$$y[n] = \frac{1}{2}\int \left[\sum_{k=-\infty}^{\infty} h[k]\, \mathrm{sinc}(2W\tau - k)\right] \left[\sum_{m=-\infty}^{\infty} x[m]\, \mathrm{sinc}\left(2W\left(\frac{n}{2W} - \tau\right) - m\right)\right] d\tau$$

$$= \frac{1}{2} \sum_{k=-\infty}^{\infty} \sum_{m=-\infty}^{\infty} h[k]\, x[m] \int \mathrm{sinc}(2W\tau - k)\, \mathrm{sinc}(n - m - 2W\tau)\, d\tau \qquad (9)$$

It is known ~~that~~

$$\int \mathrm{sinc}(2W\tau - k)\, \mathrm{sinc}(n - m - 2W\tau)\, d\tau = \frac{1}{2W}\, \mathrm{sinc}\left((m+k-n)\right) \qquad (10)$$

(this can be easily proven using the parseval's theorem).

Using (10) in (9) we have

$$y[n] = \frac{1}{4W} \sum_{k=-\infty}^{\infty} \sum_{m=-\infty}^{\infty} h[k]\, x[m]\, \mathrm{sinc}(m+k-n)$$

We note that $\mathrm{sinc}(m+k-n) = \begin{cases} 1 & m+k=n \\ 0 & m+k \neq n \end{cases}$

$$\therefore \quad y[n] = \frac{1}{4W} \sum_{k=-\infty}^{\infty} h[k]\, x[n-k]$$

which is nothing but filtering in discrete-time baseband.