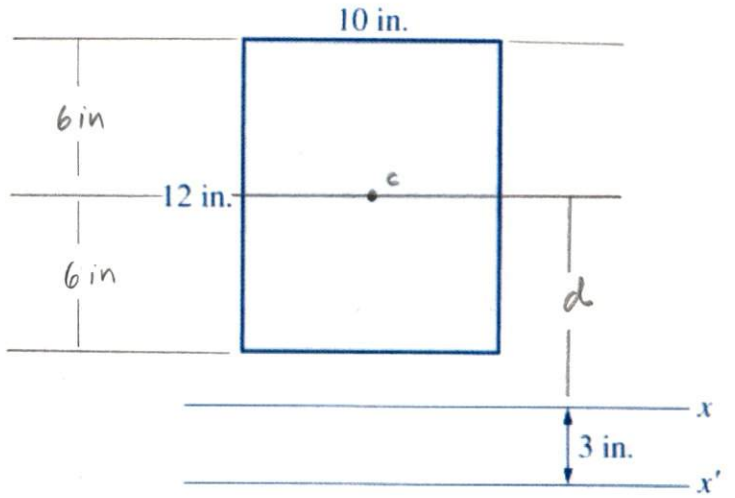
8-6. Refer to Fig. P8-6. If the moment of inertia I_x of the rectangular area about the x axis is 7320 in.^{4}, determine I_x, of the area about the x' axis.

Solution.



From Table 8-1

$$\bar{I}_x = \frac{bh^3}{12}$$

From (8-7) $\quad I_x = \bar{I}_x + Ad^2$

$$7320\ \text{in.}^4 = \frac{10\ \text{in}\ (12\text{in})^3}{12} + 10\text{in}\,(12\text{in})\,d^2$$

$$d^2 = \frac{7320\ \text{in}^4 - 1440\ \text{in}^4}{120\ \text{in}^2}$$

$$d^2 = 49\ \text{in.}^2$$

$$d = \sqrt{49\ \text{in}^2} = 7\ \text{in.}$$

$$I_{x'} = \bar{I}_x + A(d+3)^2$$

$$= \frac{10\ \text{in}\ (12\text{in})^3}{12\text{in}} + 10\text{in}\,(12\text{in})\,(7\text{in} + 3\text{in})^2$$

$$= 1440\ \text{in}^4 + 12{,}000\ \text{in}^4$$

$$= 13{,}440\ \text{in}^4$$