

# Finding the Midpoint

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

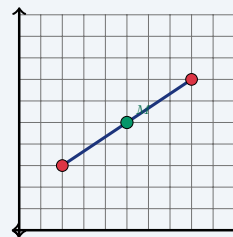
The midpoint of a segment is the *average* of the endpoints' coordinates:  $M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ . Add the two  $x$ -values and divide by 2 for the  $x$ -coordinate; do the same with the two  $y$ -values for the  $y$ -coordinate.

▶ **Example:** Find the midpoint between (2, 3) and (8, 7).

**Work:** Average the  $x$ -values:  $\frac{2 + 8}{2} = 5$ . Average the  $y$ -values:

$$\frac{3 + 7}{2} = 5.$$

★ **Answer:** (5, 5)



Midpoint of (2, 3) and (8, 7) is (5, 5).

### ◆ Practice Problems

Find the midpoint of the segment with the given endpoints.

- |  |   |
|--|---|
| <p>1. (0, 0) and (4, 6) _____</p> <p>2. (1, 2) and (5, 8) _____</p> <p>3. (2, 4) and (6, 10) _____</p> <p>4. (-2, 3) and (4, 7) _____</p> <p>5. (0, 5) and (10, 5) _____</p> <p>6. (3, 1) and (9, 7) _____</p> <p>7. (-4, -2) and (2, 6) _____</p> | <p>8. (1, 1) and (7, 9) _____</p> <p>9. (5, 2) and (5, 10) _____</p> <p>10. (0, 0) and (8, 8) _____</p> <p>11. (-6, 4) and (2, -4) _____</p> <p>12. (3, 7) and (11, 3) _____</p> <p>13. (2, -3) and (8, 5) _____</p> <p>14. (-1, -1) and (5, 7) _____</p> |
|--|---|

### ◆ Word Problems

15. On a map, a road runs from town A at (2, 4) to town B at (10, 8). Where is the rest stop placed exactly halfway between them? \_\_\_\_\_
16. Two friends stand at (1, 3) and (7, 9). They agree to meet at the midpoint. What point is that? \_\_\_\_\_
17. A bridge spans from (-4, 2) to (6, 2). Find the midpoint of the bridge. \_\_\_\_\_
18. The endpoints of a circle's diameter are (0, -2) and (8, 6). The center is the midpoint. Find the center. \_\_\_\_\_



## Answer Keys

- |           |             |            |
|-----------|-------------|------------|
| 1. (2, 3) | 7. (-1, 2)  | 13. (5, 1) |
| 2. (3, 5) | 8. (4, 5)   | 14. (2, 3) |
| 3. (4, 7) | 9. (5, 6)   | 15. (6, 6) |
| 4. (1, 5) | 10. (4, 4)  | 16. (4, 6) |
| 5. (5, 5) | 11. (-2, 0) | 17. (1, 2) |
| 6. (6, 4) | 12. (7, 5)  | 18. (4, 2) |

### Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The midpoint averages the two  $x$ 's and the two  $y$ 's:  $\frac{0+4}{2} = 2$  and  $\frac{0+6}{2} = 3$ , so (2, 3). So the final answer is (2, 3).
2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{1+5}{2} = 3$  and  $\frac{2+8}{2} = 5$ , giving (3, 5). So the final answer is (3, 5).
3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{2+6}{2} = 4$  and  $\frac{4+10}{2} = 7$ , so (4, 7). So the final answer is (4, 7).
4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Average even with a negative:  $\frac{-2+4}{2} = 1$  and  $\frac{3+7}{2} = 5$ . So the final answer is (1, 5).
5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{0+10}{2} = 5$  and  $\frac{5+5}{2} = 5$ , so (5, 5). So the final answer is (5, 5).
6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{3+9}{2} = 6$  and  $\frac{1+7}{2} = 4$ . So the final answer is (6, 4).
7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{-4+2}{2} = -1$  and  $\frac{-2+6}{2} = 2$ , giving (-1, 2). So the final answer is (-1, 2).
8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{1+7}{2} = 4$  and  $\frac{1+9}{2} = 5$ . So the final answer is (4, 5).
9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Same  $x$ , so it stays 5; for  $y$ ,  $\frac{2+10}{2} = 6$ . So the final answer is (5, 6).
10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{0+8}{2} = 4$  for both, so (4, 4). So the final answer is (4, 4).
11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{-6+2}{2} = -2$  and  $\frac{4+(-4)}{2} = 0$ . So the final answer is (-2, 0).
12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{3+11}{2} = 7$  and  $\frac{7+3}{2} = 5$ . So the final answer is (7, 5).
13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{2+8}{2} = 5$  and  $\frac{-3+5}{2} = 1$ . So the final answer is (5, 1).
14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\frac{-1+5}{2} = 2$  and  $\frac{-1+7}{2} = 3$ . So the final answer is (2, 3).
15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The rest stop is the midpoint:  $(\frac{2+10}{2}, \frac{4+8}{2}) = (6, 6)$ . So the final answer is (6, 6).
16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Meet at the midpoint:  $(\frac{1+7}{2}, \frac{3+9}{2}) = (4, 6)$ . So the final answer is (4, 6).
17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Midpoint of the bridge:  $(\frac{-4+6}{2}, \frac{2+2}{2}) = (1, 2)$ . So the final answer is (1, 2).
18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The center is the midpoint of the diameter:  $(\frac{0+8}{2}, \frac{-2+6}{2}) = (4, 2)$ . So the final answer is (4, 2).



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