How to Draw Gemstone Scales: Overlapping Facet Rows

Original tasks 1, 2 / complete keys

Task 1

On a 40 mm wide strip, draw two rows of gemstone scales with w = 10 mm and h = 8 mm (hypothetical). Row 0 starts at the left edge. State the midpoint positions for both rows and check the offset.

Answer: Row 0 midpoints at 5, 15, 25, and 35 mm. Row 1 offset by w/2 = 5 mm, so midpoints at 0, 10, 20, 30, and 40 mm (the last may be clipped). Offset is 5 mm, which is w/2.

Reason: Row 0 top edges span 0–10, 10–20, 20–30, 30–40 mm; midpoints are at 5, 15, 25, 35 mm. Row 1 shifts by half width, so midpoints shift by 5 mm. The 40 mm midpoint is at the border and may be clipped.

Check: Measure the distance between a row 0 midpoint and the nearest row 1 midpoint; it should be 5 mm. Confirm each row 0 lower point lands at the shared endpoint between two row 1 top edges.

Task 2

A plate is 50 mm wide with w = 10 mm and h = 6 mm (hypothetical). Row 0 has 5 scales. How many scales can row 1 have if it is offset by w/2 and clipped at both borders? Explain.

Answer: Row 1 has 4 full scales (midpoints at 10, 20, 30, 40 mm) plus 2 partial scales clipped at the borders (midpoints at 0 and 50 mm, each showing only half its width inside the plate), for 6 scale positions total; if only full scales are counted, there are 4.

Reason: Row 0 midpoints at 5, 15, 25, 35, 45 mm. Row 1 midpoints at 0, 10, 20, 30, 40, 50 mm. A scale centered at 0 mm spans -5 to 5 mm, so only the 0–5 mm half lies inside the plate; a scale centered at 50 mm spans 45 to 55 mm, so only the 45–50 mm half lies inside. Counting full scales gives 4; counting partials gives 6.

Check: Count a scale as full only if its entire top edge lies within 0–50 mm; midpoints at 0 and 50 mm are partial scales showing half their width inside the plate. Thus row 1 has 4 full scales and 2 partial scales (6 positions total). Confirm the offset is 5 mm and that each row 0 lower point lands at the shared endpoint between two adjacent row-1 top-edge intervals.

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Original tasks 3, 4 / complete keys

Task 3

You draw three rows with w = 12 mm and h = 9 mm (hypothetical). Row 0 starts at 0 mm. List the guide line depths and the midpoint positions for row 2. Check that row 2 aligns with row 0.

Answer: Guide 0 at 0 mm, guide 1 at 9 mm, guide 2 at 18 mm. Row 0 midpoints at 6, 18, 30 mm (for three scales). Row 2 aligns with row 0, so midpoints at 6, 18, 30 mm. Offset between rows is 6 mm, which is w/2.

Reason: Guides are spaced by h = 9 mm. Row 1 is offset by 6 mm; row 2 returns to row 0 alignment because two offsets of 6 mm equal 12 mm, which is w. Thus row 2 midpoints match row 0.

Check: Measure guide spacing: 9 mm between guides. Confirm row 2 midpoints are directly below row 0 midpoints. Check that row 1 midpoints are 6 mm offset.

Task 4

A scale has a top edge from 5 mm to 25 mm on guide 0 and a lower point 15 mm below guide 0. Neighboring row-0 scales repeat every 20 mm. Row 1 is shifted by w/2=10 mm and drawn 15 mm below guide 0. Give the top-edge midpoint and row-1 midpoints, then check the lower point.

Answer: The top-edge midpoint is (5+25)/2=15 mm. Row-0 midpoints continue at 15, 35, and 55 mm. Shifting row 1 by 10 mm gives midpoints 5, 25, and 45 mm; their top-edge intervals include −5–15 mm and 15–35 mm. The lower point at x=15 mm lands exactly at the shared endpoint of those two intervals.

Reason: A 10 mm shift is half the 20 mm scale width. Since the intervals touch, their shared endpoint is at x=15 mm; the lower point is not in the interior of either interval.

Check: Measure the top-edge midpoint and shift. Confirm row-1 intervals meet at x=15 mm and that the lower point aligns with that junction.

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Source rubric / reflection

- [ ] Each scale has a three-sided triangular outline with a horizontal top edge and one lower point.
- [ ] Midline crease runs from top edge midpoint to lower point.
- [ ] Rows are offset by half the scale width (w/2), producing nesting.
- [ ] Scale width and depth are consistent within each row, or variations are intentional and noted.
- [ ] Overlap is readable: hidden outlines are light, visible edges are darker.
- [ ] Valid alternatives (curved side edges, double crease, border clipping) are accepted if the convention remains clear.

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