

Finding the Midpoint

Name: _____ Date: _____ Score: _____ / 18

Quick Review and Helpful Hints

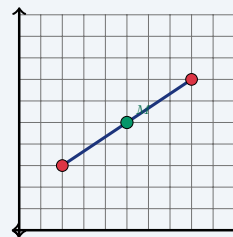
The midpoint of a segment is the *average* of the endpoints' coordinates: $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$. Add the two x -values and divide by 2 for the x -coordinate; do the same with the two y -values for the y -coordinate.

▶ **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.

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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> |
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◆ 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. $(2, 3)$
2. $(3, 5)$
3. $(4, 7)$
4. $(1, 5)$
5. $(5, 5)$
6. $(6, 4)$

7. $(-1, 2)$
8. $(4, 5)$
9. $(5, 6)$
10. $(4, 4)$
11. $(-2, 0)$
12. $(7, 5)$

13. $(5, 1)$
14. $(2, 3)$
15. $(6, 6)$
16. $(4, 6)$
17. $(1, 2)$
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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