# Finding the Midpoint

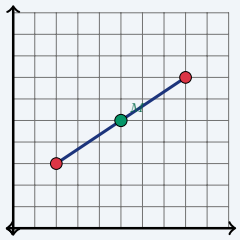
| Name: _____ | Date: _____ | Score: _____ / 18 |
|---|---|---|

## 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 $(4, 6)$ _____
2. $(1, 2)$ and $(5, 8)$ _____
3. $(2, 4)$ and $(6, 10)$ _____
4. $(-2, 3)$ and $(4, 7)$ _____
5. $(0, 5)$ and $(10, 5)$ _____
6. $(3, 1)$ and $(9, 7)$ _____
7. $(-4, -2)$ and $(2, 6)$ _____
8. $(1, 1)$ and $(7, 9)$ _____
9. $(5, 2)$ and $(5, 10)$ _____
10. $(0, 0)$ and $(8, 8)$ _____
11. $(-6, 4)$ and $(2, -4)$ _____
12. $(3, 7)$ and $(11, 3)$ _____
13. $(2, -3)$ and $(8, 5)$ _____
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.** $(2,3)$ | **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: $\left(\frac{2+10}{2},\frac{4+8}{2}\right)=(6,6)$. 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: $\left(\frac{1+7}{2},\frac{3+9}{2}\right)=(4,6)$. 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: $\left(\frac{-4+6}{2},\frac{2+2}{2}\right)=(1,2)$. 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: $\left(\frac{0+8}{2},\frac{-2+6}{2}\right)=(4,2)$. So the final answer is $(4,2)$.

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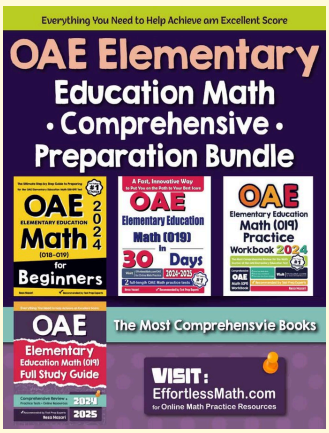


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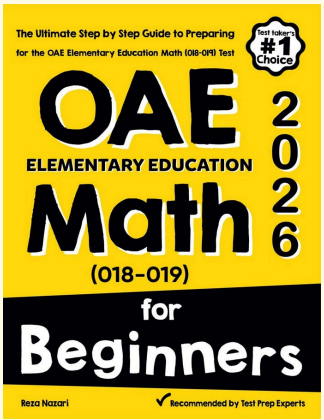


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