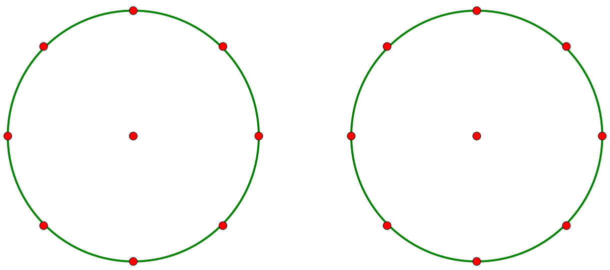
COMMON DENOMINATORS Name ______________________________________

Shade in $\frac{3}{8}$ of the first circle and $\frac{1}{8}$ of the second circle.



If you were to combine the shaded pieces together into one circle, how much of the circle would be shaded?

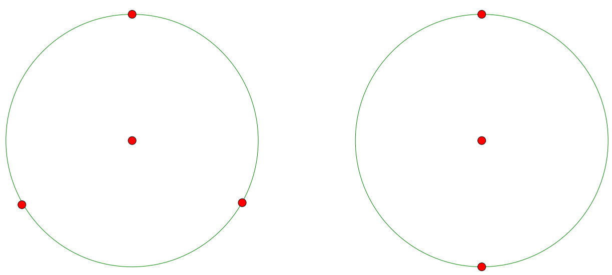
Combining pieces of a whole (or adding fractions) is not too much of a problem if the sizes of the pieces are the same.

When the sizes of the pieces in two fractions are the same we say that the two fractions have “common denominators.”

So, $\frac{3}{8}$ and $\frac{1}{8}$ are two fractions with common denominators or same size pieces.

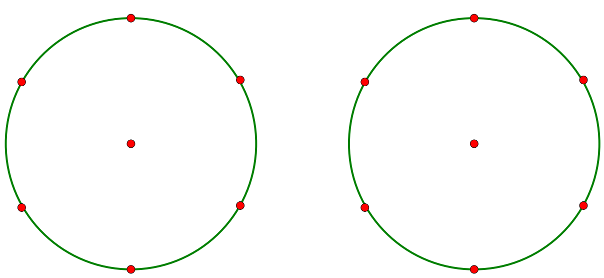
$$\frac{3}{8}+\frac{1}{8}=$$

Shade in $\frac{1}{3}$ of the first circle and $\frac{1}{2}$ of the second circle.



If you were to combine the shaded pieces together into one circle, it would be difficult to add the pieces because they are different sizes.

Shade in $\frac{2}{6}$ of the first circle and $\frac{3}{6}$ of the second circle.



You should now be able to combine the pieces. How much of one circle would be shaded if you combined the pieces?

When the two fractions you are adding do not have same size pieces, adding the two fractions can be more of a challenge.

The process of finding equivalent fractions that use the same size pieces is called, “finding the common denominator.”

Notice in the problem on the left that $\frac{1}{3}$ and $\frac{1}{2}$ use different size pieces, making it more difficult to add the two fraction together.

Since $\frac{1}{3}=\frac{2}{6}$ and $\frac{1}{2}=\frac{3}{6}$ instead of adding $\frac{1}{3}$ and $\frac{1}{2}$ we can use equivalent fractions having the same denominator (or same size pieces) and then combine the pieces. In other words, by adding $\frac{2}{6}$ and $\frac{3}{6}$ we get the same result.

$\frac{1}{3}+\frac{1}{2}$ is the same as $\frac{2}{6}+\frac{3}{6}$

$$\frac{2}{6}+\frac{3}{6}=$$

Finding the common denominator is related to finding the LCM. Remember back in Unit 2, we found the LCM (Least Common Multiple) in a couple of different ways.

If the numbers are familiar enough, you can sometimes come up with the LCM "off the top of your head." For example, the least common multiple of 2 and 3 is 6 because 6 is the smallest number that both 2 and 3 will divide into without a remainder. It doesn't take a lot of work to "figure" this out. Most people just know it.

However, as the numbers get larger and less familiar, you may not know the LCM off the top of your head.

One method we looked at in Unit 2 was to list multiples of each number.

> Let's say we want to find the LCM for 16 and 24.
>
> The multiples of 16 are 16, 32, 48, 64, 80, 96, …
>
> The multiples of 24 are 24, 48, 72, 96, …
>
> 48 and 96 are both multiples of 16 and 24, and 48 is the least (or lowest) common multiple.

The other method we looked at in Unit 2 was to find the LCM using prime factorization. This process looked like…

$$16 = 2 \cdot 2 \cdot 2 \cdot 2$$
$$24 = 2 \cdot 2 \cdot 2 \quad \cdot 3$$

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so the LCM is $2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 = 48$

This LCM is the smallest number divisible by both 16 and 24.

If I want to add $\frac{5}{16} + \frac{7}{24}$ the problem is that I have two fractions with different sized pieces. In order to add them, I need same size pieces. That is where the LCM comes in, but since the 16 and 24 are denominators of fractions, we are now looking for the LCD or Lowest Common Denominator.

Once we know the Lowest Common Denominator, we need to find equivalent fractions having that denominator.

Find the equivalent fractions.

$\frac{5}{16} = \frac{\quad}{48}$ $\qquad$ $\frac{7}{24} = \frac{\quad}{48}$ $\qquad$ Go back to the Building Up Fractions portion of Unit 4 if you are not certain how to do this.

Once you have equivalent fractions for $\frac{5}{16}$ and $\frac{7}{24}$ having a common denominator, then adding (or subtracting) the fractions is easy!

$$\frac{5}{16} + \frac{7}{24}$$
$$\frac{15}{48} + \frac{14}{48} = \frac{29}{48}$$

Find a common denominator for $\frac{7}{18}$ and $\frac{2}{15}$, then rewrite the fractions with that denominator.