Another continuous case is the distribution of a mass m over a plane region R with density δ (mass per unit area) so that

$$dm = \delta dA$$

If a curve (or a region) is given with correspınding densities, the total mass is obtained by integrating δ ds or δ dA, but in the second case the evaluation is possible when δ is function of x (or y) alone, which in the first case may be given as δ (x,y) and reducible to δ (x) or to δ (y) since x, y are related by equation of the curve.

<u>Mass of a wire</u> : Let the wire be in the shape of the curve
y=f(x)ε D(a,b) or x=g(y)ε D(c.d)

Then

$$m = \begin{cases} \int_a^b \delta(x)\sqrt{1+f^2(x)}dx \\ \int_c^d \delta(y)\sqrt{1+g^2(x)}dy \end{cases}$$

<u>Mass of a plate</u> : Let the plate be in the shape of the region

$$R_{xy} = (a,b;y_1(x) or y_2(x)) or R_{yx} = (c,d;x_1(y) or x_2(y))$$

Then

$$m = \begin{cases} \int_a^b \delta(x)(y_2(x) - y_1(x))dx \\ \int_c^d \delta(y)(x_2(y) - x_1(y))dy \end{cases}$$

<u>Example</u> .Find the total mass of a wire bent to form the semicirle $x^2 + y^2 = a^2, y \geq 0 with \delta(y) = 2y.$