Goals: To consider how addition and subtraction of mixed numbers can be done.

* How can we add and subtract mixed numbers

Draw a picture depicting the meaning of the problem which also shows the result for $3\frac{1}{2}-2\frac{1}{4}$

# How can we add and subtract mixed numbers?

There are two basic methods for adding and subtracting mixed numbers.

1. Turn the mixed numbers into improper fractions and add or subtract the numbers as fractions.

2. Consider the mixed numbers as the sum of whole parts and fractional parts.

Depending on how hard the problems are, we may choose either method, selecting of course, the one that feels easier to us.

Example: Simplify

$$7\frac{2}{9}+3\frac{1}{3}=$$

Note: Turning these into improper fractions seems unnecessarily hard, let’s instead just add the whole parts and then add up the fractional parts:

$$\left(7+3\right)+\left(\frac{2}{9}+\frac{1}{3}\right)=10+\left(\frac{2}{9}+\frac{3}{9}\right)=10\frac{5}{9}$$

Example: Simplify

$$1\frac{7}{9}+2\frac{4}{5}=$$

Note: the answer is 3 and change, or more likely 4 and some change, but to get the exact answer neither method seems easier than the other. Let’s try method 1 then.

$$1\frac{7}{9}+2\frac{4}{5}=\frac{16}{9}+\frac{14}{5}$$

$$=\left(\frac{5}{5}\right)\frac{16}{9}+\frac{14}{5}\left(\frac{9}{9}\right)$$

$$=\frac{80}{45}+\frac{126}{45}$$

$$=\frac{206}{45} $$

What if the fractions you are adding or subtracting have no common factors in the divisors? There is a quick thing you can do to add these types of fractions.

Example:

1. $\frac{1}{2}+\frac{1}{3}=$ b) $\frac{1}{5}+\frac{2}{3}=$ c) $\frac{3}{4}+\frac{1}{5}=$ d) $\frac{5}{7}+\frac{3}{8}=$

Which is not necessarily what we would do if there is a common factor in the divisors.

Example:

1. $\frac{1}{2}+\frac{1}{4}=$ b) $\frac{2}{3}+\frac{1}{6}=$ c) $\frac{1}{6}+\frac{1}{4}=$

Now in the case of Mixed numbers, we can just add the whole number parts and more easily add the fraction parts.

Example: Simplify

1. $3\frac{1}{2}+2\frac{1}{2}=$ b) $17\frac{3}{4}+2\frac{1}{4}=$ c) $20\frac{1}{3}+22\frac{1}{2}=$

d) $13\frac{2}{3}+5\frac{1}{4}=$ e) $1\frac{7}{9}+2\frac{3}{5}=$ f) $54\frac{6}{7}+22\frac{1}{3}=$

When subtracting it is important to remember what a mixed number means.

Example:

T / F $- 2\frac{1}{2}=-2+\frac{1}{2} $

T / F $- 5\frac{1}{2}=-5+\frac{1}{2}=-4\frac{1}{2} $

T / F $- 3\frac{1}{3}=-2-\frac{1}{3} $

Practice doing these in your head, see if you can find an easy way to think about it.

Example: Simplify

1. $3-\frac{1}{2}=$ b) $5-\frac{2}{5}=$ c) $7-\frac{3}{8}=$ d) $4-1\frac{1}{2}=$

e) $102-\frac{1}{2}=$ f)$ 1003-\frac{4}{5}=$ g) $496-\frac{99}{100}=$ h) $3-\frac{91}{100}=$

i) $3-\frac{47}{50}=$ j) $6-\frac{19}{20}=$ k) $9-\frac{8}{7}=$ l) $18-15\frac{47}{50}=$

Now that we practiced this skill we are better prepared for subtracting mixed numbers.

1. $3\frac{1}{2}-2\frac{1}{2}=$ b) $13\frac{1}{2}-8\frac{1}{4}=$ c) $7\frac{2}{3}-5\frac{1}{6}=$ d) $8\frac{3}{4}-2\frac{1}{2}=$

e) $103\frac{1}{6}-100\frac{3}{4}=$ f) $3\frac{1}{2}-2\frac{3}{4}=$ g) $13\frac{1}{4}-2\frac{1}{2}=$ h) $21\frac{13}{15}-20\frac{14}{15}=$

i) $ 15\frac{90}{100}-13\frac{91}{100}=$ j) $2\frac{1}{2}-3\frac{1}{2}=$ k) $35\frac{1}{2}-35\frac{2}{3}=$ l) $7\frac{1}{3}-5\frac{1}{2}=$

Draw a picture depicting the meaning of the problem which also shows the result for $5\frac{2}{3}-1\frac{1}{3}$