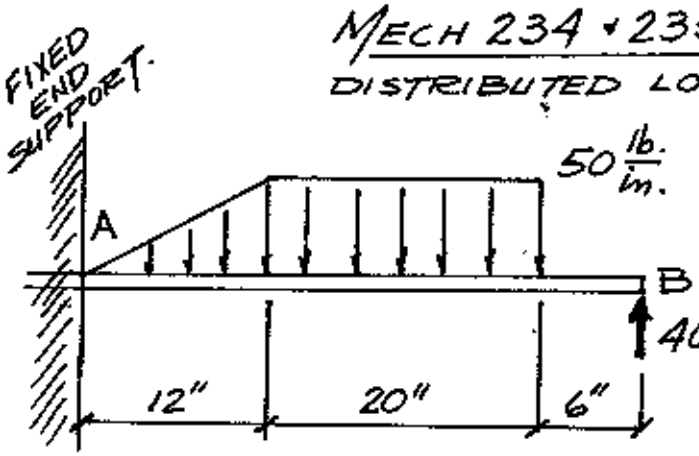
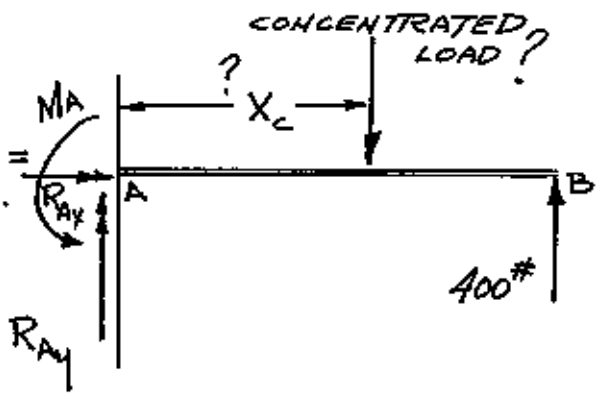
MECH 234 • 235

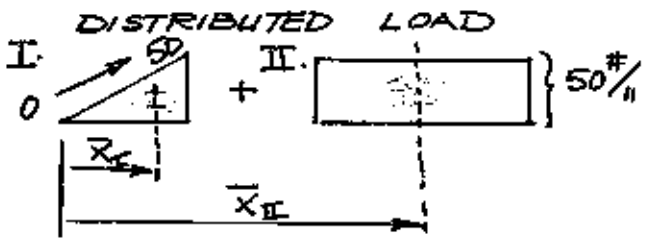
DISTRIBUTED LOAD

PROB. 5-77

p. 246



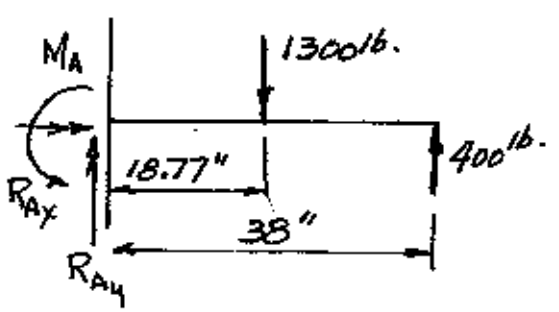




SECT.	AREA	CENTROID from pt. A	FIRST MOM. = $A\bar{X}$
I.	$\frac{1}{2}bh = \frac{1}{2}(12")(50\frac{\#}{"}) = 300\#$	$\bar{X}_I = \frac{2}{3}b = \frac{2}{3}(12") = 8"$	$(300\#)(8") = 2400$ in.lb.
II.	$bh = (20")(50\frac{\#}{"}) = 1000\#$	$\bar{X}_{II} = 12" + \frac{1}{2}b$ from left $= 12" + 10" = 22"$	$(1000\#)(22") = 22,000$ in.lb.
	$\Sigma A = 1300$ lb. CONC. LOAD		$\Sigma A\bar{X} = 24,400$ in.lb.

$$\therefore \bar{X}_c = \frac{\Sigma A\bar{X}}{\Sigma A} = \frac{24,400 \text{ in.lb.}}{1300 \text{ lb.}} = \boxed{18.77" = X_c}$$

$$\boxed{\text{CONC. LOAD} = 1300\#}$$



$$\Sigma F_x = 0 = R_{Ax} \quad \checkmark$$

$$\Sigma F_y = 0 = R_{Ay} - 1300\# + 400\#$$

$$\boxed{R_{Ay} = 900\# \uparrow}$$

$$\Sigma \overset{\curvearrowleft}{M_A} = 0 = +M_A - (1300\#)(18.77") + (400\#)(38")$$

$$M_A = 24,400 - 15,200$$

$$\boxed{M_A = 9,200 \text{ in.lb.} = 766.67 \text{ ft.lb.} \curvearrowleft}$$