Finding the Midpoint

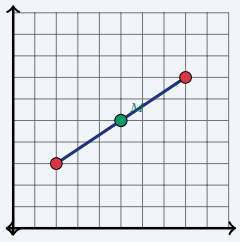
Name: _____	Date: _____	Score: _____ / 18

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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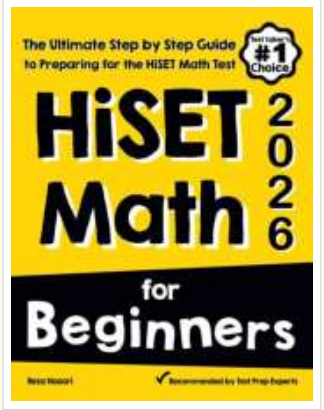

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