Draw a Cage: Bar Spacing, Curved Top, and Depth

Original tasks 1, 2, 3 / complete keys

Task 1

A cage front has six bars and five gaps. The span is 50 mm. Calculate the spacing unit and state one check.

Answer: Spacing unit = 50 mm divided by 5 gaps = 10 mm per gap. Check that every gap measures 10 mm within your drawing tolerance.

Reason: The number of gaps is one less than the number of bars, so five gaps divide the 50 mm span equally.

Check: Measure each of the five gaps with a ruler and compare the largest difference to your stated tolerance.

Task 2

A curved top has a span of 60 mm and a rise of 15 mm. Describe how to mark the three points for the arc and one symmetry check.

Answer: Mark the left top, the midpoint plus 15 mm rise, and the right top. Draw a smooth arc through all three. Check that the left-to-rise arc length equals the rise-to-right arc length within tolerance.

Reason: Three points define a smooth arc; symmetry ensures the curve is not lopsided.

Check: Use a string or flexible ruler to compare the two arc lengths, or compare horizontal distances from the midpoint.

Task 3

A cage drawing uses a depth offset of 20 mm at 30 degrees. Four depth lines are drawn. State the expected measurement for each and one parallel check.

Answer: Each depth line should measure 20 mm. Check that each depth line is parallel to the first by comparing angles or using a set square.

Reason: Equal offset and angle keep the back face parallel to the front face.

Check: Measure each depth line and compare angles against a reference line.

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Original tasks 4 / complete keys

Task 4

A student draws seven bars with gaps of 9, 10, 11, 10, 9, and 11 mm. The stated tolerance is 1 mm. Does the drawing pass the gap check? Explain.

Answer: No. The gaps range from 9 mm to 11 mm, a difference of 2 mm, which exceeds the 1 mm tolerance. Adjust the ticks so all gaps are within 1 mm of the chosen unit.

Reason: The check compares the largest and smallest gap against the stated tolerance, not just the average.

Check: Subtract the smallest gap from the largest gap and compare to the tolerance.

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Source rubric / reflection

- [ ] Bar gaps are equal within the stated drawing tolerance.
- [ ] The curved top is smooth and passes through the left top, rise point, and right top.
- [ ] The curve is symmetric about the midpoint within the stated tolerance.
- [ ] Depth lines are equal in length and parallel.
- [ ] Front bars and curve are visually dominant over depth lines.
- [ ] Labels state the spacing unit, rise, and depth offset as hypothetical values.

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