Animal Skeleton Contour Drawing: Bone Outlines and Joint Connections

Original task 1 / complete key

Task 1

Draw a contour skull and spine from a reference where the skull is 2 units and the spine is 6 units. Use a joint gap of 1 millimeter. After drawing, measure your spine and skull. If your spine is 7 units, what is the ratio and what adjustment is needed?

Answer: Reference ratio: 6/2 = 3. Your ratio: 7/2 = 3.5. Difference: 0.5 (dimensionless), more than 0.2, so shorten the spine by about 1 unit to reach 6 units.

Reason: Divide spine length by skull length to compare. A difference over 0.2 in the dimensionless ratio signals adjustment.

Check: Measure skull and spine with a ruler, compute both ratios, and confirm three joint gaps are 1 millimeter within 0.5 millimeters.

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Original task 2 / complete key

Task 2

Draw a ribcage with five rib pairs. Each rib connects to the spine with a small loop and a 1 millimeter gap. After drawing, count the loops and measure two gaps. What should you check?

Answer: Five rib pairs contain ten ribs. Under the stated one-loop-per-rib convention, count ten loops in total, five on each side of the spine. Confirm two selected joint gaps measure 1 millimeter within the chosen 0.5 millimeter tolerance. Add a missing loop or redraw an excessive gap.

Reason: A pair contains two ribs; five pairs therefore require 5 x 2 = 10 individual rib-to-spine loops. The visible gap is a selected drawing convention, not an anatomical or manufacturing standard.

Check: Count loops and measure gaps with a ruler; compare to the planned checklist.

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Original task 3 / complete key

Task 3

Draw a limb with a femur 4 units and a tibia 3 units, using a 1 millimeter joint gap at the knee. After drawing, measure your femur and tibia. If your tibia is 4 units, what is the ratio and what adjustment is needed?

Answer: Reference ratio: 3/4 = 0.75. Your ratio: 4/4 = 1.0. Difference: 0.25 (dimensionless), more than 0.2, so shorten the tibia by about 1 unit to reach 3 units.

Reason: Compare tibia to femur by division. Adjust when the difference exceeds 0.2 in the dimensionless ratio.

Check: Measure both bones, compute ratios, and confirm the knee gap is 1 millimeter within 0.5 millimeters.

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Original task 4 / complete key

Task 4

Make a second contour pass without looking at the paper for a skeleton with a skull 3 units and a femur 4 units. Afterward, compare joint gaps at the shoulder and hip. If one gap is 2 millimeters and the other is 1 millimeter, what is the difference and what should you do?

Answer: Difference: 1 millimeter. Redraw the larger gap to match 1 millimeter within 0.5 millimeters, then compare bone ratios to the reference.

Reason: Consistent joint gaps make the contour readable. A 1 millimeter difference exceeds the 0.5 millimeter tolerance.

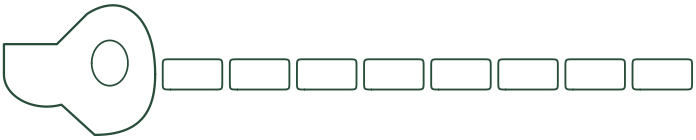
Check: Measure both gaps with a ruler and confirm they are equal within 0.5 millimeters; check femur-to-skull ratio is 4/3 within 0.2 in the dimensionless ratio.

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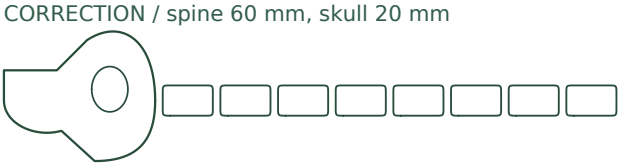
Task 1 / answers

Generic quadruped bone contours / selected one unit = 10 mm / strict gap studies separate from no-lift routes

GIVEN / spine 70 mm, skull 20 mm



CORRECTION / spine 60 mm, skull 20 mm



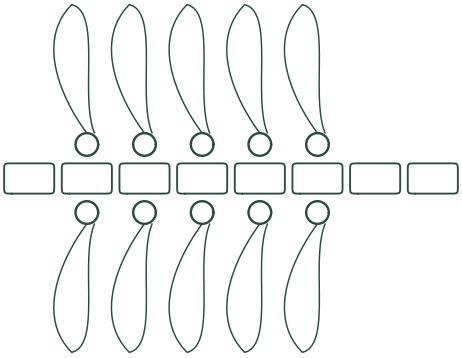
Given spine 70 mm / skull 20 mm = 3.5; target 60 / 20 = 3. The ratio difference is 0.5, dimensionless. Shorten by one chosen unit (10 mm). Each vertebral segment gap and the skull-to-spine gap is 1 mm. The given and corrected models are hypothetical examples, not measured student outcomes.

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Task 2 / answers

Generic quadruped bone contours / selected one unit = 10 mm / strict gap studies separate from no-lift routes

5 pairs x 2 = 10 loops / 1 mm joint gaps



Count five upper and five lower individual rib-to-spine loops in this selected plan-view ribcage. Each loop comes within 3 mm of the spinal axis while the vertebral envelope edge is 2 mm from it, leaving a 1 mm drawing gap. The separate outer rib arches are bone contours, not extra attachment loops. This is a generic diagram, not a species-specific rib count standard.

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Task 3 / answers

Generic quadruped bone contours / selected one unit = 10 mm / strict gap studies separate from no-lift routes

GIVEN / femur 40 mm, tibia 40 mm



CORRECTION / femur 40 mm, tibia 30 mm



Given tibia/femur = 40/40 = 1. Reference = 30/40 = 0.75. The difference is 0.25, dimensionless, above this worksheet tolerance 0.2; shorten tibia by one chosen unit (10 mm). Both diagrams keep the physical knee gap 1 mm. Bone widths and end shapes are selected schematic choices.

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Task 4 / answers

Generic quadruped bone contours / selected one unit = 10 mm / strict gap studies separate from no-lift routes

GIVEN shoulder gap: 2 mm



GIVEN hip gap: 1 mm



The original two given gaps differ by 2 - 1 = 1 mm. Redraw the larger gap to the chosen 1 mm target, with the stated 0.5 mm tolerance; do not change the skull/femur ratio 4/3. These enlarged bone-end detail models show the two gaps at print 1:1; the full skull/femur reference is separate. No actual blind drawing or observation is claimed.

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Source rubric / reflection

- [ ] Bone outlines are drawn with contour lines and no shading.
- [ ] Each major joint shows a visible gap between bone ends.
- [ ] At least three joint gaps are equal within 0.5 millimeters.
- [ ] Bone length ratios are within 0.2 in the dimensionless ratio of the reference.
- [ ] For a separate optional no-lift route study, construction travel connections are explicit and are not mislabelled as bone edges; strict joint-gap drawings may use separate strokes.
- [ ] The second pass without looking shows recognizable bone groups and joint gaps.
- [ ] Valid alternatives in line weight and joint-gap size are accepted as long as gaps remain consistent and no shading is used.

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