Draw Overlapping Mermaid Tail Scale Rows on a Curved Form

Original tasks 1, 2, 3 / complete keys

Task 1

On a tail outline 10 cm long at the centerline, you draw three rows. Hypothetical scale height is 1.2 cm and overlap is 0.4 cm. How far does the third row line start below the first row line?

Answer: 1.6 cm below the first row line.

Reason: Each row advances by 1.2 cm minus 0.4 cm equals 0.8 cm. Three rows advance two times: 2 times 0.8 cm equals 1.6 cm.

Check: Measure the distance between the first and third row lines along the centerline with a ruler; it should read about 1.6 cm.

Task 2

A row near the narrow end has an arc length of 6 cm. Hypothetical scale width is 1.5 cm. How many scales fit in that row if you keep scale size consistent?

Answer: Four scales fit.

Reason: 6 cm divided by 1.5 cm per scale equals 4 scales. Keeping scale size consistent means reducing the count rather than shrinking scales.

Check: Count the scales in the row and confirm each is about 1.5 cm wide; the total should be about 6 cm.

Task 3

You draw two adjacent rows. The upper scale height is 1 cm. The lower row covers 0.5 cm of the upper scale. Is the overlap within the one-third convention? Explain.

Answer: No. The overlap is 0.5 cm out of 1 cm, which is one-half, not one-third.

Reason: One-third of 1 cm is about 0.33 cm. A 0.5 cm overlap is too large and should be reduced by shifting the lower row down or adjusting scale height.

Check: Trace a vertical line through the two rows and measure the covered portion; it should be about 0.33 cm, not 0.5 cm.

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Original tasks 4 / complete keys

Task 4

A tail outline curves so that the arc length between two row lines is 8 cm at the centerline and 6 cm at the left edge. You plan scales 1 cm wide. How many scales should the row have at the centerline and at the left edge, and what should you do if the counts differ?

Answer: Eight scales at the centerline and six at the left edge. If counts differ, reduce the number of scales near the edge rather than shrinking every scale unevenly.

Reason: 8 cm divided by 1 cm equals 8; 6 cm divided by 1 cm equals 6. Curvature changes arc length, so scale count can vary across a row while scale size stays consistent.

Check: Measure the arc lengths and count scales at both locations; confirm scale width remains about 1 cm and the row does not cross the tail outline.

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Source rubric / reflection

- [ ] Scale convention is stated and followed: rounded arch, width about twice height, soft bottom point.
- [ ] Row lines follow the tail curve rather than straight horizontals.
- [ ] Overlap is about one-third of scale height and is consistent across rows.
- [ ] Scale size is consistent within a row; narrow rows reduce scale count rather than shrinking all scales.
- [ ] Shading reinforces overlap with a slightly darker covered lower edge.
- [ ] Valid stylistic alternatives are accepted if overlap, row spacing, and curvature are consistent.

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