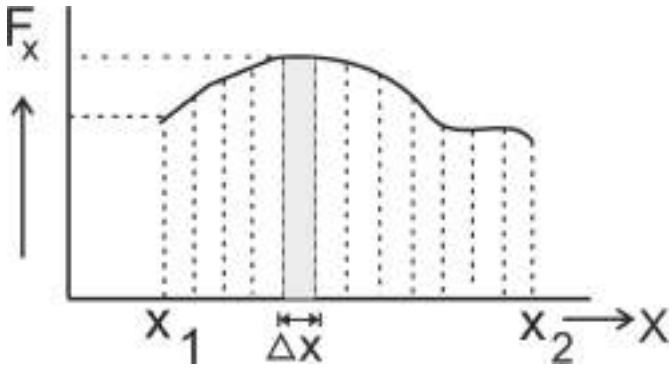
(B) For variable force

In this case fx – x graph is a curve. Let us divide the whole area under the graph into thin strips width of each strip represent small displacement and the average height of the strip represent the force fx. So, area of each strip represent the work done by the force for small displacement.



Total area under fx – x graph

= Sum of area of all the strips

$= \Delta w_1 + \Delta w_2 + \ldots\ldots\ldots\ldots\ldots\ldots + \Delta w_n$

= Total work done.

So, in general, the area under a F-x graph represents the work done by the force.

Example 6: A woman pushes a trunk on a railway platform which has a rough surface. She applies a force of 100N over a distance of 10m. Thereafter, she gets progressively tired and her applied force reduces linearly with distance to 50N. The total distance through which the trunk has been moved is 20m. Plot the force applied by the woman and frictional force (which is 50N) versus displacement. Calculate the work done by the two forces over 20m. **(NCERT)**

Ans: $W_{woman} = 1750J$, $W_{friction} = -1000J$