**Main Problem #5**

Topic: *Breaking Apart Fractions*

Problem: You and your friend Rami are making some delicious neapolitan pizzas for Justin’s birthday. For this special occasion, Rami takes out his father’s famous “Pizza Joe” recipe.

For one neapolitan pizza, the recipe entails:

* $\frac{3}{2}$cup of warm water,
* $\frac{5}{4}$cups of dry yeast,
* $\frac{7}{4}$cup of virgin olive oil,
* $\frac{36}{8}$cups of all-purpose flour,
* 2 cans of crushed tomatoes,
* 1 teaspoons of dried oregano, and
* $11$basil leaves.

Because Rami is a very meticulous person - he pays attention to detail and precision - he will be measuring the water, yeast, olive oil, and flour with an eighth-sized measuring cup ($\frac{1}{8}$the size of a standard cup) and an twelfth-sized measuring cup to double check his measurements. These 4 ingredients are crucial for making the dough of the pizza.

**Note:** For Q1 and Q2, break apart each fraction into 2 different decompositions that are not all all units fractions. (ex. $\frac{4}{4}=\frac{2}{4}+\frac{2}{4}=\frac{1}{4}+\frac{3}{4}$)

Q1. For each ingredient, decompose the fraction of cups needed with Rami’s eighth-sized cup.

Q2. For each ingredient, decompose the fraction of cups needed with Rami’s twelfth cup.

Students are not limited to the answers below. They can design their decompositions in any way. However, they should know that the fraction of cups needed for each ingredient does not have the same denominator as the measuring cups.

A1. Rami is using an eighth-sized measuring cup ($\frac{1}{8}$).

Water: $\frac{3}{2}⋅\frac{4}{4}=\frac{12}{8}=\frac{1}{8}+\frac{2}{8}+\frac{3}{8}+\frac{4}{8}+\frac{2}{8}$ and $\frac{12}{8}=\frac{4}{8}+\frac{8}{8}$

Yeast: $\frac{5}{4}⋅\frac{2}{2}=\frac{10}{8}=\frac{1}{8}+\frac{2}{8}+\frac{3}{8}+\frac{4}{8}$ and $\frac{12}{8}=\frac{2}{8}+\frac{8}{8}$

Olive Oil: $\frac{7}{4}⋅\frac{2}{2}=\frac{14}{8}=\frac{3}{8}+\frac{3}{8}+\frac{4}{8}+\frac{4}{8}$ and $\frac{14}{8}=\frac{6}{8}+\frac{8}{8}$

Flour: $\frac{36}{8}=\frac{8}{8}+\frac{8}{8}+\frac{8}{8}+\frac{8}{8}+\frac{4}{8}$ and $\frac{36}{8}=\frac{16}{8}+\frac{20}{8}$

A2. Rami is using an twelfth- measuring cup ($\frac{1}{12}$).

Water: $\frac{3}{2}⋅\frac{6}{6}=\frac{18}{12}=\frac{9}{12}+\frac{12}{12}$ and $\frac{18}{12}=\frac{6}{12}+\frac{6}{12}+\frac{6}{12}$

Yeast: $\frac{5}{4}⋅\frac{3}{3}=\frac{15}{12}=\frac{5}{12}+\frac{5}{12}+\frac{5}{12}$ and $\frac{15}{12}=\frac{12}{12}+\frac{3}{12}$

Olive Oil: $\frac{7}{4}⋅\frac{3}{3}=\frac{21}{12}=\frac{12}{12}+\frac{9}{12}$ and $\frac{21}{12}=\frac{8}{12}+\frac{4}{12}+\frac{3}{12}+\frac{6}{12}$

Flour: $\frac{9}{2}⋅\frac{6}{6}=\frac{54}{12}=\frac{24}{12}+\frac{24}{12}+\frac{6}{12}$ and $\frac{54}{12}=\frac{27}{12}+\frac{27}{12}$

EXPLANATION:

$\frac{36}{8}=\frac{8}{8}+\frac{8}{8}+\frac{8}{8}+\frac{8}{8}+\frac{4}{8}=\frac{2}{2}+\frac{2}{2}+\frac{2}{2}+\frac{2}{2}+\frac{1}{2}=\frac{9}{2}$.

The value stays the same regardless of how you decide to express 1; $\frac{8}{8}=\frac{2}{2}=1$.