Draw a Pointing Finger: Knuckle and Proportion Construction

Original tasks 1, 2 / complete keys

Task 1

A palm block is 8 cm wide. Using the hypothetical ratio of 1.5 to 1, calculate the index finger length. Then divide the finger into three segments where the distal segment is 0.5 cm shorter than the middle segment and the proximal segment is 0.3 cm longer than the middle segment. Give all three lengths.

Answer: Finger length = 8 × 1.5 = 12 cm. Let middle = m. Then distal = m − 0.5 and proximal = m + 0.3. Sum: (m + 0.3) + m + (m − 0.5) = 3m − 0.2 = 12, so 3m = 12.2 and m = 12.2 ÷ 3 ≈ 4.0667 cm. Exact solution: middle ≈ 4.0667 cm, proximal ≈ 4.3667 cm, distal ≈ 3.5667 cm; sum = 12.0 cm, proximal is 0.3 cm longer than middle, and distal is 0.5 cm shorter than middle. If you round to one decimal place, use proximal 4.4 cm, middle 4.1 cm, distal 3.6 cm; sum = 12.1 cm, and note that rounding changes the differences slightly.

Reason: Multiply palm width by the ratio to get total finger length. Set up a sum with the given differences, solve for the middle segment, then round to practical lengths and verify the total.

Check: Add the three segment lengths; the sum should equal 12.0 cm. Confirm the distal segment is 0.5 cm shorter than the middle and the proximal is 0.3 cm longer.

Task 2

A drawing has a palm width of 5 cm and an index finger length of 6.5 cm. Is the finger-to-palm ratio close to the hypothetical 1.5 to 1? If not, by how many centimeters should the finger length change to reach 1.5 to 1?

Answer: Current ratio = 6.5 ÷ 5 = 1.3 to 1, which is below 1.5. Target length = 5 × 1.5 = 7.5 cm. Increase the finger by 7.5 − 6.5 = 1.0 cm.

Reason: Divide finger length by palm width to find the current ratio. Multiply palm width by the target ratio to find the target length. Subtract to find the change.

Check: Recompute 7.5 ÷ 5 = 1.5. Confirm the change is 1.0 cm and that the palm width was not altered.

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Original tasks 3, 4 / complete keys

Task 3

You draw the same pointing gesture at two scales. At the small scale, palm width is 3 cm and finger length is 4.2 cm. At the large scale, palm width is 9 cm and finger length is 13.5 cm. Are the ratios consistent? Show the arithmetic.

Answer: Small ratio = 4.2 ÷ 3 = 1.4 to 1. Large ratio = 13.5 ÷ 9 = 1.5 to 1. The ratios differ by 0.1, so they are not perfectly consistent. To match the large scale, the small finger should be 3 × 1.5 = 4.5 cm, an increase of 0.3 cm.

Reason: Compute each ratio separately. Compare the two results. If they differ, calculate the target length at the smaller scale using the larger scale's ratio.

Check: Verify 4.5 ÷ 3 = 1.5 and 13.5 ÷ 9 = 1.5. Confirm the difference at the small scale is 4.5 − 4.2 = 0.3 cm.

Task 4

A palm block is 7 cm wide and 4.6 cm tall. Using the hypothetical palm height of about 0.66 times the width, is the height acceptable? If not, what should the height be, and what is the difference?

Answer: Target height = 7 × 0.66 = 4.62 cm. The drawn height of 4.6 cm is within 0.02 cm of the target, so it is acceptable. The difference is 4.62 − 4.6 = 0.02 cm.

Reason: Multiply palm width by 0.66 to find the target height. Compare the drawn height to the target. A small difference is acceptable because the ratio is a hypothetical guide, not a strict standard.

Check: Recompute 7 × 0.66 = 4.62. Subtract 4.6 to get 0.02 cm. Confirm the units are centimeters throughout.

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Source rubric / reflection

- [ ] Palm block is a rounded rectangle with width W and height about 0.66W.
- [ ] Four knuckle points are marked along the top edge and connected by a shallow arc.
- [ ] Index finger length is about 1.5 times palm width, or a documented alternative ratio.
- [ ] Index finger has three segments with joint lines; distal segment is slightly shorter.
- [ ] Fingertip is rounded, not pointed.
- [ ] Three folded finger blocks sit below the index finger and do not extend past the palm's bottom edge.
- [ ] Thumb is on the opposite side, angled about 45 degrees, length about one x-height.
- [ ] Gesture is repeated at three scales with consistent proportions.
- [ ] Measurements are recorded and any numerical values are labeled as hypothetical examples.

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