Name: _____

Section 9-5: Rational Equation Word Problems

Part A: Number Problems

Use algebra to solve the following applications.

1. A positive integer is twice another. The sum of the reciprocals of the two positive integers is 3/10. Find the two integers.

3. A positive integer is twice another. The difference of the reciprocals of the two positive integers is 1/8. Find the two integers.

5. A positive integer is 2 less than another. If the sum of the reciprocal of the smaller and twice the reciprocal of the larger is 5/12, then find the two integers.

7. The sum of the reciprocals of two consecutive positive even integers is 11/60. Find the two even integers.

9. The difference of the reciprocals of two consecutive positive even integers is 1/24. Find the two even integers.

11. If 3 times the reciprocal of the larger of two consecutive integers is subtracted from 2 times the reciprocal of the smaller, then the result is 1/2. Find the two integers.

13. A positive integer is 5 less than another. If the reciprocal of the smaller integer is subtracted from 3 times the reciprocal of the larger, then the result is 1/12. Find the two integers.

Part B: Uniform Motion Problems

Use algebra to solve the following applications.

15. James can jog twice as fast as he can walk. He was able to jog the first 9 miles to his grandmother's house, but then he tired and walked the remaining 1.5 miles. If the total trip took 2 hours, then what was his average jogging speed?

17. Sally was able to drive an average of 20 miles per hour faster in her car after the traffic cleared. She drove 23 miles in traffic before it cleared and then drove another 99 miles. If the total trip took 2 hours, then what was her average speed in traffic?

19. A bus averages 6 miles per hour faster than a trolley. If the bus travels 90 miles in the same time it takes the trolley to travel 75 miles, then what is the speed of each?

21. A light aircraft travels 2 miles per hour less than twice as fast as a passenger car. If the passenger car can travel 231 miles in the same time it takes the aircraft to travel 455 miles, then what is the average speed of each?

23. An airplane traveling with a 20-mile-per-hour tailwind covers 270 miles. On the return trip against the wind, it covers 190 miles in the same amount of time. What is the speed of the airplane in still air?

25. A boat averages 16 miles per hour in still water. With the current, the boat can travel 95 miles in the same time it travels 65 miles against it. What is the speed of the current?

27. If the river current flows at an average 3 miles per hour, then a tour boat makes the 9-mile tour downstream with the current and back the 9 miles against the current in 4 hours. What is the average speed of the boat in still water?

29. Jose drove 15 miles to pick up his sister and then returned home. On the return trip, he was able to average 15 miles per hour faster than he did on the trip to pick her up. If the total trip took 1 hour, then what was Jose's average speed on the return trip?

31. Jerry paddled his kayak upstream against a 1-mile-per-hour current for 12 miles. The return trip downstream with the 1-mile-per-hour current took 1 hour less time. How fast can Jerry paddle the kayak in still water?

Part C: Work-Rate Problems

Use algebra to solve the following applications.

33. James can paint the office by himself in 7 hours. Manny paints the office in 10 hours. How long will it take them to paint the office working together?

35. Jerry can detail a car by himself in 50 minutes. Sally does the same job in 1 hour. How long will it take them to detail a car working together?

37. Allison can complete a sales route by herself in 6 hours. Working with an associate, she completes the route in 4 hours. How long would it take her associate to complete the route by herself?

39. Joe can assemble a computer by himself in 1 hour. Working with an assistant, he can assemble a computer in 40 minutes. How long would it take his assistant to assemble a computer working alone?

41. A larger pipe fills a water tank twice as fast as a smaller pipe. When both pipes are used, they fill the tank in 5 hours. If the larger pipe is left off, then how long would it take the smaller pipe to fill the tank?

43. Working alone, Henry takes 9 hours longer than Mary to clean the carpets in the entire office. Working together, they clean the carpets in 6 hours. How long would it take Mary to clean the office carpets if Henry were not there to help?

45. Jerry can lay a tile floor in 3 hours less time than Jake. If they work together, the floor takes 2 hours. How long would it take Jerry to lay the floor by himself?

47. Harry can paint a shed by himself in 6 hours. Jeremy can paint the same shed by himself in 8 hours. How long will it take them to paint two sheds working together?

49. Jerry can lay a tile floor in 3 hours, and his assistant can do the same job in 4 hours. If Jerry starts the job and his assistant joins him 1 hour later, then how long will it take to lay the floor?

Answers

1: {5, 10}

3: {4, 8}

5: {6, 8}

7: {10, 12}

9: {6, 8}

11: {1, 2} or {−4, −3}

13: {4, 9} or {15, 20}

15: 6 miles per hour

17: 46 miles per hour

19: Trolley: 30 miles per hour; bus: 36 miles per hour

21: Passenger car: 66 miles per hour; aircraft: 130 miles per hour

23: 115 miles per hour

25: 3 miles per hour

27: 6 miles per hour

29: 40 miles per hour

31: 5 miles per hour

33: $4\frac{2}{17}$ hours

35: $27\frac{3}{11}$ minutes

37: 12 hours

39: 2 hours

41: 15 hours

43: 9 hours

45: 3 hours

47: $6\frac{6}{7}$ hours

49: $2\frac{1}{7}$ hours