

## Rules of Arithmetic Part 2

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Graduate Bsc (Hons) MathsSci (Open) GIMA

### Combination of Fractions and Whole Numbers

When using a combination of whole numbers and fractions we have to be careful. For addition and subtraction we can add/subtract the whole numbers and add/subtract the fractions separately and then combine them together at the end. Alternatively we can change them into top-heavy fractions and then apply the rules for fractions and arithmetic. For multiplication and division we have no option but to using the top heavy method.

Top heavy fractions method

$$3\frac{1}{2} = \frac{(3 \cdot 2 + 1)}{2} = \frac{7}{2}$$

$$5\frac{1}{3} = \frac{(5 \cdot 3 + 1)}{3} = \frac{16}{3}$$

Addition:  $5\frac{1}{3} + 3\frac{1}{2}$

$$5\frac{1}{3} + 3\frac{1}{2} = (5 + 3) + \left(\frac{1}{3} + \frac{1}{2}\right) = 8 + \left(\frac{2 + 3}{6}\right) = 8 + \frac{5}{6} = 8\frac{5}{6}$$

Or

$$5\frac{1}{3} + 3\frac{1}{2} = \left(\frac{16}{3} + \frac{7}{2}\right) + \left(\frac{32}{6} + \frac{21}{6}\right) = \left(\frac{53}{6}\right) = 8\frac{5}{6}$$

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Subtraction:  $5\frac{1}{3} - 3\frac{1}{2}$

Same idea

$$5\frac{1}{3} - 3\frac{1}{2} = (5-3) + \left(\frac{1}{3} - \frac{1}{2}\right) = 2 + \left(\frac{2-3}{6}\right) = 2 - \frac{1}{6} = 1\frac{5}{6}$$

Or

$$5\frac{1}{3} - 3\frac{1}{2} = \left(\frac{16}{3} - \frac{7}{2}\right) = \frac{32-21}{6} = \frac{11}{6} = 1\frac{5}{6}$$

Multiplication: No option **must** use top heavy method.

$$5\frac{1}{3} \cdot 3\frac{1}{2} = \left(\frac{16}{3} \cdot \frac{7}{2}\right) = \frac{112}{6} = 18\frac{4}{6} = 18\frac{2}{3}$$

Division: No option **must** use top heavy method.

$$5\frac{1}{3} \div 3\frac{1}{2} = \left(\frac{16}{3} \cdot \frac{2}{7}\right) = \frac{32}{21}$$