Questions

1. Multiply then simplify $\dfrac{36}{7} \times \dfrac{5}{9}$.

2. Multiply then simplify $\dfrac{17}{18} \times \dfrac{3}{5}$.

3. Divide then simplify $\dfrac{\frac{5}{8}}{1\frac{3}{4}}$.

4. Divide then simplify $\dfrac{\frac{2}{3}}{1\frac{1}{4}}$.

5. Multiply then simplify $6 \times 4\dfrac{2}{3}$.

6. Multiply then simplify $2\dfrac{1}{2} \times \dfrac{1}{10} \times \dfrac{3}{4}$.

7. Jennifer rode her mountain bike for $4\frac{1}{5}$ miles after work. Two-thirds of the distance was over a mountain bike trail. How long is the mountain bike trail?

Solutions

Technique: write mixed numbers if they occur as improper fractions then multiply or divide using the rules:

To multiply fractions:

1. multiply numerators

2. multiply denominators

To divide fractions:

1. invert the second fraction (the divisor)

2. then multiply the two fractions

1.

$$\begin{aligned}
\frac{36}{7} \times \frac{5}{9} &= \frac{36 \times 5}{7 \times 9} \text{ multiply numerator and denominator} \\
&= \frac{\cancel{9} \times 4 \times 5}{7 \times \cancel{9}} \text{ factor to simplify} \\
&= \frac{20}{7}
\end{aligned}$$

2.

$$\begin{aligned}
\frac{17}{18} \times \frac{3}{5} &= \frac{17 \times 3}{18 \times 5} \\
&= \frac{17 \times \cancel{3}}{\cancel{3} \times 6 \times 5} \\
&= \frac{17}{30}
\end{aligned}$$

3. Convert mixed numbers to improper fractions.

$$1\frac{3}{4} = 1 + \frac{3}{4} = \frac{4}{4} + \frac{3}{4} = \frac{4+3}{4} = \frac{7}{4}$$

$$\frac{\frac{5}{8}}{1\frac{3}{4}} = \frac{\frac{5}{8}}{\frac{7}{4}}$$
$$= \frac{5}{8} \times \frac{4}{7}$$
$$= \frac{5 \times 4}{8 \times 7}$$
$$= \frac{5 \times \cancel{4}}{2 \times \cancel{4} \times 7}$$
$$= \frac{5}{14}$$

4. Convert mixed numbers to improper fractions.

$$1\frac{1}{4} = 1 + \frac{1}{4} = \frac{4}{4} + \frac{1}{4} = \frac{4+1}{4} = \frac{5}{4}$$

$$\frac{\frac{2}{3}}{1\frac{1}{4}} = \frac{\frac{2}{3}}{\frac{5}{4}}$$
$$= \frac{2}{3} \times \frac{4}{5}$$
$$= \frac{2 \times 4}{3 \times 5}$$
$$= \frac{8}{15}$$

5.

$$4\frac{2}{3} = 4 + \frac{2}{3} = \frac{4 \times 3}{3} + \frac{2}{3} = \frac{12}{3} + \frac{2}{3} = \frac{12+2}{3} = \frac{14}{3}$$

$$6 \times 4\frac{2}{3} = 6 \times \frac{14}{3}$$
$$= \frac{6 \times 14}{3}$$
$$= \frac{2 \times \cancel{3} \times 14}{\cancel{3}} = 28$$

6.

$$2\frac{1}{2} = 2 + \frac{1}{2} = \frac{2 \times 2}{2} + \frac{1}{2} = \frac{4}{2} + \frac{1}{2} = \frac{4+1}{2} = \frac{5}{2}$$

$$2\frac{1}{2} \times \frac{1}{10} \times \frac{3}{4} = \frac{5}{2} \times \frac{1}{10} \times \frac{3}{4}$$
$$= \frac{5 \times 1 \times 3}{2 \times 10 \times 4}$$
$$= \frac{\cancel{5} \times 1 \times 3}{2 \times 2 \times \cancel{5} \times 4}$$
$$= \frac{3}{16}$$

7. The mountain bike trail will have length $\frac{2}{3}$ of the distance traveled.

$$\frac{2}{3} \times 4\frac{1}{5} = \frac{2}{3} \times \frac{21}{5}$$
$$= \frac{2 \times 21}{3 \times 5}$$
$$= \frac{2 \times 7 \times \cancel{3}}{\cancel{3} \times 5}$$
$$= \frac{14}{5}$$

The mountain bike trail is $\frac{14}{5} = 2\frac{4}{5}$ miles long.