Questions

1. Multiply then simplify \( \frac{36}{7} \times \frac{5}{9} \).
2. Multiply then simplify \( \frac{17}{18} \times \frac{3}{5} \).
3. Divide then simplify \( \frac{58}{1\frac{3}{4}} \).
4. Divide then simplify \( \frac{2}{1\frac{1}{4}} \).
5. Multiply then simplify \( 6 \times \frac{2}{3} \).
6. Multiply then simplify \( 2\frac{1}{2} \times \frac{1}{10} \times \frac{3}{4} \).
7. Jennifer rode her mountain bike for \( 4\frac{1}{2} \) 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. \[ \frac{36}{7} \times \frac{5}{9} = \frac{36 \times 5}{7 \times 9} \text{ multiply numerator and denominator} \]
   \[ = \frac{9 \times 4 \times 5}{7 \times 9} \text{ factor to simplify} \]
   \[ = \frac{20}{7} \]

2. \[ \frac{17}{18} \times \frac{3}{5} = \frac{17 \times 3}{18 \times 5} \]
   \[ = \frac{17 \times 3}{3 \times 6 \times 5} \]
   \[ = \frac{17}{30} \]
3. Convert mixed numbers to improper fractions.

\[
\frac{3}{4} = 1 + \frac{3}{4} = \frac{4}{4} + \frac{3}{4} = \frac{4+3}{4} = \frac{7}{4}
\]

\[
5\frac{3}{4} = \frac{5 \times 4 + 3}{4} = \frac{23}{4} = 5\frac{3}{4}
\]

4. Convert mixed numbers to improper fractions.

\[
1\frac{1}{4} = 1 + \frac{1}{4} = \frac{4}{4} + \frac{1}{4} = \frac{4+1}{4} = \frac{5}{4}
\]

\[
2\frac{2}{4} = \frac{2 \times 4 + 2}{4} = \frac{10}{4} = 2\frac{1}{2}
\]

5. Convert mixed numbers to improper fractions.

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

\[
6 \times \frac{2}{3} = \frac{6 \times 2}{3} = \frac{12}{3} = 2 \times \frac{12}{3} = 2 \times 4 = 8
\]

6.

\[
2\frac{1}{2} = 2 + \frac{1}{2} = \frac{2 \times 2 + 1}{2} = \frac{4+1}{2} = \frac{5}{2}
\]

\[
2\frac{1}{2} \times \frac{1}{10} \times \frac{3}{4} = \frac{5}{2} \times \frac{1}{10} \times \frac{3}{4}
\]

\[
= \frac{5 \times 1 \times 3}{2 \times 10 \times 4}
\]

\[
= \frac{5 \times 3}{2 \times 4}
\]

\[
= \frac{3}{16}
\]

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

\[
\frac{2}{3} \times \frac{41}{5} = \frac{2 \times 41}{3 \times 5}
\]

\[
= \frac{2 \times 21}{3 \times 5}
\]

\[
= \frac{2 \times 7 \times 3}{3 \times 5}
\]

\[
= \frac{14}{15}
\]

The mountain bike trail is \( \frac{14}{15} = 2\frac{2}{3} \) miles long.