

1.3 Exercises

Assignment Guide and Homework Check

ASSIGNMENT

Basic: 1, 2, 3–33 odd, 40, 42, 46–53

Average: 1, 2, 4–12 even, 16–34 even, 37, 40, 42, 46–53

Advanced: 1, 2, 10, 14, 16, 22, 28–34 even, 35–53

HOMEWORK CHECK

Basic: 3, 9, 13, 19, 27

Average: 10, 20, 26, 37, 42

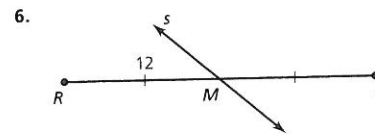
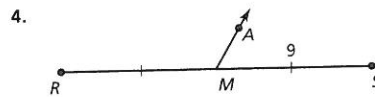
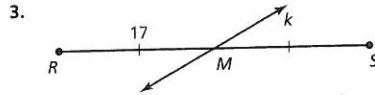
Advanced: 10, 16, 22, 30, 37, 45

Vocabulary and Core Concept Check

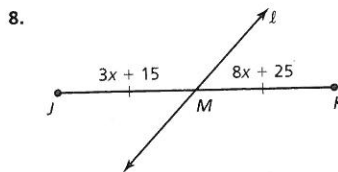
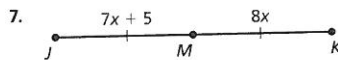
- VOCABULARY** If a point, ray, line, line segment, or plane intersects a segment at its midpoint, then what does it do to the segment?
- COMPLETE THE SENTENCE** To find the length of \overline{AB} , with endpoints $A(-7, 5)$ and $B(4, -6)$, you can use the _____.

Monitoring Progress and Modeling with Mathematics

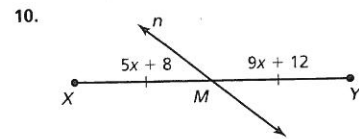
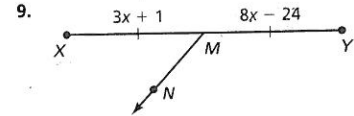
In Exercises 3–6, identify the segment bisector of \overline{RS} . Then find RS . (See Example 1.)



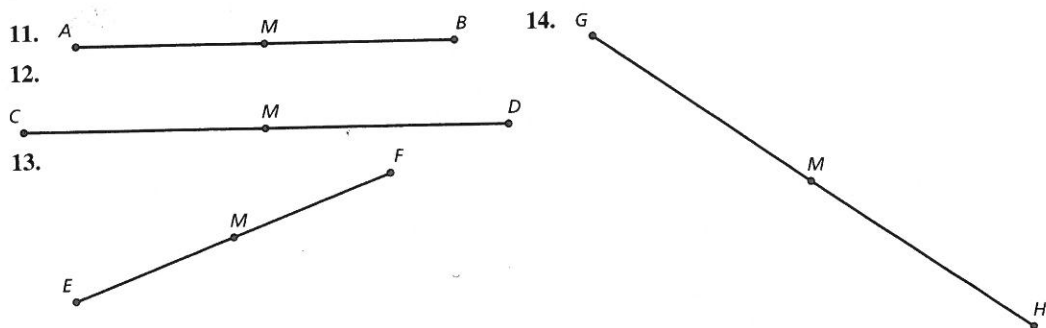
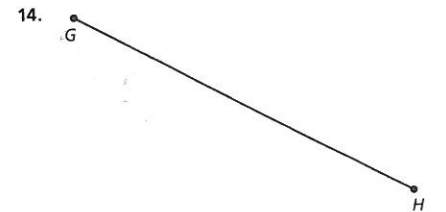
In Exercises 7 and 8, identify the segment bisector of \overline{JK} . Then find JM . (See Example 2.)



In Exercises 9 and 10, identify the segment bisector of \overline{XY} . Then find XY . (See Example 2.)



CONSTRUCTION In Exercises 11–14, copy the segment and construct a segment bisector by paper folding. Then label the midpoint M .



ANSWERS

- It bisects the segment.
- Distance Formula
- line k ; 34
- \overline{MA} ; 18
- M ; 44
- line s ; 24
- M ; 40
- line l ; 9
- \overline{MN} ; 32
- line n ; 6

In Exercises 15–18, the endpoints of \overline{CD} are given. Find the coordinates of the midpoint M . (See Example 3.)

15. $C(3, -5)$ and $D(7, 9)$
16. $C(-4, 7)$ and $D(0, -3)$
17. $C(-2, 0)$ and $D(4, 9)$
18. $C(-8, -6)$ and $D(-4, 10)$

In Exercises 19–22, the midpoint M and one endpoint of \overline{GH} are given. Find the coordinates of the other endpoint. (See Example 3.)

19. $G(5, -6)$ and $M(4, 3)$
20. $H(-3, 7)$ and $M(-2, 5)$
21. $H(-2, 9)$ and $M(8, 0)$
22. $G(-4, 1)$ and $M(-\frac{13}{2}, -6)$

In Exercises 23–30, find the distance between the two points. (See Example 4.)

23. $A(13, 2)$ and $B(7, 10)$
24. $C(-6, 5)$ and $D(-3, 1)$
25. $E(3, 7)$ and $F(6, 5)$
26. $G(-5, 4)$ and $H(2, 6)$
27. $J(-8, 0)$ and $K(1, 4)$
28. $L(7, -1)$ and $M(-2, 4)$
29. $R(0, 1)$ and $S(6, 3.5)$
30. $T(13, 1.6)$ and $V(5.4, 3.7)$

ERROR ANALYSIS In Exercises 31 and 32, describe and correct the error in finding the distance between $A(6, 2)$ and $B(1, -4)$.

31. \times

$$\begin{aligned} AB &= (6 - 1)^2 + [2 - (-4)]^2 \\ &= 5^2 + 6^2 \\ &= 25 + 36 \\ &= 61 \end{aligned}$$

32. \times

$$\begin{aligned} AB &= \sqrt{(6 - 2)^2 + [1 - (-4)]^2} \\ &= \sqrt{4^2 + 5^2} \\ &= \sqrt{16 + 25} \\ &= \sqrt{41} \\ &\approx 6.4 \end{aligned}$$

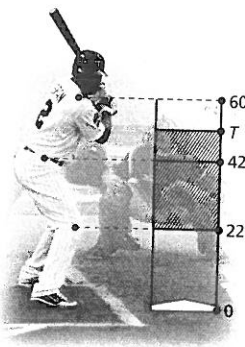
COMPARING SEGMENTS In Exercises 33 and 34, the endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent. If they are not congruent, state which segment length is greater.

33. \overline{AB} : $A(0, 2)$, $B(-3, 8)$ and \overline{CD} : $C(-2, 2)$, $D(0, -4)$
34. \overline{EF} : $E(1, 4)$, $F(5, 1)$ and \overline{GH} : $G(-3, 1)$, $H(1, 6)$

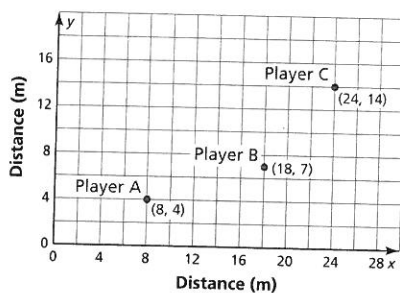
35. **WRITING** Your friend is having trouble understanding the Midpoint Formula.

- a. Explain how to find the midpoint when given the two endpoints in your own words.
- b. Explain how to find the other endpoint when given one endpoint and the midpoint in your own words.

36. **PROBLEM SOLVING** In baseball, the strike zone is the region a baseball needs to pass through for the umpire to declare it a strike when the batter does not swing. The top of the strike zone is a horizontal plane passing through the midpoint of the top of the batter's shoulders and the top of the uniform pants when the player is in a batting stance. Find the height of T . (Note: All heights are in inches.)



37. **MODELING WITH MATHEMATICS** The figure shows the position of three players during part of a water polo match. Player A throws the ball to Player B, who then throws the ball to Player C.



- a. How far did Player A throw the ball? Player B?
- b. How far would Player A have to throw the ball to throw it directly to Player C?

Dynamic Teaching Tools

Dynamic Assessment & Progress Monitoring Tool

Interactive Whiteboard Lesson Library

Dynamic Classroom with Dynamic Investigations

ANSWERS

15. $(5, 2)$
16. $(-2, 2)$
17. $(1, \frac{9}{2})$
18. $(-6, 2)$
19. $(3, 12)$
20. $(-1, 3)$
21. $(18, -9)$
22. $(-9, -13)$
23. 10
24. 5
25. $\sqrt{13}$, or about 3.6
26. $\sqrt{53}$, or about 7.3
27. $\sqrt{97}$, or about 9.8
28. $\sqrt{106}$, or about 10.3
29. 6.5
30. $\sqrt{62.17}$, or about 7.9
31. The square root should have been taken. $\sqrt{61} \approx 7.8$
32. The difference of the x -values and the difference of the y -values should be used.

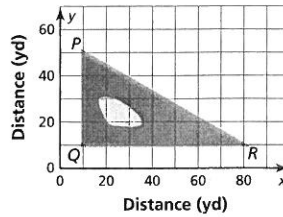
$$\begin{aligned} AB &= \sqrt{(6 - 1)^2 + [2 - (-4)]^2} \\ &= \sqrt{5^2 + 6^2} \\ &= \sqrt{25 + 36} \\ &= \sqrt{61} \\ &\approx 7.8 \end{aligned}$$
33. about 6.7, about 6.3; no; $AB > CD$
34. 5, about 6.4; no; $GH > EF$
35. a. To find the x -coordinate of the midpoint, add the x -coordinates of the endpoints, and divide by 2. To find the y -coordinate of the midpoint, add the y -coordinates of the endpoints, and divide by 2.
 b. To find the x -coordinate of the other endpoint, multiply the x -coordinate of the midpoint by 2, and subtract the x -coordinate of the given endpoint. To find the y -coordinate of the other endpoint, multiply the y -coordinate of the midpoint by 2, and subtract the y -coordinate of the given endpoint.
36. 51 in.
37. a. about 10.4 m; about 9.2 m
 b. about 18.9 m

ANSWERS

38. about 3.5 mi
39. a. about 191 yd
b. about 40 yd
c. about 1.5 min; $MR \approx 40$ yd, total distance $\approx 40 + 40 + 40 + 70 + 40 = 230$ yd, $\frac{230}{150} \approx 1.5$ min
40. no; You have to take the absolute value of the difference.
41. $\left(\frac{a+b}{2}, c\right), |b-a|$
42. a. $AM = MB$; M is the midpoint of \overline{AB} .
b. $AC < MB$; C is between A and M , so $AC < AM$. Because $AM = MB$, $AC < MB$.
c. impossible to tell; The problem does not provide any information about whether C or D is closer to M .
d. $MB > DB$; D is between M and B , so $MB > DB$.
43. location D for lunch; The total distance traveled if you return home is $AM + AM + AB + AB$. The total distance traveled if you go to location D for lunch is $AB + DB + DB + AB$. Because $DB < AM$, the second option involves less traveling.

44–53. See Additional Answers.

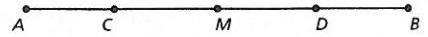
38. **MODELING WITH MATHEMATICS** Your school is 20 blocks east and 12 blocks south of your house. The mall is 10 blocks north and 7 blocks west of your house. You plan on going to the mall right after school. Find the distance between your school and the mall assuming there is a road directly connecting the school and the mall. One block is 0.1 mile.
39. **PROBLEM SOLVING** A path goes around a triangular park, as shown.



- a. Find the distance around the park to the nearest yard.
- b. A new path and a bridge are constructed from point Q to the midpoint M of \overline{PR} . Find \overline{QM} to the nearest yard.
- c. A man jogs from P to Q to M to R to Q and back to P at an average speed of 150 yards per minute. About how many minutes does it take? Explain your reasoning.
40. **MAKING AN ARGUMENT** Your friend claims there is an easier way to find the length of a segment than the Distance Formula when the x -coordinates of the endpoints are equal. He claims all you have to do is subtract the y -coordinates. Do you agree with his statement? Explain your reasoning.

41. **MATHEMATICAL CONNECTIONS** Two points are located at (a, c) and (b, c) . Find the midpoint and the distance between the two points.

42. **HOW DO YOU SEE IT?** \overline{AB} contains midpoint M and points C and D , as shown. Compare the lengths. If you cannot draw a conclusion, write *impossible to tell*. Explain your reasoning.



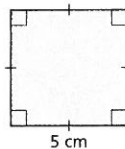
- a. AM and MB
b. AC and MB
c. MC and MD
d. MB and DB
43. **ABSTRACT REASONING** Use the diagram in Exercise 42. The points on \overline{AB} represent locations you pass on your commute to work. You travel from your home at location A to location M before realizing that you left your lunch at home. You could turn around to get your lunch and then continue to work at location B . Or you could go to work and go to location D for lunch today. You want to choose the option that involves the least distance you must travel. Which option should you choose? Explain your reasoning.
44. **THOUGHT PROVOKING** Describe three ways to divide a rectangle into two congruent regions. Do the regions have to be triangles? Use a diagram to support your answer.
45. **ANALYZING RELATIONSHIPS** The length of \overline{XY} is 24 centimeters. The midpoint of \overline{XY} is M , and C is on \overline{XM} so that XC is $\frac{2}{3}$ of XM . Point D is on \overline{MY} so that MD is $\frac{3}{4}$ of MY . What is the length of \overline{CD} ?

Maintaining Mathematical Proficiency

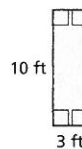
Reviewing what you learned in previous grades and lessons

Find the perimeter and area of the figure. (Skills Review Handbook)

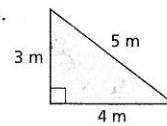
46.



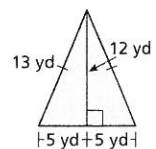
47.



48.



49.



Solve the inequality. Graph the solution. (Skills Review Handbook)

50. $a + 18 < 7$

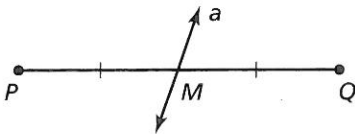
51. $y - 5 \geq 8$

52. $-3x > 24$

53. $\frac{z}{4} \leq 12$

Mini-Assessment

Use the figure below.



- Identify the segment bisector of \overline{PQ} . line a
- If $MQ = 2\frac{1}{3}$, find PQ . $4\frac{2}{3}$
- If $PM = 5x + 2$ and $MQ = 7x - 4$, find PQ . 34
- The endpoints of \overline{FG} are $F(-2, -4)$ and $G(1, 0)$.
 - Find the coordinates of the midpoint M of \overline{FG} . $(-0.5, -2)$
 - Find the length of \overline{FG} . 5

If students need help...

Resources by Chapter

- Practice A and Practice B
- Puzzle Time

Student Journal

- Practice

Differentiating the Lesson Skills Review Handbook

If students got it...

Resources by Chapter

- Enrichment and Extension
- Cumulative Review

Start the *next* Section