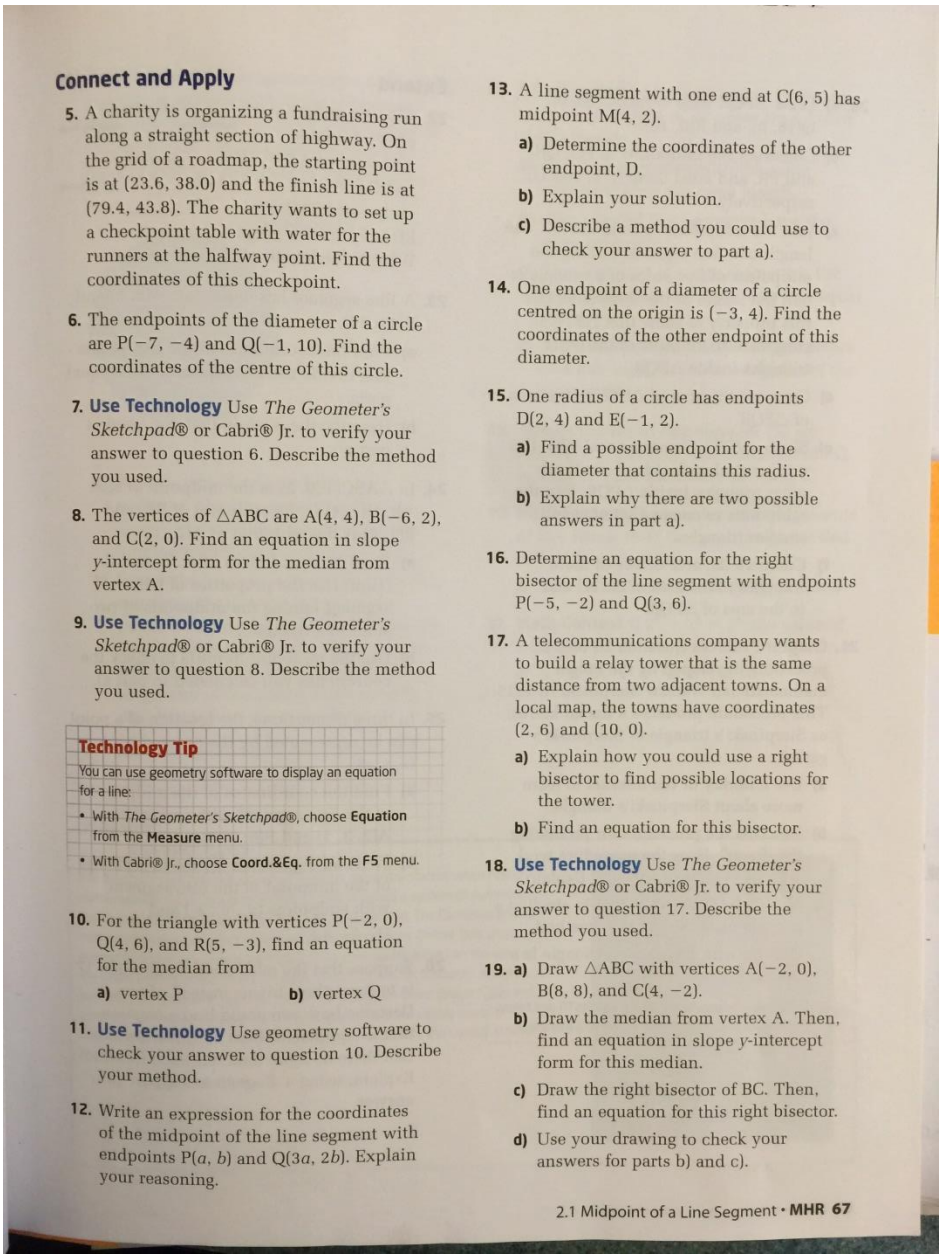
Questions # 5 & 9. (Pg. 67)



Connect and Apply

5. A charity is organizing a fundraising run along a straight section of highway. On the grid of a roadmap, the starting point is at (23.6, 38.0) and the finish line is at (79.4, 43.8). The charity wants to set up a checkpoint table with water for the runners at the halfway point. Find the coordinates of this checkpoint.

6. The endpoints of the diameter of a circle are P(−7, −4) and Q(−1, 10). Find the coordinates of the centre of this circle.

7. Use Technology Use *The Geometer's Sketchpad*® or Cabri® Jr. to verify your answer to question 6. Describe the method you used.

8. The vertices of △ABC are A(4, 4), B(−6, 2), and C(2, 0). Find an equation in slope *y*-intercept form for the median from vertex A.

9. Use Technology Use *The Geometer's Sketchpad*® or Cabri® Jr. to verify your answer to question 8. Describe the method you used.

Technology Tip

You can use geometry software to display an equation for a line:

- With *The Geometer's Sketchpad*®, choose **Equation** from the **Measure** menu.
- With Cabri® Jr., choose **Coord.&Eq.** from the **F5** menu.

10. For the triangle with vertices P(−2, 0), Q(4, 6), and R(5, −3), find an equation for the median from

a) vertex P **b)** vertex Q

11. Use Technology Use geometry software to check your answer to question 10. Describe your method.

12. Write an expression for the coordinates of the midpoint of the line segment with endpoints P(a, b) and Q($3a$, $2b$). Explain your reasoning.

13. A line segment with one end at C(6, 5) has midpoint M(4, 2).

a) Determine the coordinates of the other endpoint, D.

b) Explain your solution.

c) Describe a method you could use to check your answer to part a).

14. One endpoint of a diameter of a circle centred on the origin is (−3, 4). Find the coordinates of the other endpoint of this diameter.

15. One radius of a circle has endpoints D(2, 4) and E(−1, 2).

a) Find a possible endpoint for the diameter that contains this radius.

b) Explain why there are two possible answers in part a).

16. Determine an equation for the right bisector of the line segment with endpoints P(−5, −2) and Q(3, 6).

17. A telecommunications company wants to build a relay tower that is the same distance from two adjacent towns. On a local map, the towns have coordinates (2, 6) and (10, 0).

a) Explain how you could use a right bisector to find possible locations for the tower.

b) Find an equation for this bisector.

18. Use Technology Use *The Geometer's Sketchpad*® or Cabri® Jr. to verify your answer to question 17. Describe the method you used.

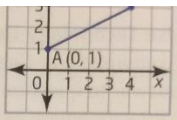
19. a) Draw △ABC with vertices A(−2, 0), B(8, 8), and C(4, −2).

b) Draw the median from vertex A. Then, find an equation in slope *y*-intercept form for this median.

c) Draw the right bisector of BC. Then, find an equation for this right bisector.

d) Use your drawing to check your answers for parts b) and c).

Questions # 4 & 5. (Pg. 77)



C2 When you use the formula for the length of a line segment, does it matter which point is represented by (x_1, y_1) and which point is represented by (x_2, y_2)? Use an example to explain your reasoning.

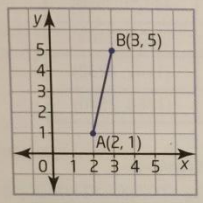
C3 Explain why the expression $(x_2 - x_1)^2 + (y_2 - y_1)^2$ never has a negative value.

Practise

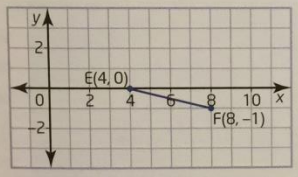
For help with questions 1 to 3, see Examples 1 to 3.

1. Estimate the length of each line segment from its graph. Then, calculate the exact length.

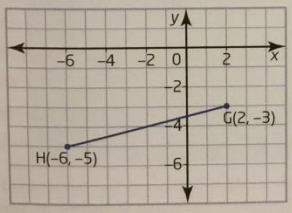
a)



b)



c)



2. Calculate the length of the line segment defined by each pair of endpoints.

a) A(−6, −2) and B(4, 3)

b) C(−2, 0) and D(7, −3)

c) E(−5, −6) and F(−1, −2)

d) G(0, 5) and H(8, −1)

3. Calculate the length of the line segment defined by each pair of endpoints.

a) J(2.1, 8.3) and K(−4.5, −4.7)

b) L(−4.2, −5.1) and M(11.6, 9.2)

c) $N\left(\frac{1}{2}, \frac{5}{2}\right)$ and $P\left(\frac{3}{2}, -\frac{5}{2}\right)$

Connect and Apply

4. On a city map, the coordinates of two department stores are (4, 3) and (1, 7). How far apart are the stores if each unit on the map represents 1 km?

5. On a street map of his town, Jordan's house has coordinates (8, 1). The town's two high schools are at (0, 5) and (6, 11).

a) Which school is closer to Jordan's house?

b) Describe a method you could use to check your answer to part a).

6. The vertices of △ABC are A(2, 5), B(−6, −1), and C(10, −1).

a) Determine the length of each side of this triangle.

b) Determine the perimeter of the triangle.

c) Classify the triangle.

7. a) Show that the triangle with vertices D(−1, 0), E(1, 0), and $F(0, \sqrt{3})$ is equilateral.

b) List the coordinates of the vertices of another equilateral triangle.

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13. Determine the shortest distance from the point E(1, -4) to the line through points F(-5, 2) and G(3,4). Use a diagram to check your answer

14. Determine the shortest distance from the point H (5,2) to the line through points J(-6, 4) and K(-2, -4)