BIG IDEAS:

- Positive fractions can be written as a **sum of unit fractions**
- A **common denominator** is used for **adding** and **subtracting** fractions
- **Mixed numbers** can be added and subtracted by **converting to improper fractions** or by looking at the **whole part and fraction part** separately

EXAMPLE 1

a) $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$

b) $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$

$= \frac{5}{3} \quad \left(\text{or } 1\frac{2}{3}\right)$

c) $\frac{9}{11} - \frac{3}{11}$

$= \frac{6}{11}$

EXAMPLE 2

$2\frac{3}{5} + 4\frac{3}{4}$

$= \frac{13}{5} + \frac{19}{4}$ — Convert to improper fractions

$= \frac{13 \times 4}{5 \times 4} + \frac{19 \times 5}{4 \times 5}$ — Rewrite with common denominator

$= \frac{52}{20} + \frac{95}{20}$

$= \frac{147}{20}$ — Add the fractions

$= 7\frac{7}{20}$ — Convert to mixed number (if needed)

EXAMPLE 3

a) $\frac{10}{17} + \frac{-6}{17}$

$= \frac{4}{17}$

b) $-\frac{10}{9} - \left(-\frac{5}{6}\right)$

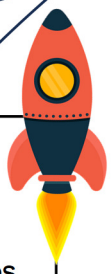
$= -\frac{10}{9} + \frac{5}{6}$

$= -\frac{20}{18} + \frac{15}{18}$

$= -\frac{5}{18}$

MORE EXAMPLES

Things to remember...



THINKING BEYOND...

1. Mark has 4 metres of electrical wire. He uses $1\frac{1}{3}$ metres to move an electrical outlet in his basement. Later, Mark uses half of the remaining wire for another project. How much wire does Mark have left?
2. **Sigma notation** provides a concise way to represent sums. For example, $\sum_{n=1}^{5} n^2 = 1^2 + 2^2 + 3^2 + 4^2 + 5^2$, which equals 55. Determine the value of each of the following.

a) $\sum_{n=1}^{10} n$ b) $\sum_{n=1}^{4} \frac{1}{n}$ c) $\sum_{n=1}^{3} \frac{3}{n^2}$ d) $\sum_{n=1}^{4} \frac{2n}{n+1}$