Fractions

Key Vocabulary

- numerator
- denominator
- proper fraction
- improper fraction
- factor
- highest common multiple
- lowest common multiple
- equivalents
- common numerator
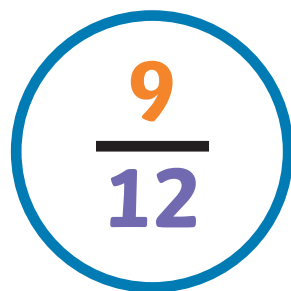- common denominator
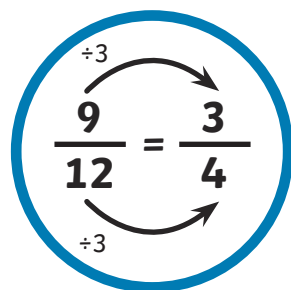- decimal equivalent
- simplify
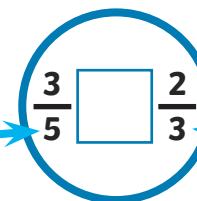- simplest form
- mixed number
- whole number
- mixed number

Simplify Fractions

$$\frac{9}{12}$$

Factors of 9:
1, **3**, 9

Factors of 12:
1, 2, **3**, 4, 6, 12

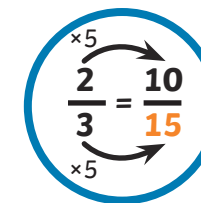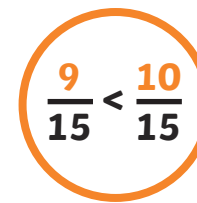$$\frac{9}{12} \overset{\div 3}{\underset{\div 3}{=}} \frac{3}{4}$$

Compare and Order Fractions

Use the Common Denominator

Multiples of 5:
5, 10, **15**

$$\frac{3}{5} \;\square\; \frac{2}{3}$$

Multiples of 3:
3, 6, 9, 12, **15**

$$\frac{3}{5} \overset{\times 3}{\underset{\times 3}{=}} \frac{9}{15}$$

$$\frac{9}{15} < \frac{10}{15}$$
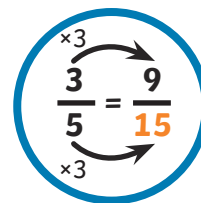
$$\frac{2}{3} \overset{\times 5}{\underset{\times 5}{=}} \frac{10}{15}$$

Use the Common Numerator

Multiples of 5:
5, **10**, 15

$$\frac{5}{8} \;\square\; \frac{10}{13}$$

Multiples of 10:
10, 20

$$\frac{5}{8} \overset{\times 2}{\underset{\times 2}{=}} \frac{10}{16}$$

$$\frac{10}{16} < \frac{10}{13}$$

$$\frac{10}{13} = \frac{10}{13}$$
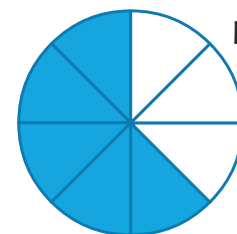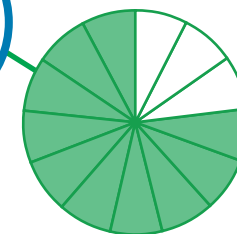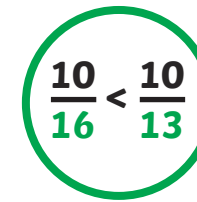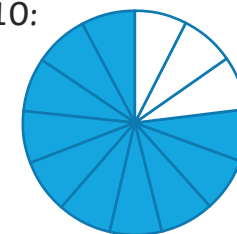
Adding and Subtracting Proper Fractions

Same Denominators

$$\frac{4}{7} + \frac{2}{7} = \frac{6}{7}$$

$$\frac{8}{11} - \frac{3}{11} = \frac{5}{11}$$

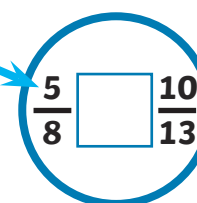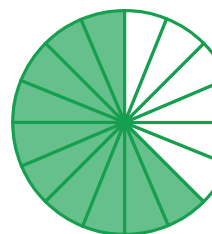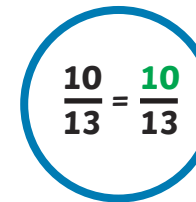### Different Denominators

$$\frac{2}{7} \quad \frac{3}{5}$$

Multiples of 7: 7, 14, 21, 28, **35**
Multiples of 5: 5, 10, 15, 20, 25, 30, **35**

$$\frac{2}{7} = \frac{10}{35}, \ \frac{3}{5} = \frac{21}{35}$$

$$\frac{10}{35} + \frac{21}{35} = \frac{31}{35}$$

$$\frac{9}{10} \quad \frac{1}{4}$$

Multiples of 10: 10, **20**
Multiples of 4: 4, 8, 12, 16, **20**

$$\frac{9}{10} = \frac{18}{20}, \ \frac{1}{4} = \frac{5}{20}$$

$$\frac{18}{20} - \frac{5}{20} = \frac{13}{20}$$

Multiplying Proper Fractions

Multiplying Fractions by Fractions

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

Multiplying Fractions by Whole Numbers

$$\frac{2}{5} \times 3 \rightarrow \qquad 3 = \frac{3}{1}$$

$$\frac{2}{5} \times \frac{3}{1} = \frac{6}{5} = 1\frac{1}{5}$$

Adding and Subtracting Mixed Numbers

Add or subtract the whole numbers and fractions separately.

$$2\frac{2}{5} + 1\frac{3}{10}$$

$$2 + 1 = 3$$

$$\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$$

$$3 + \frac{7}{10} = 3\frac{7}{10}$$

$$2\frac{1}{2} - 1\frac{1}{4}$$

$$2 - 1 = 1$$

$$\frac{1}{2} - \frac{1}{4} = \frac{2}{4} - \frac{1}{4} = \frac{1}{4}$$

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

Convert the mixed numbers to improper fractions.

$$2\frac{2}{5} + 1\frac{3}{10}$$

$$2\frac{2}{5} = \frac{12}{5} \qquad 1\frac{3}{10} = \frac{13}{10}$$

$$\frac{12}{5} + \frac{13}{10} = \frac{24}{10} + \frac{13}{10} = \frac{37}{10}$$

$$\frac{37}{10} = 3\frac{7}{10}$$

$$2\frac{1}{2} - 1\frac{1}{4}$$

$$2\frac{1}{2} = \frac{5}{2} \qquad 1\frac{1}{4} = \frac{5}{4}$$

$$\frac{5}{2} - \frac{5}{4} = \frac{10}{4} - \frac{5}{4} = \frac{5}{4}$$

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

Dividing Fractions by Whole Numbers

$$\frac{2}{5} \div 2 = \frac{1}{5}$$

Multiplication and division are the inverse of one another so:

$\div \, 2$ is the same as $\times \frac{1}{2}$

$$\frac{2}{5} \times \frac{1}{2} = \frac{2}{10}$$