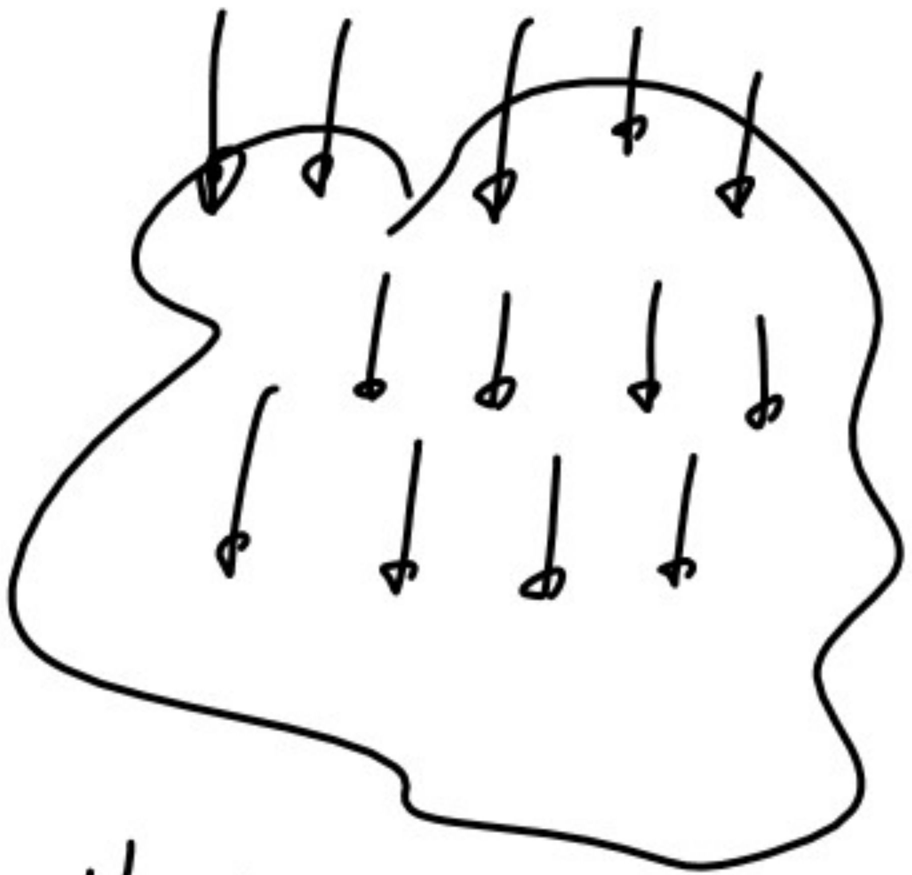
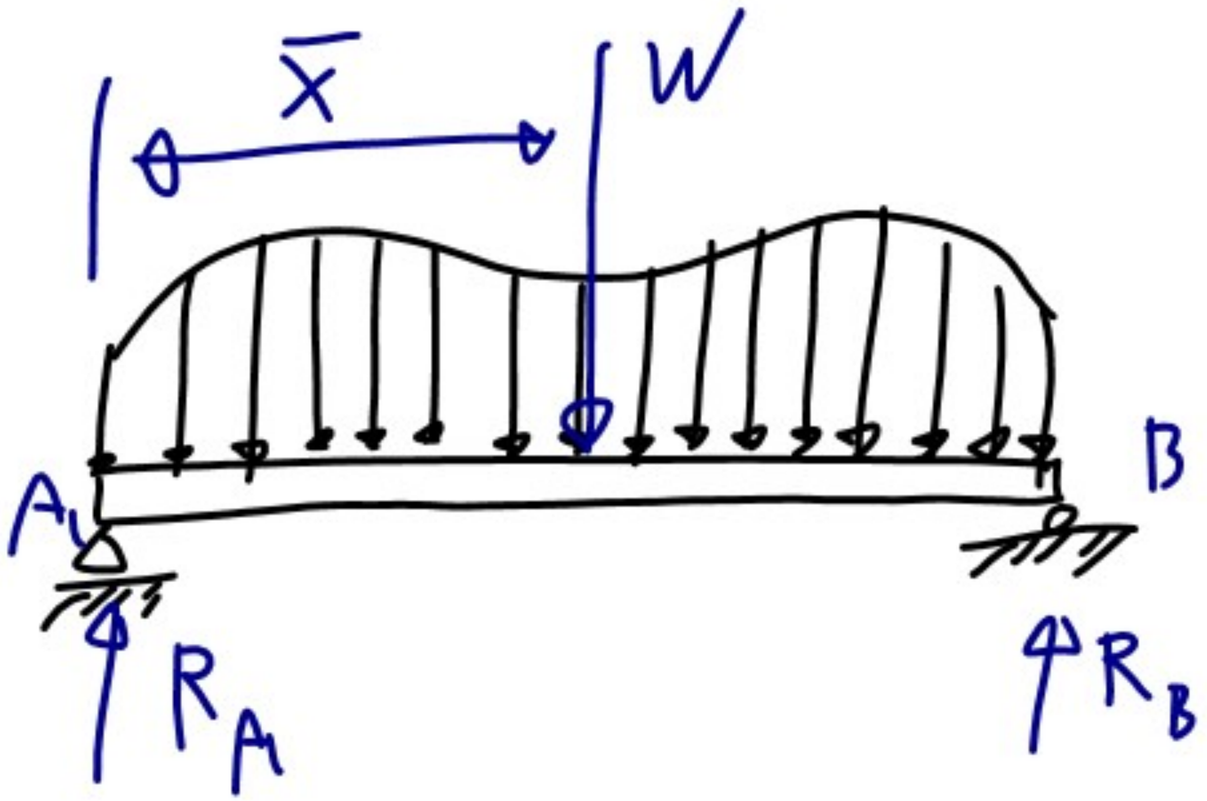
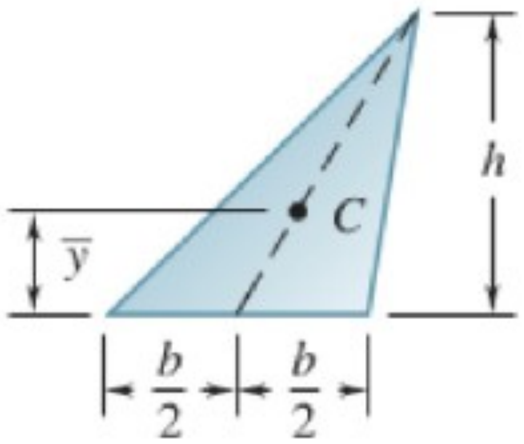
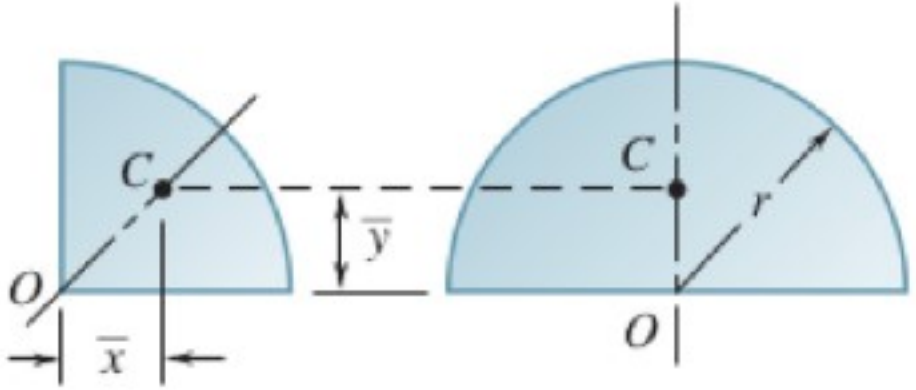
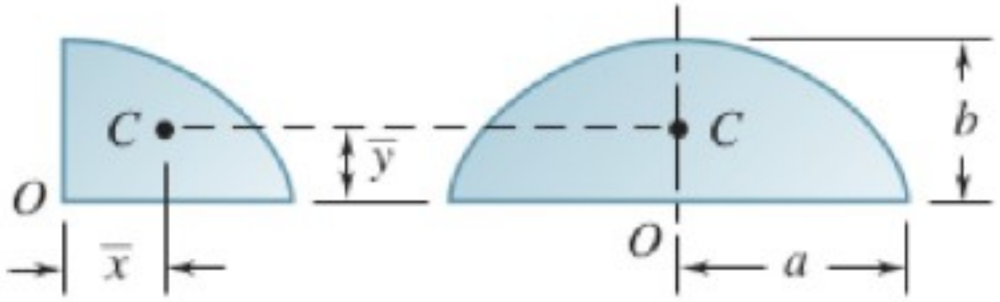


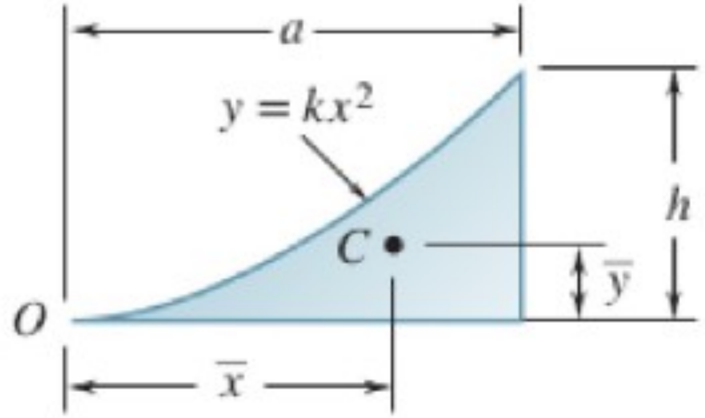
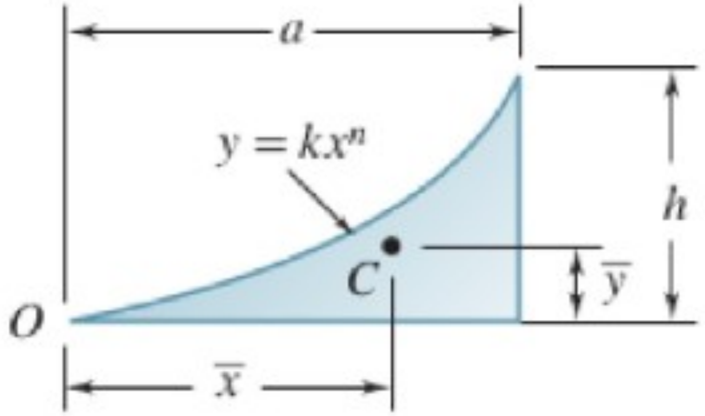
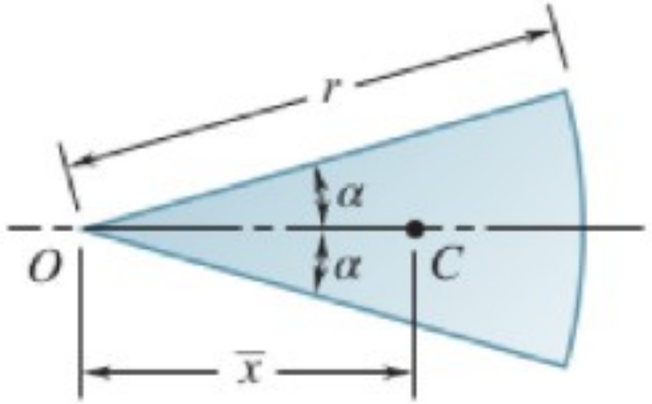
thickness

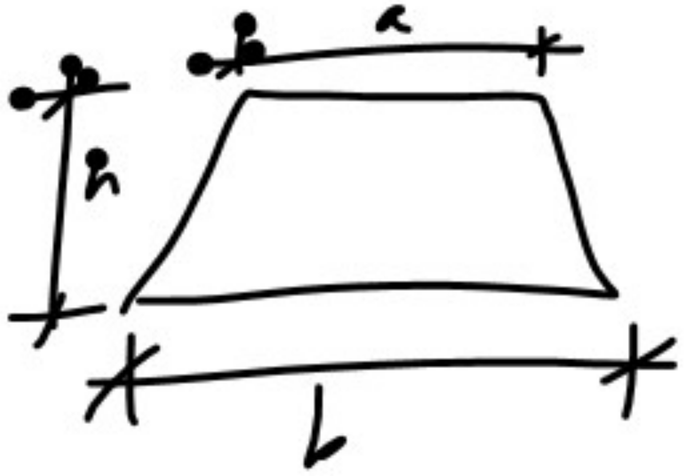
$$\bar{x} = \frac{\int x \, dW}{W}$$

$$W = \int dW$$



Shape		$\bar{x}$	$\bar{y}$	Area
Triangular area			$\frac{h}{3}$	$\frac{bh}{2}$
Quarter-circular area		$\frac{4r}{3\pi}$	$\frac{4r}{3\pi}$	$\frac{\pi r^2}{4}$
Semicircular area		0	$\frac{4r}{3\pi}$	$\frac{\pi r^2}{2}$
Quarter-elliptical area		$\frac{4a}{3\pi}$	$\frac{4b}{3\pi}$	$\frac{\pi ab}{4}$
Semielliptical area		0	$\frac{4b}{3\pi}$	$\frac{\pi ab}{2}$

Parabolic spandrel		$\frac{3a}{4}$	$\frac{3h}{10}$	$\frac{ah}{3}$
General spandrel		$\frac{n+1}{n+2}a$	$\frac{n+1}{4n+2}h$	$\frac{ah}{n+1}$
Circular sector		$\frac{2r \sin \alpha}{3\alpha}$	0	αr^2



$A = h\,\dfrac{a+b}{2}$

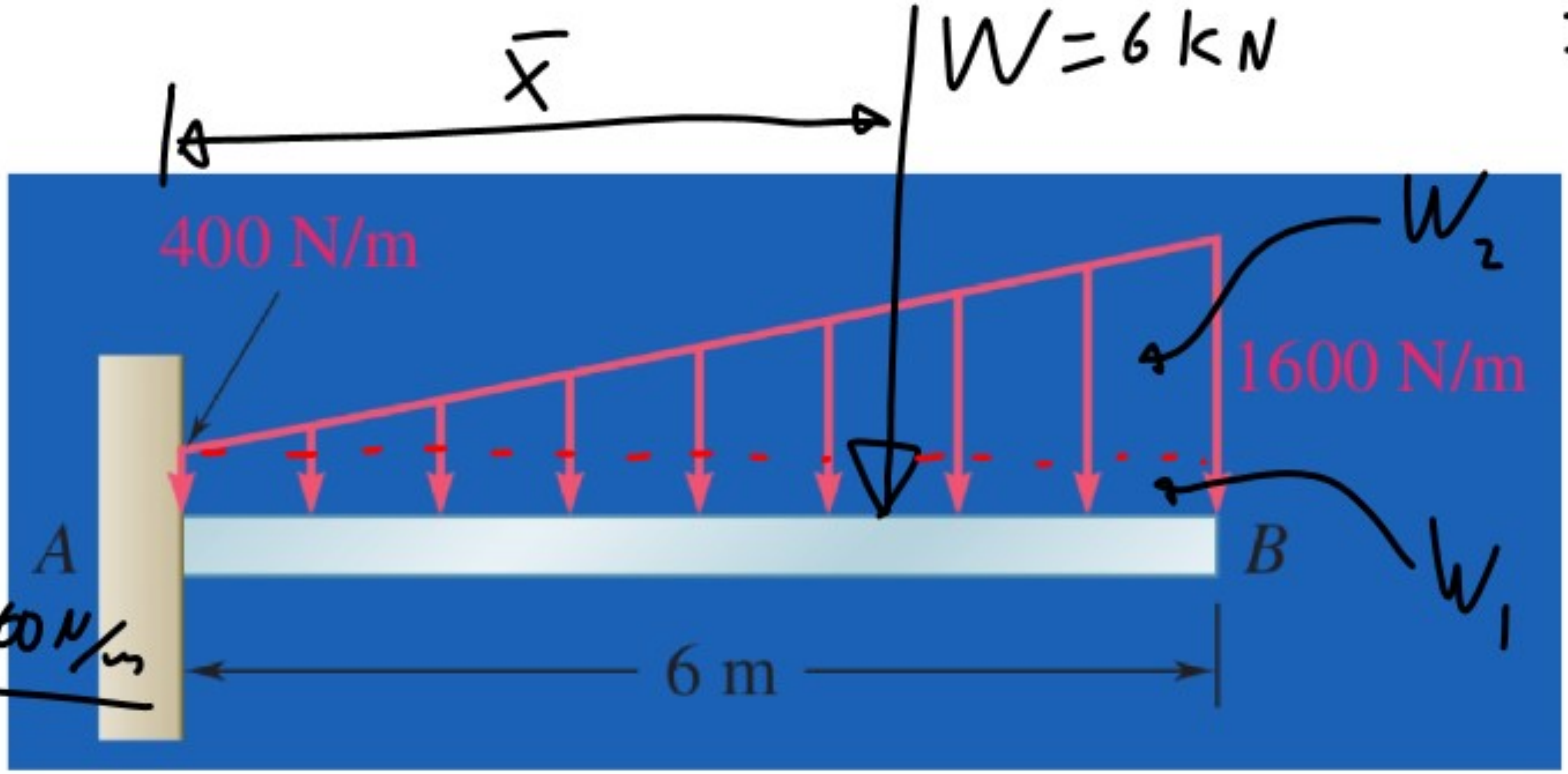
$W = 6\,\text{m}\,\dfrac{400\,\text{N/m} + 1600\,\text{N/m}}{2}$

$= 6000\ \text{N}$

$W_1 = 6\,\text{m}\ 400\,\text{N/m} = 2400\ \text{N}$

$W_2 = 6\,\text{m}\ \dfrac{1200\,\text{N/m}}{2}$

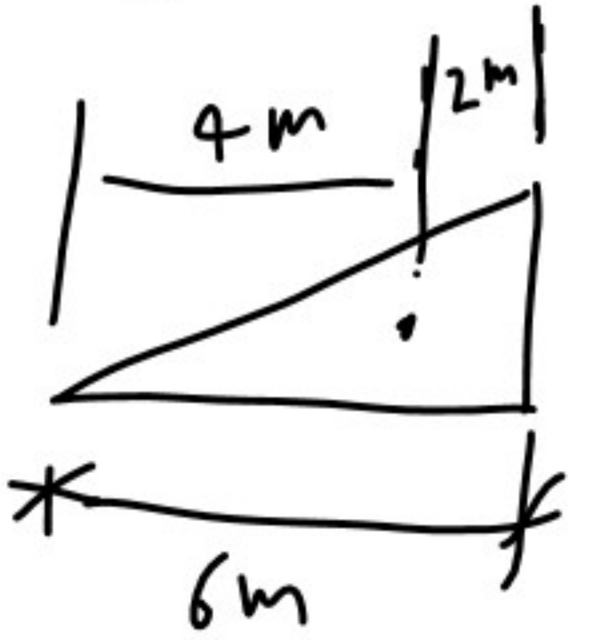
$= 3600\ \text{N}$



$\bar{x}_1 = 3\,\text{m}$

$\bar{y} = \dfrac{6\,\text{m}}{3} = 2\,\text{m}$

$\bar{x}_2 = 4\ \text{m}$

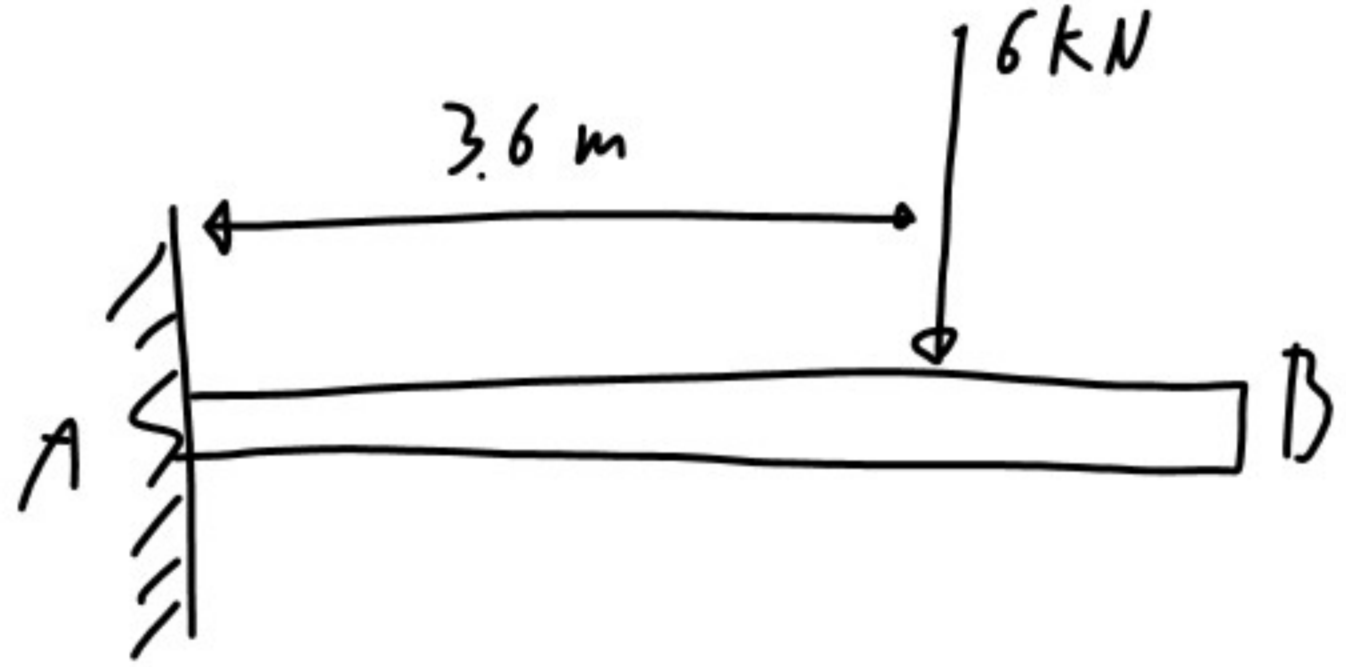


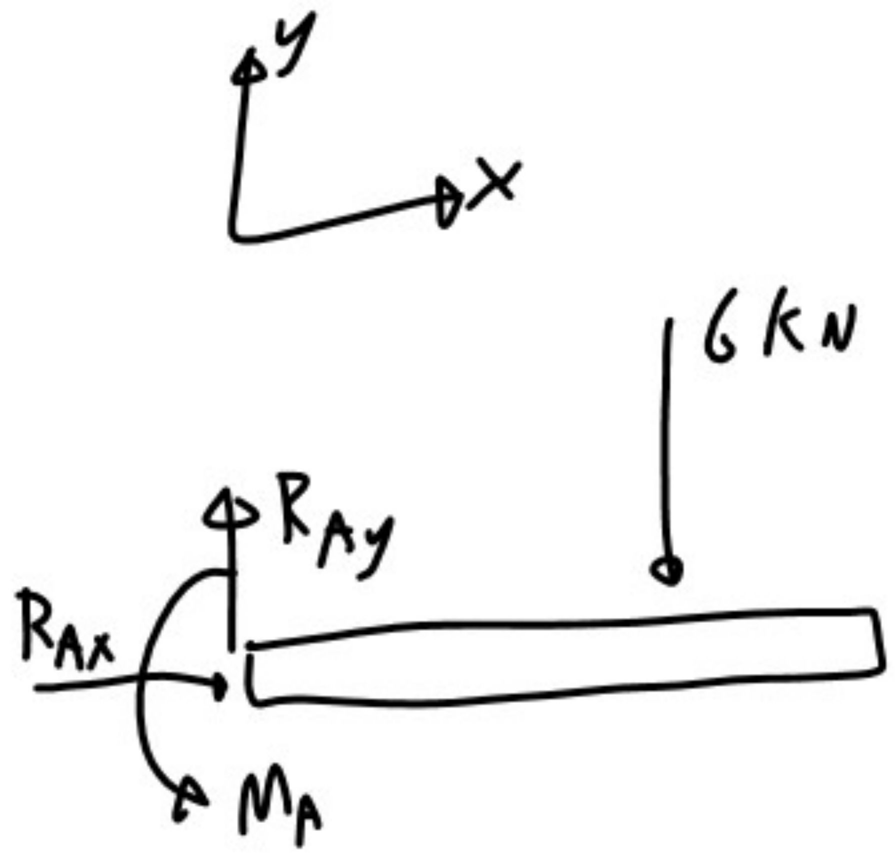
$$\bar{x} = \frac{W_1\bar{x}_1 + W_2\bar{x}_2}{W} = \frac{2400(3) + 3600(4)}{6000} = 3.6\,\text{m}$$

R_{Ax}

R_{Ay}

M_A





$\Sigma F_x = 0 \quad \Sigma F_y = 0 \quad \Sigma M_A = 0$

$\Sigma F_x = \boxed{R_{Ax} = 0}$

$\Sigma F_y = R_{Ay} - 6\,kN = 0 \qquad \boxed{R_{Ay} = 6\,kN}$

$\Sigma M_A = -3.6(6000) + M_A = 0 \qquad M_A = 3.6(6000) = 21.6\ kN\text{-}m$

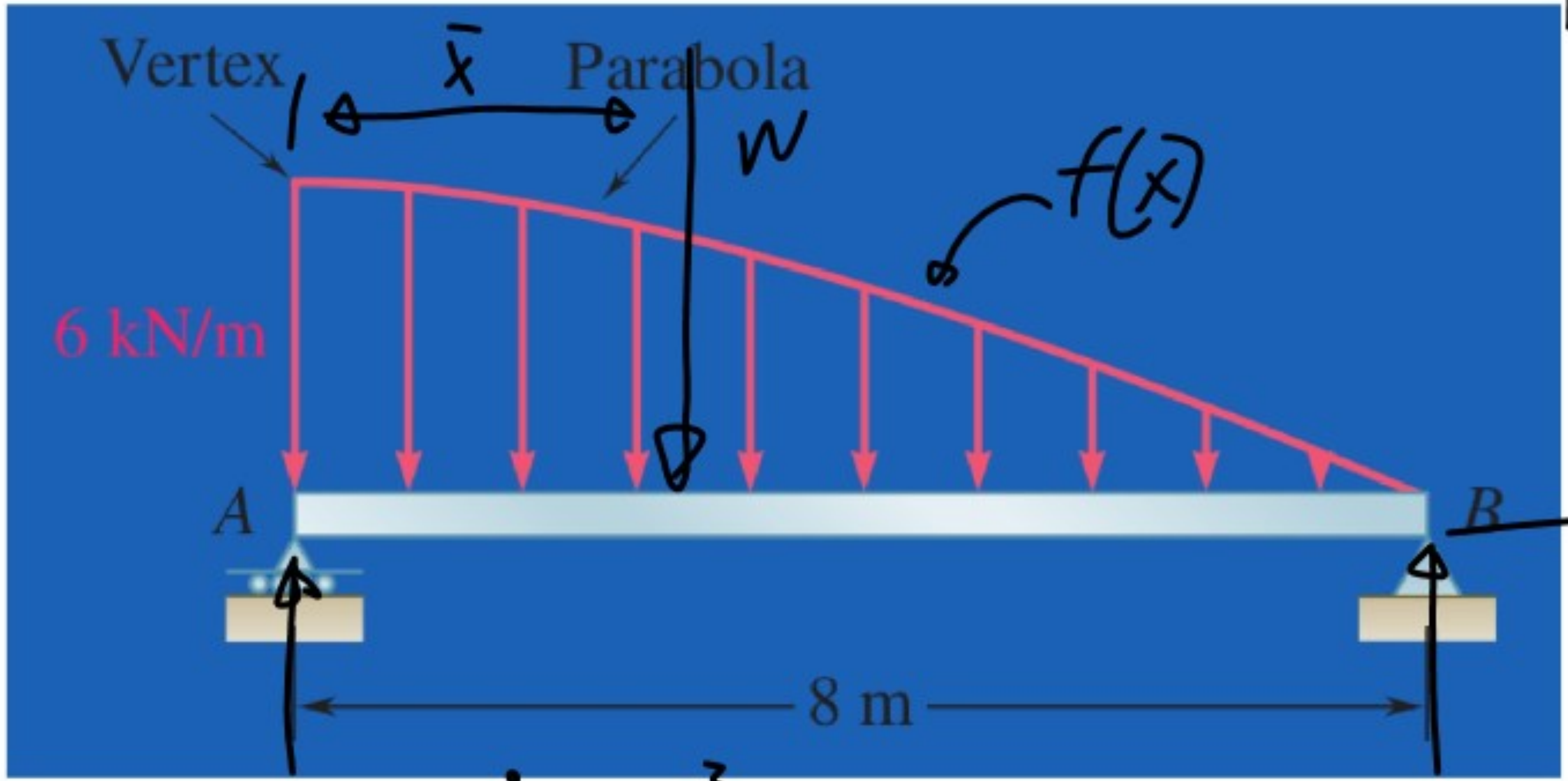
$f(x) = ax^2 + b$

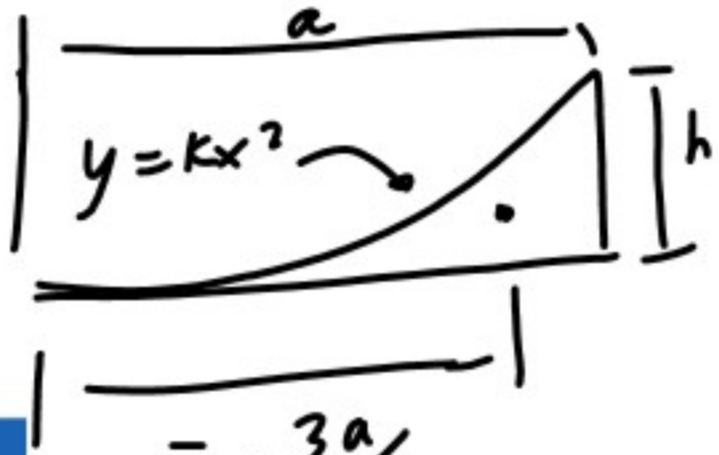
$f(0) = 6 \qquad f(0) = a(0) + b \implies b = 6$

$f(8) = 0$

$f(8) = a8^2 + 6 = 0$

$a = \frac{-6}{64} = \frac{-3}{32}$





$\bar{x} = 3a/4$

$\bar{x} = \frac{\int x \, dW}{W}$

$W = \int_0^8 -\frac{3}{32}x^2 + 6 \, dx = \frac{-3x^3}{32 \cdot 3} + 6x \Big|_0^8 = \frac{-8^3}{32} + 6 \cdot 8 = 32 \text{ kN}$

$\bar{X} = \frac{\int x f(x) dx}{W} = \frac{\int_0^8 \frac{-3}{32} x^3 + 6x \, dx}{32} =$