Distance and Midpoint Formulas: Plot, Compute, Check

Original tasks 1, 2, 3 / complete keys

Task 1

Plot A(1, 2) and B(4, 6) on a grid with one unit per square. Find the distance AB and the midpoint M. Show a check.

Answer: Distance = 5 units; midpoint M = (2.5, 4).

Reason: Differences: 4 - 1 = 3 and 6 - 2 = 4. Squares: 9 + 16 = 25; sqrt(25) = 5. Midpoint: ((1 + 4)/2, (2 + 6)/2) = (2.5, 4). Check: from M to A differences are 1.5 and 2; from M to B differences are 1.5 and 2, so M is halfway. The 3-4-5 pattern supports the distance.

Check: Confirm the squared differences sum to 25 and that M lies halfway between A and B on the drawn segment.

Task 2

Plot C(-2, 3) and D(2, 6). Find the distance CD and the midpoint M. State units.

Answer: Distance = 5 units; midpoint M = (0, 4.5).

Reason: Differences: 2 - (-2) = 4 and 6 - 3 = 3. Squares: 16 + 9 = 25; sqrt(25) = 5. Midpoint: ((-2 + 2)/2, (3 + 6)/2) = (0, 4.5). Check: from M to C differences are 2 and 1.5; from M to D differences are 2 and 1.5.

Check: Verify the horizontal and vertical differences from M to each endpoint match in size, and that 4-3-5 forms a right-triangle pattern.

Task 3

Plot E(0, 0) and F(5, 12). Find the distance EF and the midpoint M. Show the squared-sum check.

Answer: Distance = 13 units; midpoint M = (2.5, 6).

Reason: Differences: 5 - 0 = 5 and 12 - 0 = 12. Squares: 25 + 144 = 169; sqrt(169) = 13. Midpoint: ((0 + 5)/2, (0 + 12)/2) = (2.5, 6). Check: 13^2 = 169 equals 25 + 144.

Check: Square the distance and confirm it equals the sum of the squared coordinate differences; confirm M is halfway on the segment.

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Original tasks 4 / complete keys

Task 4

Plot G(3, 1) and H(3, 7). Find the distance GH and the midpoint M. Explain why the horizontal difference is zero.

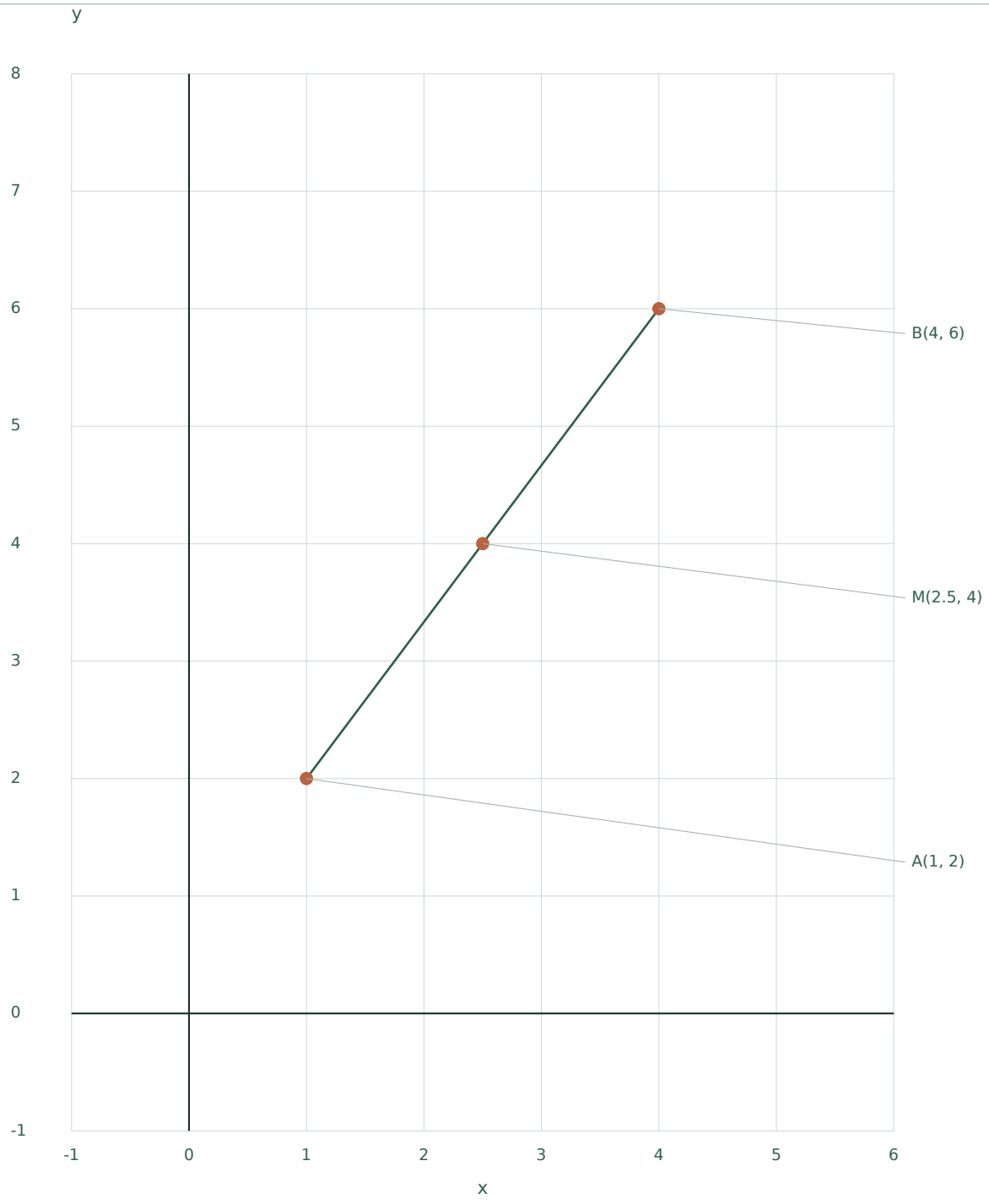
Answer: Distance = 6 units; midpoint M = (3, 4).

Reason: Differences: 3 - 3 = 0 and 7 - 1 = 6. Squares: 0 + 36 = 36; sqrt(36) = 6. Midpoint: ((3 + 3)/2, (1 + 7)/2) = (3, 4). The horizontal difference is zero because both points have the same x-coordinate, so the segment is vertical.

Check: Count six vertical squares between G and H; confirm M is three squares from each endpoint and lies on the vertical segment.

Distance and Midpoint Formulas: Plot, Compute, Check

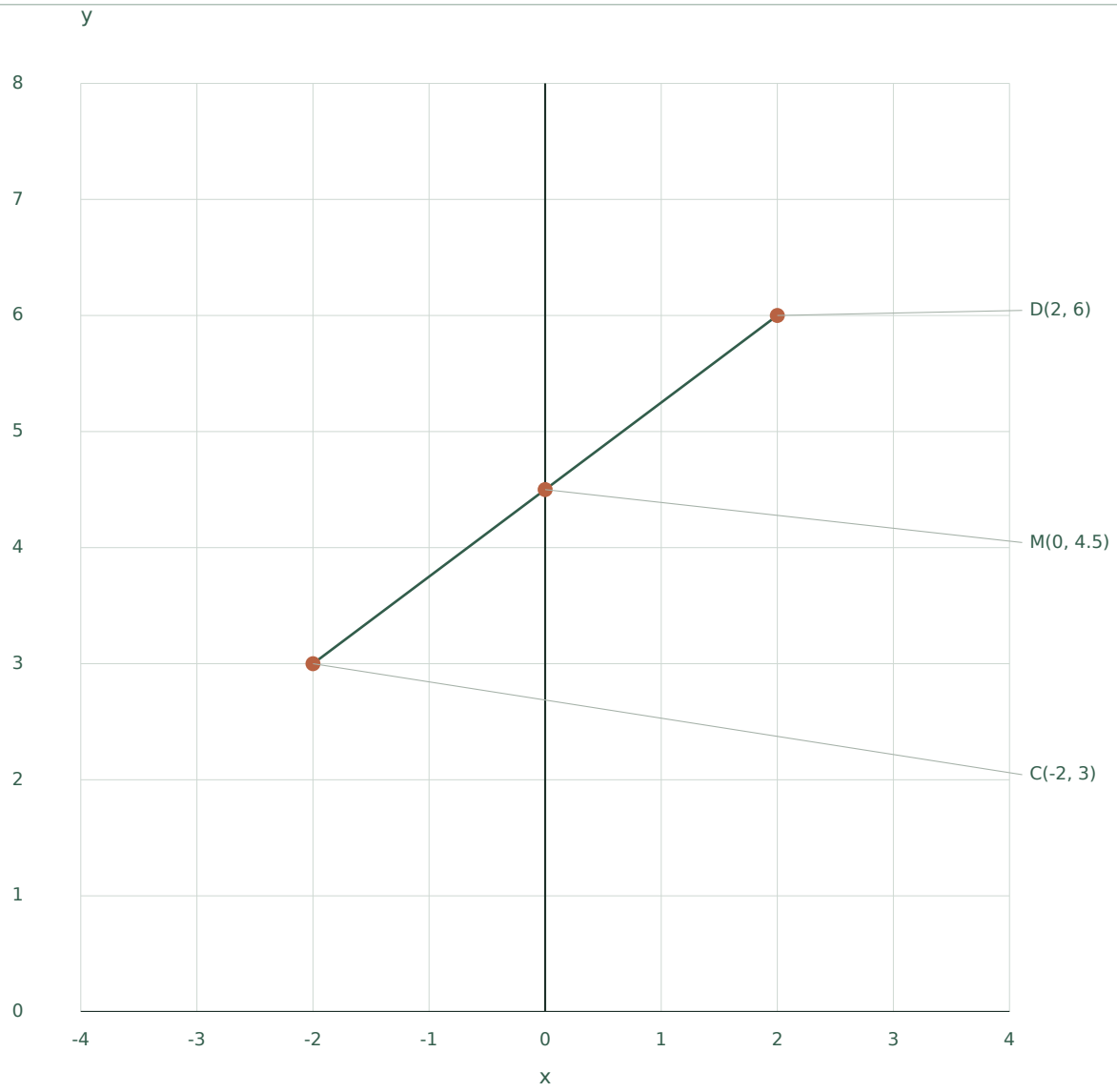
Task 1 answer: A(1,2), B(4,6), segment, midpoint M(2.5,4)



Answer plot: segment AB with midpoint M marked. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Distance and Midpoint Formulas: Plot, Compute, Check

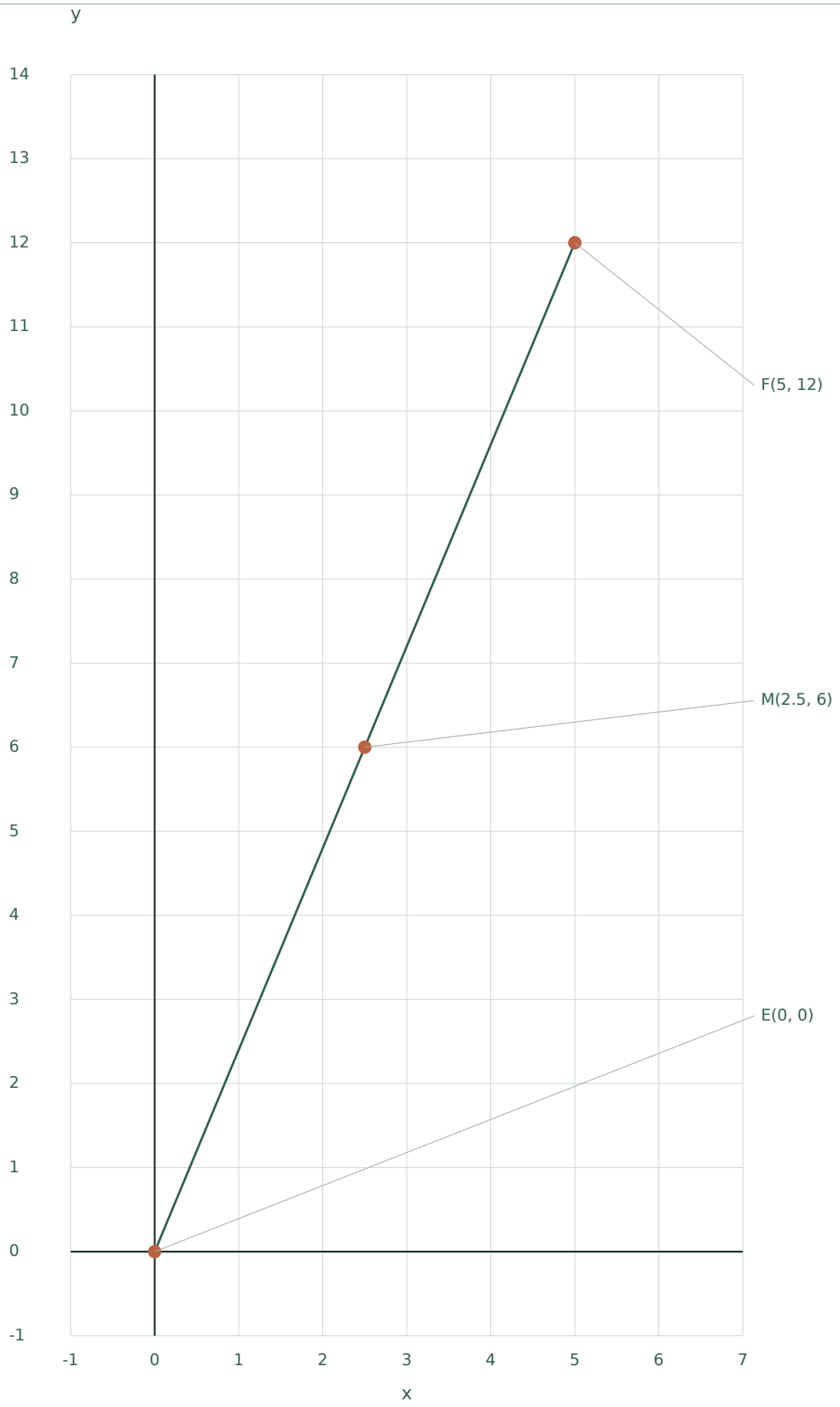
Task 2 answer: C(-2,3), D(2,6), segment, midpoint M(0,4.5)



Answer plot: segment CD with midpoint M marked. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Distance and Midpoint Formulas: Plot, Compute, Check

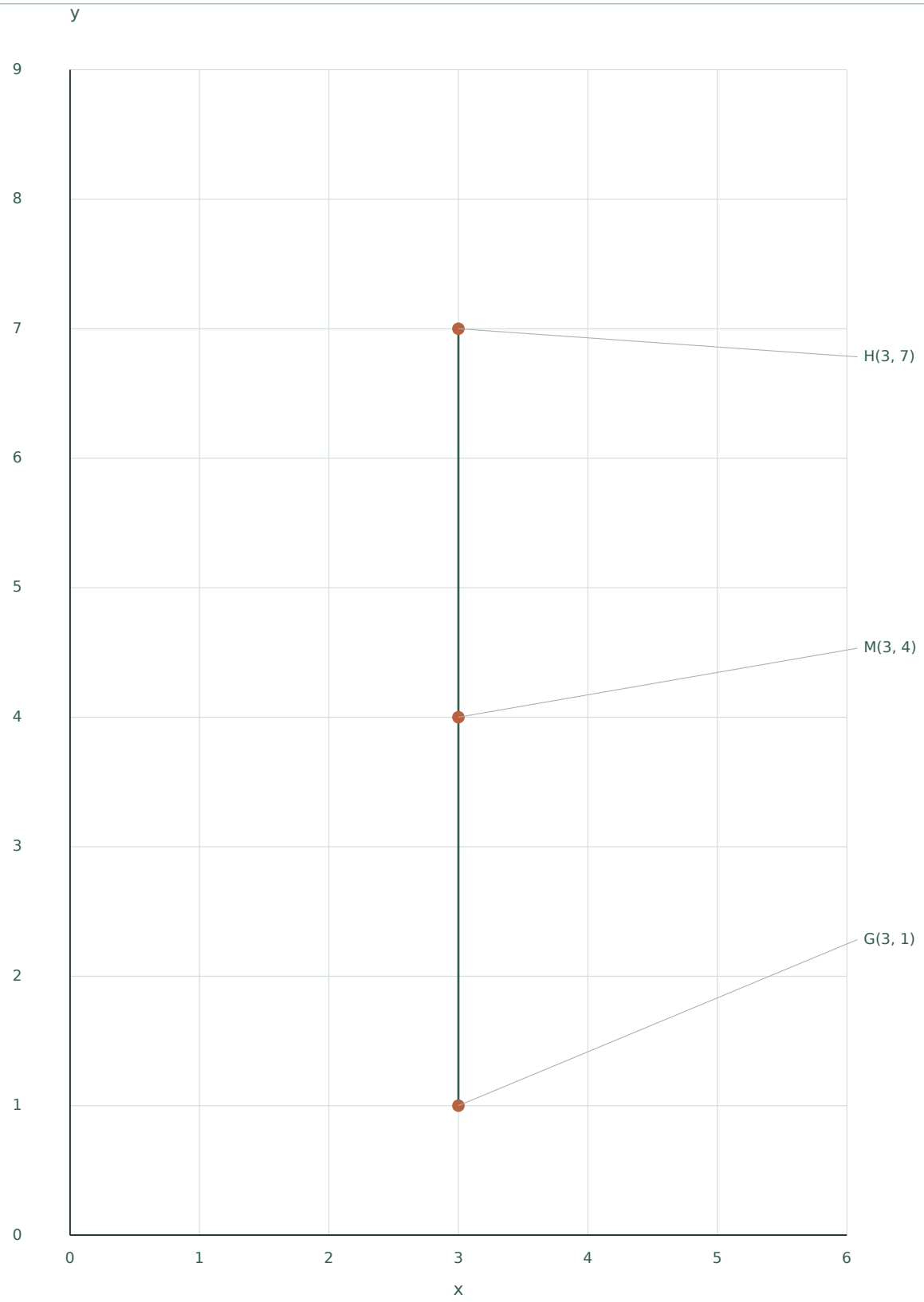
Task 3 answer: E(0,0), F(5,12), segment, midpoint M(2.5,6)



Answer plot: segment EF with midpoint M marked. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Distance and Midpoint Formulas: Plot, Compute, Check

Task 4 answer: G(3,1), H(3,7), vertical segment, midpoint M(3,4)



Answer plot: vertical segment GH with midpoint M marked. Coordinate labels sit outside the plot; thin grey leaders are annotations, not function curves.

Distance and Midpoint Formulas: Plot, Compute, Check

Source rubric / reflection

- [ ] Both points are plotted and labeled with ordered pairs on a grid with a stated scale.
- [ ] The segment joining the points is drawn.
- [ ] Distance formula is written or implied with correct coordinate differences.
- [ ] Squared differences are added correctly and the square root is taken.
- [ ] Distance is stated with units and simplified or rounded as instructed.
- [ ] Midpoint formula is applied by averaging both coordinates.
- [ ] Midpoint is written as an ordered pair and plotted on the segment.
- [ ] A check is shown: midpoint is halfway and distance matches a grid pattern or squared-sum check.
- [ ] Handwriting and letter style may vary; coordinates and labels are legible and consistent.

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