Balance Scale Black Line Drawing: Clean Outline Technique

Original tasks 1, 2, 3 / complete keys

Task 1

A scale has a beam 18 units wide. The hanging points are 7 units left and 7 units right of the midpoint. How many units of beam overhang remain on each side?

Answer: 2 units on each side.

Reason: The distance between hanging points is 7 + 7 = 14 units. The beam is 18 units wide, so total overhang is 18 - 14 = 4 units. Split equally, each side has 4 / 2 = 2 units.

Check: Add the two overhangs to the hanging distance: 2 + 14 + 2 = 18 units, matching the beam width.

Task 2

You plan a stand 9 units tall and a beam 12 units wide. The pivot circle is 2 units across and centered at the top of the stand. Describe where the beam's top edge should sit relative to the pivot, and state one continuity check.

Answer: The beam's top edge should pass through or touch the pivot's center line so the pivot is centered on the beam. Continuity check: the pivot outline must close and meet the beam without a gap.

Reason: Centering the pivot on the beam keeps the scale symmetric. The pivot is a closed outline, so it must touch the beam at a clear junction rather than float above it.

Check: Measure from the beam midpoint to each end: both should be 12 / 2 = 6 units. Confirm the pivot circle is 2 units across and centered on that midpoint.

Task 3

A student draws a balanced scale with left pan 4 units wide and right pan 5 units wide. The hanging points are equal distances from the midpoint. Identify the error and give a fix using the outline convention.

Answer: The pans are unequal on a balanced scale. Redraw the right pan to 4 units wide, or redraw the left pan to 5 units wide, keeping both closed outlines and equal hanging distances.

Reason: Equal hanging distances imply balance, so pan widths should match. The fix must preserve one continuous outline per pan and avoid double lines.

Check: Compare pan widths directly: 4 units versus 5 units is a 1-unit difference. After redrawing, both should measure the same width.

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Original tasks 4 / complete keys

Task 4

Your beam is 16 units wide and each side overhang is 3 units. What is the distance between the two hanging points? If each pan is 4 units wide, state whether the pans fit inside the overhang and explain.

Answer: The distance between hanging points is 10 units. The pans do not fit inside the overhang because each pan is 4 units wide and each overhang is only 3 units.

Reason: Total overhang is 3 + 3 = 6 units, so hanging distance is 16 - 6 = 10 units. A 4-unit pan is wider than a 3-unit overhang, so it extends beyond the beam end if centered at the hanging point.

Check: Add the parts: 3 + 10 + 3 = 16 units. Compare pan width 4 with overhang 3; 4 is greater than 3, confirming the pan extends past the beam end.

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Source rubric / reflection

- [ ] The stand, beam, and two pans are all present and readable as a balance scale.
- [ ] The beam midpoint sits on the same vertical axis as the stand center.
- [ ] Left and right hanging points are equal distances from the midpoint on a balanced scale.
- [ ] Each visible edge is a single continuous black outline with no double lines.
- [ ] All junctions meet cleanly; no gaps or stray tails remain.
- [ ] Pans are closed outlines and equal in width on a balanced scale.
- [ ] Valid stylistic alternatives, such as a square pivot or different pan curve, are accepted if structure and continuity hold.

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