Grid Leaf Drawing: Outline and Vein Construction

Original tasks 1 / complete keys

Task 1

On a 6 by 10 cell frame with a vertical midrib, treat the frame as 6 cells wide and 10 cell intervals tall, giving 11 horizontal grid lines. Plot a narrow leaf using half-widths in cells from base to tip: 0.5, 1, 1.5, 2, 2, 1.5, 1, 0.5, 0.5, 0. Place three side veins at intervals 3, 5, and 7, alternating left and right. End rows 3 and 5 exactly one cell short; at interval 7, where the half-width is 1 cell, use the stated short-row exception and either end at the outline or at the permitted 0.5-cell reference. Describe the steps and give the vein counts.

Answer: Mark the frame and midrib. Plot the outline at each interval, using cell centers for half-cell values, and join points with short segments. At interval 3 the half-width is 1.5, so a left vein ends 0.5 cell out; at interval 5 the half-width is 2, so a right vein ends 1 cell out. At interval 7 the half-width is 1, so the prompt’s explicit narrow-row exception allows an endpoint on the outline or 0.5 cell out. Do not call that exception one cell short.

Reason: Subtracting one cell works as the stated vein rule at the wider rows. At interval 7, a half-width of one cell makes the exact one-cell-short endpoint coincide with the midrib; the prompt therefore gives a separate, explicit narrow-row exception.

Check: Check that intervals 3 and 5 use half-width minus one. At interval 7, verify the endpoint follows the prompt’s explicit exception. Confirm every outline point and endpoint sits on a grid intersection or allowed cell center.

Grid Leaf Drawing: Outline and Vein Construction

Original tasks 2 / complete keys

Task 2

Use a 10 by 10 cell frame with a vertical midrib, treating the frame as 10 cells wide and 10 cell intervals tall, giving 11 horizontal grid lines. Plot a rounded leaf with half-widths in cells from base to tip: 1, 2, 3, 4, 5, 5, 4, 3, 2, 0. Place four side veins at intervals 3, 5, 7, and 9, alternating left and right, each ending one cell short of the outline. What are the vein cell counts, and how do you check the outline is closed?

Answer: Plot the outline points at each interval using the half-widths, joining base to tip on each side. The base point is the midrib base intersection (half-width 0). The 10 half-widths apply to intervals 1–10, and the final value is 0, so the tip is the shared point on the top frame line at interval 10. At interval 3 the half-width is 3 cells, so a left vein ends 2 cells out; at interval 5 the half-width is 5 cells, so a right vein ends 4 cells out; at interval 7 the half-width is 4 cells, so a left vein ends 3 cells out; at interval 9 the half-width is 2 cells, so a right vein ends 1 cell out. The outline is closed if the first segment starts at the base intersection, the plotted points run through interval 10, and the last segment ends at the tip intersection on both sides, with no gaps.

Reason: Each vein endpoint is one cell short of the outline, so the vein length is the half-width minus one. The outline closure is checked by following the plotted points from base to tip on each side and confirming the tip point is shared.

Check: Trace the outline from the base intersection through each plotted interval to the tip intersection on the left side, then from the tip back to the base on the right side. Confirm the first segment starts at the base intersection, the last segment ends at the tip intersection, and every point is on a grid reference.

Grid Leaf Drawing: Outline and Vein Construction

Original tasks 3 / complete keys

Task 3

On an 8 by 12 cell frame, treat the frame as 8 cells wide and 12 cell intervals tall. Use an angled midrib starting at the bottom-center intersection: move up one cell and right one cell for each of the first two intervals, then up one cell and left one cell for the next two intervals, then straight up one cell for each of the last eight intervals to reach the top frame line. At every interval, plot an outline point 2 cells to each side of the midrib. Place side veins at intervals 3 and 6, each ending one cell short of the outline. Describe the midrib path and vein cell counts.

Answer: The frame has x-coordinates 0 through 8, and the midrib starts at x=4. Its center positions after intervals 1–12 are 5, 6, 5, 4, 4, 4, 4, 4, 4, 4, 4, and 4. Plot each outline point 2 cells to either side; the resulting x-coordinates stay between 2 and 8 throughout. At intervals 3 and 6, the half-width is 2 cells, so a vein ending one cell short extends 1 cell from the midrib. Draw the veins on alternating sides.

Reason: Two up-right steps move the center from x=4 to x=6; two up-left steps return it to x=4; the remaining eight steps go straight up. Because every center stays between x=4 and x=6, adding and subtracting the 2-cell half-width keeps all outline points inside x=0..8. Subtract one cell from the 2-cell half-width for each vein endpoint.

Check: Count two up-right, two up-left, and eight straight-up steps. For every interval, confirm the midrib x-coordinate is 4, 5, or 6 and that the outline endpoints (x−2 and x+2) stay within 0..8. At intervals 3 and 6, confirm each vein extends one cell from the midrib.

Grid Leaf Drawing: Outline and Vein Construction

Original tasks 4 / complete keys

Task 4

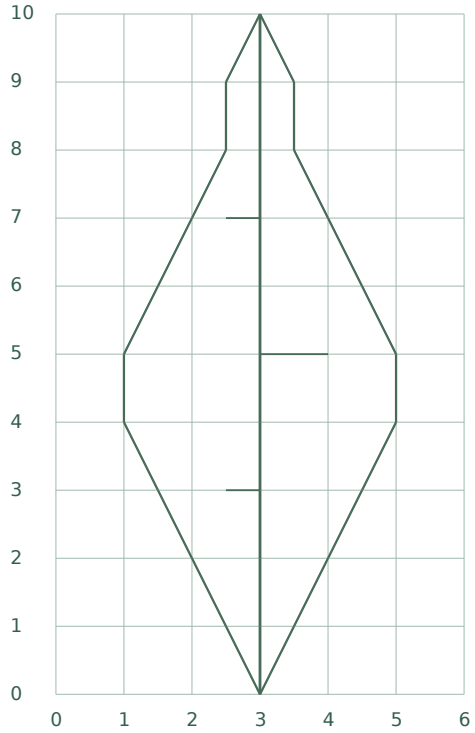
Design your own leaf on a 9 by 9 cell frame with a vertical midrib, treating the frame as 9 cells wide and 9 cell intervals tall. Choose half-widths in cells from base to tip that increase, then decrease, using at least six intervals. Place at least three side veins, alternating sides, each ending one cell short of the outline. State your half-width sequence, the vein cell counts, and one check you will use to confirm grid consistency.

Answer: One complete example uses half-widths 1, 2, 3, 4, 4, 3, 2, 1, 0 at intervals 1–9, so the final zero is the shared tip on the top frame line. Place veins at intervals 3, 5, and 7, alternating left, right, left. Their half-widths are 3, 4, and 2 cells, so endpoints one cell short lie 2, 3, and 1 cells from the midrib, respectively. The check is to count each plotted point and endpoint against the grid and confirm the left and right outline paths meet at the same tip.

Reason: The chosen sequence rises from 1 to 4 cells and then decreases to a zero-width tip. At the three selected rows the half-widths are all at least two cells, so subtracting one gives distinct vein endpoints without an exception.

Check: Compare the plotted outline with the stated nine-value sequence at intervals 1–9. Recalculate vein distances: interval 3: $3-1=2$ cells; interval 5: $4-1=3$ cells; interval 7: $2-1=1$ cell. Verify the final zero is one shared tip and every endpoint uses the stated grid convention.

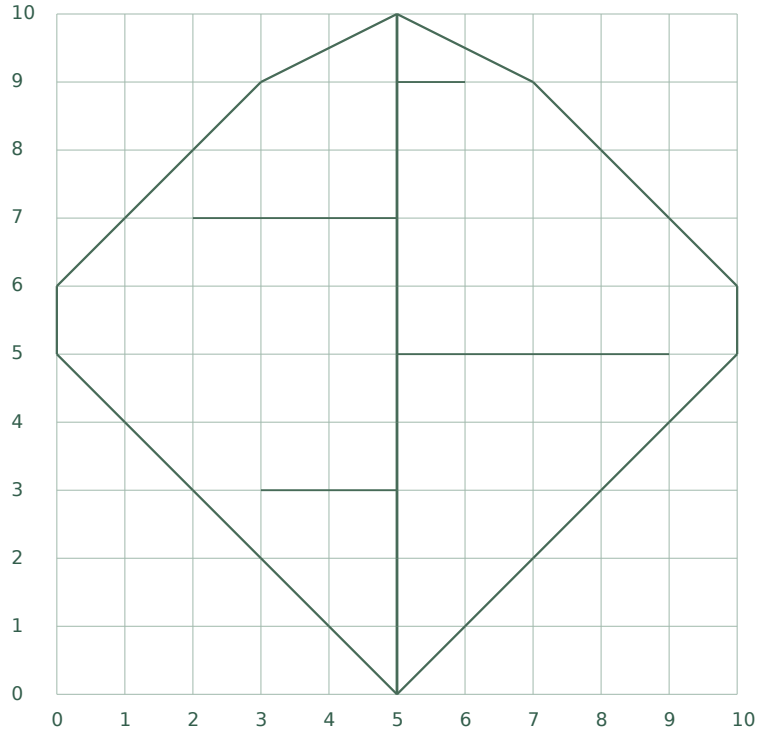
6 by 10 cells / 9 mm printed practice cells



Task 1 key chooses the permitted 0.5-cell endpoint at interval 7. This exception is not called one cell short. Other selected veins use half-width minus one.

Your width/vein record: _____

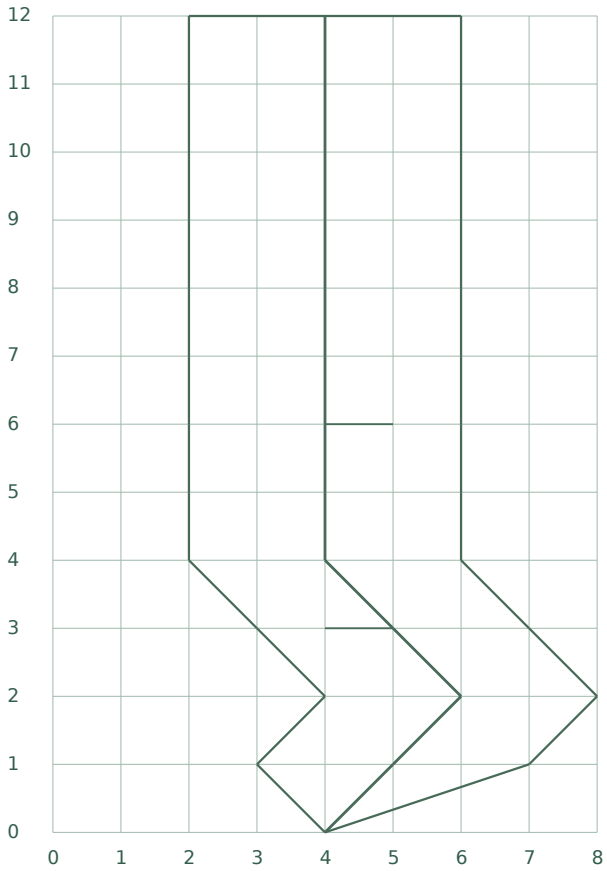
10 by 10 cells / 9 mm printed practice cells



Widths refer to intervals above the base, not an extra base row. Both outlines start at the common base; the final zero gives one common tip.

Your width/vein record: _____

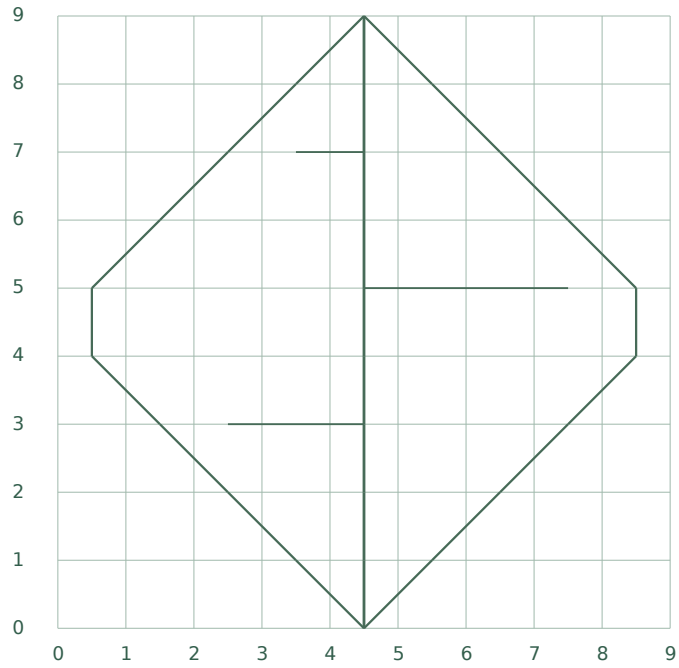
8 by 12 cells / 9 mm printed practice cells



Given constant half-width 2 at every interval: the top remains four cells wide, not a zero-width tip. The diagram joins its top endpoints to close this particular fixed-width outline.

Your width/vein record: _____

9 by 9 cells / 9 mm printed practice cells



Widths refer to intervals above the base, not an extra base row. Both outlines start at the common base; the final zero gives one common tip. The Task 4 key is one valid design, not a required unique answer.

Your width/vein record: _____

Grid Leaf Drawing: Outline and Vein Construction

Source rubric / reflection

- [ ] Frame and midrib are clearly marked and consistent with the stated grid convention.
- [ ] Every outline point sits on a grid intersection or cell center, or an alternative convention is stated and applied consistently.
- [ ] The outline closes from base to tip without unexplained gaps or jumps.
- [ ] Side veins originate on the midrib and end at a defined grid reference near the outline.
- [ ] Vein lengths are plausible for the leaf width at their height, checked by cell counts.
- [ ] The drawing includes a label of frame size and convention so another person can verify the grid logic.
- [ ] Valid alternatives are accepted: asymmetric outlines, angled midribs, and curved veins made of grid segments, provided the convention is clear.

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