Fractions (Part 3)

Recall

- First estimate then multiply: $\frac{1}{3} \times 3 \frac{3}{4}$
- Divide: $\frac{5}{16} \div \frac{25}{32}$

Adding Fractions

- Does this make sense? $\frac{1}{4} + \frac{3}{8} = \frac{4}{12} = \frac{1}{3}$
- Represent the problem with a picture. What do we need to do to add these two fractions?

Adding/Subtracting Fractions (Same Denominator)

- Example: $\frac{3}{4} - \frac{1}{4}$
- Example: $\frac{5}{8} + \frac{7}{8}$
- Try Yourself: $\frac{7}{32} + \frac{9}{32} + \frac{5}{32}$
- Try Yourself: $\frac{15}{16} - \frac{9}{16}$

Application Problem

- A pipe has an outer diameter of $\frac{13}{16}$" and inner diameter of $\frac{11}{16}$". What is the thickness of the pipe?
Common Denominators

As discussed before, in order to add/subtract fractions we need a common denominator (same number on the bottoms of the fractions).
To do this we are looking for a number that each of the denominators goes into.
There can be many common denominators, but if we find the least common denominator (LCD) we can work with smaller numbers and our calculations will be easier.

Adding/Subtracting Fractions (Different Denominators)

Example: \( \frac{3}{4} + \frac{5}{6} \)

1. What is the common denominator:
2. What is \( \frac{3}{4} \) written with the com. den.:
   
   What is \( \frac{5}{6} \) written with the com. den.:
3. Rewrite the problem with the common denominators and add:

Application Problem

A part is supposed to have a length of \( \frac{5}{8} \)\" once machined. If the tolerance is \( \pm \frac{1}{16} \)\", what are the shortest and longest tolerable lengths they could be?

Try Yourself

1) \( \frac{2}{2} + \frac{5}{8} \)

2) \( \frac{11}{32} + \frac{3}{4} \)
Try Yourself

3) A washer has an outer diameter of \( \frac{7}{8} \). The wall thickness of the washer is \( \frac{3}{32} \). What is the inner diameter?

Adding Mixed Numbers

To add mixed numbers, you can always change the mixed numbers to improper fractions and add as previously shown.

It's often easier to add the whole numbers, add the proper fractions and change any improper fraction to a mixed number and combine.

Example: \( 3 \frac{1}{2} + 2 \frac{3}{4} \)

Adding Mixed Numbers

Example: \( 6 \frac{1}{8} + 1 \frac{3}{16} \)

Example: \( 3 \frac{1}{2} + \frac{3}{4} + 4 + 2 \frac{5}{8} + 4 \frac{1}{16} \)

Subtracting Mixed Numbers

If the problem is set up that you would be subtracting a larger proper fraction from a smaller one, borrow 1 from the whole number part of the first mixed fraction.

Example: \( 6 \frac{1}{4} - 2 \frac{3}{4} \)

Try Yourself

1) \( 6 \frac{5}{8} + 3 \frac{11}{16} + 2 \frac{1}{2} \)

2) \( 4 \frac{3}{16} - 2 \frac{3}{32} \)

3) \( 5 - 2 \frac{13}{16} \)
Application Problem

Three parts with lengths of $2\frac{3}{8}$, $4\frac{5}{16}$, and $\frac{3}{4}$ are lined up and welded together. What is the total length if $\frac{1}{16}$ length should be added for the weld between each part?

Differences between multiplying and adding fractions

Compare the two problems: What do each look like with a picture before solving?

\[ \frac{1}{2} \times \frac{4}{5} \]

\[ \frac{1}{2} + \frac{4}{5} \]

Order of Operations and Fractions

Recall: What are the steps to the order of operations?

Example: $\frac{3}{4}(\frac{5}{6} - \frac{3}{8}) - \frac{7}{32}$

Application Problem

The following sizes of piping are needed to be cut. What is the total needed: five pieces of $2\frac{3}{4}$, three pieces of $1\frac{5}{8}$, and eight pieces of $6\frac{1}{2}$.

Try Yourself

1) You are working on a bar that is $21\frac{1}{4}$" wide. You are to drill five holes in the bar with the distance from the ends to the centers of the first and last holes being $1\frac{15}{16}$. What is the distance between the holes?

Try Yourself

2) You start with a $60"$ piece of round stock and cut four pieces of $4\frac{3}{4}"$. For each piece cut, $\frac{1}{16}$" is lost due to cutting. How much of the original piece of round stock is leftover?