Problem of the Week-6: Simplifying An Expression with Square Roots

In solving an algebra problem, medieval Muslim mathematician Abu Kamil (850-930) needed to simplify the expression

$$\frac{10}{\frac{3}{2} + \sqrt{\frac{5}{4}} + \sqrt{\frac{1}{2} + \sqrt{\frac{5}{4}}}}$$

This mathematician whose epithet was "the Egyptian calculator" proved that his title was well deserved by skillfully applying the newly discovered rules of algebra to simplify the above expression to something in the form $a - \sqrt{\sqrt{b} - c}$ where a, b, c are all positive integers.

Find this expression $a - \sqrt{\sqrt{b} - c}$ (with the values a, b, c determined of course), showing and justifying every step from the original expression to the end.