Mapping Snake-Scale Bands onto a Human Arm or Leg

Original tasks 1, 2, 3, 4 / complete keys

Task 1

An arm outline has a forearm width of 50 mm at the top and 40 mm at the wrist. You plan five bands. Using the hypothetical average width, find the approximate interval and check it.

Answer: Average width = (50 + 40) / 2 = 45 mm. Interval = 45 / 5 = 9 mm. Check: 9 × 5 = 45 mm.

Reason: Average the two measured widths, divide by band count, then multiply back to verify.

Check: Multiply interval by band count and compare to average width.

Task 2

A thigh tapers from 80 mm at the top to 50 mm at the knee. The taper ratio is 80 / 50 = 1.6. If the hypothetical top interval is 8 mm, what is the approximate joint interval, and how do you check it?

Answer: Joint interval = 8 / 1.6 = 5 mm. Check: 5 × 1.6 = 8 mm.

Reason: Divide the top interval by the taper ratio to reduce spacing toward the joint.

Check: Multiply joint interval by taper ratio and compare to top interval.

Task 3

A calf outline has three cross-sections: 70 mm, 60 mm, and 50 mm. You plan four bands between the first and second sections. What is the approximate interval, and how do you check it?

Answer: Average of first two sections = (70 + 60) / 2 = 65 mm. Interval = 65 / 4 = 16.25 mm. Check: 16.25 × 4 = 65 mm.

Reason: Use the two adjacent cross-sections that bound the banded region.

Check: Multiply interval by band count and compare to the average of the bounding widths.

Task 4

An upper arm has a top width of 75 mm and an elbow width of 45 mm. You want the hypothetical joint interval to be 6 mm. What top interval follows from the taper ratio, and how do you check it?

Answer: Taper ratio = 75 / 45 = 1.666... Top interval = 6 × 1.666... ≈ 10 mm. Check: 10 / 1.666... ≈ 6 mm.

Reason: Multiply the joint interval by the taper ratio to scale back to the top.

Check: Divide top interval by taper ratio and compare to joint interval.

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Source rubric / reflection

- [ ] Limb outline includes top, joint, and bottom cross-sections.
- [ ] Outer and inner contour guides plus a midline are drawn.
- [ ] X-height convention is stated on the sheet.
- [ ] Bands cross the midline consistently and stay within contour guides.
- [ ] Spacing changes smoothly and follows a checkable taper ratio.
- [ ] Joint bands compress inside the bend and spread outside.
- [ ] Valid alternatives such as rounded, angular, or diamond bands are accepted.
- [ ] Numerical examples are labeled hypothetical and arithmetic is correct.

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