Draw a Simple Dog Bone on Graph Paper: Grid Steps and Proportion Checks

Original tasks 1, 2, 3 / complete keys

Task 1

On a hypothetical grid, plan a horizontal dog bone 8 cells long and 4 cells high at each lobe, with a 2-cell shaft. State the lobe width you choose and the shaft offset.

Answer: Example: lobe width 3 cells; shaft offset 1 cell above and 1 below the shaft lines. Total length 8 cells, lobe height 4 cells, shaft height 2 cells.

Reason: The lobe height is split 2 above and 2 below the guide line. A 2-cell shaft centered leaves 1 cell of lobe above and 1 below the shaft lines.

Check: Count total length, lobe height, lobe width, and shaft offset; confirm left and right counts match.

Task 2

A student draws a bone with left lobe height 5 cells and right lobe height 6 cells on the same guide line. What is the count error and how should it be fixed?

Answer: The right lobe is 1 cell taller. Fix by reducing the right lobe by 1 cell or increasing the left by 1 cell, then recheck both sides above and below the guide line.

Reason: Symmetry requires equal counted height. The error is a countable difference, not a style difference.

Check: Count cells above and below the guide line on each lobe and compare totals.

Task 3

Plan a vertical dog bone 9 cells tall and 4 cells wide at each end, with a 2-cell shaft. Describe where the guide line goes and how you check symmetry.

Answer: Use a vertical guide line. Each end is 4 cells wide, split 2 left and 2 right of the guide line. The 2-cell shaft is centered with 1 cell offset on each side. Check by counting left and right widths at both ends.

Reason: Rotating the plan keeps the same counted proportions; the guide line follows the long axis.

Check: Count total height, end width, shaft width, and left-right offsets at both ends.

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Original tasks 4 / complete keys

Task 4

Your paper's small squares measure 5 mm per side as a hypothetical example. A planned bone is 12 cells long. What is the drawn length in millimeters, and what should you record?

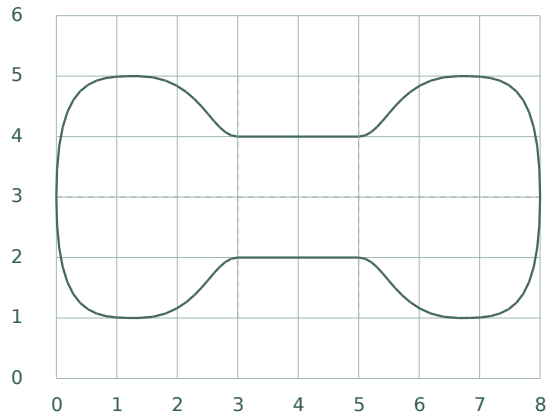
Answer: 12 cells times 5 mm per cell equals 60 mm. Record the cell count and the measured cell size separately.

Reason: Multiplying a count by a measured unit gives a checkable length without mixing units in the drawing plan.

Check: Re-measure one square, multiply by the cell count, and compare with the drawn length.

Source-counted dog-bone plan

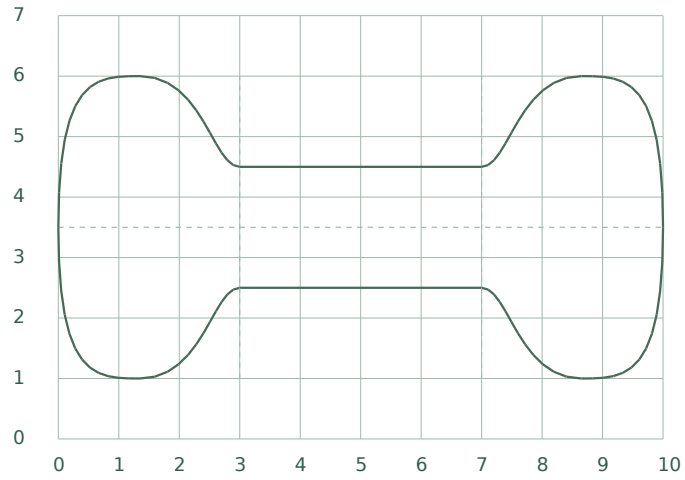
Long axis 8 cells / lobe heights 4, 4 / shaft 2 / chosen lobe widths 3



Counted rounded lobes and connecting shaft form one outer contour. The long guide follows the horizontal or vertical axis.

Source-counted dog-bone plan

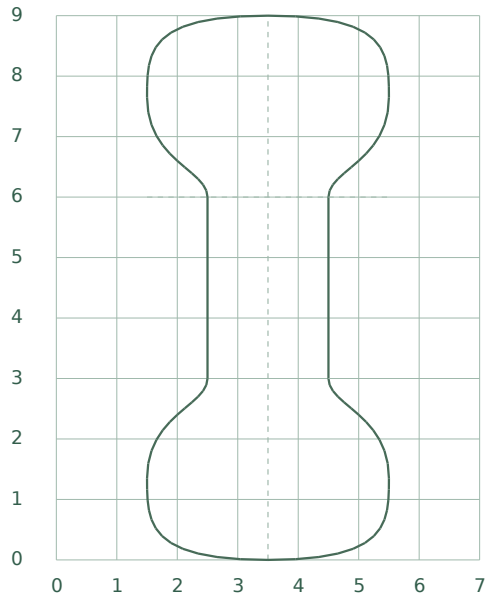
Long axis 10 cells / lobe heights 5, 5 / shaft 2 / chosen lobe widths 3



The prompt gives only lobe heights 5 and 6. Other dimensions here are a clearly chosen layout. The key shows one valid fix: reduce the right lobe to 5, leaving equal offsets around the guide.

Source-counted dog-bone plan

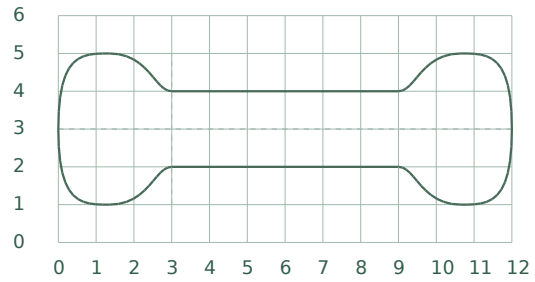
Long axis 9 cells / lobe heights 4, 4 / shaft 2 / chosen lobe widths 3



Counted rounded lobes and connecting shaft form one outer contour. The long guide follows the horizontal or vertical axis.

Source-counted dog-bone plan

Long axis 12 cells / lobe heights 4, 4 / shaft 2 / chosen lobe widths 3



Task 4 actual printed cells are 5 mm: 12 cells x 5 mm = 60 mm long. The 4-cell lobe height, 3-cell lobe width and 2-cell shaft are chosen illustration values, not extra givens in the prompt.

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Source rubric / reflection

- [ ] The drawing uses counted grid cells and states the cell counts.
- [ ] Two end lobes have equal counted height and width.
- [ ] The shaft is centered on the guide line with the planned offset.
- [ ] The outline is clear and construction marks are removed or light.
- [ ] A proportion check lists total length, lobe height, lobe width, and shaft height.
- [ ] Valid style differences in roundness and line quality are accepted if counts match.

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