There are two types of complex fractions…

Type I: There is only one fraction in the top and the bottom.

Example: $$\dfrac{\dfrac{3}{4}}{\dfrac{7}{8}}$$ or $$\dfrac{\dfrac{x+1}{x-2}}{\dfrac{x+4}{2x-4}}$$

To simplify, just rewrite the problem as a division problem:

$$\dfrac{3}{4} \div \dfrac{7}{8}$$ or $$\dfrac{x+1}{x-2} \div \dfrac{x+4}{2x-4}$$

Now, we know how to divide fractions (invert and multiply). . . . . .

$$\dfrac{3}{4} \times \dfrac{8}{7}$$ or $$\dfrac{x+1}{x-2} \times \dfrac{2x-4}{x+4}$$

Factor and Reduce:

$$\dfrac{3}{4} \times \dfrac{8}{7}$$ $$\dfrac{x+1}{x-2} \times \dfrac{2(x-2)}{x+4}$$

$$\dfrac{3}{1} \times \dfrac{2}{7}$$ $$\dfrac{x+1}{1} \times \dfrac{2}{x+4}$$

$$\dfrac{6}{7}$$ $$\dfrac{2(x+1)}{x+4}$$

Don't panic because they look scary.
They are nothing but a division problem.

On to Type II ……..

Type 2: Has more than one fraction in the top and bottom.

Example: $\dfrac{2+\dfrac{1}{x}}{\dfrac{1}{2}+\dfrac{1}{x}}$

Steps to simplify:

1. Turn everything into a fraction by using 1 as a denominator: $\dfrac{\dfrac{2}{1}+\dfrac{1}{x}}{\dfrac{1}{2}+\dfrac{1}{x}}$

2. Examine all the fractions and find the LCD.   LCD = 2x

3. Put each fraction into ( ) and multiply by the <u>LCD</u>: $\dfrac{\dfrac{2x}{1}\left(\dfrac{2}{1}\right)+\left(\dfrac{1}{x}\right)\dfrac{2x}{1}}{\dfrac{2x}{1}\left(\dfrac{1}{2}\right)+\left(\dfrac{1}{x}\right)\dfrac{2x}{1}}$

4. Reduce and multiply.

   (Can you see what this step accomplishes?) $\dfrac{\dfrac{2x}{1}\left(\dfrac{2}{1}\right)+\left(\dfrac{1}{x}\right)\dfrac{2x}{1}}{\dfrac{2x}{1}\left(\dfrac{1}{2}\right)+\left(\dfrac{1}{x}\right)\dfrac{2x}{1}}$

5. Combine like terms if possible. $\dfrac{4x+2}{x+2}$

6. This is the last step. Factor and reduce if possible: $\dfrac{2(2x+1)}{x+2}$

   Since we are unable to reduce, we are done!