

# Finding the Midpoint

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

## Quick Review and Helpful Hints

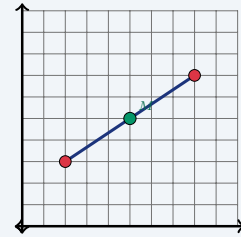
The midpoint of a segment is the *average* of the endpoints' coordinates:  $M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ . Add the two  $x$ -values and divide by 2 for the  $x$ -coordinate; do the same with the two  $y$ -values for the  $y$ -coordinate.

▶ **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.

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

### ◆ 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. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(2, 3)</span> | 7. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(-1, 2)</span>  | 13. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(5, 1)</span> |
| 2. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(3, 5)</span> | 8. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(4, 5)</span>   | 14. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(2, 3)</span> |
| 3. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(4, 7)</span> | 9. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(5, 6)</span>   | 15. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(6, 6)</span> |
| 4. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(1, 5)</span> | 10. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(4, 4)</span>  | 16. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(4, 6)</span> |
| 5. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(5, 5)</span> | 11. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(-2, 0)</span> | 17. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(1, 2)</span> |
| 6. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(6, 4)</span> | 12. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(7, 5)</span>  | 18. <span style="border: 1px solid black; border-radius: 5px; padding: 2px;">(4, 2)</span> |

### 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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