Airplane Blueprint on Graph Paper: Plot Fuselage, Wing and Tail Outlines

Original tasks 1, 2 / complete keys

Task 1

Plot a wing plan outline with coordinates (2,14), (8,14), (10,12), (8,10), (2,10). Connect the points in order and close the shape. State the root chord length and the tip chord length in squares.

Answer: The root chord is from (2,14) to (2,10), length 14 minus 10 equals 4 squares. The chord at x=8 is from (8,14) to (8,10), length 14 minus 10 equals 4 squares. The outermost tip point is (10,12), so the tip chord is measured at the tip station x=10, where the leading and trailing edges meet at a single point; the tip chord there is 0 squares. The shape has a rectangular inner section of constant 4-square chord from x=2 to x=8, then a tapered outer section ending in a pointed tip.

Reason: Plot each point by counting right and up from the origin. Connect (2,14) to (8,14) for the leading edge, then to (10,12) for the tip, then to (8,10) for the trailing edge, then to (2,10), and close to (2,14). The root chord is the vertical distance at x=2 between y=14 and y=10, which is 4 squares. The chord at x=8 is the vertical distance between y=14 and y=10, also 4 squares. The tip chord is measured at the tip station x=10, where the outline narrows to the single point (10,12), so the tip chord is 0 squares.

Check: Re-count each point from the origin. Measure the root chord by counting squares from (2,14) down to (2,10); it should be 4. Measure the chord at x=8 from (8,14) down to (8,10); it should be 4. Confirm that (10,12) is the only point at x=10, so the tip chord is 0 squares. Check that (10,12) is two squares right of x=8 and two squares above y=10, which is consistent with the plotted shape.

Task 2

Plot a tail stabilizer outline with coordinates (14,14), (18,14), (19,13), (18,12), (14,12). Connect the points and close the shape. State the span and the root chord in squares.

Answer: The span is from x=14 to x=19, length 19 minus 14 equals 5 squares. The root chord is from (14,14) to (14,12), length 14 minus 12 equals 2 squares.

Reason: Plot the points in order. The left edge is vertical from (14,14) to (14,12), so the root chord is 2 squares. The rightmost point is (19,13), so the span measured horizontally is 5 squares. Connect (14,14) to (18,14), then to (19,13), then to (18,12), then to (14,12), and close to (14,14).

Check: Count squares along the left edge from (14,14) to (14,12); it should be 2. Count squares from x=14 to x=19 along the horizontal guide; it should be 5. Re-count each point from the origin to confirm no point is shifted.

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Original tasks 3, 4 / complete keys

Task 3

A fuselage outline uses points (3,7), (11,7), (13,6), (13,5), (11,5), (3,5), (2,6). Plot the outline and check the bottom straight segment length. Then state whether the tail taper is symmetric about y=6.

Answer: The bottom straight segment runs from (3,5) to (11,5), length 11 minus 3 equals 8 squares. The fuselage body's straight top and bottom are at y=7 and y=5, so the centerline is y=6. The tail taper points (13,6) and (13,5) are not symmetric about y=6: the top taper point lies on the centerline and the bottom taper point is one square below it.

Reason: Plot each point. The bottom straight segment is horizontal at y=5 from x=3 to x=11, so its length is 8 squares. The fuselage body's straight top and bottom are at y=7 and y=5, whose midpoint is y=6, so the centerline is y=6. The tail taper has a top point at (13,6) and a bottom point at (13,5). Their midpoint is (6+5)/2 equals 5.5, so the taper is symmetric about y=5.5, not about the centerline y=6. Because the top taper point lies on the centerline and the bottom taper point is one square below it, the taper is not symmetric about y=6.

Check: Count squares along the bottom segment from (3,5) to (11,5); it should be 8. Find the fuselage centerline by averaging the straight top and bottom y-coordinates: (7+5)/2 equals 6. Find the taper's symmetry line by averaging the taper points' y-coordinates: (6+5)/2 equals 5.5. Confirm that (13,6) and (13,5) are each half a square from y=5.5, so the taper is symmetric about y=5.5 and not about y=6.

Task 4

Plot a wing outline with points (4,16), (10,16), (12,14), (10,12), (4,12). A learner claims the tip chord is 2 squares. Check this claim by counting squares and state the correct tip chord length.

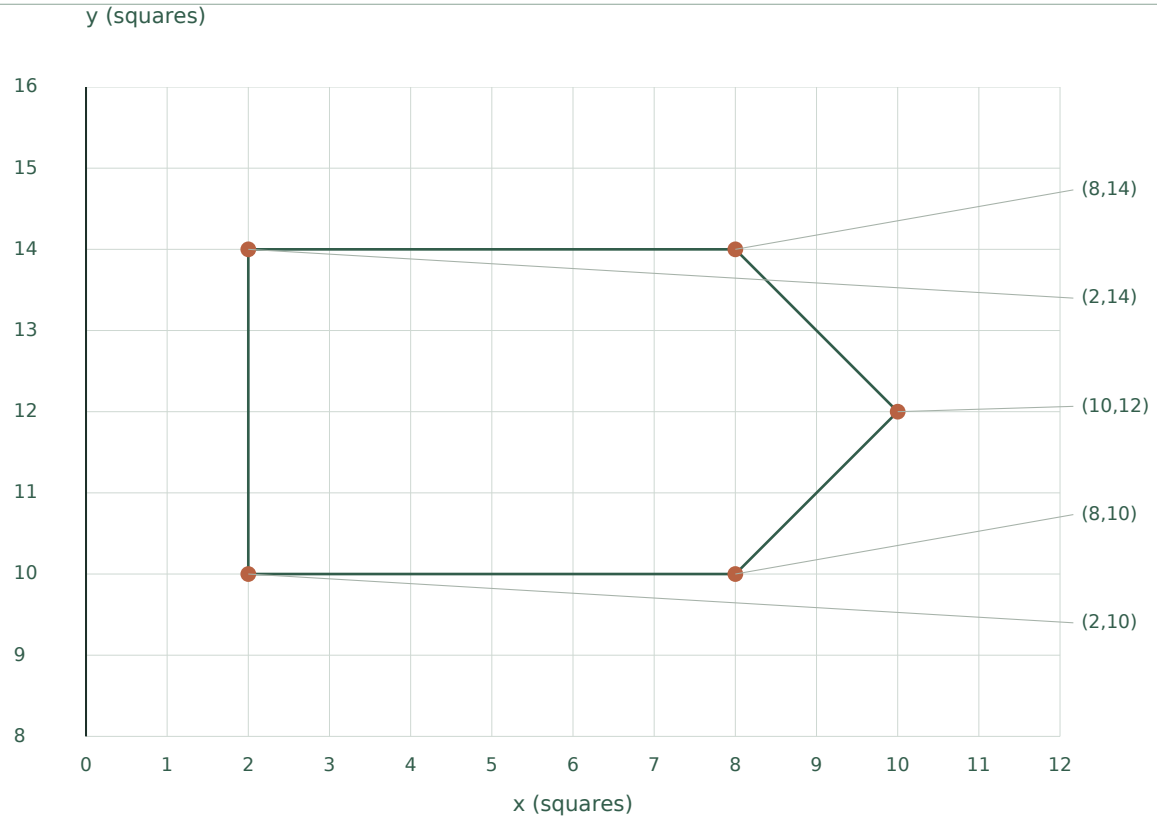
Answer: The chord at x=10 is from (10,16) to (10,12), length 16 minus 12 equals 4 squares. The outermost tip point is (12,14), where the leading and trailing edges meet, so the tip chord is 0 squares. The learner's claim of a 2-square tip chord is incorrect; the correct tip chord is 0 squares, and the 4-square chord is at station x=10, not at the tip.

Reason: Plot the points. The chord at x=10 is the vertical distance between the leading-edge point (10,16) and the trailing-edge point (10,12): 16 minus 12 equals 4 squares. The tip station is the outermost x-value, x=12, where the outline narrows to the single point (12,14). At a single point the chord is 0 squares. The claim of 2 squares confuses the chord at x=10 with the tip chord.

Check: Count squares from (10,16) down to (10,12); it should be 4. Confirm that x=12 is the largest x-value in the outline and that (12,14) is the only point at x=12, so the tip chord is 0 squares. Re-count all points from the origin and compare with the claimed 2 squares to identify the error.

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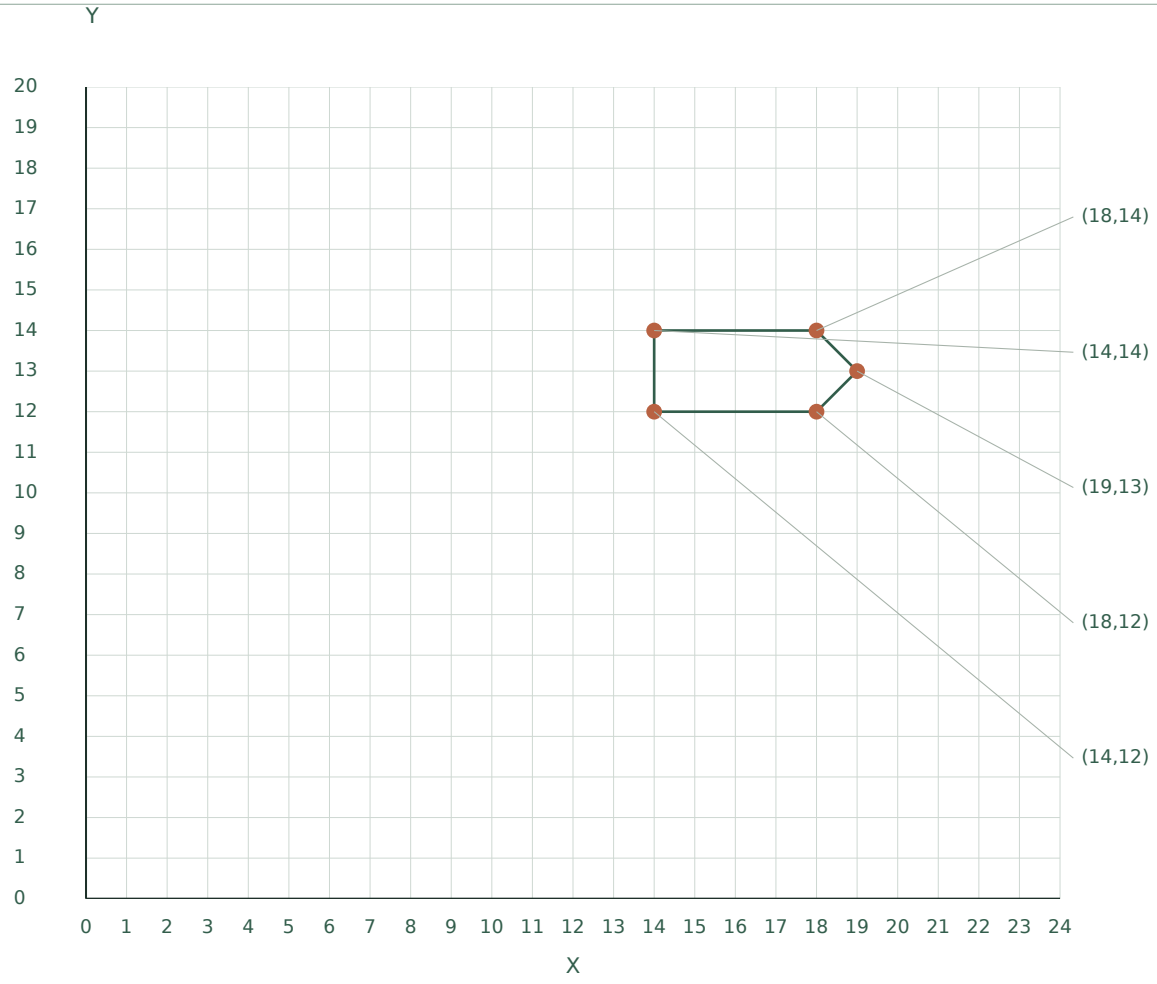
Completed wing plan outline with root and tip chord



Root chord at x=2 is 4 squares; tip chord at x=10 is 0 squares. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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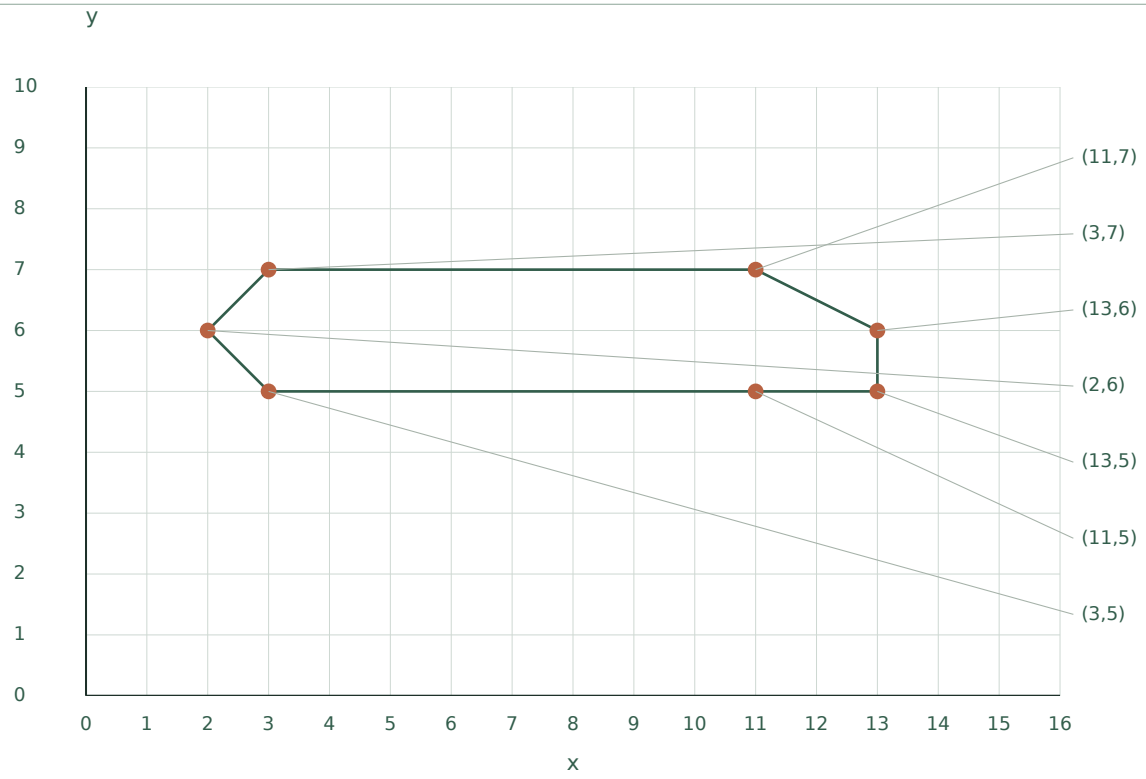
Completed tail stabilizer outline on the grid



Span 5 squares; root chord 2 squares. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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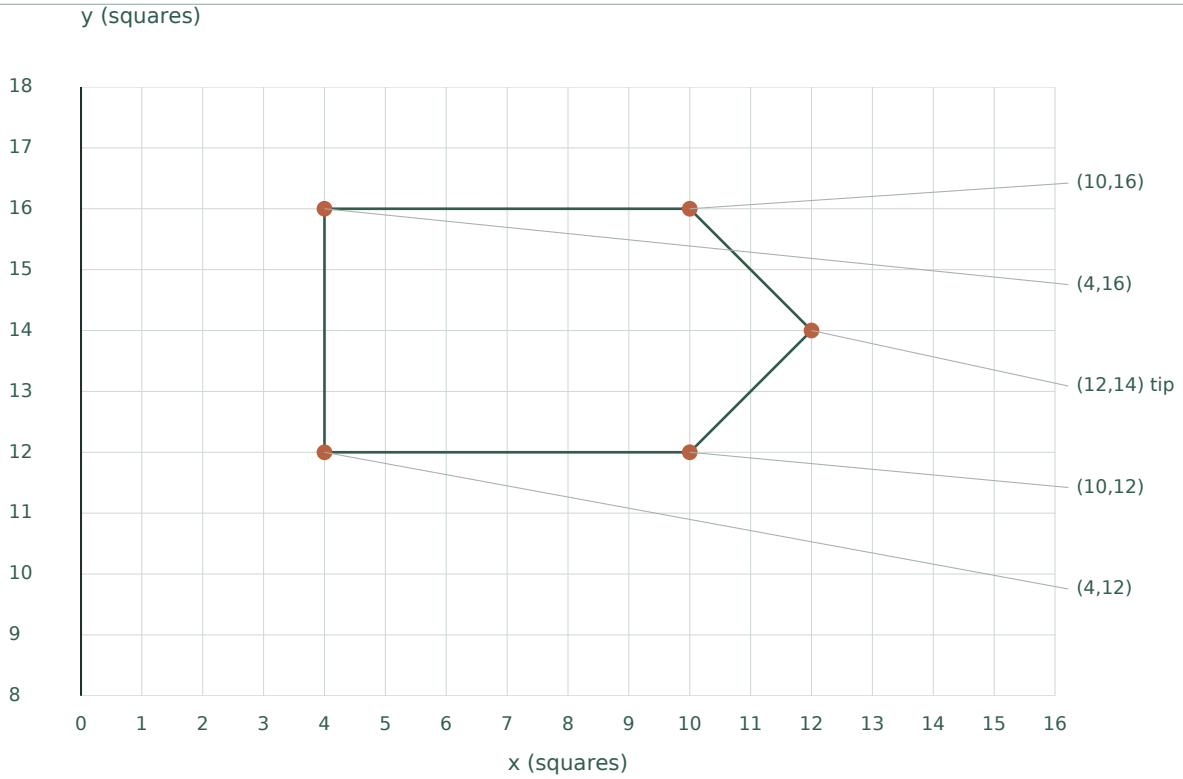
Reference plot of the fuselage outline



Reference outline; bottom straight segment from (3,5) to (11,5) is 8 squares; tail taper is not symmetric about y=6. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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Reference plot of the wing outline with tip chord check



Chord at x=10 is 4 squares; tip chord at x=12 is 0 squares. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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Source rubric / reflection

- [ ] All plotted points match their stated coordinates when re-counted from the origin.
- [ ] Fuselage, wing, and tail outlines are separate and clearly labeled.
- [ ] Straight segments connect plotted points and their lengths match coordinate differences.
- [ ] The nose curve passes through its plotted points; alternative curve styles are acceptable.
- [ ] Title block includes name, date, unit note, and legend.
- [ ] Blueprint is readable: outlines are darkened, construction marks are light or erased.

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