Example Preview

If Sarah were to paint her living room alone, it would take 5 hours. Her sister Rachel could do the job in 8 hours. How many hours would it take them working together?

Solution

The rate of work for Sarah is $\frac{1}{5}$, while the rate of work for her sister Rachel is $\frac{1}{8}$. If we let x denote the time needed to paint the living room when both sisters are working together, the sum of the two individual rates must equal $\frac{1}{x}$. So, we need to solve the equation $\frac{1}{5}+\frac{1}{8}=\frac{1}{x}$. In this case, the LCD is $40x$.

The equation can be solved as follows.

$$\begin{aligned} 40x\cdot\frac{1}{5}+40x\cdot\frac{1}{8} &= 40x\cdot\frac{1}{x} \\ 8x+5x &= 40 \\ 13x &= 40 \\ x &= \frac{40}{13} \end{aligned}$$

It would take them $\frac{40}{13}$, or a little over 3 hours to paint the living room together.

1.R.2 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

1. To find $\frac{1}{2}$ of $\frac{2}{9}$ requires multiplication.

2. $\frac{3}{4}\cdot\frac{9}{10}=\frac{27}{40}$

3. The statement $\frac{1}{3}\cdot\frac{2}{5}=\frac{2}{5}\cdot\frac{1}{3}$ is an example of the associative property of multiplication.

4. The product of a nonzero number and its reciprocal is undefined.

5. The reciprocal of 1 is undefined.

6. The result of $\frac{1}{3} \div \frac{1}{6}$ is 2.

7. The reciprocal of 12 is $\frac{12}{1}$.

Practice

Multiply and reduce to lowest terms. (**Hint:** Factor before multiplying.)

8. $\frac{0}{3} \cdot \frac{5}{7}$

9. $\frac{1}{3} \cdot \frac{3}{4}$

10. $\left(-\frac{1}{5}\right)\left(-\frac{4}{7}\right)$

11. $\frac{5}{16} \cdot \frac{16}{15}$

12. $\frac{9}{10} \cdot \frac{35}{40} \cdot \frac{25}{15}$

Divide and reduce to lowest terms.

13. $\frac{2}{3} \div \frac{3}{4}$

14. $0 \div \frac{5}{6}$

15. $\frac{5}{6} \div 0$

16. $\frac{14}{15} \div \frac{21}{25}$

Applications

Solve.

17. ***Recipes:*** A recipe calls for $\frac{3}{4}$ cups of flour. How much flour should be used if only half of the recipe is to be made?

18. ***Demographics:*** A study showed that $\frac{3}{5}$ of the students in an elementary school were left-handed. If the school had an enrollment of 600 students, how many were left-handed?

19. ***Geology:*** The floor of the Atlantic Ocean is spreading apart at an average rate of $\frac{3}{50}$ of a meter per year. How long will it take for the ocean floor to spread 12 meters?

20. ***Airplane Capacity:*** An airplane is carrying 180 passengers. This is $\frac{9}{10}$ of the capacity of the airplane.

a. Is the capacity of the airplane more or less than 180?

b. If you were to multiply 180 times $\frac{9}{10}$, would the product be more or less than 180?

c. What is the capacity of the airplane?

Writing & Thinking

21. If two fractions are between 0 and 1, can their product be more than 1? Explain.

22. Explain the process of multiplying two fractions. Give an example of a product that cannot be reduced.

23. Explain why the number 0 has no reciprocal.

24. Is division a commutative operation? Explain briefly and give three examples using fractions to help justify your answer.