

Some Basic Facts about Fractions

Rewrite an integer as a fraction

$$x = \frac{x}{1}$$

Example 1: $2 = \frac{2}{1}$

Example 2: $85 = \frac{85}{1}$

Rewrite a negative fraction

$$-\frac{a}{b} = \frac{-a}{b} = \frac{a}{-b}$$

Example 1: $-\frac{2}{3} = \frac{-2}{3} = \frac{2}{-3}$

Example 2: $-\frac{1}{9} = \frac{-1}{9} = \frac{1}{-9}$

Rewrite a fraction in simplest form

$$\frac{xc}{xd} = \frac{x}{x} \cdot \frac{c}{d} = 1 \cdot \frac{c}{d} = \frac{c}{d}$$

Example 1:

$$\frac{12}{16} = \frac{3 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 2} = \frac{3}{2 \cdot 2} \cdot \frac{2 \cdot 2}{2 \cdot 2} = \frac{3}{2 \cdot 2} \cdot 1 = \frac{3}{4}$$

Example 2: $\frac{100}{120} = \frac{2 \cdot 2 \cdot 5 \cdot 5}{2 \cdot 2 \cdot 5 \cdot 6} = \frac{2 \cdot 2 \cdot 5}{2 \cdot 2 \cdot 5} \cdot \frac{5}{6} = 1 \cdot \frac{5}{6} = \frac{5}{6}$

Rewrite the zero fraction

$$\frac{0}{1} = \frac{0}{5} = \frac{0}{100} = \frac{0}{\text{anything}} = 0$$

But remember:

$$\frac{1}{0} = \frac{5}{0} = \frac{100}{0} = \frac{\text{anything}}{0} = \text{undefined}$$

Divide with fractions

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$$

Example 1: $\frac{2}{3} \div \frac{5}{7} = \frac{2}{3} \cdot \frac{7}{5} = \frac{2 \cdot 7}{3 \cdot 5} = \frac{14}{15}$

Example 2: $3 \div \frac{2}{7} = \frac{3}{1} \div \frac{2}{7} = \frac{3}{1} \cdot \frac{7}{2} = \frac{3 \cdot 7}{1 \cdot 2} = \frac{21}{2} = 10\frac{1}{2}$

Add with fractions

$$\frac{a}{b} + \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{d} + \frac{c}{d} \cdot \frac{b}{b} = \frac{ad}{bd} + \frac{cb}{db} = \frac{ad}{bd} + \frac{cb}{bd} = \frac{ad + cb}{bd}$$

Example 1: $\frac{1}{3} + \frac{3}{7} = \frac{1 \cdot 7}{3 \cdot 7} + \frac{3 \cdot 3}{7 \cdot 3} = \frac{7}{21} + \frac{9}{21} = \frac{7+9}{21} = \frac{16}{21}$

Example 2: $3 + \frac{3}{5} = \frac{3}{1} + \frac{3}{5} = \frac{3 \cdot 5}{1 \cdot 5} + \frac{3 \cdot 1}{5 \cdot 1} = \frac{3 \cdot 5}{1 \cdot 5} + \frac{3 \cdot 1}{5 \cdot 1} = \frac{15}{5} + \frac{3}{5} = \frac{15+3}{5} = \frac{18}{5} = 3\frac{3}{5}$