## Fractions (Part 3)

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## Recall

, First estimate then multiply: $\frac{1}{3} \times 3 \frac{3}{4}$

- Divide: $\frac{5}{16} \div \frac{25}{32}$


## 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?


## Common Denominators

, What are the common denominators for the following sets of denominators?
8, 32

4, 6

5, 8, 16
Try Yourself:

- 3,16

10, 4


## Adding/Subtracting Fractions

- Example: $\frac{5}{16}+\frac{3}{32}$

Example: $\frac{7}{8}+\frac{1}{6}$

## Try Yourself

-1) $\frac{3}{2}+\frac{5}{8}$
-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 $\frac{3}{32}{ }^{2}$. What is the inner diameter?

## Adding Mixed Numbers

- To add mixed numbers, you can always changed 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: $3 \frac{1}{2}+2 \frac{3}{4}$


## 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: $6 \frac{1}{4}-2 \frac{3}{4}$
, Example: $3 \frac{1}{2}+\frac{3}{4}+4+2 \frac{5}{8}+4 \frac{1}{16}$


## Subtracting Mixed Numbers

, Example: $12 \frac{9}{16}-10 \frac{1}{2}$
, Example: $8 \frac{1}{8}-3 \frac{11}{32}$

## Try Yourself

1) $6 \frac{5}{8}+3 \frac{13}{16}+2 \frac{1}{2}$
-2) $4 \frac{3}{16}-2 \frac{3}{32}$
, 3) $5-2 \frac{13}{16}$

## Application Problem

- Three parts with lengths of $2 \frac{1}{8}$ ", $4 \frac{3}{16}$ ", 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?


## Order of Operations and Fractions

- Recall: What are the steps to the order of operations?
- Example: $\frac{3}{4}\left(\frac{5}{8}-\frac{3}{16}\right)-\frac{7}{32}$


## 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 are last holes being $1 \frac{15}{16}$ ". What is the distance between the holes?


## Differences between multiplying and adding fractions

- Compare the two problems: What do each look like with a picture before solving?
, $\frac{1}{2} \times \frac{4}{2}$
, $\frac{1}{2}+\frac{4}{5}$


## 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

-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?

