Graphing Ellipses Worksheet: Center, Axes, and Foci

Original tasks 1, 2 / complete keys

Task 1

Graph (x + 1)^2 / 16 + (y - 3)^2 / 4 = 1. State center, major and minor axis lengths, vertices, co-vertices, and foci.

Answer: Center (-1, 3). Major axis horizontal, length 8 (a = 4). Minor axis vertical, length 4 (b = 2). Vertices: (3, 3) and (-5, 3). Co-vertices: (-1, 5) and (-1, 1). c^2 = 16 - 4 = 12, c = sqrt(12) ≈ 3.46. Foci: (-1 ± sqrt(12), 3).

Reason: Larger denominator 16 is under x, so major axis is horizontal. a = 4, b = 2. Add and subtract a from h for vertices; add and subtract b from k for co-vertices. Compute c from a^2 - b^2.

Check: Verify each vertex satisfies the equation: at (3,3), (4)^2/16 + 0 = 1. At (-1,5), 0 + (2)^2/4 = 1. Confirm foci distance squared is 12 and foci lie on y = 3.

Task 2

Graph (x - 4)^2 / 9 + (y + 2)^2 / 36 = 1. State center, major and minor axis lengths, vertices, co-vertices, and foci.

Answer: Center (4, -2). Major axis vertical, length 12 (a = 6). Minor axis horizontal, length 6 (b = 3). Vertices: (4, 4) and (4, -8). Co-vertices: (7, -2) and (1, -2). c^2 = 36 - 9 = 27, c = sqrt(27) ≈ 5.20. Foci: (4, -2 ± sqrt(27)).

Reason: Larger denominator 36 is under y, so major axis is vertical. a = 6, b = 3. Vertices move vertically from center; co-vertices move horizontally. c^2 = 36 - 9 = 27.

Check: Check vertex (4,4): 0 + (6)^2/36 = 1. Check co-vertex (7,-2): (3)^2/9 + 0 = 1. Confirm foci are on x = 4 and distance squared is 27.

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Original tasks 3, 4 / complete keys

Task 3

Graph x^2 / 49 + (y - 1)^2 / 25 = 1. State center, major and minor axis lengths, vertices, co-vertices, and foci.

Answer: Center (0, 1). Major axis horizontal, length 14 (a = 7). Minor axis vertical, length 10 (b = 5). Vertices: (7, 1) and (-7, 1). Co-vertices: (0, 6) and (0, -4). c^2 = 49 - 25 = 24, c = sqrt(24) ≈ 4.90. Foci: (±sqrt(24), 1).

Reason: Larger denominator 49 is under x, so major axis is horizontal. a = 7, b = 5. Center is (0,1). Vertices add and subtract 7 from x; co-vertices add and subtract 5 from y. c^2 = 49 - 25 = 24.

Check: Check vertex (7,1): 49/49 + 0 = 1. Check co-vertex (0,6): 0 + 25/25 = 1. Confirm foci on y = 1 at distance sqrt(24) from center.

Task 4

Graph (x + 3)^2 / 4 + (y - 5)^2 / 64 = 1. State center, major and minor axis lengths, vertices, co-vertices, and foci.

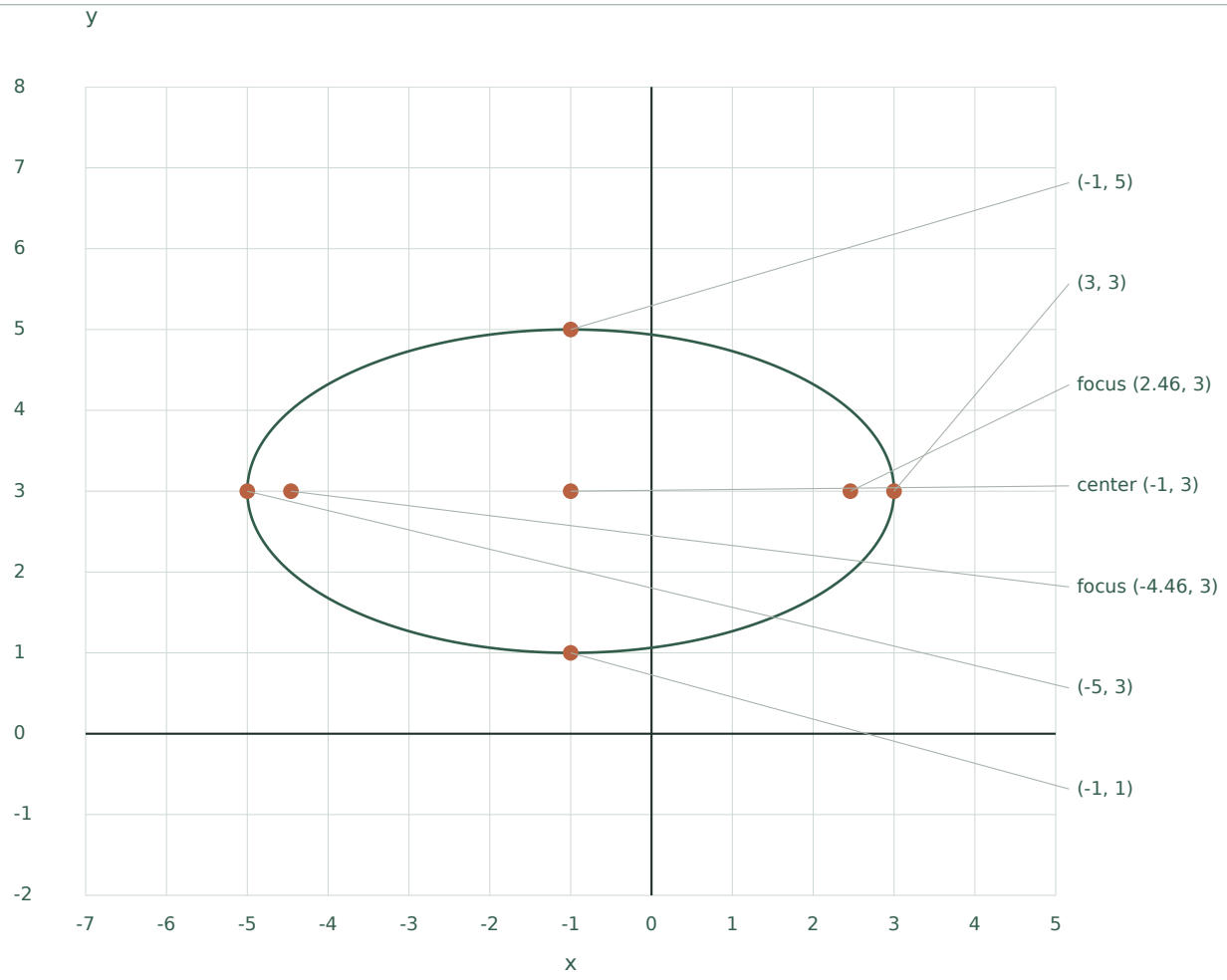
Answer: Center (-3, 5). Major axis vertical, length 16 (a = 8). Minor axis horizontal, length 4 (b = 2). Vertices: (-3, 13) and (-3, -3). Co-vertices: (-1, 5) and (-5, 5). c^2 = 64 - 4 = 60, c = sqrt(60) ≈ 7.75. Foci: (-3, 5 ± sqrt(60)).

Reason: Larger denominator 64 is under y, so major axis is vertical. a = 8, b = 2. Center (-3,5). Vertices move vertically by 8; co-vertices move horizontally by 2. c^2 = 64 - 4 = 60.

Check: Check vertex (-3,13): 0 + (8)^2/64 = 1. Check co-vertex (-1,5): (2)^2/4 + 0 = 1. Confirm foci on x = -3 at distance sqrt(60) from center.

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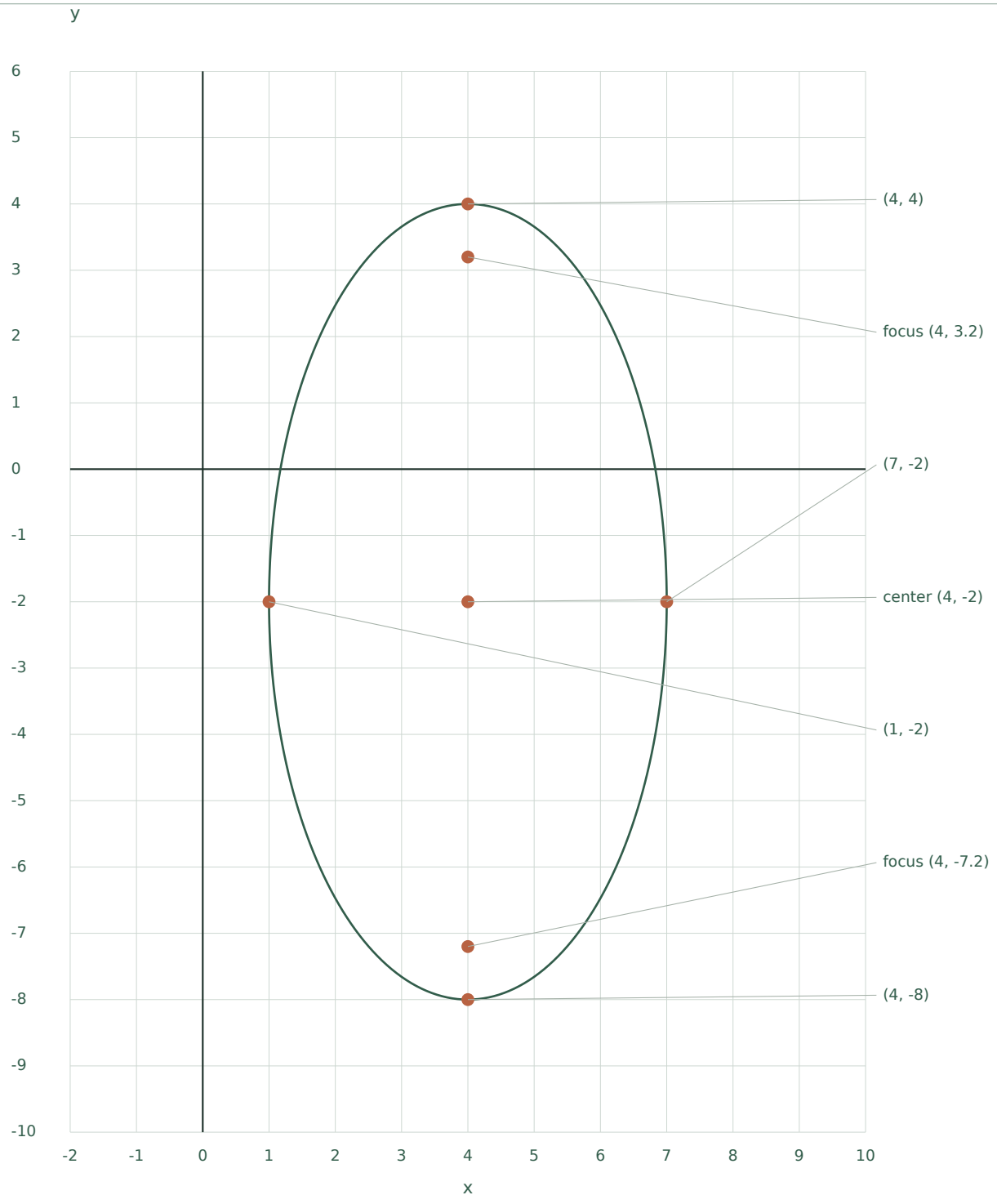
Answer graph: (x + 1)^2/16 + (y - 3)^2/4 = 1



Answer key graph with center, vertices, co-vertices, and foci labeled. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Graphing Ellipses Worksheet: Center, Axes, and Foci

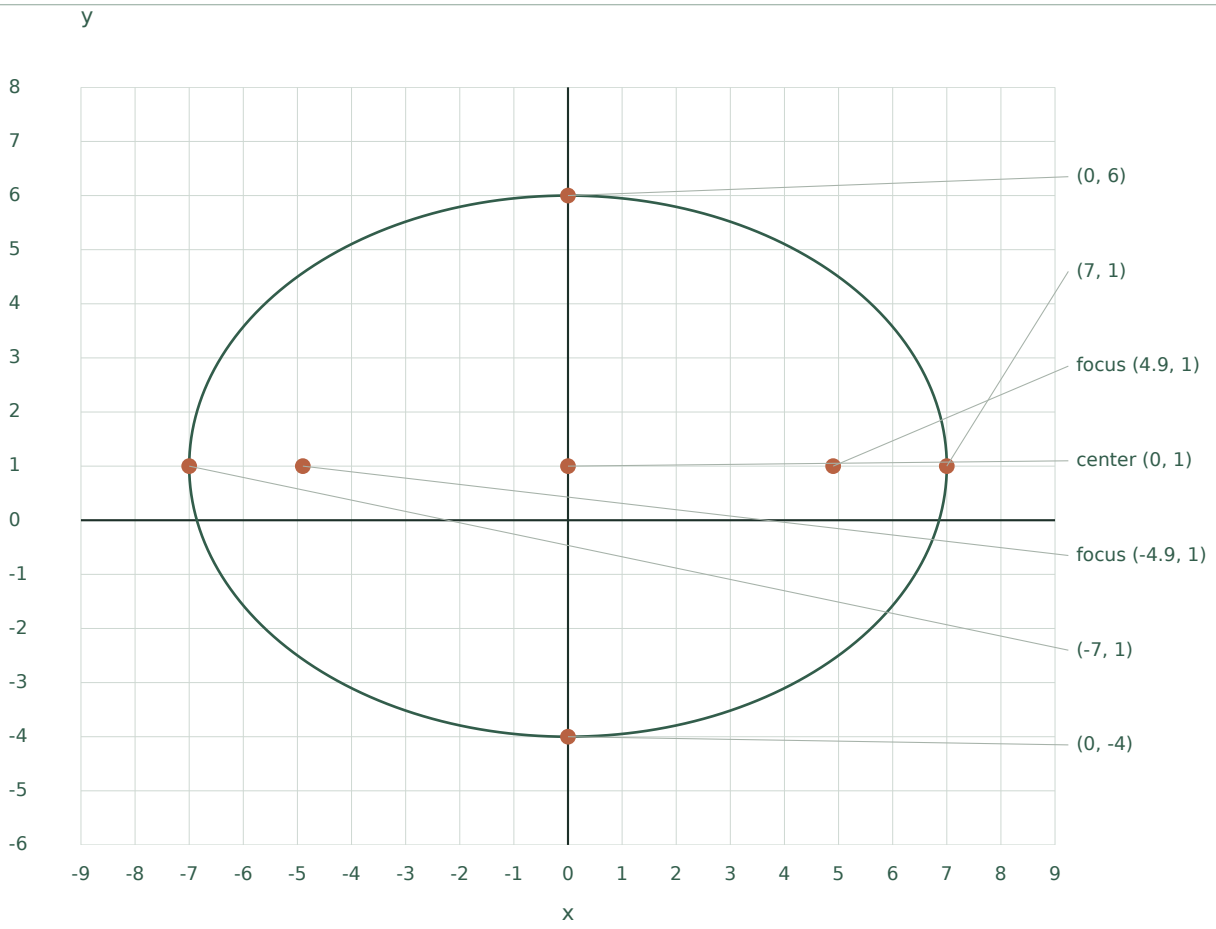
Answer graph: (x - 4)^2/9 + (y + 2)^2/36 = 1



Answer key graph with center, vertices, co-vertices, and foci labeled. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

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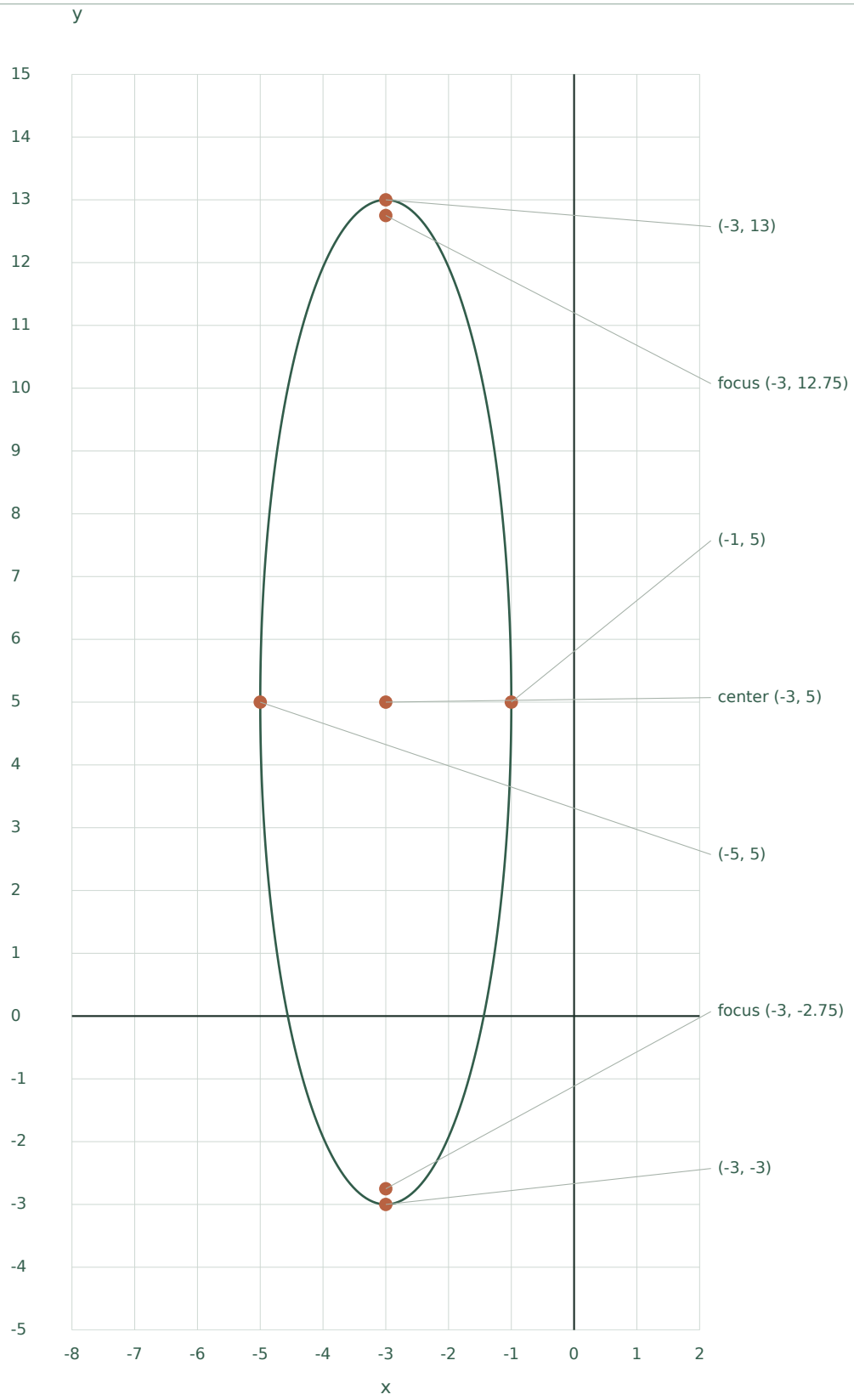
Answer graph: x^2/49 + (y - 1)^2/25 = 1



Answer key graph with center, vertices, co-vertices, and foci labeled. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Graphing Ellipses Worksheet: Center, Axes, and Foci

Answer graph: (x + 3)^2/4 + (y - 5)^2/64 = 1



Answer key graph with center, vertices, co-vertices, and foci labeled. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Graphing Ellipses Worksheet: Center, Axes, and Foci

Source rubric / reflection

- [ ] Center correctly identified and plotted at (h, k).
- [ ] Major axis direction correctly chosen by comparing denominators.
- [ ] Values of a and b correctly computed as square roots of denominators.
- [ ] Vertices plotted at distance a from center along major axis.
- [ ] Co-vertices plotted at distance b from center along minor axis.
- [ ] Foci plotted on major axis at distance c with $c^2 = a^2 - b^2$.
- [ ] Curve is smooth, closed, and passes through all four axis endpoints.
- [ ] Labels and units are consistent and readable.

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