



total # of pixels to center the window (the mask)
 $(N-2p)(M-2k) \rightarrow (*)$

the mask has $m \times n$ pixels \Rightarrow there are $m \times n - 1$ summations, but we have $m \times n$ operands in the summation for each operand we have a multiplication \Rightarrow for each position of the mask we have $m \cdot n - 1 + m \cdot n = 2mn - 1$ arithmetic operations but we have $(*)$ positions for the mask \Rightarrow the total # of operations is

$$\begin{aligned}
 & (N-2p)(M-2k)(2mn-1) = (NM - 2Mp - 2Nk + 4kp)(2kp + 2k + 2p) \\
 & = (NM - 2Mp - 2Nk + 4kp)(4kp + 2k + 2p)
 \end{aligned}$$

the summations are $m \times n - 1$ because each row has $n - 1$ summations, the number of row is $m \Rightarrow$ we are doing the above summations m times $\Rightarrow m(n-1)$ there is a summation also between every two rows \Rightarrow we add $m - 1$ more summations $\Rightarrow m(n-1) + m - 1 = 2mn - 1$