

MTH1W Grade 9 Mathematics

2.1 Adding and Subtracting Fractions and Mixed Numbers

- Goal(s)**
- Use unit fractions to help add and subtract fractions
 - Solve addition and subtraction problems with positive and negative fractions and mixed numbers
 - Solve problems with various measurement systems

Page 50 #s 1, 2ab, 3bd, 6ace, 7ace, 8ace,
9, 10acegik, 11

Page 52 #s 17abij, 19ab, 22

Use unit fractions to represent $\frac{3}{4}$ as a sum of its parts.

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

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

Give two different (but equivalent) answers to the addition statement below.

$$\begin{aligned}\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} &= \frac{4}{3} = 1\frac{1}{3} \\ \underbrace{\hspace{1.5cm}} & \\ &= \frac{3}{3} = 1 \\ &1 + \frac{1}{3} = 1\frac{1}{3}\end{aligned}$$

How can these values be added?

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

add the whole numbers

$$1 + 2 = 3$$

add the fractions

$$\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$$

$$\Rightarrow 3 + \frac{4}{5} = 3\frac{4}{5}$$

How many one-fourths are you starting with? How many are being taken away? How many are left?

$$2\frac{3}{4} - 1\frac{1}{4}$$

Subtract the whole numbers

$$2 - 1 = 1$$

Subtract the fractions

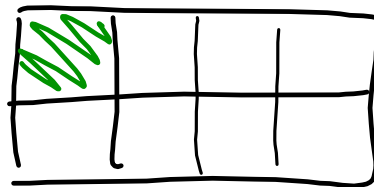
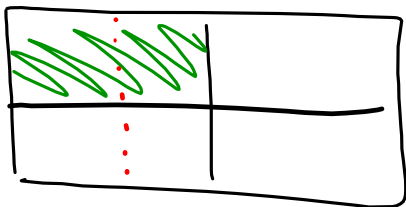
$$\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$$

$$\Rightarrow 1 + \frac{2}{4} = 1\frac{2}{4} \text{ (or } 1\frac{1}{2}\text{)}$$

↖ add because we want both!

How are the denominators related? How can equivalent fractions be used to add them?

$$\frac{1}{4} + \frac{1}{8}$$



$$= \frac{2}{8} + \frac{1}{8}$$

$$= \frac{3}{8}$$

$\frac{1}{4}$ is equivalent to $\frac{2}{8}$

How are the denominators related? How can equivalent fractions be used to subtract them?

$$5\frac{5}{7} - 3\frac{2}{14}$$

Subtract the whole numbers

$$5 - 3 = 2$$

find equivalent fractions

$$\frac{5}{7} - \frac{2}{14}$$

$$\frac{5}{7} \times \frac{2}{2} - \frac{2}{14}$$

$$= \frac{10}{14} - \frac{2}{14}$$

$$= \frac{8}{14}$$

$$\Rightarrow 2 + \frac{8}{14}$$

$$= 2\frac{8}{14} \text{ (or } 2\frac{4}{7}\text{)}$$

again we want both!

Adding and Subtracting Fractions and Mixed Numbers

To add or subtract fractions it is important to remember that we need to work with a **common denominator**.

A common denominator can be found by **multiplying the denominators** together. For example:

$$\frac{2}{3} + \frac{3}{5} \quad \text{The common denominator for these fractions would be } 3 \times 5 \text{ or } 15.$$

To create equivalent fractions with the new denominator, **multiply** both **each numerator** by the **appropriate denominator**.

$$\frac{2}{3} + \frac{3}{5} = \frac{2 \times 5}{15} + \frac{3 \times 3}{15} = \frac{10}{15} + \frac{9}{15}$$

Only add / subtract the numerators of the equivalent fractions and reduce if needed.

$$\frac{2}{3} + \frac{3}{5} = \frac{2 \times 5}{15} + \frac{3 \times 3}{15} = \frac{10}{15} + \frac{9}{15} = \frac{19}{15} = 1\frac{4}{15}$$

Evaluate

$$\begin{aligned}\frac{2}{5} - \frac{1}{10} &= \frac{2}{5} \times \frac{2}{2} - \frac{1}{10} \\ &= \frac{4}{10} - \frac{1}{10} \\ &= \frac{3}{10}\end{aligned}$$

$$\begin{aligned}3\frac{2}{3} + 1\frac{1}{10} &= \\ 3 + 1 &= 4 \qquad \frac{2}{3} + \frac{1}{10} \\ &= \frac{2 \times 10}{3 \times 10} + \frac{3 \times 1}{3 \times 10} \\ &= \frac{20}{30} + \frac{3}{30} \\ &= \frac{23}{30} \\ \Rightarrow 4 + \frac{23}{30} &= 4\frac{23}{30}\end{aligned}$$

Calculate.

$$2\frac{7}{10} + 4\frac{9}{10} =$$

$$2 + 4 = 6$$

$$\frac{7}{10} + \frac{9}{10}$$

$$= \frac{16}{10}$$

$$\Rightarrow 6 + 1\frac{6}{10}$$

$$= 7\frac{6}{10}$$

$$\text{(or } 7\frac{3}{5}\text{)}$$

$$4\frac{1}{8} - 1\frac{3}{4} =$$

$$4 - 1 = 3$$

$$\frac{1}{8} - \frac{3}{4}$$

$$= \frac{1}{8} - \frac{3}{4} \times \frac{2}{2}$$

$$= \frac{1}{8} - \frac{6}{8}$$

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

$$\Rightarrow 3 + \frac{-5}{8}$$

$$= \frac{3}{1} \times \frac{8}{8} - \frac{5}{8}$$

$$= \frac{24}{8} - \frac{5}{8} = \frac{19}{8} = 2\frac{3}{8}$$