Draw an Actual-Size Cat Paw Print: Pad and Toe Geometry

Original tasks 1, 2 / complete keys

Task 1

Draw an actual-size print using these hypothetical values: print 50 mm wide, 55 mm tall; main pad 24 mm by 18 mm; toe pads 12 mm by 14 mm; inner toe centers 14 mm from center, outer 19 mm; toe centers 30 mm above main pad top; claw marks 4 mm long with 2 mm gap. Check left-right symmetry and record all measurements.

Answer: A valid drawing has a centered 24 mm by 18 mm main pad, four 12 mm by 14 mm toe ovals with centers at 14 mm and 19 mm left and right, all 30 mm above the main pad top, and 4 mm claw marks 2 mm beyond toe tips. Left and right centers match. Total width including outer toes is 19 + 19 + 12 = 50 mm, matching the stated 50 mm width. Record all values with units and label them as hypothetical examples.

Reason: The exercise tests applying the convention to new values and checking arithmetic. The width check confirms consistency: 19 + 19 + 12 = 50 mm matches the stated 50 mm width.

Check: Measure each toe center from the center line; left and right should match within 1 mm. Measure toe center height from main pad top; all should be 30 mm. Measure claw gap and length. Confirm total width is 19 + 19 + 12 = 50 mm.

Task 2

Redraw the worked example at half scale. List every half-scale measurement and verify each is exactly half the actual-size value.

Answer: Half-scale values: print 20 mm wide and 22.5 mm tall; inner toe centers 6 mm from center, outer toe centers 7.5 mm, toe centers 12.5 mm above the main pad top; main pad 10 mm by 7.5 mm; toe pads 5 mm by 6 mm; claw marks 1.5 mm long with a 1 mm gap. Verify each half-scale value is exactly half the actual-size value by writing each actual-size value beside its half-scale value and dividing by two, then measuring the drawing with a ruler.

Reason: Halving every linear measurement preserves geometry. The check confirms no measurement was missed.

Check: Write actual-size values beside half-scale values and divide each by two. Measure the drawing with a ruler and compare.

Draw an Actual-Size Cat Paw Print: Pad and Toe Geometry

Original tasks 3, 4 / complete keys

Task 3

A student draws a print with toe centers at 10 mm, 15 mm, 15 mm, and 10 mm from the center line, all 20 mm above the main pad top. The main pad is 18 mm wide and 14 mm tall. Identify one symmetry error and one possible correction, then state a check method.

Answer: The left inner toe is 10 mm and the right inner toe is 15 mm, so symmetry is broken. Correction: move the right inner toe to 10 mm from center, or move the left inner toe to 15 mm, keeping both equal. Check by measuring each toe center from the center line and confirming left and right pairs match within 1 mm.

Reason: Symmetry requires equal distances on both sides. The error is detectable by measurement, and the correction preserves the arc height.

Check: Measure all four toe centers from the center line. Pair inner left with inner right and outer left with outer right; each pair should match within 1 mm.

Task 4

Design a half-scale check for a print with actual-size main pad 22 mm by 16 mm, toe pads 11 mm by 13 mm, toe centers 13 mm and 19 mm from center, 27 mm above main pad top, and claw marks 3.5 mm long with 1.5 mm gap. State the half-scale values and one arithmetic check.

Answer: Half-scale values: main pad 11 mm by 8 mm; toe pads 5.5 mm by 6.5 mm; toe centers 6.5 mm and 9.5 mm from center; 13.5 mm above main pad top; claw marks 1.75 mm long with 0.75 mm gap. Arithmetic check: the computed actual total width is 19 + 19 + 11 = 49 mm; half scale is 24.5 mm, matching 9.5 + 9.5 + 5.5 = 24.5 mm.

Reason: The exercise tests halving fractional values and using a width check to confirm consistency.

Check: Divide each actual-size value by two and compare to the listed half-scale values. Measure the drawing and confirm the total width check: 24.5 mm at half scale equals half of 49 mm.

Draw an Actual-Size Cat Paw Print: Pad and Toe Geometry

Source rubric / reflection

- [ ] Center line is drawn and used for symmetry.
- [ ] Main pad is centered and its width and height are recorded.
- [ ] Four toe pads are drawn on an arc above the main pad.
- [ ] Left and right toe centers match within 1 mm.
- [ ] Claw marks are placed beyond toe tips with a recorded gap.
- [ ] Actual-size measurements are recorded with units.
- [ ] Half-scale measurements are exactly half of actual-size values.
- [ ] Hypothetical example values are labeled clearly.
- [ ] Convention is stated and followed, allowing valid alternatives.

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