9.5 Exercises

For the rational functions in Exercises 1-6, perform each of the following tasks.

i. Load the function \( f \) and the line \( y = k \) into your graphing calculator. Adjust the viewing window so that all point(s) of intersection of the two graphs are visible in your viewing window.

ii. Copy the image in your viewing window onto your homework paper. Label and scale each axis with xmin, xmax, ymin, and ymax. Label the graphs with their equations. Remember to draw all lines with a ruler.

iii. Use the intersect utility to determine the coordinates of the point(s) of intersection. Plot the point of intersection on your homework paper and label it with its coordinates.

iv. Solve the equation \( f(x) = k \) algebraically. Place your work and solution next to your graph. Do the solutions agree?

1. \( f(x) = \sqrt{x + 3}, \ k = 2 \)
2. \( f(x) = \sqrt{4 - x}, \ k = 3 \)
3. \( f(x) = \sqrt{7 - 2x}, \ k = 4 \)
4. \( f(x) = \sqrt{3x + 5}, \ k = 5 \)
5. \( f(x) = \sqrt{5 + x}, \ k = 4 \)
6. \( f(x) = \sqrt{4 - x}, \ k = 5 \)

In Exercises 7-12, use an algebraic technique to solve the given equation. Check your solutions.

7. \( \sqrt{-5x + 5} = 2 \)

8. \( \sqrt{4x + 6} = 7 \)
9. \( \sqrt{6x - 8} = 8 \)
10. \( \sqrt{2x + 4} = 2 \)
11. \( \sqrt{-3x + 1} = 3 \)
12. \( \sqrt{4x + 7} = 3 \)

For the rational functions in Exercises 13-16, perform each of the following tasks.

i. Load the function \( f \) and the line \( y = k \) into your graphing calculator. Adjust the viewing window so that all point(s) of intersection of the two graphs are visible in your viewing window.

ii. Copy the image in your viewing window onto your homework paper. Label and scale each axis with xmin, xmax, ymin, and ymax. Label the graphs with their equations. Remember to draw all lines with a ruler.

iii. Use the intersect utility to determine the coordinates of the point(s) of intersection. Plot the point of intersection on your homework paper and label it with its coordinates.

iv. Solve the equation \( f(x) = k \) algebraically. Place your work and solution next to your graph. Do the solutions agree?

13. \( f(x) = \sqrt{x + 3 + x}, \ k = 9 \)
14. \( f(x) = \sqrt{x + 6} - x, \ k = 4 \)
15. \( f(x) = \sqrt{x - 5} - x, \ k = -7 \)
16. \( f(x) = \sqrt{x + 5} + x, \ k = 7 \)

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In Exercises 17-24, use an algebraic technique to solve the given equation. Check
your solutions.

17. \( \sqrt{x+1} + x = 5 \)
18. \( \sqrt{x+8} - x = 8 \)
19. \( \sqrt{x+4} + x = 8 \)
20. \( \sqrt{x+8} - x = 2 \)
21. \( \sqrt{x+5} - x = 3 \)
22. \( \sqrt{x+5} + x = 7 \)
23. \( \sqrt{x+9} - x = 9 \)
24. \( \sqrt{x+7} + x = 5 \)

27. \( f(x) = \sqrt{x+2} + \sqrt{3x+4}, \ k = 2 \)
28. \( f(x) = \sqrt{6x+7} + \sqrt{3x+3}, \ k = 1 \)

In Exercises 29-40, use an algebraic technique to solve the given equation. Check
your solutions.

29. \( \sqrt{x+46} - \sqrt{x-35} = 1 \)
30. \( \sqrt{x-16} + \sqrt{x+16} = 8 \)
31. \( \sqrt{x-19} + \sqrt{x-6} = 13 \)
32. \( \sqrt{x+31} - \sqrt{x+12} = 1 \)
33. \( \sqrt{x-2} - \sqrt{x-49} = 1 \)
34. \( \sqrt{x+13} + \sqrt{x+8} = 5 \)
35. \( \sqrt{x+27} - \sqrt{x-22} = 1 \)
36. \( \sqrt{x+10} + \sqrt{x+13} = 3 \)
37. \( \sqrt{x+30} - \sqrt{x-38} = 2 \)
38. \( \sqrt{x+36} - \sqrt{x+11} = 1 \)
39. \( \sqrt{x-17} + \sqrt{x+3} = 10 \)
40. \( \sqrt{x+18} + \sqrt{x+13} = 5 \)

For the rational functions in Exercises 25-28, perform each of the following tasks.

i. Load the function \( f \) and the line \( y = k \) into your graphing calculator. Adjust
the viewing window so that all point(s) of intersection of the two graphs
are visible in your viewing window.

ii. Copy the image in your viewing window onto your homework paper. Label
and scale each axis with xmin, xmax, ymin, and ymax. Label the
graphs with their equations. Remember to draw all lines with a ruler.

iii. Use the intersect utility to determine the coordinates of the point(s)
of intersection. Plot the point of intersection on your homework paper
and label it with its coordinates.

iv. Solve the equation \( f(x) = k \) algebraically. Place your work and solution
next to your graph. Do the solutions agree?

25. \( f(x) = \sqrt{x-1} + \sqrt{x+6}, \ k = 7 \)
26. \( f(x) = \sqrt{x+2} + \sqrt{x+9}, \ k = 7 \)
9.5 Answers

1. \( x = 1 \)

7. \( \frac{1}{5} \)

9. 12

11. \( -\frac{8}{3} \)

13. \( x = 6 \)

3. \( x = -\frac{9}{2} \)

15. \( x = 9 \)

5. \( x = 11 \)

17. 3

19. 5

21. -1
23. \(-8, -9\)

25. \(x = 10\)

\[
f(x) = \sqrt{x+1} + \sqrt{x+6}
\]

27. \(x = -1\)

\[
f(x) = \sqrt{x+2} + \sqrt{3x+4}
\]

29. \(1635\)

31. \(55\)

33. \(578\)

35. \(598\)

37. \(294\)

39. \(33\)