)* Explain how the element of **form** and the principle of **scale** are read differently in a planometric drawing and in a perspective drawing. *(4 marks)*

Q20. *(Using the PITTA drawings.)* A designer reduces every height in the PITTA planometric to **two-thirds** so the room looks less stretched, and writes nothing about it on the sheet. Explain what this does to the drawing, state what a builder scaling the 2100 mm shelving off it would read, and state what the designer should have put on the sheet. *(4 marks)*

Q21. *(New scenario.)* **BOATBILL BOAT SHED** is a disused timber boat shed on a regional river, internal **18 000 mm** long (running north–south, down to the water at the north end) × **7000 mm** wide, with a gable roof on exposed timber trusses — eaves **3000 mm** above the floor, ridge **5400 mm**. A **5000 mm** wide boat door in the north end wall opens onto a ramp down to the water; the floor sits 900 mm above normal water level, and the ground falls 1500 mm from the car park at the south end to the water's edge. It is to become a rowing club community room with a boat store. The design criteria are: **1.** seat 60 people for a presentation; **2.** the boat store opens directly onto the ramp; **3.** an uninterrupted view down the river through the open boat doors from **every** seat; **4.** a step-free route from the car park to the community room. Produce a written plan of the three-dimensional representations you would prepare, naming at least **four** and, for each, its method, its viewpoint and eye level or scale where one applies, and what it would show. *(8 marks)*

Q22. *(BOATBILL.)* State which three-dimensional method best tests **criterion 3** and justify the choice, including the eye level you would use. Then select and justify a scale for a 45° planometric of the whole shed on an A3 sheet, showing the calculation. *(5 marks)*

Q23. Evaluate the MONARCH folio page against what the **Develop** and **Deliver** stages of the VCD design process require of three-dimensional representation. *(6 marks)*

Answers

Q1. (a) Do parallel edges stay parallel (paraline) or converge to vanishing points (perspective)? (b) Spaces = planometric; objects = isometric. (c) Paraline — measurements along the axes stay true, so lengths can be read directly. **Q2.** (a) Any two of: the plan's shape, the plan's size, 90° angles, parallel edges, true heights, plan circles. (b) (9100 + 6100) × cos 45° = 10 748 mm, so 107 mm wide; 10 748 + 3200 = 13 948 mm, so 139 mm high. (c) It stays a circle — the plan is rotated, not sheared. **Q3.** (a) The viewer's eye level. (b) Standing adult ≈ 1600 mm; seated at a table ≈ 1200 mm. (c) It is above eye level, so the viewer sees its underside. **Q4.** (a) The back wall — it is parallel to the picture plane. (b) One, on the horizon line. (c) See solutions. **Q5.** (a) Both on the same horizon line, well apart. (b) The one vertical that lies in the picture plane — in an exterior, the building corner nearest the viewer; it alone is drawn to scale. (c) Severe distortion — see solutions. **Q6.** (a) Any two of: card, foam-board, balsa, corrugated board, acrylic/acetate for glazing. (b) A massing model is solid blocks and tests only the form and how it sits on the site; a sectional (open-top) model has a wall or the roof off and tests the interior. (c) It is editable — one change updates the model and every view taken from it, where card must be rebuilt; the sun can also be set for a given date and time. **Q7.** Any three of: the "planometric" is drawn at 30°/30° so it is an isometric; two horizon lines; the near corner is not vertical; 3600 dimensioned off the true-height line, on the far vertical edge; "scale 1:50" on a perspective; no eye level stated; one line weight; no human figure. See solutions. **Q8.** An **isometric**. The plan has been sheared to a 60°/120° rhombus, so plan angles and the semicircle of chairs are no longer true. See solutions. **Q9.** Two horizons = two eye levels in one drawing, which is impossible. See solutions. **Q10.** The dimensioned edge is not in the picture plane, so it is drawn at a ratio the sheet never states — neither the real height nor the scaled one. Measure on the true-height line and take heights to a VP. **Q11.** Diagonals of the finished bay cross at its perspective centre; a VP ray through the crossing gives the mid-point of the far edge. Rule from the near corner on one side through that mid-point to the receding side edge on the other side — that is the next bay's far corner. Repeat. Exact because every line used already converges with the drawing. **Q12.** A perspective uses a different ratio at every depth, so it has no single scale. Label the eye level and the viewpoint. **Q13.** Criteria 1 and 3 cannot be checked — see solutions. **Q14.** Rotate 45° (or 30°/60° to favour the store wall); project 3600 to the trusses; cut the roof off and the near walls to 900; it settles the seating arc, the 1200 clearance and the store's opening. See solutions. **Q15.** Heaviest on the silhouette, medium between visible faces, lightest on surface detail. See solutions. **Q16.** Strength + limitation + next action in design terminology, tied to numbered criteria — see solutions. **Q17.** Committee = a rendered two-point perspective (or a presentation model); conductor = a cut-away planometric, because it can be measured. See solutions. **Q18.** Manual: set square, straight-edge and pins/tape for the vanishing points on cartridge. Digital: a 3D model with a camera set to a stated eye level. See solutions. **Q19.** Form is read as a solid volume in both, but only the perspective foreshortens it; scale is read by measurement in a planometric and by comparison with a figure in a perspective. See solutions. **Q20.** The plan stays true but the heights no longer match the stated scale, and nothing warns the reader. A builder would read two-thirds of 2100 = **1400 mm**. Either draw the heights full size or write "heights reduced to two-thirds" beside the scale. See solutions. **Q21.** See fully-worked solutions for a model plan of four representations. **Q22.** A one-point interior perspective looking north through the boat doors, eye level 1200 mm (seated). Planometric at **1:100** — see solutions for the calculation. **Q23.** Not yet meeting either stage: neither drawing is a correct system, nothing is measurable, and nothing is evaluated. See solutions.

Fully-worked solutions

Q1. (a) Ask whether edges that are parallel on the real space stay **parallel** on the page or **converge**: parallel means paraline, converging means perspective *(1 mark).* (b) The paraline system for **spaces** is the **planometric** (plan oblique); the paraline system for **objects** is the **isometric** *(1 mark each).* (c) The **paraline** family can be measured. Because nothing converges, the drawing keeps a single fixed relationship between a length on the page and a length in the real space along each of its axes, so a ruler and the stated scale convert one into the other anywhere on the drawing. In a perspective the ratio changes with depth, so the same 10 mm on the page means different real lengths in different parts of the drawing *(2 marks).*

Q2. (a) Any two of: the **shape** of the plan; the **size** of the plan; **90° angles**; **parallel** edges; **heights** (drawn true length); **circles** in the plan *(1 mark each).* (b) Rotated 45°, the page width is (9100 + 6100) × cos 45° = 15 200 × 0.7071 = **10 748 mm**, and the page height is that same 10 748 mm plus the 3200 mm parapet = **13 948 mm**. At 1:100 the drawing is 10 748 ÷ 100 ≈ **107 mm wide** and 13 948 ÷ 100 ≈ **139 mm high** *(1 mark for the width, 1 for the height; accept 107 × 139 mm).* (c) It **stays a circle**. The plan has only been **rotated**, and rotation does not change any shape or any length — so the Ø1200 round table is drawn as a Ø1200 circle at scale. (In an isometric the same circle would become an ellipse, because there the plan is sheared) *(2 marks: the answer + the reason).*

Q3. (a) The **eye level** of the viewer — the height at which the drawing is imagined to be seen *(1 mark).* (b) A standing adult ≈ **1600 mm**; a person seated at a table ≈ **1200 mm** — which is also about where the eye of an adult using a wheelchair sits. *(Accept 900 mm for a young child as a third case.) (1 mark each.)* (c) An edge above the horizon is **above the viewer's eye**, so the viewer is looking **up** at it and sees its **underside** — the soffit of an awning, the underside of a shelf or a bulkhead. (Below the horizon they look down and see the top surface; at exactly eye level the edge shows as a single line) *(2 marks).*

Q4. (a) The **back wall**, because it is the one face set **parallel to the picture plane**, and anything lying in the picture plane is drawn at true shape and true scale *(2 marks).* (b) **One**, and it sits on the **horizon line** *(1 mark).* (c) One-point suits an interior because in a rectangular room the wall you face is naturally parallel to the picture plane, so it can be drawn straight out at a stated scale and the remaining three surfaces — floor, ceiling and two side walls — are found with four rays from a single vanishing point. That makes the set-up fast and, more importantly, it keeps the *back wall* — usually the wall carrying the windows and the thing the room is about — undistorted and readable. A two-point view of the same room turns the viewer into a corner and foreshortens both walls, which is dramatic but harder to read and slower to construct *(2 marks).*

Q5. (a) Both on the **same horizon line**, and well apart from each other *(1 mark).* (b) The **true-height line** is the one vertical in the drawing that lies in the **picture plane**; on an exterior two-point view it is the building corner nearest the viewer, the corner the picture plane was passed through. It alone is drawn to a stated scale — for PITTA the 3200 mm parapet at 1:100 is 32 mm — and every other height in the drawing is obtained by measuring on it and taking that height to a vanishing point *(2 marks).* (c) The two receding faces are squeezed into an impossibly narrow cone. The corner becomes a sharp wedge, like the prow of a ship; the two faces of the building rake away so steeply that neither can be read; and the drawing describes a view no one could have, because the vanishing points being close means the viewer is imagined standing almost on top of the building. The drawing then misleads the client instead of informing them. As a working rule keep the vanishing points at least about twice the drawn width of the object apart, running them off the sheet onto a strip of tape if necessary *(2 marks: the geometric effect + the consequence for the reader).*

Q6. (a) Any two of: **card**, **foam-board**, **balsa**, corrugated board, clear **acrylic or acetate** for glazing, timber veneer, found materials for landscape *(1 mark each).* (b) A **massing model** is built as solid blocks with no interior. It tests only the overall form of the building and how it sits on its site: bulk, height against its neighbours, and the shape of the outdoor space left around it. A **sectional model** (also called an open-top model) has one wall or the roof taken off so the inside can be seen. It tests the interior: the layout, the ceiling height, the sightlines across the space and how far the daylight reaches into it *(1 mark each: what each one is + what it is used to test).* (c) A digital model is **editable**: move a wall, raise a ceiling or change a scale and the model itself updates, whereas a card model has to be cut and built again from scratch. Everything taken off that one updated model — the planometric, the one-point, the two-point and the sections — updates with it, and the sun can be set to a given date and time so shadows are calculated rather than approximated with a desk lamp *(2 marks).*

Q7. *(Any three; 1 mark for the fault, 1 mark for the correction.)*

1. **The "planometric" is drawn with both axes at 30°, so it is an isometric.** *Correction:* rotate the *plan* — at 45°, or 30°/60° — and project verticals from it, so the plan keeps its true shape and size.
2. **The perspective has two horizon lines, one through each vanishing point.** *Correction:* rule **one** horizon at a stated eye level and put both vanishing points on it.
3. **The near corner of the perspective is not vertical.** *Correction:* in one- and two-point perspective all verticals stay vertical; rule them with a set square.
4. **The 3600 mm height is dimensioned on the far vertical edge of the left-hand wall, away from the picture plane.** *Correction:* measure it on the **true-height line** at the near corner and take the height from there to a vanishing point.
5. **"scale 1:50" is written under the perspective.** *Correction:* delete it; a perspective has no single scale. Label the eye level and viewpoint instead.
6. **No eye level is stated.** *Correction:* write it on the drawing ("eye level 1600, standing").
7. **Both drawings use one line weight.** *Correction:* use three — heaviest on the silhouette, medium between visible faces, lightest on surface detail.
8. **There is no human figure at scale.** *Correction:* add one, so the size of the hall can be read.

Q8. The student has produced an **isometric** drawing. A marker can tell at a glance because the plan has been **sheared into a rhombus**: the corners of the 14 000 × 8000 rectangle are drawn as 60° and 120° instead of 90°, and the semicircle of players' chairs — which is a true semicircle in the plan — has been squashed into an elliptical arc. In a planometric the plan is only **rotated**, so those chairs would still sit on a true circular arc and every corner would still be a right angle. What the student has lost is the one property they chose a planometric for: the **plan is no longer true in its own right**. An isometric is still paraline, so a length that runs *parallel to one of the three axes* is still drawn full size — but that is all. The shear alters every length that lies at an angle to the axes, and it alters every plan angle. Criterion 1 asks for 35 players in a semicircle with 1200 mm clear behind the back row, and that clearance is read outwards from an arc, in a fan of directions that are not axis-parallel; on the sheared ellipse it cannot be scaled at all. On a planometric the same plan is true everywhere, so a scale rule laid across it in any direction gives the clearance directly. They have also imported a system built for **objects** (Chapter 5A) into a problem about a **space** *(4 marks: named as isometric; the visible evidence of the shear; the loss of a true plan; and the consequence for a named criterion).*

Q9. The horizon line **is** the viewer's eye level, and a viewer has one pair of eyes at one height. Two horizon lines therefore claim that the drawing was made from two different eye levels at the same time, which is impossible. Geometrically the damage is immediate: all the horizontal edges of one wall converge toward a point on the student's second horizon, visibly higher up the page than the point on the first horizon that the other wall's edges converge on, so the two walls describe rooms tilted relative to one another, the floor is not flat, and the corner where they meet cannot exist. For a reader, the drawing stops being evidence. They cannot work out what height the view was taken from, so they cannot check any sightline in it; the space looks subtly wrong without their being able to say why; and the whole drawing loses the authority a perspective is supposed to earn — that it shows what a person standing in a particular place would really see. The fix is one horizon at a stated eye level with **both** vanishing points ruled on it *(4 marks: what the horizon means, why two is impossible, the geometric consequence, and the cost to the reader).*

Q10. In perspective the only lengths that survive at the stated scale are those lying in the **picture plane**. The edge the student has dimensioned does not lie in it: it is the vertical at the far end of the left-hand wall, standing several metres back from the near corner. Being vertical, it is at least parallel to the picture plane, so it is reduced by a *single* ratio rather than a varying one — but that ratio is set by its depth, it is not the drawing's stated 1:50, and nothing on the sheet says what it is. A ruler laid on it therefore reads neither the real 3600 mm nor 3600 mm at the stated scale; the number is not a measurement anyone can convert back, and anyone who trusts it will get the ceiling height wrong. (A **receding** edge — one of the horizontal wall lines running back to a vanishing point — is worse again: its ratio changes continuously along its length, so no single number could describe it at all.) The height should have been measured on the **true-height line** — the vertical corner where the two walls meet, which is the vertical the picture plane was passed through. There the student sets out 3600 mm at whatever page size they have chosen for that line, marks the ceiling and the floor, and then **carries** those heights into the rest of the drawing by ruling from each mark to the appropriate **vanishing point**. Where such a ray meets a vertical at any depth, it gives the correct foreshortened 3600 mm at that depth. Every height in the drawing — the trusses, the store door head, a music stand — is found the same way *(4 marks: why an edge away from the picture plane cannot be measured; the true-height line named and located; heights carried to a VP; the general rule stated).*

Q11. The depth of the second bay cannot be measured, because equal real depths diminish as they recede — but it can be **constructed**. First find the **mid-point of the far edge** of the finished bay. The general way to get it is from the bay's own **diagonals**: they cross at the rectangle's **perspective centre**, and a line ruled from the **vanishing point** through that crossing meets the far edge exactly at its mid-point. *(In a one-point drawing the cross joints lie parallel to the picture plane, so that edge could also simply be bisected with a ruler — but the diagonal construction is the one that keeps working when the edge itself recedes.)* Now rule a line from the **near corner on one side** of the bay, through that mid-point, and on until it meets the **receding side edge on the other side**, produced beyond the far edge. Where it lands is the far corner of the second bay; rule the cross joint in there and the bay is finished. Repeat the whole construction on the bay just made for the third, and again for the fourth. The method is **exact rather than an estimate** because every line it uses is already converging correctly on the sheet: the diagonals and the rays to the vanishing point obey the same perspective as the drawing does, so the halving they perform is a true halving *in perspective*, not on the page. Stepping the bays off with a ruler instead would give four equal page distances, which is the one answer that must be wrong — the far bays have to be drawn shallower than the near ones *(3 marks: the mid-point of the far edge found by diagonals and the perspective centre; the near-corner-through-mid-point construction, repeated bay by bay; and why a construction that converges with the drawing beats a measurement).*

Q12. A **scale** is a single fixed ratio between a length on the drawing and the same length in reality — "1:50" promises that 1 mm on the sheet is 50 mm on site, **everywhere** on the sheet. A perspective drawing is built on exactly the opposite principle: the further from the viewer something is, the smaller it is drawn, so the ratio changes continuously with depth. At the picture plane it might be 1:50; two metres further back it is smaller than that; at the near edge it is larger. Writing "1:50" under a perspective therefore states something that is untrue of every part of the drawing except the picture plane, and it invites a reader to measure the rehearsal room off a drawing that cannot be measured — the same class of error as dimensioning a bubble diagram. The perspective should instead be labelled with the two things it really does depend on: the **eye level** and the **viewpoint** — for example "two-point perspective · eye level 1600 · viewed from the north-west corner of the hall". If a scale is wanted on the sheet at all, it belongs to the *plan* or the *planometric* drawn beside it, which really are set out at a fixed ratio *(4 marks: what a scale claims; why a perspective cannot satisfy it; the misuse it invites; and the correct labelling).*

Q13. A perspective drawing is a claim about what a person of a stated height, standing in a stated place, would see. Without the eye level, the reader cannot tell what height was assumed, so nothing in the drawing can be checked against the brief — and the student cannot check it either. *Criterion 1* requires 35 players seated in a semicircle with 1200 mm clear behind the back row. Whether the drawing shows that clearance depends entirely on the eye level: a high eye level looks down into the arc and makes the gaps behind the players look generous, while a seated 1200 mm eye level flattens the arc so that the rows overlap and the clearance disappears from view. The committee reading the drawing cannot know which they are looking at. *Criterion 3* requires the existing timber trusses to be left **exposed**. Trusses sit at 3600 mm, well above any human eye level, so they can only be read from below — but how much of them is visible, and from where in the room, changes completely between an eye level of 1600 mm and one of 6000 mm. Without a stated eye level the drawing cannot demonstrate that a player sitting in the room will actually see the structure the brief wants kept. The remedy is a single line on the sheet: "eye level 1600 (standing), viewed from the west door" — and, for a sightline criterion, a second view at the **lowest** relevant eye level *(4 marks: 2 marks for each criterion, each tied to a specific consequence of not knowing the eye level).*

Q14. *(Model specification — accept any coherent, correctly-constructed alternative.)*

Rotation. Rotate the plan **45°**, so that both the 14 000 mm and the 8000 mm wall directions are shown equally and the whole seating arc is legible. *(A 30°/60° rotation would also be defensible if the drawing is meant to favour the east wall, where the store sits — say which and why.)* Rotating changes nothing about the plan: the hall is still 14 000 × 8000, the corners are still 90°, and the semicircle of players is still a true arc that can be measured.

Scale. Rotated 45°, the page footprint is (14 000 + 8000) × cos 45° = 15 556 mm across and the same up, plus the 3600 mm height = 19 156 mm. At **1:100** that is **156 × 192 mm**, which sits comfortably on A3 with room for annotations. *(At 1:50 it would be 311 × 383 mm and would not fit.)*

Heights projected. From every plan corner and every fitting: walls and the underside of the trusses at **3600**; the store partition and its door head; the chair seats at 450 and the music stands at about 1000; a 1800 mm figure at the same scale as the scale reference.

What is cut away. The **roof and trusses are drawn but the roof covering is left off**, so the exposed timber trusses required by criterion 3 can be seen from above; and the **two walls nearest the viewer** — chosen from the rotation, so after a 45° rotation these are the west (arrival) and south walls — are **cut down to 900 mm**, with the cut faces filled solid exactly as they are on the floor plan.

What it settles. Because the plan is still true, the drawing can be measured, so it settles the three criteria that are about layout: whether 35 chairs really fit on the semicircle (criterion 1) with the **1200 mm** clear behind the back row; whether the lockable store opens directly onto the rehearsal floor rather than off a corridor (criterion 2); and whether the route from the west car-park door to the rehearsal floor is unobstructed and step-free (criterion 4). It does **not** settle criterion 3, because what a seated player can see of the trusses is a sightline question and needs a perspective at a seated eye level *(5 marks: rotation with a reason, a calculated scale, the heights, the cut-away specified including the cut faces, and the criteria it settles — with the honest note of what it cannot settle).*

Q15. A three-dimensional drawing should carry at least three weights: the **heaviest** line on the outer **silhouette** of the whole form; a **medium** line on the edges **between visible faces**; and the **lightest** line on **surface detail** — shelf lines, floor finishes, glazing bars, texture. Without them a reader loses the depth cue that tells a solid from a hole: the outline of the hall, the edge where two walls meet, and a line drawn on the floor all look identical, so the eye cannot decide

which shapes are objects and which are markings, and the drawing flattens back into a wire diagram. On the MONARCH page this matters immediately — the instrument store cannot be distinguished from a rug, and the trusses cannot be distinguished from lines painted on the ceiling *(3 marks: the three weights named and placed + the consequence for the reader).*

Q16. *Model rewrite:* "Both three-dimensional drawings put the players' semicircle against the long north wall with the store in the east corner, which is the layout's real strength: the store opens straight onto the rehearsal floor rather than off a corridor, so criterion 2 is met and instruments can be moved without crossing the playing area. Its limitation is that neither drawing can yet be trusted to prove it. The 'planometric' has been drawn at 30°/30°, so it is an isometric: the plan is sheared, the semicircle of chairs comes out as an elliptical arc, and the 1200 mm clear space behind the back row that criterion 1 requires can no longer be scaled off that arc. The perspective carries two horizon lines and no stated eye level, so it cannot show whether a seated player can actually see the exposed trusses (criterion 3). Next step: redraw the paraline view as a true 45° planometric at 1:100 on A3 (156 × 192 mm) with the roof off, and dimension the clearance behind the back row; then redraw the perspective with **one** horizon at a **1200 mm** seated eye level, heights taken from the true-height line, and the eye level written on the sheet." *(4 marks: a strength and a limitation, both in design terminology and both tied to numbered criteria, plus a specific next action; the original annotation's faults — an unsupported preference and a false scale claim — replaced by evidence.)*

Q17. For the committee — a rendered two-point exterior perspective, or a presentation model. The committee are not builders; they need to picture the rehearsal room as a real place before they approve it. A corner view at a standing eye level of 1600 mm shows two faces of the hall at once with converging edges, tone and cast shadow, so it reads almost like a photograph and communicates character rather than dimensions. A 1:100 sectional model would serve the same purpose even better, because every member of the committee can walk round it and look in. **For the conductor — a cut-away planometric.** The conductor's question is a measurement: will 35 players in a semicircle, each with a stand, fit with 1200 mm clear behind the back row? Only a paraline drawing can answer it, because a planometric keeps the plan true, so a scale rule laid on the drawing gives real distances between the chairs and the wall. A perspective could not settle this at all, since nothing on it away from the picture plane can be measured *(4 marks: a method named for each purpose, each justified by what the audience needs and what the method can or cannot do).*

Q18. Manual — set square, straight-edge and pinned vanishing points on cartridge paper. The student rules one horizon line right across the sheet at the chosen eye level, tapes a strip of paper out to each side and pins the two vanishing points on it well beyond the sheet edges, draws the true-height line at the near corner and sets the 3600 mm ceiling height on it, then rules every receding edge from the true-height line to one or other vanishing point with a long straight-edge, keeping all verticals vertical with a set square. *Advantage:* it costs nothing, it is immediate, and because the construction is made by hand the student can see and control the vanishing points, the eye level and the viewing distance — the three decisions the drawing depends on. **Digital — build the hall as a 3D model and place a camera.** The student models the 14 000 × 8000 × 3600 volume, the store and the seating at their real dimensions, then sets a camera at a stated eye level and points it at the corner. *Advantage:* the perspective is geometrically exact and the eye level can be changed in seconds, so the same model produces a 1600 mm standing view for the committee and a 1200 mm seated view to test criterion 3 — as well as the planometric and the plan — without any re-drawing. *(4 marks: each method described as a procedure, with an advantage stated for each; no marks for naming software alone, since a program is a medium, not a method.)*

Q19. Form. In both drawings **form** is the element that appears only in three dimensions — the solid volume of the building and the void of the room. But the two systems report it differently. A **planometric** describes form *dimensionally*: because the plan is true and the heights are true, the reader can measure the volume, and the PITTA reading room reads as a precise 8400 × 5400 × 2700 box with a shelf wall and a glazed end. A **perspective** describes form *experientially*: the same volume is foreshortened, so the room appears to open away toward the courtyard glazing, and the reader feels the depth of it rather than measuring it. **Scale.** In a **planometric**, scale is read by **measurement** — the stated ratio plus a ruler give the size of anything on the drawing — and a human figure is added only as a courtesy. In a **perspective** there is no fixed ratio, so scale can only be read by **comparison**: the 1800 mm figure, the 740 mm table top and the 450 mm window seat are the references against which everything else is judged, and without at least one of them a viewer cannot tell whether the PITTA reading room is a study or a hall. That is why a presentation perspective without a figure in it fails as communication even when the geometry is perfect *(4 marks: form treated in both systems, scale treated in both systems, with evidence from the PITTA drawings).*

Q20. Reducing the heights is not, in itself, an error — it is a recognised convention, used because a tall space drawn with full-size verticals can look stretched. Doing it **silently** is the error, and it does something worse than make the drawing inaccurate: it makes it inaccurate in one direction only. The rotated plan is still exact, so every plan dimension still scales correctly, and the drawing still looks like a perfectly ordinary 45° planometric. Nothing on the sheet tells the reader that the verticals now run at a different ratio from the horizontals, and nothing in the drawing looks wrong, so the mistake is undetectable by inspection. A builder scaling the shelving would read two-thirds of 2100 = **1400 mm** — at 1:50, 28 mm on the page instead of 42 mm. They would set the top shelf 700 mm low, which not only breaks the setting-out but silently satisfies criterion 3 ("top shelf no higher than 2100 mm") on a drawing that no longer proves it. The 2700 ceiling would read 1800, the 740 table top 493 and the 450 sill 300: every height on the sheet is wrong, and consistently so, which is exactly why nothing gives it away. The designer should have done one of two things: draw the verticals **full size**, which is what makes a planometric measurable in all three directions; or, having reduced them, write it on the sheet beside the scale — "1:50, heights reduced to two-thirds" — so the reader knows to convert. A planometric's whole claim on a designer's trust is that plan *and* height come off it at one stated ratio; the moment that is not true, it has to be said out loud *(4 marks: the effect on measurability and why it is invisible; the 1400 mm a builder would read; the remedy stated; and the convention correctly identified as legitimate when declared).*

Q21. *(Model plan — accept any set of at least four representations, each correctly named, with a viewpoint and eye level or a scale as appropriate, and a stated content.)*

Develop — the drawings that test the design.

1. **Cut-away planometric of the whole shed, 45°, at 1:100.** Rotated 45° the footprint spans (18 000 + 7000) × cos 45° = 17 678 mm each way, and what stands over the topmost corner of that footprint is the **3000 mm eaves**, not the ridge, so the page height is 17 678 + 3000 = 20 678 mm (see Q22). At 1:100 the drawing is **177 × 207 mm** — it fits A3 with room for notes, in either orientation. Roof covering left off so the exposed trusses show; the two near walls cut to 900 mm. *Shows:* the whole layout in one measurable drawing — the 60 seats laid out in the community room (criterion 1), the boat store in the northern third opening straight onto the ramp (criterion 2), and the clear route from the south car-park door (criterion 4).
2. **One-point interior perspective looking north through the open boat doors, eye level 1200 mm.** The back "wall" is the north end wall, 7000 mm wide × 3000 mm to the eaves and 5400 mm to the ridge, with the 5000 mm boat door open in it; drawn at 1:50 that face is 140 mm wide and 60 mm to the eaves. Viewing distance 1.5 × 7000 = 10 500 mm, so the distance point is 210 mm from the VP and the half-distance point 105 mm. *Shows:* exactly what a **seated** guest sees down the shed and out to the river — the drawing that tests criterion 3, and the reason for choosing a seated rather than a standing eye level.
3. **Longitudinal sectional perspective (or a sectional planometric) cut along the 18 000 mm length.** *Shows:* the exposed truss structure above the seating, the 900 mm the floor stands above the water, and the fall of the ground from the car park to the water's edge — the relationship between the inside and the sloping outside that neither of the drawings above can carry.

Deliver — the representations that present the design.

4. **Two-point exterior perspective from the ramp, eye level 1600 mm, viewer to the north-east.** Picture plane through the north-east corner of the shed, so that corner is the true-height line — at 1:200 the 5400 mm ridge is 27 mm on it. *Shows:* the shed as a building on its bank, the open boat doors facing the water, and the ramp; the drawing the rowing club's members will actually respond to.
5. **1:100 sectional card model on a shaped baseboard.** The shed becomes a 180 × 70 mm footprint with 30 mm walls, one long wall removable, on a base contoured to the 1500 mm fall. *Shows:* the three dimensions all at once — a lamp set at a low north angle tests how far the light comes in through the open doors, and a committee member can put their eye at seat height and check the river view for themselves.

(8 marks: at least four representations named; each correctly classified as paraline, perspective or model; an eye level given for every perspective and a scale for every paraline drawing and the model, with none given for the perspectives; a stated content for each; and the set tied to the BOATBILL criteria rather than listed generically.)

Q22. The method. Criterion 3 — an uninterrupted view down the river through the open boat doors from **every** seat — is a **sightline** requirement, and a sightline is about what a particular pair of eyes can see from a particular place. The method that tests it is a **one-point interior perspective looking north along the shed and out through the boat doors**, with the **horizon ruled at 1200 mm**, a **seated** eye level, because the criterion is about seated guests and not

about someone standing at the back. One-point is the right kind of perspective because the north end wall, which contains the 5000 mm boat door, is parallel to the picture plane and so is drawn in true shape — the opening the whole criterion is about is therefore undistorted and can be compared directly against the seating. A planometric could not test this at all: it looks down from above and has no eye level, so it can show *where* the seats are but never what a person in one of them can see. *(A longitudinal section drawn at 1:100 is a useful companion, because it dimensions the head height of the opening; but the section shows one plane only, whereas the perspective shows whether the seats at the edges of the room also have the view.)*

The scale of the planometric. Rotated 45°, the page footprint of the 18 000 × 7000 mm shed is (18 000 + 7000) × cos 45° = 25 000 × 0.7071 = **17 678 mm** across. The page height is that footprint **plus whatever stands over its topmost corner** — and at that corner the roof is at its **eaves**, 3000 mm, not at its ridge: 17 678 + 3000 = **20 678 mm**. The ridge is 5400 mm high but it runs along the **centreline** of the plan, which lands only 15 203 mm up the page, so its own top reaches 15 203 + 5400 = 20 603 mm — just short of the eaves corner. Adding the ridge to the corner of the bounding box, as you correctly would for PITTA's parapet or MONARCH's uniform walls, would overstate the sheet by 2400 mm here, because a gable's tallest line is not on the perimeter. A3 is 420 × 297 mm.

- At **1:50**: 17 678 ÷ 50 = 354 mm × 20 678 ÷ 50 = 414 mm. It fits neither way round: portrait, the 354 mm width will not go on a 297 mm sheet edge; landscape, the 414 mm height will not.
- At **1:100**: 177 × 207 mm, which fits the sheet used portrait (297 × 420 mm) with 120 mm spare across and 213 mm down for a title block and evaluative annotations.
- At **1:200**: 88 × 103 mm — it fits easily but wastes three-quarters of the sheet and makes the seating impossible to read.

∴ 1:100 at A3 *(5 marks: the correct method named with a reason tied to the criterion; a stated seated eye level and why; the reason a planometric cannot answer it; and a scale chosen with the arithmetic shown for at least two options).*

Q23. The MONARCH folio page **does not yet meet what either stage requires**, though it is not without merit. Its genuine strength is coverage: the student has understood that an environmental project needs both a paraline drawing and a perspective, and both drawings carry the same design decision — the players' semicircle against the long wall with the instrument store in the corner — so the folio at least records a consistent idea.

Everything else falls short, and in both families of method. **Develop** requires drawings a designer can *test* the design against. The paraline drawing is set out at 30°/30°, so the plan has been sheared into a rhombus and it is an **isometric**, not a planometric; the one property the student chose the method for — a **true** plan, scalable in any direction rather than only along the axes — has been thrown away, and with it any chance of scaling the 1200 mm clear space behind the back row that criterion 1 requires off a semicircle now drawn as an ellipse. Nothing is dimensioned, there is no scale on the drawing that could be, and there is no figure at scale, so the size of a 14 000 × 8000 hall cannot be read at all.

Deliver requires representations that communicate the resolved solution honestly. The perspective carries **two horizon lines**, which claims two eye levels in one view and makes the two walls describe rooms tilted against each other; the near corner is not vertical, though verticals never converge in a two-point drawing; the 3600 mm ceiling height has been dimensioned on a wall edge **away from the picture plane**, so it is drawn at a ratio the sheet never states and is neither the real height nor a scaled one; and "scale 1:50" has been written under a drawing that by definition has no single scale. **No eye level is stated anywhere**, so criterion 3 — the exposed trusses, which can only be judged from below at a stated height — cannot be tested by the student or checked by a marker. Both drawings use a single line weight, so a reader cannot separate the silhouette from a wall junction from a line on the floor.

The **annotation** compounds it: "it looks realistic" is a preference, "shows the room really well" is unsupported, and the claim that the perspective is "at 1:50, the same as my plan" repeats the central misunderstanding. No strength, no limitation, no next action and no criterion appears anywhere on the page.

∴ what the student holds is two drawings of an untested arrangement, neither of which is a correct projection system. To meet the two stages they would need to redraw the paraline view as a true **45° planometric at 1:100** (156 × 192 mm on A3) with the roof off, three line weights, a figure at scale and the clearance behind the back row dimensioned; redraw the perspective with **one** horizon at a **stated** eye level, both vanishing points on it well apart, verticals vertical and all heights taken from a true-height line, labelled with its eye level and viewpoint rather than a scale; and annotate

each drawing with a strength, a limitation and a next action tied to the four numbered criteria *(6 marks: strengths and limitations; specific evidence from both drawings; the requirements of Develop and of Deliver applied separately; and an overall judgement with a stated remedy).*

Chapter 7 Visualising environments — 7C Documentation conventions & resolving to a brief

Theory

Unit 2 Outcome 1 ends with a sentence that decides what this subtopic is about. In the Deliver phase, students *"present their resolved design solution as either a model or documentation drawings with technical conventions that comply with Australian Standards."* Chapter 7A gave you the two-dimensional methods and 7B the three-dimensional ones. This subtopic turns those drawings into **documentation**, then asks the only question the client actually cares about: **does the resolved solution meet the brief, and can you prove it?**

Three things have to happen, and they happen in this order.

1. **Apply the technical conventions**, so a stranger can read the drawings.
2. **Resolve the solution**, so nothing is left undecided.
3. **Annotate evaluatively**, so the reasoning is on the page in design terminology, checked against the numbered design criteria.

What a documentation drawing is. The study design divides drawing into three categories by purpose, and the distinction is examinable.

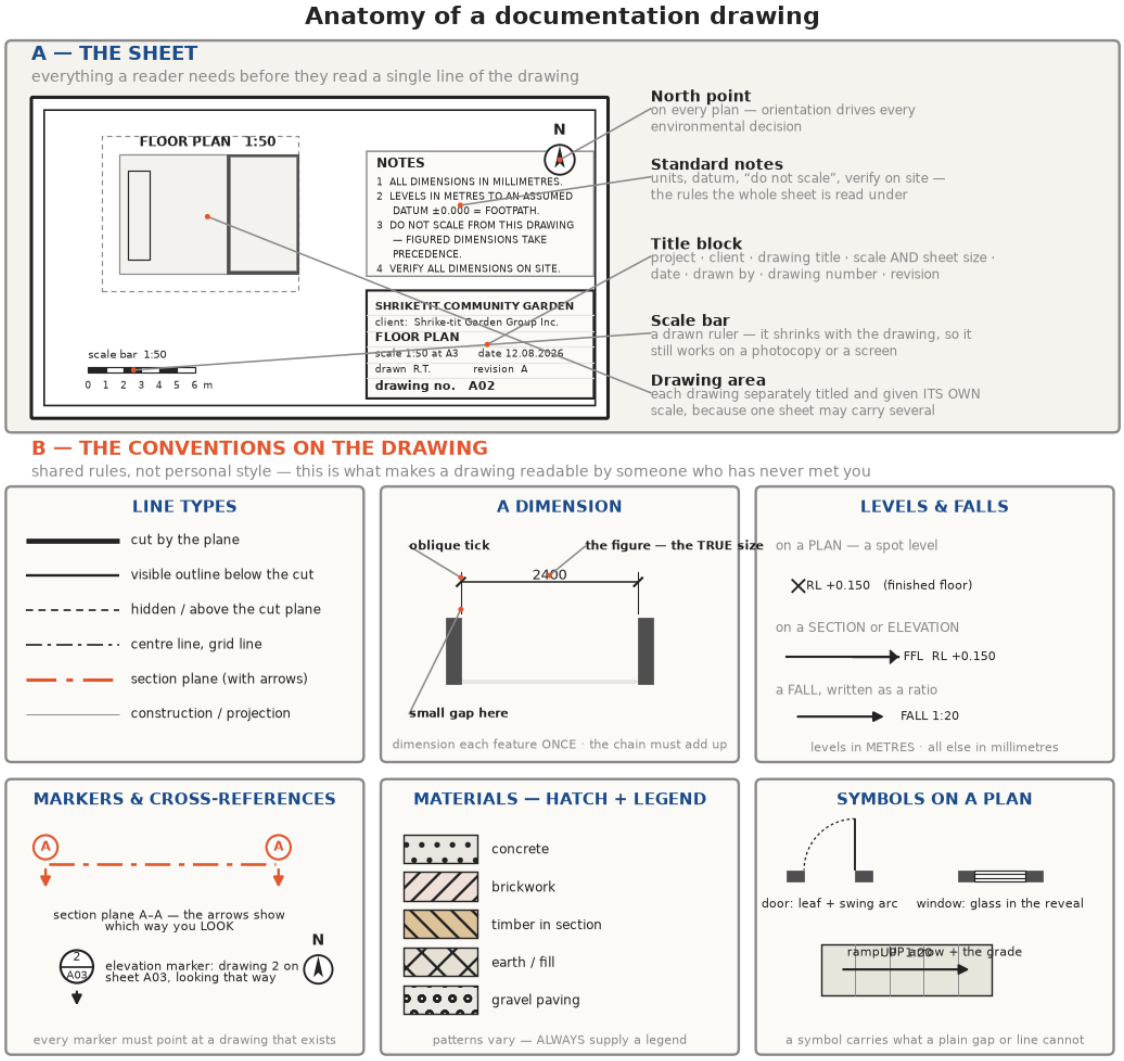
Category	What it is for	Typical examples for an environment
Development drawing	To visualise, test and communicate **ideas and concepts** so they can be analysed and evaluated. Often rapid, informal and expressive.	Site analysis, bubble, circulation and zoning diagrams; ideation sketches; quick perspectives; mock-ups
Documentation drawing	To **define and record the technical specifications** required to build the thing. It carries **technical conventions — symbols, dimensions and scales.**	Site plan, floor plan, elevations, sections, detail drawings
Presentation drawing	To convey the **resolved concept to stakeholders** for consideration.	Rendered impression or perspective, illustration; drawings for a concept board or style guide

The categories describe the **job**, not the neatness and not the projection system. A carefully ruled sketch with no scale is still a development drawing; a rendered impression with nothing on it but the render is still a presentation drawing even if it took a week. The study design is explicit about the second half of that: documentation drawings *"may represent forms in two dimensions, such as orthogonal drawings, architectural plans and elevations"* or *"in three dimensions, such as perspective and paraline (isometric and planometric) drawings"*. So a three-dimensional view **can** be a documentation drawing — but only when it does the documentation job and carries the technical conventions. The categories also overlap at the edges: the study design lists documentation drawings among the presentation drawings too, because a set is often shown to a client as well. What is never optional is the conventions. A drawing that carries none of them cannot be built from, whatever it is called.

Why environments are documented orthogonally. A plan, an elevation and a section can each be set out to one stated scale and dimensioned; a perspective cannot, because its lines converge and every part of it sits at a different scale. That is why the SHRIKETIT and CROTALARIA sets below are orthogonal, and why a rendered perspective — however resolved the design behind it — cannot carry the proof.

> **Watch-out — a rendered perspective cannot replace documentation.** It is the most attractive drawing in the folio and on its own it proves almost nothing. Its lines converge, so it has no single scale and no length on it can be measured; it shows one viewpoint only; and the rendered impression a student submits carries no dimensions, no levels, no symbols and no legend. Unit 2 Outcome 1 accepts a **model** or **documentation drawings**; a perspective may accompany them, but it cannot replace them.

Conventions and Australian Standards. A **technical convention** is a shared rule for representing something on a drawing — a line type, a symbol, a way of writing a dimension. The Australian Standard for technical drawing is **AS 1100**, with **AS 1100.301** covering architectural drawing. You are not asked to memorise clause numbers. You are asked to *use* the conventions, because their whole value is that they are shared: a builder, a council officer or a volunteer who has never met you reads your drawing and gets the space you designed. A private symbol invented for one sheet is not a convention, however elegant — it is a code only you can read.



The sheet. Before a reader looks at a single line, the sheet has to tell them what they are holding.

- The **title block**, usually bottom-right, carries the **project**, the **client**, the **drawing title**, the **scale and the sheet size**, the **date**, **who drew it**, and the **drawing number**. The drawing number is what lets someone say "the store door is wrong on A02" instead of "the store door is wrong on the one with the plan on it".
- **Standard notes** state the rules the whole sheet is read under. Four are close to universal: *all dimensions in millimetres*; *levels in metres to a stated datum*; ***do not scale from this drawing — figured dimensions take precedence***; and *verify all dimensions on site*.
- A **scale bar** is a drawn ruler. Unlike the written ratio, it shrinks and grows with the drawing, so it still works after the sheet has been photocopied at 71% or opened on a phone.
- A **north point** goes on every plan.
- Each drawing on the sheet gets **its own title and its own scale**, because one sheet often carries several drawings at different scales.

Watch-out — the "do not scale" note is not a contradiction. The drawing *is* set out to scale; the note exists because paper stretches, printers rescale and photocopies lie. Where a written dimension exists, it wins. Where none exists, the reader asks — they do not guess with a ruler.

Line types. Architectural documentation uses line weight to say what each shape *is*. Anything **cut** by the plane of the drawing takes the heaviest line and is usually filled solid (**poché**); a **visible outline** below the cut takes a medium line; **hidden** work, or anything **above** a plan's cut plane, is dashed; **centre lines and grid lines** are thin chain lines; the **section plane** is a chain line with arrows; **construction and projection** lines stay faint. Chapter 5C set out the same logic for objects — the vocabulary is shared across the whole subject.

Dimensions. A dimension is built from three parts: **extension lines** carried out from the feature, each beginning with a **small gap** so it can never be mistaken for an edge of the building; a **dimension line** parallel to the feature, closed at each end by an **arrowhead or an oblique tick**; and the **figure**, set above the line and readable from the bottom or the right of the sheet. Five rules do most of the work:

- Dimension every feature **once**. A measurement given twice is a measurement that can contradict itself.
- **The chain must add up.** If a string reads 2400 + 3600 + 1800, the overall dimension beside it must read 7800. A chain that does not close tells the reader the drawing was never checked, and they can no longer trust any figure on it.
- Keep dimensions **outside** the drawing where you can, with the **small dimensions nearest** the drawing and the **overall furthest out**, so no two strings cross.
- Dimension to **structure**, not to furniture, and to **visible** outlines rather than hidden ones.
- The figure is always the **true size** of the thing, never the length it happens to be drawn on the paper.

Scale. A scale is the ratio **drawing : reality**, so 1:50 means one millimetre on the sheet stands for fifty on site. Australian practice draws from a set of preferred ratios — 1:1, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:1000 — and environmental work uses them roughly like this:

Drawing	Usual scale	Why
Construction or joinery **detail**	1:5, 1:10, 1:20	Enough sheet per millimetre to show how parts meet
Floor plan, elevation, section	1:50 or 1:100	The whole building on one sheet, still readable
Site plan	1:200 or 1:500	The whole site, its boundaries and its access
Locality plan	1:1000 and smaller	Where the site sits in its street or suburb

Choose a scale by calculating. Divide the real length by the second number of the ratio and check it fits the sheet with room left for dimension strings and notes. And note the scale **under each drawing**, not once in the title block, the moment a sheet carries more than one scale.

Levels, datum and falls — the conventions environments add. An object sits on a bench; a building sits on the ground, and the ground is never quite flat. Environmental documentation therefore carries a second measuring system.

- A **datum** is the agreed zero from which heights are measured. Say what it is: "±0.000 = the existing footpath at the east boundary". Without a stated datum, "+300" means nothing at all — 300 above what?
- A **reduced level (RL)** is a height relative to that datum, written **in metres to three decimal places**: RL +0.150. That is a deliberate exception to "all dimensions in millimetres", and the notes on the sheet say so.
- On a **plan**, a level is marked with a small **cross or triangle** at the point, with the RL written beside it. On a **section or elevation**, it is a horizontal **level line** closed by a half-filled triangle and labelled — **FFL** (finished floor level), **NGL** (natural ground level), eaves, ridge.
- A **fall or grade** is written as a ratio with an arrow pointing downhill: *FALL 1:20*. A grade is calculated as **run ÷ rise**: a path rising 150 mm over 3000 mm is 3000 ÷ 150 = **1:20**.

Symbols. A symbol carries information a plain line cannot. A **door** is a break in the wall plus a leaf, a hinge and a **swing arc**, because the swing eats floor space a clearance may need. A **window** shows the glass as thin lines inside the reveal. A **ramp or stair** carries an **UP arrow** and its **grade**. **Materials in section** are shown by **hatch patterns** — concrete, brickwork, timber, earth, gravel — and every hatch is decoded in a **legend**, because patterns vary between

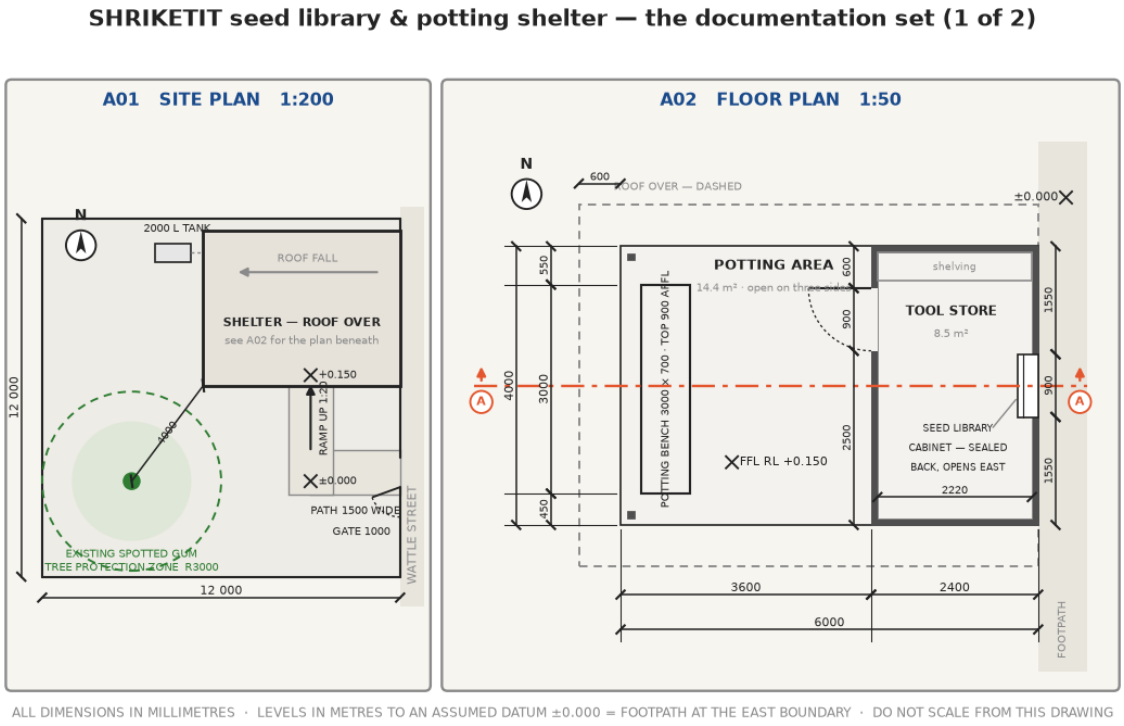
offices. **Colour is not a convention.** A drawing coloured to show materials cannot be photocopied, cannot be read by a colour-blind reader and carries no agreed meaning.

> **Watch-out — hatch and legend, never colour alone.** Colour on a documentation drawing is decoration until a legend gives it meaning, and it dies the first time the sheet is photocopied. Hatch the materials and supply a key.

Cross-referencing: the set, not the drawing. No single drawing describes a space. Documentation comes as a **set**, and the set is held together by **markers**: a **section marker** on the plan (a chain line, an arrow at each end showing the direction of view, and a letter at each end) points to a section drawing labelled to match; an **elevation marker** points to a numbered elevation on a named sheet. The rule is absolute — **every marker must point at a drawing that actually exists.** A section marker with no section behind it is worse than no marker, because it tells the reader the information exists somewhere and sends them looking for it.

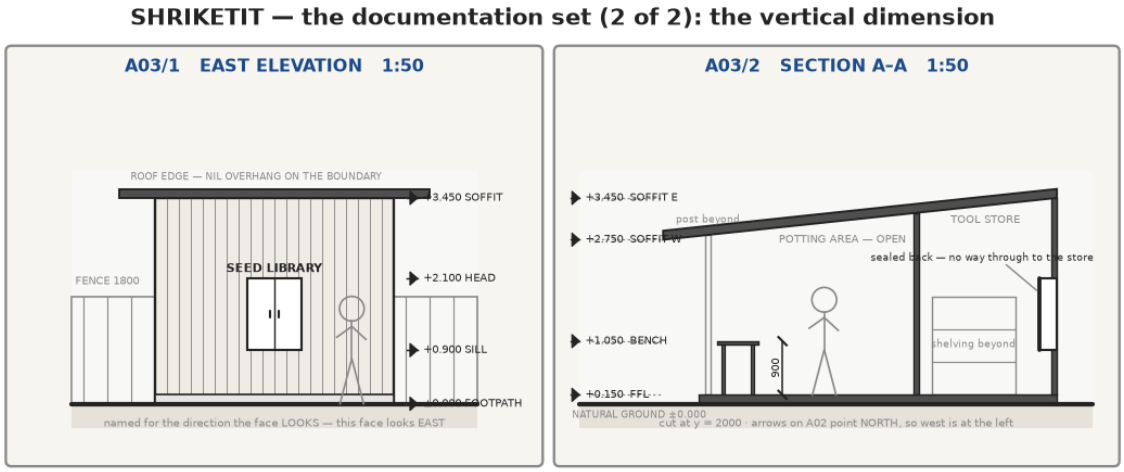
The project. Everything in this subtopic is documented against one original project, **SHRIKETIT**.

Entry	What the brief says
Client	Shrike-tit Garden Group Inc., a volunteer community garden on a 12 000 × 12 000 mm fenced corner of a suburban park.
Communication need	Environments — a small open shelter at the garden's street corner that shades a shared potting bench, stores tools securely, and houses a seed library the public can use when the garden is locked.
Purpose	To shelter, to work, to store, and to share seed with the street.
Context	The east boundary is the Wattle Street footpath; the garden gate is in that fence. An existing spotted gum stands in the south-west corner with a 3000 mm tree protection zone. The site is flat.
Users	Gardeners aged roughly 8 to 85, two of whom use walking frames; a weekly school group; passers-by who use the seed library without entering.
Design criteria	**1.** the potting bench is roofed, with the roof extending at least 600 mm beyond the bench on every open side; **2.** a step-free path at least 1200 mm wide runs from the street footpath to the potting bench, with no grade steeper than 1:20; **3.** the seed-library cabinet can be reached from the footpath when the garden gate is locked; **4.** tools are stored in a lockable room with no opening into that room visible from the street; **5.** the slab is no larger than 6000 × 4000 mm and no part of the structure stands inside the tree protection zone.



Read the two drawings above as a pair. **A01, the site plan at 1:200**, answers site questions: where the building sits, how you reach it, what must be protected. It shows the building as its **roof**, because that is what you see looking down on a site — the plan of the inside is A02's job. It carries the path and its **1:20 ramp**, spot levels at the bottom (±0.000) and top (+0.150) of that ramp, the 3000 mm **tree protection zone** with the 4000 mm dimension from the trunk to the nearest roof corner, the boundary dimensions, and a north point.

A02, the floor plan at 1:50, answers building questions. The 90 mm store walls and the two posts are cut by the plane and filled solid; the potting bench and the store shelving sit below the cut and take a medium line; the roof is above the cut plane and is **dashed**. The store door is drawn with its leaf and swing arc, and the swing deliberately falls into the potting area rather than into the store. The dimension strings close: 3600 + 2400 = 6000 across, and 450 + 3000 + 550 = 4000 up. The **section plane A–A** runs across the drawing with arrows pointing north.



A03/1, the east elevation, is named for the direction the face **looks** — east, at Wattle Street. It is the only drawing that shows what the street sees: a closed clad wall built in the boundary, with the **seed-library cabinet** as its single opening, sill at RL +0.900 and head at +2.100 so an adult or a seated user can reach it from the footpath. Note the roof has **no overhang** on this side; it stops at the boundary, which is a design decision the elevation makes visible.

A03/2, section A–A, is cut at y = 2000 with the arrows on A02 pointing north, so it is drawn with **west at the left and east at the right**. It carries the vertical half of the design: the finished floor 150 above natural ground, the bench top 900 above that floor, the skillion roof rising from RL +2.750 at the west eave to +3.450 at the east wall, and — the

detail the brief turns on — the **sealed back of the seed cabinet**, which is why a cabinet in the street wall does not become a way into the tool store. Things the plane misses, such as the post at x = 150 and the shelving beyond, are drawn in a lighter line.

Resolution — meeting the requirements of the brief. A **resolved** design solution is one in which every decision has been made. Not "a timber bench" but 3000 × 700, recycled hardwood, top 900 above the floor. Not "step-free access" but a 1500 mm path with a 150 mm rise over 3000 mm at 1:20. Resolution is convergent work: you stop generating options and start closing them, and the test of whether you have finished is not that the drawing looks complete but that **nothing is left to be decided later**.

That gives a precise procedure, and it is the examinable move of this subtopic. For **each numbered design criterion**:

1. name the **drawing** that proves it;
2. quote the **evidence** on that drawing — a dimension, a level, a symbol, a note;
3. give a **verdict**: met, partly met, or not met;
4. if it is not fully met, say **what would prove it** and what you will do next.

Resolving to the brief — and writing it down

A — THE RESOLUTION CHECK: every criterion, the drawing that proves it, the evidence, the verdict

SHRIKETIT design criterion	proved by	evidence on the drawing	verdict
1 the roof extends at least 600 mm beyond the bench on every open side	A02	roof line dashed 600 out; the bench face is 300 from the slab edge → the roof oversails it by 900	MET
2 a step-free path at least 1200 wide, no grade steeper than 1:20	A01	path 1500 wide; ramp rises 150 over 3000 = 1:20; spot levels ±0.000 and +0.150	MET
3 the seed cabinet can be reached from the footpath when the gate is locked	A01 + A03/1	cabinet set in the east wall, which IS the boundary; sill +0.900, head +2.100 above the footpath	MET
4 tools lockable, with no opening into the store visible from the street	A02 + A03/2	the store door faces west; the only thing in the east wall is the sealed 300 deep cabinet box	PARTLY — needs A04
5 slab no larger than 6000 × 4000, and nothing inside the tree protection zone	A01	slab dimensioned 6000 × 4000; nearest roof corner 4000 from the trunk, TPZ R3000 → 1000 clear	MET, but no tolerance

an honest check names what is NOT yet proved — here, criterion 4 waits on drawing A04, the seed-cabinet detail at 1:10

B — THE FIVE PARTS OF AN EVALUATIVE ANNOTATION

1. **NAME the feature, in design terminology**
   "the 3000 × 700 potting bench set along the west edge, under the low side of the skillion"
2. **POINT at a NUMBERED criterion**
   "criterion 1 — the roof must extend at least 600 beyond the bench on every open side"
3. **QUOTE the evidence in the drawing**
   "A02 shows the roof line 900 west of the bench face"
4. **JUDGE — a strength AND a limitation**
   "met, with 300 to spare — but the slab is dimensioned at exactly the 6000 × 4000 maximum (criterion 5)"
5. **STATE the next action**
   "re-dimension the slab 5900 × 3900 and reissue A01 and A02"

three ways of writing on a drawing

LABEL
"timber bench"
names the thing — decides nothing

SPECIFICATION NOTE
"recycled hardwood bench, 3000 × 700"
tells a builder what to make

EVALUATIVE ANNOTATION
the five parts at left
judges the design against the brief

The check above is the model. Notice two honest verdicts. Criterion 4 is **partly met**: the design is right, but the sealed back of the cabinet is drawn only at 1:50 and needs the seed-cabinet detail **A04 at 1:10** before anyone could build it correctly — so the criterion is not yet *proved*. Criterion 5 is **met with no tolerance**: the slab is dimensioned at exactly the 6000 × 4000 maximum, so a set-out error of 20 mm on site would put the project outside its own brief. A resolution check that returned five ticks and no reservations would be a weaker piece of work, not a stronger one, because it would mean the drawings had not been interrogated.

> **Watch-out — "it meets the brief" is not a resolution.** The marks are in the *evidence*. Name the criterion by number, name the drawing, quote the figure on it, then judge. An answer with no dimensions, levels or drawing numbers in it is an opinion about a building.

Evaluative annotation using appropriate design terminology. The study design asks for *appropriate design terminology used in evaluative annotations*. Three different things get written on drawings and only one of them is an evaluative annotation:

- a **label** — "timber bench" — names the thing and decides nothing;
- a **specification note** — "recycled hardwood bench, 3000 × 700, top 900 AFFL" — tells a builder what to make, and belongs on the documentation drawing itself;
- an **evaluative annotation** — which judges the work against the brief, and belongs on the folio page beside it.

An evaluative annotation has five parts: **name** the feature in design terminology; **point** at a numbered criterion; **quote** the evidence in the drawing; **judge** it, giving a strength *and* a limitation; and **state the next action**. "Appropriate design terminology" means the vocabulary of the subject — the design **elements** (point, line, shape, form, tone, texture, colour, type) and **principles** (figure–ground, balance, contrast, cropping, hierarchy, scale, proportion, pattern), together with the spatial vocabulary environments need: *orientation, aspect, threshold, circulation, sightline, enclosure, permeability, materiality, human scale, poché, datum, grade*. Terminology is not decoration: "the low side of the skillion holds the bench in shadow" is checkable, "it feels nice under there" is not.

> **Watch-out — an annotation without a criterion is a preference.** "I'm happy with the layout" and "my friend said it looks good" record no reasoning at all. Every evaluative annotation names the numbered criterion it is testing.
>
> **Watch-out — do not confuse the two kinds of writing.** Specification notes go **on** the documentation drawing and describe what to build. Evaluative annotations judge the design and sit beside it in the folio. A documentation drawing covered in judgements is unbuildable; a folio page with only specification notes records no thinking.

Manual or digital. Either is acceptable. Manually, documentation is set out with a scale rule, set square and fineliner, using three pen widths for the three line weights, and a printed title block. Digitally, the drawing is built at **full size** and *printed* to a chosen scale, with line weights set by layer, so one change to a wall updates every view and every dimension. The conventions are identical either way — the standard is about the drawing, not the tool.

Documentation is still iterative. Drawing up is not a formality performed on a finished design. Dimensioning a plan is the first time some decisions are actually tested, and a chain that will not close, a swing arc that eats a clearance or a level that will not reach is the drawing telling you the design is not resolved yet. Going back is the process working.

> **Watch-out — apply the conventions, do not write about them.** These marks are earned by a drawing that *uses* the conventions: correct line weights, complete and closing dimension strings, levels to a stated datum, symbols, a legend, a scale under each drawing, a north point and a filled-in title block. A neat drawing plus a paragraph explaining what you would have added earns nothing.
>
> **Units 3 & 4 preview — beyond the Units 1&2 study design.** Units 3 and 4 add no new drawing conventions to the ones set out above: what changes is that you apply them across two separate design processes, at greater depth, and defend the result in a pitch. Three further documentation **methods** belong to **professional practice** and sit outside Units 1–4 altogether. They are **not** assessed in any question below. First, **revision control**: once a drawing has been issued, every later change is given a revision letter (Rev A, Rev B), the changed area is ringed with a **revision cloud** carrying a numbered triangle, and the sheet is stamped with an **issue status** such as *For Approval* or *For Construction*. Second, the **drawing register** — a controlled list of every sheet in the set with its number and current revision, reissued each time anything changes. Third, the **written specification**, a separate document that the drawings refer to instead of carrying long material notes themselves. In Units 1 and 2 you produce one issue of a small set, so a filled-in title block with a **drawing number** is all the control you need; revisions, registers and specifications are named here only so that the habit of numbering and cross-referencing your drawings is already in place.

Worked examples

Example 1 — scaffolded

A correctly drawn but undocumented plan of the SHRIKETIT shelter has been set out at 1:50. Set out, in order, the conventions you would add to turn it into a documentation drawing, and explain what each one lets a reader do. (8 marks)

Working	Comment
1. Fix the line weights first. Fill the 90 mm store walls and the two 100 × 100 posts solid (poché) as the heaviest line; draw the potting bench, the store shelving and the slab edge in a medium line; dash the roof line 600 mm outside the slab on the north, west and south.	Line weight is the code that says what each shape *is*. Until it is right, nothing else on the sheet can be read — the reader cannot tell a wall from a bench. Note the roof is dashed because it is **above** the plan's cut plane.
2. Add the symbols. Draw the store door as a break in	A gap in a wall says a door is somewhere near; a swing

Working	Comment
the west wall with its leaf, hinge and **swing arc**; draw the seed cabinet as a 300 mm deep box let into the east wall.	arc says which way the leaf sweeps and how much floor it takes — which is what makes a clearance checkable on the drawing rather than discoverable on site.
3. Dimension it, outermost last. Put the short strings nearest the drawing (450 · 3000 · 550 up the west side; 2500 · 900 · 600 for the door opening; 1550 · 900 · 1550 for the cabinet) and the overalls furthest out (4000 and 6000). Check every chain closes: 3600 + 2400 = 6000; 450 + 3000 + 550 = 4000.	Small dimensions inside, overall outside — that is what stops strings crossing. Then **check the arithmetic**: a chain that does not add up to its overall is the single fastest way to lose a reader's trust in every other figure on the sheet.
4. Add the levels and the datum. Write **FFL RL +0.150** on the slab and **±0.000** on the footpath, and state the datum in the notes: "levels in metres to an assumed datum ±0.000 = footpath at the east boundary".	A level with no datum is not information. This is the convention environments add and objects never need — and it is what lets the reader check the 150 mm step and the ramp that answers criterion 2.
5. Orient and cross-reference it. Add the **north point**, then the **section plane A–A** — a chain line right across the drawing, an arrow at each end pointing north, a circled **A** at each end — and make sure a drawing titled SECTION A–A exists on sheet A03.	Orientation drives every environmental decision, so no plan is complete without north. The section marker must point at a drawing that exists; otherwise it sends the reader looking for information that was never made.
6. Finish the sheet. Title the drawing **FLOOR PLAN** with **1:50** beneath it; fill in the title block (project, client, drawing title, scale and sheet size, date, drawn by, drawing number **A02**); add the standard notes and a scale bar.	The last step is what separates a plan from a sketch. The drawing number is what lets someone refer to this drawing precisely, and "1:50 at A3" survives being emailed in a way "1:50" alone does not. *(1 mark per convention correctly named and justified, to a maximum of 8.)*

Example 2 — scaffolded

Test the resolved SHRIKETIT solution against the five design criteria. For each, name the drawing that proves it, state the evidence, and give a verdict. (10 marks)

Working	Comment
Criterion 1 — the roof extends at least 600 mm beyond the bench on every open side. *Proved by A02.* The roof line is dashed 600 mm outside the slab; the bench face sits 300 mm inside the west slab edge, ∴ the roof oversails it by 900 mm on the west, 1050 mm on the south and 1150 mm on the north. **MET**, with 300 mm to spare on the tightest side.	Name the drawing, then quote a figure you could put a scale rule on. "The bench is under the roof" is an observation; "900 mm against a required 600 mm" is evidence. Always test the **tightest** side, not the easiest one.
Criterion 2 — a step-free path at least 1200 wide, no grade steeper than 1:20. *Proved by A01.* The path is dimensioned 1500 wide; the ramp rises from RL ±0.000 to RL +0.150 over a 3000 mm run, so the grade is 3000 ÷ 150 = **1:20**. **MET** — exactly at the limit.	A grade is a calculation, so show it. Note that "1:20" is the shallowest permitted here and the design sits exactly on it: worth flagging, because a grade at the limit leaves no room for the slab being poured 10 mm high.
Criterion 3 — the seed cabinet can be reached from the footpath when the gate is locked. *Proved by A01 and A03/1.* A01 shows the east wall built **in** the boundary with the gate 3000 mm to the south; A03/1 shows the cabinet in that wall, sill RL +0.900, head RL +2.100. **MET.**	Some criteria need two drawings: the site plan proves the wall *is* the street frontage, the elevation proves the cabinet is in it at a reachable height. Say which drawing does which job.
Criterion 4 — tools lockable, no opening into the store visible from the street. *Proved by A02 and A03/2.* A02 shows the only door in the **west** wall, facing into the garden; A03/2 shows the cabinet as a 300 mm deep	This is the honest verdict, and it earns more than a tick. The design satisfies the criterion; the *documentation* does not yet prove it. Distinguish the two — that distinction is the whole point of a resolution check.

Working	Comment
box with a **sealed back**, so nothing in the street wall opens into the store. **PARTLY MET** — the principle is right, but at 1:50 the sealed back is one heavy line. It needs **A04, seed-cabinet detail at 1:10**, before a builder could construct it correctly.	
Criterion 5 — slab no larger than 6000 × 4000, nothing inside the tree protection zone. *Proved by A01.* The slab is dimensioned 6000 × 4000 and the nearest roof corner is 4000 mm from the trunk against a 3000 mm protection zone, ∴ 1000 mm clear. **MET, but with no tolerance** on the footprint: at exactly the maximum, any set-out error puts the project outside its brief.	Two halves to one criterion, so test both. "Met with no tolerance" is a real finding and leads straight to a next action — re-dimension the slab 5900 × 3900 and reissue A01 and A02.
Overall. Four criteria are met and one is met in principle but not yet documented. ∴ the solution is **resolved in design and all but resolved in documentation**; issuing A04 and re-dimensioning the slab completes it.	Close with an overall judgement, not just a list. *(2 marks per criterion: the drawing named, the evidence quoted, and a verdict given.)*

Example 3 — unscaffolded

Explain the difference between a development drawing and a documentation drawing, and state two things a documentation drawing must carry that a development drawing need not. (4 marks)

A **development drawing** exists to visualise and test **ideas and concepts** so they can be analysed, discussed and evaluated — the site analysis, bubble and zoning diagrams, ideation sketches and quick perspectives a designer makes during Develop. It is often rapid and informal, it may be expressive or diagrammatic, and its value lies in how cheaply it can be produced and discarded: it is where being wrong is affordable. A **documentation drawing** exists to **define and record the technical specifications** required to build the space, so it is made once the decisions have been taken and it is judged by whether a stranger could construct the design from it. Two things it must carry that a development drawing need not are a **stated scale**, so every length on it is a true measurement of the building reduced by a fixed ratio, and **technical conventions** — dimensions with their extension lines and figures, symbols such as door swings and level marks, hatching with a legend, a north point and a title block. ∴ the two drawings are not better and worse versions of each other: the development drawing decides *what the design should be*, and the documentation drawing records *exactly what it is*.

Example 4 — unscaffolded

Write the evaluative annotations that would accompany the resolved SHRIKETIT floor plan — one identifying a strength and one a limitation — using appropriate design terminology, each referring to a numbered design criterion and each ending in a next action. (6 marks)

Strength. The 3000 × 700 potting bench is set along the western edge of the slab, under the low side of the skillion, where the roof oversails it by 900 mm against the 600 mm criterion 1 requires (A02). Placing the bench on the low side rather than the high side also puts the deepest part of the roof's shadow over the working surface, and the open north and west sides keep a clear **sightline** from the bench into the garden, so a volunteer working at the bench still supervises the beds — an efficient use of a small **footprint**, in which the same decision serves shelter, orientation and outlook. *Next action:* confirm the bench height of 900 mm AFFL with two of the walking-frame users before A02 is issued, since the criterion fixes the cover but not the working height.

Limitation. The slab is dimensioned 6000 × 4000 on A01 and A02 — **exactly** the maximum criterion 5 allows — so the design has no tolerance at all: a set-out error of 20 mm on site, which is ordinary in a volunteer-built slab, would put the completed shelter outside its own brief, and the same dimension leaves the roof corner only 1000 mm clear of the tree protection zone. The **proportion** of the plan is also affected: at 6000 × 4000 the potting area is 3600 wide against a 2400 store, which is comfortable, but any reduction will come out of the potting area rather than the store. *Next action:* re-dimension the slab 5900 × 3900, taking the 100 mm off the store in each direction so the bench and its 900 mm oversail are untouched, and reissue A01 and A02.

(6 marks: two annotations, each naming the feature in design terminology, each tied to a numbered criterion with evidence quoted from the drawing, each judged, and each ending in a specific next action.)

Practice questions

Scaffolded

Q1. (a) State, in the study design's own terms, what a documentation drawing does. *(1 mark)* (b) Name the three kinds of technical convention a documentation drawing carries. *(3 marks)* (c) State the two presentation formats Unit 2 Outcome 1 accepts for a resolved environmental design solution. *(2 marks)*

Q2. Using the SHRIKETIT drawings: (a) State what the note "1:50 at A3" tells a reader. *(2 marks)* (b) The slab is 6000 mm long. Calculate its drawn length at 1:50 and at 1:200. *(2 marks)* (c) Explain why a **scale bar** is drawn on the sheet even though the ratio is already written in the title block. *(2 marks)*

Q3. (a) Name **four** items that must appear in the title block of a documentation drawing. *(4 marks)* (b) Explain why documentation drawings carry the note "Do not scale from this drawing — figured dimensions take precedence". *(2 marks)*

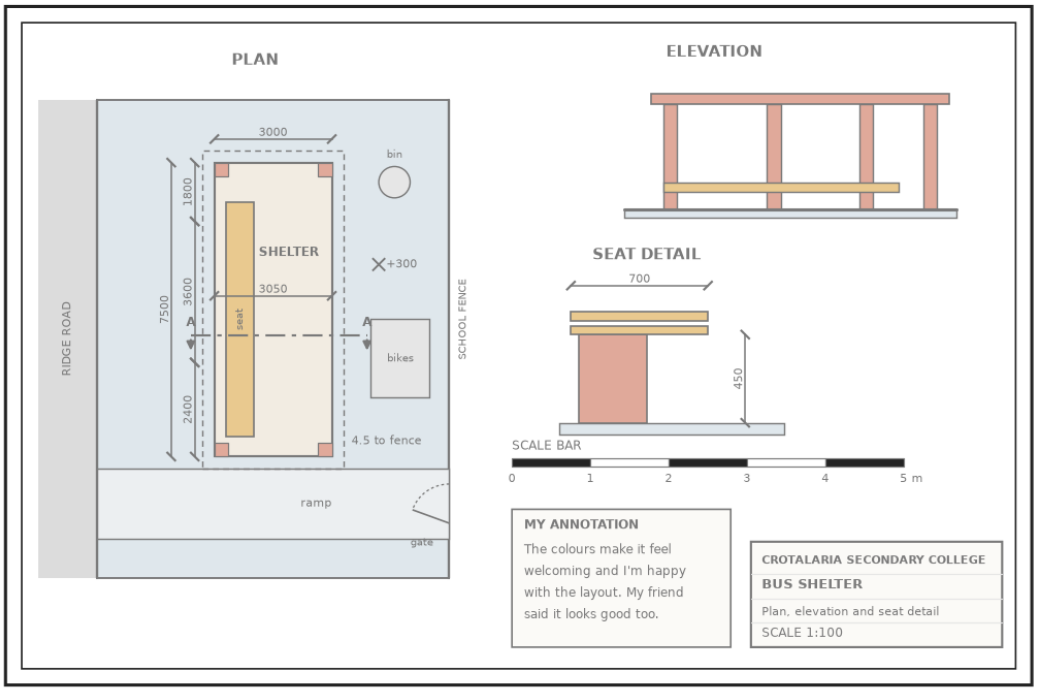
Q4. (a) Define **reduced level (RL)** and **datum**. *(2 marks)* (b) A01's ramp rises from RL ±0.000 at the footpath to RL +0.150 at the finished floor. A student redraws that ramp over a run of **2400 mm**. Calculate the grade of the redrawn ramp and state whether SHRIKETIT criterion 2 would still be met. *(2 marks)* (c) State how a level is shown on a **plan** and how it is shown on a **section**. *(2 marks)*

Q5. (a) State what each of these conveys on a documentation drawing: a chain line with an arrow and a letter at each end; a dashed rectangle drawn outside the walls of a plan; 45° hatching across a wall in section. *(3 marks)* (b) Explain why materials are shown by **hatching with a legend** rather than by colour. *(2 marks)* (c) State **two** things a door symbol tells a reader that a plain gap in a wall does not. *(2 marks)*

Q6. (a) Name the three parts of a dimension. *(3 marks)* (b) Explain why a dimension chain must add up to the overall dimension beside it. *(2 marks)* (c) State where the small dimensions and the overall dimension sit in a dimension string, and why. *(2 marks)*

Unscaffolded

CROTALARIA Secondary College bus shelter — a student's documentation sheet, as submitted



reproduced as submitted — nothing has been added, corrected or removed

Questions 7–26 refer to the CROTALARIA student documentation sheet above, unless otherwise stated. The brief it responds to is:

Entry	What the brief says
Client	CROTALARIA Secondary College.
Communication need	Environments — a bus waiting shelter and paved forecourt at the college's Ridge Road entrance.
Context	The forecourt faces **west** onto Ridge Road; the ground falls **450 mm** over the 9000 mm from the school gate to the kerb; winter wind and rain come from the west; an existing bike rack and bin stand on the forecourt.
Users	Up to 60 students waiting for four buses, a staff member on duty, and one student who uses a wheelchair.
Design criteria	**1.** seat at least 24 students under cover; **2.** shelter the waiting area from westerly wind and rain; **3.** a step-free route from the school gate to the bus door zone at the kerb, with no grade steeper than 1:20; **4.** keep a clear path 1800 mm wide across the forecourt at all times.

Q7. Identify **four** technical conventions that are missing from, or incorrect on, the CROTALARIA sheet and, for each, state the correction. *(8 marks)*

Q8. The sheet carries a plan and a seat detail drawn at different scales, with "SCALE 1:100" noted once in the title block. Explain the problem this creates and state the convention that fixes it. *(4 marks)*

Q9. The dimension string down the shelter reads 2400, 3600 and 1800 against an overall dimension of 7500, and the shelter width is dimensioned 3000 outside the plan and 3050 inside it. Explain what each fault costs the reader, and describe how the two strings should be set out. *(5 marks)*

Q10. The plan carries the level "+300" and nothing else. Explain why this level cannot be used, and rewrite it correctly for the CROTALARIA forecourt. *(4 marks)*

Q11. Materials on the sheet are shown in coloured pencil with no key. State the convention that applies and describe how the concrete paving, the brick piers and the timber seat should be shown instead. *(4 marks)*

Q12. A section marker **A–A** appears on the plan, but no section drawing exists. Explain what cross-referencing does in a documentation set, and state what this marker costs the reader. *(4 marks)*

Q13. The forecourt falls 450 mm over the 9000 mm from the school gate to the kerb. Calculate the grade, state whether design criterion 3 is met, and name the drawing and the conventions that would prove it. *(5 marks)*

Q14. The sheet carries no north point. Explain what that omission costs on an environmental project, referring to design criterion 2. *(3 marks)*

Q15. The plan mixes the note "4.5 to fence" with figures such as 2400, and the sheet carries no notes block. Explain the risk this creates and state **two** standard notes the sheet should carry. *(4 marks)*

Q16. The ramp is drawn as a plain band across the forecourt. Describe how a ramp should be documented on a plan, and explain why this matters for design criterion 3. *(4 marks)*

Q17. Rewrite the student's annotation as **two evaluative annotations** for CROTALARIA, each using appropriate design terminology and each referring to a numbered design criterion. *(6 marks)*

Q18. Distinguish between a **specification note** and an **evaluative annotation**, giving one example of each for CROTALARIA. *(4 marks)*

Q19. The student intends to submit a rendered perspective of the shelter as the presentation of the resolved solution. Explain why a rendered perspective alone cannot present a resolved environmental design solution, and state what Unit 2 Outcome 1 accepts. *(4 marks)*

Q20. Name the documentation drawings you would issue to resolve the CROTALARIA shelter, giving a scale for each and stating what each would prove against the design criteria. *(8 marks)*

Q21. *(SHRIKETIT.)* Explain how the SHRIKETIT documentation set proves criterion 3 without breaching criterion 4, naming the drawings that carry the evidence. *(4 marks)*

Q22. *(SHRIKETIT.)* The section marker on A02 is labelled A–A with its arrows pointing north. Explain how a reader uses that marker, and state what would change on the section drawing if the arrows pointed south instead. *(4 marks)*

Q23. *(SHRIKETIT.)* Explain why documentation drawings for an environmental project must comply with **Australian Standards**, and describe what goes wrong on site when a drawing uses private conventions instead. *(4 marks)*

Q24. *(New scenario.)* **DODONAEA STUDY ROOM.** A country neighbourhood house is fitting out a disused side room in a 1920s mechanics' institute hall as a shared study and craft room. The room is **7200 × 5400 mm** internally, with 350 mm solid brick walls, a pressed-metal ceiling 3600 mm above the floor, existing double-hung windows in the south wall, an unused fireplace in the east wall and a single 820 mm doorway from the main hall in the west wall. The room floor stands **150 mm above** the hall floor — a single step at that doorway. The building is on a heritage overlay: the ceiling, the fireplace surround and the windows must not be altered, and **nothing may be fixed into the brickwork or the ceiling**. Users are adults and students of all ages, two of whom drive mobility scooters; the room is used in the evening in winter. The design criteria are: **1.** seat 12 people at work surfaces that two people can clear and stack within one hour; **2.** a step-free route from the hall doorway to every work surface, with no grade steeper than 1:14; **3.** every work surface has task lighting that is **not** fixed to the pressed-metal ceiling; **4.** no new fixing into the brickwork, the fireplace surround or the ceiling.

Produce the **documentation schedule** for DODONAEA: name at least **five** drawings and, for each, give its type, its scale and what it would prove. *(8 marks)*

Q25. *(DODONAEA.)* Write the **resolution statement**: for each of the four design criteria, name the drawing that would prove it, the evidence that drawing would carry, and a verdict. Then state which criteria your **1:50** drawings alone could not prove, and name the drawing in your schedule that closes them. *(8 marks)*

Q26. Evaluate the CROTALARIA sheet as documentation of a **resolved** design solution. *(6 marks)*

Answers

Q1. (a) It defines and records the technical specifications required to build the environment. (b) Symbols, dimensions, scales. (c) A model, **or** documentation drawings with technical conventions complying with Australian Standards. **Q2.** (a) The drawing is set out at 1:50 and printed on an A3 sheet. (b) 120 mm at 1:50; 30 mm at 1:200. (c) It shrinks with the drawing — see solutions. **Q3.** (a) Any four of: project, client, drawing title, scale, sheet size, date, drawn by, drawing number, revision. (b) See solutions. **Q4.** (a) RL = a height relative to a stated datum, written in metres; datum = the agreed zero. (b) 2400 ÷ 150 = **1:16**; steeper than 1:20, so criterion 2 would **not** be met. (c) Plan = a cross or triangle with the RL beside it; section = a level line closed by a half-filled triangle, labelled. **Q5.** (a) A section plane and its direction of view; work **above** the plan's cut plane (here, the roof); brickwork in section. (b) See solutions. (c) Any two of: the width of the opening, which side is hinged, which way the leaf swings, how much floor the swing takes. **Q6.** (a) Extension (projection) lines, a dimension line with arrowheads or oblique ticks, and the figure. (b) See solutions. (c) Small dimensions nearest the drawing, overall furthest out, so strings do not cross. **Q7.** Any four of: no north point; no drawing number/date/drawn by in the title block; only one scale noted for two scales; a scale bar that disagrees with the drawing; a chain that does not add up; a dimension given twice with two different figures; a level with no datum; colour instead of hatching, with no legend; a section marker with no section; a ramp with no UP arrow or grade; mixed units and no notes block. See solutions. **Q8.** Every drawing needs its own scale noted beneath it. See solutions. **Q9.** 2400 + 3600 + 1800 = 7800, not 7500; and 3000 vs 3050 is the same length dimensioned twice. See solutions. **Q10.** "+300" has no datum and no units convention, so it measures nothing. See solutions. **Q11.** Hatch each material in section and decode the patterns in a legend. See solutions. **Q12.** Cross-referencing ties the set together; a marker pointing at nothing sends the reader looking for a drawing that was never made. **Q13.** 9000 ÷ 450 = **1:20** — exactly at the limit, so criterion 3 *can* be met by grading the route to the natural fall, but the sheet documents no levels, grade or landings, so as drawn it is neither met nor unmet: it is undocumented. Proved on a site plan by spot levels, a fall arrow and a grade note. **Q14.** Orientation cannot be checked, so the westerly the shelter must block (criterion 2) cannot be located. See solutions. **Q15.** Mixed units invite a 1000-fold error. Notes: "ALL DIMENSIONS IN MILLIMETRES"; "DO NOT SCALE FROM THIS DRAWING — FIGURED DIMENSIONS TAKE PRECEDENCE". *(Accept the datum note or "verify all dimensions on site".)* **Q16.** An UP arrow, the grade as a ratio, spot levels top and bottom, the width and the landings. See solutions. **Q17.–Q18.** See fully-worked solutions. **Q19.** A rendered perspective carries none of the conventions — no dimensions, levels or legend — its converging lines leave no single scale to measure from, and it shows one viewpoint, so no criterion can be tested on it; Outcome 1 accepts a model or documentation drawings. **Q20.** Site plan 1:200; floor plan 1:100; two elevations 1:50 or 1:100; section A–A 1:50; seat and pier detail 1:10. See solutions. **Q21.** The cabinet is in the east wall (A01, A03/1) but is a sealed 300 mm box (A03/2), and the only store door faces west (A02). **Q22.** The arrows give the direction of view; reversing them mirrors the section left-for-right. **Q23.** Conventions are shared rules — see solutions. **Q24.–Q25.** See fully-worked solutions. **Q26.** Not resolved and not documentation: the conventions are largely absent and no criterion is demonstrated. See solutions.

Fully-worked solutions

Q1. (a) A documentation drawing **defines and records the technical specifications required for the assembly of** three-dimensional objects and environments *(1 mark).* (b) **Symbols**, **dimensions** and **scales** *(1 mark each).* (c) A **model**, **or documentation drawings with technical conventions that comply with Australian Standards** *(1 mark each).* A rendered perspective, a concept board or a written rationale may accompany either, but neither replaces them.

Q2. (a) It states two things: the drawing has been set out at a ratio of **1:50**, so one millimetre on the sheet stands for fifty millimetres on site; and it was drawn to print at **A3** (420 × 297 mm). The sheet size matters because a photocopy, a reduction to A4 or a screen changes the physical size of the drawing without changing the printed ratio, so "1:50" alone can become a lie *(2 marks).* (b) At 1:50, 6000 ÷ 50 = **120 mm**. At 1:200, 6000 ÷ 200 = **30 mm** *(1 mark each).* (c) The written ratio is only true at the size the drawing was printed. A **scale bar** is drawn on the sheet, so it is enlarged or reduced by exactly the same amount as the drawing: on a photocopy at 71%, the ratio 1:50 is now wrong but the bar's "5 m" mark still measures five real metres. It also lets a reader with no calculator take an approximate measurement directly. ∴ the ratio tells you how the drawing was made, and the bar tells you how it is now *(2 marks).*

Q3. (a) Any four of: the **project** name, the **client**, the **drawing title**, the **scale**, the **sheet size**, the **date**, **who drew it**, the **drawing number**, the **revision** *(1 mark each).* (b) Paper stretches and shrinks with humidity, printers rescale to fit, and photocopies and PDFs are routinely reduced — so a length physically measured off a sheet may be wrong by several per cent even though the drawing was set out perfectly. A **figured** dimension is a number that survives all of

that. The note therefore establishes an order of authority: where a written dimension exists it governs, and where none exists the reader asks rather than measuring. It also protects the designer, because a builder who scales off a drawing and gets it wrong has ignored a stated instruction *(2 marks).*

Q4. (a) A **datum** is the agreed zero point from which all heights on a project are measured, and it must be stated on the drawing — for SHRIKETIT, "±0.000 = the existing footpath at the east boundary". A **reduced level (RL)** is the height of a point relative to that datum, written in **metres to three decimal places** — RL +0.150 *(1 mark each).* (b) Grade = run ÷ rise = 2400 ÷ 150 = 16, ∴ the redrawn ramp is **1:16**. Criterion 2 permits nothing steeper than 1:20, and 1:16 *is* steeper — the smaller the second number of the ratio, the steeper the slope — so criterion 2 would **not** be met. The rise is fixed at 150 mm by the slab, so the only variable is the run: shortening it from A01's 3000 mm is exactly what takes a compliant ramp out of compliance *(2 marks: the calculation and the verdict).* (c) On a **plan** the level is a **spot level**: a small cross or triangle marked at the point, with the RL written beside it. On a **section or elevation** it is a horizontal **level line** closed by an arrowhead or half-filled triangle at the point, labelled with its name and figure — FFL RL +0.150 *(1 mark each).*

Q5. (a) The **chain line with an arrow and a letter at each end** is a **section plane**: it says where the vertical cut is taken, which way the viewer looks, and what the resulting drawing is called (A–A). The **dashed rectangle outside the walls** is work **above** the plan's cutting plane — on A02 it is the roof, projecting 600 mm beyond the slab. The **45° hatching across a wall in section** is the material symbol for **brickwork** *(1 mark each).* (b) A hatch pattern is a line convention, so it survives photocopying, faxing, black-and-white printing and a colour-blind reader; a coloured wash survives none of those. More importantly, colour carries no agreed meaning — one designer's "brown" is timber and another's is brickwork — whereas hatching is decoded by the **legend** on the same sheet, so the drawing explains itself to a reader who has never met the designer *(2 marks).* (c) Any two of: the **width of the opening**; **which side is hinged**; **which way the leaf swings** (in or out, left or right); **how much floor area the swing occupies**, which decides whether a required clearance really exists *(1 mark each).*

Q6. (a) **Extension (projection) lines** carried out from the feature, each starting with a small gap so it cannot be mistaken for an edge; a **dimension line** parallel to the feature, closed at each end by an **arrowhead or oblique tick**; and the **figure**, the measurement itself, placed above the line and read from the bottom or the right of the sheet *(1 mark each).* (b) A dimension string and its overall dimension measure the same distance twice, once in parts and once whole, so they must agree. When they do not, the reader has no way of telling which figure is the mistake — and because they cannot tell, they stop trusting **every** figure on the sheet, not just those two. On site the consequence is worse than confusion: a builder setting out from the parts and a supplier quoting from the overall produce work that does not fit *(2 marks).* (c) The **small dimensions sit nearest the drawing** and the **overall dimension furthest out**, with intermediate strings between. This is so that no dimension line crosses another and no string has to jump over a figure: the strings nest, and the eye can follow any one of them from end to end. Reversing the order forces the short dimensions to cross the long one *(2 marks).*

Q7. *(Any four; 1 mark for the fault, 1 mark for the correction.)*

1. **There is no north point.** *Correction:* add one to the plan, so the westerly the shelter must block and the west-facing forecourt can be checked against the brief.
2. **The title block carries only the client, the project and the drawing title, with a single scale.** *Correction:* add the **drawing number**, the **date** and **who drew it**, so the sheet can be referred to, dated and attributed.
3. **Two drawings at two scales, with one scale noted.** *Correction:* note the scale **under each drawing** — PLAN 1:100, SEAT DETAIL 1:20 — instead of once in the title block.
4. **The scale bar does not match the drawing.** *Correction:* draw the bar at the same scale as the drawing it serves, or give each drawing its own bar; here the bar's metre is roughly twice the plan's metre, so an oversized ruler is being held against the drawing and every length checked against it reads at about **half** its true size — the 3000 mm shelter measures 1.5 m on the bar.
5. **The dimension chain does not close** — 2400 + 3600 + 1800 = 7800 against an overall of 7500. *Correction:* remeasure, correct the parts and check the sum equals the overall.
6. **The width is dimensioned twice, as 3000 and 3050.** *Correction:* dimension each feature once, outside the drawing.
7. **The level "+300" has no datum.** *Correction:* state the datum in the notes and write the level as an RL in metres — RL +0.300.
8. **Materials are shown in colour with no key.** *Correction:* hatch the materials in section and supply a **legend**.

9. **A section marker A–A points at no section.** *Correction:* draw and title SECTION A–A, or delete the marker.
10. **The ramp has no UP arrow and no grade.** *Correction:* add the arrow, the grade as a ratio, and spot levels at each end.
11. **Units are mixed** — "4.5 to fence" beside "2400" — and there is **no notes block**. *Correction:* work in millimetres throughout and add the standard notes.

Q8. A scale written in the title block is read as applying to the **sheet**. Here it does not: the plan is at 1:100 and the seat detail is drawn very much larger, at about 1:20. A reader who takes the title block at its word will read the seat as roughly five times its real size — a 700 mm seat becomes 3.5 m — and, because the sheet also carries a scale bar, they may go on measuring from it in good faith. Nothing on the sheet warns them, because a large drawing of a small thing looks exactly like a small drawing of a large thing. The convention that fixes it is simple and is used on every real documentation set: **each drawing carries its own title and its own scale immediately beneath it**, and the title block scale field either repeats the dominant scale or reads "AS SHOWN". So the sheet would read *PLAN 1:100*, *ELEVATION 1:100*, *SEAT DETAIL 1:20*, and each drawing would have its own scale bar *(4 marks: the misreading explained with an example, and the per-drawing convention stated).*

Q9. *The chain that does not close.* 2400 + 3600 + 1800 = **7800**, but the overall dimension beside it reads **7500**. The same length has been measured twice and the two answers differ by 300 mm. The reader cannot tell which figure is wrong, so they cannot use either: the shelter might be 7500 long with one bay mis-dimensioned, or 7800 long with the overall mis-dimensioned. Because the drawing has demonstrably not been checked, its other figures lose their authority too. *The dimension given twice.* The shelter width appears as **3000** outside the plan and **3050** inside it. This breaks the rule that each feature is dimensioned once: a measurement given twice is a measurement that can contradict itself, and here it does. A supplier ordering a 3000 roof sheet and a builder setting out 3050 piers produce work that will not meet. *How the strings should be set out.* Both strings go **outside** the drawing, with extension lines carried from each feature, each starting with a small gap. Along the length: one string of bay dimensions nearest the drawing, with the **overall** on a second string further out, and the parts checked to sum to the overall. Across the width: a **single** overall dimension, on the opposite side of the plan, with no repeat inside. Every string is checked by addition before the sheet is issued *(5 marks: each fault explained with its consequence, plus a correct account of nesting, extension lines and dimensioning once).*

Q10. *Why it cannot be used.* "+300" states a difference in height but not from what. There is no **datum** anywhere on the sheet, so the reader has no zero: +300 could be above the kerb, above the school gate, above the shelter floor or above an arbitrary survey peg, and on a forecourt that falls 450 mm from one end to the other those are four different heights spread across nearly half a metre. The figure also gives no units convention — 300 mm is plausible, 300 m is not, but the sheet has no note to settle it, and levels are conventionally written in **metres** while every other dimension is in millimetres. A level that cannot be tied to a zero cannot be set out, so it is not a level; it is a number. *Rewritten.* State the datum in the notes — "LEVELS IN METRES TO AN ASSUMED DATUM ±0.000 = TOP OF KERB AT RIDGE ROAD" — and then mark the level itself as a spot level: a small cross at the point with **RL +0.300** beside it. With the kerb as zero, the school gate 9000 mm away becomes **RL +0.450**, and the shelter floor can be given its own RL, so every level on the forecourt can be checked against every other *(4 marks: the missing datum and its consequence on this falling site, the units convention, and a correctly written level with a stated datum).*

Q11. The convention is that materials **cut in section** are identified by standard **hatch patterns**, and that every pattern used is decoded in a **legend** on the same sheet. Hatching is a line convention, so it photocopies, prints in black and white and reads for a colour-blind user; colour does none of that and carries no agreed meaning in any case. - **Concrete paving** — the concrete symbol, a scatter of aggregate dots and small triangles, shown wherever the paving is cut in section, with a note of its thickness and finish. - **Brick piers** — **45° hatching** across the pier where the plane cuts it, with the hatch running the same way on every brick element so the material reads consistently across the sheet. - **Timber seat** — the timber-in-section symbol, drawn to distinguish a piece cut **across** the grain from one cut along it, with the slat size noted. Each of these appears once in a **LEGEND** block beside the drawing — a small square of each pattern with its material named — so a reader who does not know the office's conventions can still decode the drawing *(4 marks: the hatch-and-legend convention stated, plus the three materials correctly treated).*

Q12. Cross-referencing is what makes a set of drawings behave as one document. No single drawing describes a space: the plan carries the horizontal dimension, the elevation the face, the section the vertical dimension and the detail the way parts meet. Markers tie them together — a **section marker** (a chain line with an arrow and a letter at

each end) on the plan says "a vertical cut is taken here, looking this way, and the drawing of it is called A–A"; an **elevation marker** says "the face you are looking at is drawing 2 on sheet A03". Every marker is a promise that a particular drawing exists somewhere in the set. Here the promise is broken. The reader sees A–A marked across the shelter and concludes, correctly, that the vertical dimension of the design has been resolved somewhere — the seat height against the roof, the head clearance under the beam, the relationship between the shelter floor and the falling forecourt. They then go looking for a drawing that was never made. The cost is therefore worse than simply missing information: it is **misleading** information, because the sheet actively claims to resolve something it has not. The correction is to draw and title SECTION A–A, or to delete the marker *(4 marks: cross-referencing defined by function, the promise a marker makes, and the specific cost — a false claim, not merely a gap).*

Q13. Calculation. Grade = run ÷ rise = 9000 ÷ 450 = 20, ∴ the forecourt falls at **1:20**. **Verdict.** Criterion 3 permits no grade steeper than 1:20, so the existing fall is **exactly at the limit** and the criterion **can** be met by grading the route to follow the natural fall — but only just, and only if the paving is laid accurately. Any local steepening, any threshold lip at the gate, or any kerb ramp at the bus door zone would break it. Note what this rules out: because 450 over 9000 is *exactly* 1:20 on average, flattening any part of the route forces the remainder steeper than 1:20, and criterion 3 forbids that — there is no "steeper but compliant" section available here. The only moves that keep the criterion are to **lengthen the route** — take it diagonally or as a dog-leg across the forecourt so the same 450 mm fall is spread over, say, 11 000 mm, giving 1:24 and room for level landings — or to state the natural fall as a design constraint, set the paving out to it accurately, and detail the two ends so that neither steepens locally. **How it would be proved.** On a **site plan** (1:200 for CROTALARIA), carrying: **spot levels** at the school gate, at intervals along the route and at the kerb, written as RLs to a stated datum; a **fall arrow** with the grade written as a ratio — *FALL 1:20* — along the route; the **width** dimensioned to show the accessible path; and, where the grade changes, **landings** dimensioned and levelled. None of these conventions appears on the student's sheet, so at present criterion 3 is neither met nor unmet — it is simply undocumented *(5 marks: the calculation, the verdict with its reservation, the drawing named, and the levels/fall-arrow/grade conventions identified).*

Q14. On an environmental project orientation is not a detail; it is the thing most other decisions follow from. Without a north point a reader cannot tell which edge of the plan is Ridge Road, which face takes the afternoon sun, or where the weather comes from — and they cannot check any of it against the brief. Criterion 2 is exactly such a check: the shelter must protect the waiting area from **westerly** wind and rain. Whether the design does that depends entirely on which side is closed and which is open, and that question cannot even be asked of an unoriented drawing. As it happens the brief says the forecourt faces west onto the road, so the open side of the shelter appears to face the very weather it is meant to block — but a reader cannot confirm that from the sheet, because nothing on it says which way is west. ∴ the omission does not merely make the drawing untidy: it makes one of the four design criteria untestable *(3 marks: orientation as the driver of environmental decisions, the specific check criterion 2 requires, and the consequence that the criterion becomes untestable).*

Q15. *The risk.* "4.5 to fence" and "2400" sit on the same drawing in different units. A reader has to guess that one is metres and the other millimetres, and the two figures are only distinguished by looking plausible — which is exactly the judgement a documentation drawing exists to remove. The error this invites is a **factor of a thousand**: 4.5 read as millimetres is a gap you could not put a hand through, and 2400 read as metres is a shelter longer than the school. Decimal points are also the first thing lost to a photocopy, a fax or a fold, so "4.5" can arrive as "45". *The notes.* Two are essential here: 1. **"ALL DIMENSIONS IN MILLIMETRES."** — the units convention, stated once and applied everywhere, so "4.5 to fence" is rewritten as **4500**. 2. **"DO NOT SCALE FROM THIS DRAWING — FIGURED DIMENSIONS TAKE PRECEDENCE."** — the order of authority, so a reader who cannot find a figure asks rather than measuring off a sheet that has already been reduced. *(Also accept: "LEVELS IN METRES TO AN ASSUMED DATUM ±0.000 = …", which is needed here in any case for the "+300" level; or "VERIFY ALL DIMENSIONS ON SITE".) (4 marks: the mixed-unit risk explained with its scale, plus two correctly worded standard notes.)*

Q16. A ramp on a plan is documented with five things, none of which the student has drawn: - an **UP arrow** running along the ramp in the direction of rise, so the reader knows which end is high; - the **grade** written as a ratio beside it — *RAMP UP 1:20* — since a plan is a horizontal projection and cannot show a slope any other way; - **spot levels** at the bottom and the top, as RLs to a stated datum, so the rise can be checked against the run; - the ramp's **width**, dimensioned, and the position of any **kerb or edge protection**; - **landings** at the top, the bottom and at any change of direction, dimensioned. This matters for criterion 3 because that criterion is entirely a statement about grade: a step-free route from the school gate to the bus door zone with nothing steeper than 1:20. A plain band of paving is silent on every part of it — the band could be level, it could be 1:20, or it could be 1:12 with a step at one end, and the drawing

would look identical. The conventions above are what turn "there is a ramp here" into a claim a reader can test, and a builder can set out to. On a forecourt already falling 450 mm over 9000 mm, that is the difference between a route the wheelchair user in the brief can use and one they cannot *(4 marks: the conventions listed, and the link to criterion 3 made through the fact that a plan cannot otherwise show a slope).*

Q17. *(Model — accept any two annotations that name a feature in design terminology, cite a numbered criterion with evidence, judge it, and state a next action.)*

Annotation 1 — a strength. "The shelter is set as a long, narrow **form**, 7500 × 3000 and parallel to the kerb, with the seat running its inner length and the 1800 mm through-path kept outside it. That **proportion** and orientation are the right response to criterion 4: waiting and **circulation** are separated by the shelter's own footprint rather than by markings, so a queue forms *along* the shelter facing the bus door zone instead of across the path, and the clear route survives even when 60 students are waiting. *Next action:* dimension the through-path on the plan — the band drawn across the forecourt from the kerb to the school gate — and show that its **1800 mm** width is held clear of the dashed roof line, which at present runs hard against the edge of it, so criterion 4 is proved rather than assumed."

Annotation 2 — a limitation. "The seating capacity is not there. The seat is drawn 6000 mm long against criterion 1's requirement to seat at least 24 students: at an ordinary allowance of about 450 mm per person a 6000 mm single-sided seat holds roughly **13**, little more than half what the brief asks. The 700 mm depth hints the seat might be intended to be used from both sides, which would give about 12 000 mm of seating edge and roughly 26 places — but neither the plan nor the elevation says which it is, so the drawing cannot settle the one thing criterion 1 turns on. *Next action:* decide the seat type, redraw it on the plan and the seat detail as a double-sided bench, and dimension the seating edge with a note stating the allowance per person and the resulting count."

(6 marks: two annotations, each naming a feature in design terminology, each tied to a numbered criterion with evidence, each judged, and each closing with a specific next action. No marks for "the colours make it feel welcoming", which names no feature, cites no criterion and records no reasoning.)

Q18. A **specification note** is written **on the documentation drawing** and tells the maker what to build. It is factual, imperative and carries no judgement: material, size, finish, fixing. It is aimed at a builder. For CROTALARIA: *"Seat: 2 no. 45 × 140 hardwood slats on galvanised steel brackets, top 450 above finished paving."* An **evaluative annotation** is written **beside the work in the folio** and judges the design against the brief. It names a feature in design terminology, cites a numbered design criterion, quotes evidence from the drawing, gives a strength and a limitation, and states a next action. It is aimed at the designer, the teacher and the client. For CROTALARIA: *"The shelter is drawn as a roof on four brick piers, open on every side, so its **enclosure** does nothing about the westerly wind and rain criterion 2 names — the roof gives a dry patch in still weather only, and driving rain from Ridge Road will reach the seat. Next: close the west side with a screen to at least seated head height and draw the west elevation to show it."* ∴ the two are not different levels of effort but different documents with different readers: the specification note makes the design **buildable**, the evaluative annotation makes it **defensible**. Putting judgements on a documentation drawing makes it unbuildable, and putting only specification notes in a folio records no thinking at all *(4 marks: a congruent two-sided distinction — purpose, location and reader — plus a correct example of each).*

Q19. The student's **rendered perspective** is a **presentation drawing**: its job is to convey a resolved concept to a stakeholder so they can consider it, and it does that better than any other drawing because it shows the space as a person would experience it. What it cannot do is document. In a perspective, lines converge toward vanishing points, so the drawing has **no single scale**: one millimetre at the near end of the shelter stands for a different real distance than one millimetre at the far end, and no length on it can be converted back to a measurement. It also shows **one viewpoint**, so everything behind the viewer, above the eye and inside the structure is simply absent, and this drawing carries none of the technical conventions — no dimensions, no levels or datum, no section markers, no hatching or legend, no title block. None of the four CROTALARIA criteria could be tested on it: not the seating count, not the westerly protection, not the 1:20 grade and not the 1800 mm clear path. It is the **conventions**, not the projection, that decide the category: the study design allows a documentation drawing to be made in three dimensions, in perspective or paraline, so a three-dimensional view that carries dimensions and assembly information does document. A rendered impression carrying none of them does not — and a perspective still cannot be scaled, which is why environmental documentation is drawn orthogonally. Unit 2 Outcome 1 accepts the resolved solution presented as **either a model or documentation drawings with technical conventions that comply with Australian Standards**. A rendered perspective may — and usually should — accompany the set, because it communicates the experience of the space to

a client in a way a plan never will. It just cannot stand in place of it *(4 marks: perspective classified as a presentation drawing, the loss of a single scale, the missing conventions, and the accepted formats stated).*

Q20. *(Model — accept any coherent set of at least five drawings, correctly typed, each with a scale and a stated content, tied to the criteria.)*

1. **Site plan, 1:200.** The forecourt from the Ridge Road kerb to the school fence: boundaries, the kerb and bus door zone, the existing bike rack and bin, the shelter footprint, the 1800 mm clear path dimensioned, **spot levels** at the gate (RL +0.450) and the kerb (RL ±0.000) with a **FALL 1:20** arrow along the route, and a **north point**. *Proves:* criteria 3 and 4, and establishes the orientation on which criterion 2 depends.
2. **Floor plan, 1:100.** The shelter itself: piers cut and filled solid, the seat and the roof line dashed over, the seat dimensioned along its length with a nested string that closes, the clear path width, and the **section marker A–A** with its direction of view. *Proves:* criterion 1 (seat length against a stated student count) and criterion 4 (the path is not eaten by the shelter).
3. **West elevation, 1:50.** The face that looks west to Ridge Road, drawn with a ground line and levels: the height of the roof, the height and extent of any screen or wall, and the seat behind it. *Proves:* criterion 2 — this is the only drawing on which the westerly protection can be seen at all.
4. **North elevation, 1:50.** The end the wind and the buses approach along, showing how the shelter meets the falling forecourt and whether the roof sheds water away from the waiting area. *Proves:* how the structure meets the ground, and supports criterion 2.
5. **Section A–A, 1:50.** Cut across the shelter through the seat: the seat height of 450 above the paving, the head clearance under the roof beam, the roof fall and gutter, and the relationship between the seat, the screen and the falling ground. *Proves:* criteria 1 and 2 together, and it is the drawing the existing marker on the student's sheet already promises.
6. **Seat and pier detail, 1:10.** The seat slats, their brackets and the fixing into the brick pier, with materials hatched and a legend. *Proves:* that criterion 1's seating is buildable, and it is the drawing the student has already begun.

Each drawing carries **its own title and scale beneath it**; the sheet carries a filled-in title block with a drawing number, the standard notes and a scale bar *(8 marks: at least five drawings named and correctly typed, a defensible scale for each, a stated content for each, and the set tied to the numbered criteria rather than listed generically).*

Q21. The two criteria pull against each other: criterion 3 wants the seed library **open to the street**, and criterion 4 wants the tool store **closed to it**. The design resolves the conflict by separating the two things that share the same wall, and three drawings carry the evidence. **A01, the site plan,** shows that the shelter's east wall is built **in the boundary**, with the Wattle Street footpath immediately beyond it and the garden gate 3000 mm to the south. That is what makes a cabinet in this wall reachable when the gate is locked — the wall *is* the street frontage. **A03/1, the east elevation,** shows the cabinet in that wall as the single opening in an otherwise closed clad face, with its sill at RL +0.900 and its head at RL +2.100, heights an adult or a seated user can reach from the footpath. Criterion 3 is met. **A03/2, section A–A,** shows why criterion 4 is not breached: the cabinet is a **300 mm deep box with a sealed back**, lined and closed on its inner face, so it opens **only** to the footpath and there is no route from it into the store. **A02, the floor plan,** completes the picture by showing the store's only door in the **west** wall, facing into the garden, where it is neither visible nor reachable from Wattle Street. ∴ the street wall contains an opening, but not an opening *into the store* — which is precisely what criterion 4 forbids *(4 marks: the tension between the two criteria identified, the drawings named, and the sealed-back detail and west-facing door given as the evidence).*

Q22. The marker does two jobs. First it **locates** the cut: the chain line running across A02 at y = 2000 tells the reader that the section is taken along that line and not somewhere else, so everything the line crosses — the potting bench, the store's west and east walls, the seed cabinet — is drawn **cut**, in the heaviest line. What the line misses is not simply dropped. Work lying **beyond** the cut in the direction of view is still drawn, in a lighter line: that is why A03/2 carries the post at x = 150 and the store shelving, both labelled *beyond*. Only what lies **behind** the viewer, south of the cut, is left off the drawing altogether. Second, the **arrows give the direction of view**: pointing north means the viewer stands to the south of the cut and looks north at the cut face. From that the reader knows how to read the drawing without being told: looking north, **west is on the left and east on the right**, which is why A03/2 is drawn with the potting bench at the left and the seed cabinet in the street wall at the right. The letters **A** at each end match the title SECTION A–A, so the marker and the drawing can be paired across the set. If the arrows pointed **south**, the viewer would be standing north of the cut looking south, and the section would be drawn **mirrored** — east on the left and

west on the right, so the seed cabinet would appear at the left of the sheet and the bench at the right, and the roof would rise toward the left instead of the right. The building would be unchanged; the drawing of it would be reversed. That is exactly why the arrows are not optional: without them the reader cannot tell a section from its mirror image *(4 marks: the marker locates the cut, the arrows give the direction of view, the resulting left–right convention on A03/2, and the mirrored result if reversed).*

Q23. A technical convention has no value in itself — a dashed line is not intrinsically better than a dotted one. Its value is entirely that it is **shared**: the standard, **AS 1100** (with **AS 1100.301** for architectural drawing), is an agreement about what marks mean, so that a drawing made by someone the reader has never met can be read without explanation. Compliance is what turns a private record of a design into a public instruction for building it, and it is what lets the same set be read by a builder, a supplier, a council officer and a certifier, each of whom looks for something different. When a drawing uses private conventions instead, the failure is not that it looks wrong — it is that it looks **right and means something else**. A reader does not know the conventions are private, so they apply the standard ones and get a confident, wrong answer. On the SHRIKETIT project: a roof drawn solid instead of dashed reads as a wall standing on the slab, so the potting area is priced and built as an enclosed room; brick shown in the designer's favourite colour rather than 45° hatching photocopies to grey and is set out in blockwork; a level written "+300" with no datum is set out from the wrong zero, and the 1:20 ramp arrives at a floor 150 mm above where it should; a section marker with no section sends the builder hunting for a drawing that does not exist, and they detail the junction themselves. In every case the work is done — just not the work that was designed. The cost of a private convention is therefore paid on site, in materials and time, by someone who followed the drawing exactly *(4 marks: conventions defined by shared readability, AS 1100 named, and at least two specific, concrete on-site consequences).*

Q24. *(Model — accept any set of at least five drawings, correctly typed and scaled, with a stated content tied to the criteria.)*

1. **Existing conditions plan, 1:50.** A measured survey of the room as found: the 7200 × 5400 internal envelope, the 350 mm solid brick walls, the 820 mm doorway in the west wall, the double-hung windows in the south wall, the fireplace in the east wall, the ceiling height of 3600 and the **150 mm level change** at the doorway, with spot levels (hall ±0.000, room +0.150) and a north point. *Proves:* nothing yet — but every other drawing is set out from it, and it is the record of what the heritage overlay protects.
2. **Floor plan, 1:50.** The new layout: six 1500 × 750 tables seating twelve, dimensioned with nested strings that close; the **ramp** with an UP arrow, *1:14*, and spot levels at each end; the 1000 mm circulation clearances a mobility scooter needs, dimensioned; the free-standing joinery; the section marker **B–B** and the elevation markers keyed to the internal elevations; hatching with a legend; a north point. *Proves:* criteria 1, 2 and 4.
3. **Internal elevations of all four walls, 1:50** (numbered and keyed to the plan by elevation markers). The north wall with the new free-standing storage and the **track lighting fixed to the existing timber picture rail**; the east wall with the fireplace surround shown untouched; the south wall windows; the west wall doorway and the head of the ramp. *Proves:* criteria 3 and 4 — these are the drawings on which "not fixed to the ceiling or the brickwork" is visible.
4. **Section B–B, 1:50.** Cut through the doorway, the ramp and the tall joinery: the 150 mm floor change, the ramp grade against it, the 3600 mm ceiling, and the clear gap between the top of the joinery and the pressed-metal ceiling. *Proves:* criteria 2 and 4.
5. **Joinery and lighting detail, 1:10.** The free-standing storage unit's ballasted foot and its packing to the wall showing that it is **not fixed** into the brickwork, and the bracket by which the lighting track is clamped to the existing picture rail. Materials hatched, legend supplied. *Proves:* criteria 3 and 4 at the resolution a builder needs.
6. **Ramp detail, 1:10.** The ramp's junction with the hall floor and the room floor, its landing, nosing and edge protection, and its levels. *Proves:* criterion 2 is buildable, not just drawn.

Every drawing carries its **own title and scale**; the sheet carries a title block with a **drawing number** and the standard notes, including the datum note that fixes ±0.000 at the hall floor *(8 marks: at least five drawings, correctly typed, with defensible scales, stated contents, and the set tied to the four numbered criteria — including at least one drawing whose whole purpose is the heritage constraint).*

Q25. *(Model resolution statement.)*

Criterion 1 — seat 12 people at work surfaces two people can clear and stack within one hour. *Proved by:* the **floor plan at 1:50**. *Evidence:* six 1500 × 750 tables laid out with two seats each, dimensioned, plus a note that all tables are folding-leg and stack five high against the north wall, and a dimensioned 1400 × 1500 stacking zone shown on the plan. *Verdict:* **met** — the seating count is dimensioned and the stacking space is drawn, though the one-hour claim is a performance test rather than a drawn one and should be recorded from a trial, not asserted on the drawing.

Criterion 2 — step-free from the hall doorway to every work surface, nothing steeper than 1:14. *Proved by:* the **floor plan at 1:50** and **section B–B at 1:50**. *Evidence:* a ramp inside the room along the west wall rising 150 mm over a 2100 mm run — 2100 ÷ 150 = **1:14** — with a 1200 mm landing at the head, spot levels RL ±0.000 (hall) and RL +0.150 (room), an UP arrow and the grade noted; the section shows the ramp against the floor change; the plan dimensions a 1000 mm clear route to every table. *Verdict:* **met**, but exactly at the 1:14 limit, so the ramp should be set out at 1:15 if the 2250 mm of floor is available.

Criterion 3 — task lighting on every work surface, not fixed to the pressed-metal ceiling. *Proved by:* the **internal elevations at 1:50**. *Evidence:* a lighting track clamped to the existing timber picture rail at 2400 above the floor on the north and south walls, with the tables positioned beneath it on the plan; the ceiling is shown untouched on section B–B. *Verdict:* **partly met** — the elevations show *where* the track runs, but at 1:50 the clamp that avoids fixing into either the ceiling or the brickwork is a single line.

Criterion 4 — no new fixing into the brickwork, the fireplace surround or the ceiling. *Proved by:* the **internal elevations** and **section B–B**. *Evidence:* the storage joinery is drawn free-standing with a 20 mm gap to the brick wall and a ballasted base; the fireplace is drawn as existing with a "NO WORKS" note; the section shows a 400 mm clear gap between the joinery top and the ceiling. *Verdict:* **met in principle, not yet proved** at this scale.

What the 1:50 drawings alone cannot prove. Criteria 3 and 4 both turn on the same junction — how something is held in place without being fixed to the fabric — and at 1:50 that junction is a single line on both the elevations and the section. Both verdicts above stop short for the same reason. The drawing that closes them is item 5 of the schedule, the **joinery and lighting detail at 1:10**, showing the ballasted foot and wall packer that hold the storage upright without a fixing, and the clamp bracket by which the lighting track grips the existing picture rail. ∴ the design is resolved, and the set resolves it in documentation only once that detail is drawn — which is exactly why a schedule for a heritage room has to carry a 1:10 detail and not stop at 1:50 *(8 marks: four criteria each with a named drawing, quoted evidence and a verdict; plus the criteria the 1:50 drawings cannot prove correctly identified and the detail named).*

Q26. The CROTALARIA sheet is **neither documentation nor evidence of a resolved solution**, although the underlying design idea is sound and the intention behind the sheet is right.

Its genuine strengths should be said first. The student has understood that documentation comes as a **set** rather than a single drawing: a plan, an elevation and a detail is exactly the right combination for a small structure, and the choice to detail the seat is a good one, because the seat is what criterion 1 is about. The layout of the sheet itself — drawings ranged across the top, title block bottom right — follows the standard arrangement. And the design decision the drawings record, a long narrow shelter set parallel to the kerb with the seat running its length, is a defensible response to a brief about queueing for four buses.

Everything else falls short, and it falls short in the specific sense that matters: **the conventions that would let someone else use the drawings are largely absent.** There is no north point, so the orientation on which criterion 2 depends cannot be established. Two drawings sit at two different scales with a single scale noted, and the scale bar is drawn at roughly twice the plan's scale, so all three of the sheet's statements about size disagree with each other. The dimension chain does not close — 2400 + 3600 + 1800 = 7800 against an overall of 7500 — and the width is dimensioned twice with two different figures, which together mean no figure on the sheet can be trusted. The level "+300" has no datum, on a forecourt that falls 450 mm end to end. Materials are shown in colour with no legend. The ramp carries no UP arrow, no grade and no levels, so the drawing is silent on criterion 3, which is entirely a statement about grade. The section marker A–A promises a drawing that does not exist. And the title block gives no drawing number, no date and no author, so the sheet cannot even be referred to precisely.

As **evidence of resolution** the sheet is weaker still, because resolution is demonstrated by criteria being provable and not one of the four is. Criterion 1 is not only undocumented but probably unmet — a 6000 mm single-sided seat at an ordinary 450 mm per person holds about 13 students, not the 24 required, and nothing on the sheet says whether the

700 mm depth is meant to be used from both sides; criterion 2 has no elevation of the western face and no orientation; criterion 3 has no levels, grade or landings; criterion 4 has no dimension on the 1800 mm clear path. The **annotation** compounds this: “the colours make it feel welcoming”, “I’m happy with the layout” and a friend’s approval are preferences. They name no feature in design terminology, cite no criterion, quote no evidence and propose no next action, so the sheet records a feeling about a design rather than a judgement of one.

∴ what the student holds is a **development drawing set out neatly**, not a documentation set. To meet the outcome they would need to: add a north point and a datum note; note a scale under every drawing and redraw the scale bar to match; remeasure and close the dimension strings, dimensioning each feature once; write the level as an RL to the stated datum; hatch the materials and supply a legend; document the ramp with its UP arrow, grade, levels and landings; draw the promised section A–A and add the west elevation criterion 2 needs; complete the title block with a drawing number, a date and an author; and replace the annotation with evaluative annotations tied to the four numbered criteria *(6 marks: strengths acknowledged with evidence, the missing conventions identified specifically, the failure of resolution shown criterion by criterion, the annotation judged, and an overall verdict with a stated remedy).*