Scale-Mail Armor on a Character: Layering and Joint Construction

Original tasks 1, 2 / complete keys

Task 1

On a 12 cm tall figure, draw a shoulder row of five scales 1 cm wide. The next row is offset by half a scale. If the second row is bounded by the same left and right edges as the first row, how many scales are fully visible in row 2, and what is the offset in centimeters?

Answer: Four scales are fully visible, with two partial scales at the ends; the offset is 0.5 cm.

Reason: A 5 cm row holds five 1 cm scales. Offsetting the second row by half a scale (0.5 cm) while keeping the same row boundaries clips the first and last scales by 0.5 cm each, so four scales remain fully visible and the two partials together add up to 1 cm.

Check: Measure the row width and the offset with a ruler; confirm the offset is half the scale width and count four full scales plus two partials.

Task 2

A knee joint is marked 6 cm from the hip on a hypothetical 15 cm leg. Rows are 1.5 cm apart. How many full rows fit above the knee, and where do you place the gap?

Answer: Three full rows fit above the gap; place the gap 0.5 cm above the knee line, at 5.5 cm from the hip.

Reason: 6 divided by 1.5 equals 4, so row ends fall at 1.5, 3, 4.5, and 6 cm. A gap placed 0.5 cm above the knee at 5.5 cm means only the rows ending at 1.5, 3, and 4.5 cm are full; the row that would end at 6 cm is replaced by the gap and a smaller scale.

Check: Count the rows ending before 5.5 cm and measure 5.5 cm from the hip with a ruler; confirm three full rows, then the gap, then a smaller scale at the knee.

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Original tasks 3, 4 / complete keys

Task 3

You draw 10 scales across a 10 cm row. The next row is offset by half a scale and keeps the same left and right boundaries. If each scale is 1 cm wide, what total width does the second row cover, and how many scales are fully visible?

Answer: The second row covers 10 cm; nine scales are fully visible and two are partial at the ends.

Reason: Ten 1 cm scales span 10 cm. A half-scale offset clips the first and last scales by 0.5 cm each, so nine scales are fully visible (9 cm) and the two partials sum to 1 cm, totaling 10 cm of visible scale width within the 10 cm row.

Check: Measure the row width and count full scales; confirm nine full scales plus two half-scales equal 10 cm, matching the 10 cm row width.

Task 4

A wrist joint is 3 cm from the elbow. Rows are 1 cm apart. Draw rows up to the wrist, then add one diagonal scale across a 0.5 cm gap. How many full rows fit before the gap, and what is the gap width in centimeters?

Answer: Two full rows fit before the gap; the gap is 0.5 cm wide.

Reason: Rows at 1 cm and 2 cm fit. The remaining 1 cm to the wrist is allocated as a 0.5 cm gap plus a 0.5 cm diagonal bridge scale, so the gap is 0.5 cm wide and the third row is not drawn full-length.

Check: Measure from the elbow to each row and to the gap; confirm two full rows, a 0.5 cm gap, and a 0.5 cm diagonal scale sum to 3 cm.

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Source rubric / reflection

- [ ] Overlap direction is stated and followed by every scale.
- [ ] Row spacing is even within 0.2 cm on a hypothetical example, measured on actual paper.
- [ ] Each joint zone has a gap or smaller scale, with no full-length scale crossing the bend.
- [ ] Any labels are readable and do not obscure the drawing.
- [ ] The drawing shows at least three distinct joint zones treated consistently.

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