GM

MECH 234 + 235
CENTROIDS

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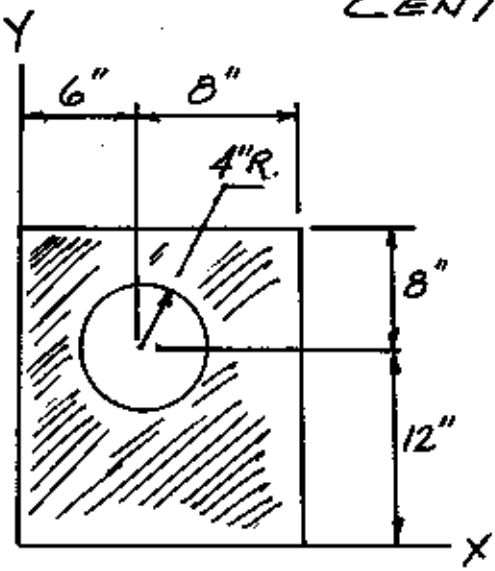

SOLID RECT. − HOLE
I II

$A_I = bh = (14")(20") = 280\ \square"$

$A_{II} = \pi r^2 = \pi (4")^2 = 50.265\ \square"$

for RECT.
width = 14" ∴ $\bar{x} = 7"$
height = 20" ∴ $\bar{y} = 10"$

SECTION	AREA	CENTERS $\bar{x}$	CENTERS $\bar{y}$	FIRST MOMENT $A\bar{x}$	FIRST MOMENT $A\bar{y}$
I	$280\ in^2$	7"	10"	$1960\ in^3$	$2800\ in^3$
− II	$-\ 50.265\ in^2$	6"	12"	$-\ 301.6\ in^3$	$-\ 603.2\ in^3$
	$229.735\ in^2$			$1658.4\ in^3$	$2196.8\ in^3$

CENTROID IN X-dir.

$\bar{x} \Sigma A = \Sigma \bar{x} A$

$\therefore \bar{x} = \dfrac{\Sigma \bar{x} A}{\Sigma A} = \dfrac{1658.4\ in^3}{229.735\ in^2}$

$\bar{x} = 7.22\ in.$

CENTROID IN Y-dir.

$\bar{y} \Sigma A = \Sigma \bar{y} A$

$\therefore \bar{y} = \dfrac{\Sigma \bar{y} A}{\Sigma A} = \dfrac{2196.8\ in^3}{229.735\ in^2}$

$\bar{y} = 9.56\ in.$