Draw an Upside-Down Room in Perspective

Original tasks 1, 2 / complete keys

Task 1

Construct the same 12 cm by 8 cm room frame with horizon y=4, VP (6,4), near opening corners (0,0), (12,0), (12,8), and (0,8), and far-wall corners (3,2), (9,2), (9,6), and (3,6). Do not rotate yet. Describe where the floor and ceiling edges meet.

Answer: Each near opening corner connects to its matching far-wall corner on a line through VP (6,4). The floor trapezoid lies below the horizon; the ceiling trapezoid lies above it. The horizontal edges remain parallel to the horizon.

Reason: The listed far-wall points are halfway toward VP from the near corners. This gives a checkable single-point construction before page rotation.

Check: Use a straightedge to check each near-corner/far-corner/VP line. Confirm floor below horizon and ceiling above in the upright drawing.

Task 2

Draw a 3 cm by 2 cm shelf attached to the ceiling plane of a one-point room. Turn the page 180 degrees around its center. State which plane the shelf touches afterward and what happens to its labels.

Answer: The shelf appears attached to the floor after rotation. Any labels rotate with the drawing and appear upside down.

Reason: A 180-degree turn swaps the visual positions of ceiling and floor while rotating every mark on the page.

Check: Mark the shelf's original ceiling contact, turn the page, and confirm it touches the floor. Check that its label orientation also turned.

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Original tasks 3, 4 / complete keys

Task 3

On a 12 cm by 8 cm page, a point inside the pre-rotation floor is at (3,1), measured from the lower-left corner. Turn the page 180 degrees around its center. Find the point's new displayed coordinates and state what happens to a floor-attached table.

Answer: The rotated coordinate is (12−3, 8−1) = (9,7). The floor-attached table appears attached to the ceiling.

Reason: A half-turn about the page center maps (x,y) to (W−x,H−y). The point is inside the lower floor plane before the turn and maps to the upper part of the rotated page.

Check: Substitute W=12, H=8, x=3, and y=1. Confirm (9,7) and verify the attachment swaps.

Task 4

On a 20 cm by 14 cm page, draw a horizon at y=7 and put VP at (4,7). Turn the page 180 degrees around its center. Give the new VP coordinates and describe the floor-line direction after rotation.

Answer: The new VP is (20−4, 14−7) = (16,7), still on the horizon. The floor plane appears above the horizon, and its receding lines converge downward toward VP.

Reason: A half-turn mirrors both coordinates around the page center. Because y=7 is the vertical center of a 14 cm page, VP remains on the horizon at the mirrored x coordinate.

Check: Compute x'=20−4=16 and y'=14−7=7. Confirm VP lies on y=7 and that floor lines point down toward it in the inverted view.

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Source rubric / reflection

- [ ] Horizon line is horizontal and VP is clearly marked on it.
- [ ] All receding lines converge at VP within a checkable tolerance.
- [ ] Floor and ceiling planes are correctly constructed and swapped after rotation.
- [ ] Furniture is attached to the correct plane after rotation.
- [ ] The page is turned 180 degrees about its center and the coordinate check for VP is correct.
- [ ] Optional labels rotate with the drawing and do not obscure perspective edges.
- [ ] Measurements are labeled as hypothetical examples and checked with a ruler.

Reflection: What did you check, what did you change, and what will you try next?