Layered Scale Pattern Drawing: Step Practice with Spacing and Row Alignment

Original tasks 1, 2 / complete keys

Task 1

In a 4 cm by 2 cm frame, draw one row of scales with W = 1 cm and H = 0.5 cm. How many scales fit edge to edge, and what is the row-alignment check for a second row offset by W/2?

Answer: Four scales fit edge to edge because 4 cm divided by 1 cm equals 4. A second row offset by W/2 = 0.5 cm would start 0.5 cm from the left edge and hold three full scales plus a partial scale, or three scales if you stop before the edge. Check: the first scale of row two sits halfway between the first and second scales of row one.

Reason: Width divided by scale width gives the count. Offset is half the scale width, so the second row shifts by 0.5 cm. The check compares the starting position of row two to row one.

Check: Measure the frame width, divide by W, and count scales. Measure the offset between row starts; it should be 0.5 cm.

Task 2

A drawing has three rows with W = 2 cm and H = 1 cm. Row one starts at 0 cm, row two at 1 cm, and row three at 0 cm. Is the offset pattern consistent? Explain and suggest a fix if needed.

Answer: No. Row two is offset by 1 cm (W/2), but row three returns to 0 cm, so it aligns with row one instead of continuing the offset pattern. A consistent pattern would place row three at 1 cm again, or alternate 0 cm and 1 cm deliberately. Fix: shift row three by 1 cm and check that each row's start differs from the previous row by W/2.

Reason: Offset consistency means each row's start differs from the previous row by the same amount. Here row three breaks the pattern by returning to the row-one position.

Check: List the start positions: 0, 1, 0. Compare consecutive differences: 1 and -1. A consistent offset would show the same difference, such as 1 and 1, or a stated alternation.

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Original tasks 3, 4 / complete keys

Task 3

You want five scales per row in a frame 10 cm wide. What scale width W should you choose if scales touch edge to edge? If you leave a 0.5 cm gap between scales, how many scales fit? Use simple arithmetic.

Answer: For five scales edge to edge, W = 10 cm divided by 5 = 2 cm. With a 0.5 cm gap, each scale plus gap uses 2.5 cm, so 10 cm divided by 2.5 cm equals 4 scales. Four scales fit with gaps; five would require 12.5 cm, which exceeds the frame.

Reason: Edge-to-edge count is frame width divided by W. With gaps, add the gap to W before dividing. The arithmetic is checkable and uses consistent units.

Check: Multiply your chosen W by the number of scales and add gaps; the total should not exceed 10 cm. For W = 2 cm and four gaps of 0.5 cm, total is 4 times 2 cm plus 3 gaps times 0.5 cm equals 9.5 cm, which fits.

Task 4

Describe how to use a tracing box to practice one scale shape, then explain how to transfer that shape into a two-row layered pattern with W = 3 cm and H = 1.5 cm. Include a row-alignment check.

Answer: Draw a tracing box 3 cm wide and 1.5 cm tall. Trace the same scale shape inside it several times to build consistency. For the pattern, mark baselines 1.5 cm apart and place scale marks every 3 cm. Draw row one, then offset row two by 1.5 cm (W/2). Row-alignment check: the first scale of row two should sit halfway between the first and second scales of row one; measure the offset and confirm it is 1.5 cm.

Reason: The tracing box fixes the scale dimensions. Transfer uses the same W and H, and the offset is half the width. The check verifies the offset numerically.

Check: Measure the tracing box and the drawn scales; both should be 3 cm wide and 1.5 cm tall. Measure the row offset; it should be 1.5 cm.

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Source rubric / reflection

- [ ] Convention is stated: scale width W, height H, and overlap amount are defined.
- [ ] Rows are offset by W/2, or a deliberate alternative is explained.
- [ ] Scale shape is consistent within each row; valid alternatives are accepted if intentional.
- [ ] Layering is clear: later rows overlap earlier rows consistently.
- [ ] Spacing guide or measurement method is used and described.
- [ ] Row-alignment check is performed and results are noted.
- [ ] Guide lines are used appropriately and erased after checking.
- [ ] Independent frame practice shows planned rows and a completed pattern.

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