Again, the sum of the individual rates is equal to the combined rate, so the following rational equation reflects this situation.

$$\begin{aligned} \frac{1}{4}-\frac{1}{x}&=\frac{1}{10} \\ 5x-20&=2x \\ 3x&=20 \\ x&=\frac{20}{3} \end{aligned}$$

Again, we multiply each term by the LCD, $20x$, to arrive at a polynomial equation to solve.

Thus, working alone, the pump can empty the pool in $\frac{20}{3}$ hours, or 6 hours and 40 minutes.

2.5 EXERCISES

PRACTICE

Solve the following rational equations. See Examples 1 and 2.

1. $\dfrac{2x^3+4x^2}{x^2-4x-12}=\dfrac{-7x-6}{x-6}$

2. $\dfrac{-x^2}{x-1}-3=0$

3. $\dfrac{3}{x-2}+\dfrac{2}{x+1}=1$

4. $\dfrac{x}{x-1}+\dfrac{2}{x-3}=-\dfrac{2}{x^2-4x+3}$

5. $\dfrac{1}{t-3}+\dfrac{1}{t+2}=\dfrac{1}{t+3}$

6. $\dfrac{z}{6+z}+\dfrac{z-1}{6-z}=\dfrac{z}{6-z}$

7. $\dfrac{y}{y-1}+\dfrac{2}{y-3}=\dfrac{y^2}{y^2-4y+3}$

8. $\dfrac{2}{2x+1}-\dfrac{x}{x-4}=\dfrac{-3x^2+x-4}{2x^2-7x-4}$

9. $\dfrac{2}{2b+1}+\dfrac{2b^2-b+4}{2b^2-7b-4}=\dfrac{b}{b-4}$

10. $\dfrac{2}{n+3}+\dfrac{3}{n+2}=\dfrac{6}{n}$

11. $\dfrac{1}{x-3}+\dfrac{1}{x+3}=\dfrac{2x}{x^2-9}$

12. $\dfrac{3}{x-1}-\dfrac{3}{x+2}=\dfrac{9}{x^2+x-2}$

13. $\dfrac{1}{|x-3|}=2$

14. $\dfrac{3}{|x+1|}=1$

15. $\dfrac{1}{|x-3|}+\dfrac{1}{|x+1|}=1$

16. $\dfrac{1}{x-2}+\dfrac{2}{|x-1|}=2$

APPLICATIONS

17. If Joanne were to paint her living room alone, it would take 5 hours. Her sister Lisa could do the job in 7 hours. How long would it take them working together?

18. The hot water tap can fill a given sink in 4 minutes. If the cold water tap is turned on as well, the sink fills in 1 minute. How long would it take for the cold water tap to fill the sink alone?

19. The hull of Jack's yacht needs to be cleaned. He can clean it by himself in 5 hours, but he asks his friend Thomas to help him. If it takes 3 hours for the two men to clean the hull of the boat, how long would it have taken Thomas alone?

20. Two hoses, one of which has a flow rate three times the other, can together fill a tank in 3 hours. How long does it take each of the hoses individually to fill the tank?

21. Officials begin to release water from a full man-made lake at a rate that would empty the lake in 12 weeks, but a river that can fill the lake in 30 weeks is replenishing the lake at the same time. How long does it take to empty the lake?

22. In order to flush deposits from a radiator, a drain that can empty the entire radiator in 45 minutes is left open at the same time it is being filled at a rate that would fill it in 30 minutes. How long does it take for the radiator to fill?

23. Jimmy and Janice are picking strawberries. Janice can fill a bucket in a half hour, but Jimmy continues to eat the strawberries that Janice has picked at a rate of one bucket per 1.5 hours. How long does it take Janice to fill her bucket?

24. A farmer can plow a given field in 2 hours less time than it takes his son. If they acquire two tractors and work together, they can plow the field in 5 hours. How long does it take the father alone? Round your answer to one decimal place.