Union find :

(p, q, value)

let, say P[ ] → stores Parent info.

W[ ] → weight from i^{th} element to its Parent.

$$\frac{p}{q} = \text{value} \quad — (1)$$

let, say Parent at P[p] → x — ultimate Parent of p.

P[q] → y — ultimate Parent of q.

x, y are Parents.

$$\therefore \frac{w[q]}{w[p]} = \frac{(q/y)}{(p/x)} = \frac{q}{p} \cdot \frac{x}{y}$$

weight from q to y

weight from p to x

$$\frac{w_q}{w_p} = \frac{q}{p} \cdot \frac{x}{y} \Rightarrow \boxed{\frac{x}{y} = \frac{w_q}{w_p} \cdot \frac{p}{q}} \quad — (2)$$

∴ If we change, P(x) to 'y' ⇒ ultimate Parent of x is y.

then W[x] ⇒ $\frac{x}{y}$ → from (2)

$$W[x] = \frac{x}{y} = \frac{w_q}{w_p} \cdot \frac{p}{q} \Rightarrow \frac{w[q]}{w[p]} \cdot \text{Value}$$