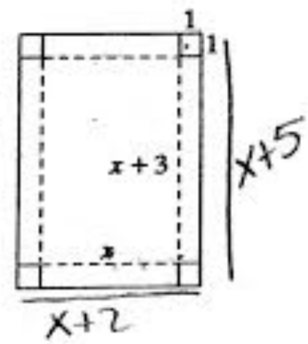
Name F Class Date

❸ Applying the Zero-Product Property The diagram shows a pattern for an open-top box. The total area of the sheet of material used to make the box is 130 in.^{2} The height of the box is 1 in. Therefore, 1 in. × 1 in. squares are cut from each corner. Find the dimensions of the box.



Define Let $\boxed{x}$ = width of a side of the box.

Then the width of the material $= x + 1 + 1 = \boxed{x+2}$.

Then the length of the material $= x + 3 + 1 + 1 = \boxed{x+5}$.

Relate width × length = area of the sheet

Write $(x + 2)(x + 5) = \boxed{130}$

$x^2 + \boxed{7x} + 10 = 130$ Find the product $(x + \boxed{})(x + \boxed{})$.

$x^2 + 7x - \boxed{120} = 0$ Subtract $\boxed{}$ from each side.

$(x - \boxed{8})(x + \boxed{15}) = 0$ Factor $x^2 + 7x - \boxed{}$.

$x - \boxed{} = 0$ or $x + \boxed{} = 0$ Use the Zero-Product Property.

$x = \boxed{8}$ or $x = \boxed{-15}$ Solve for x.

The only reasonable solution is $\boxed{8}$. So the dimensions of the box are $\boxed{8}$ in. × $\boxed{11}$ in. × $\boxed{1}$ in.

Check Understanding

1. Solve each equation.

a. $(3y - 5)(y - 2) = 0$

$X = \frac{5}{3}$ or 2

b. $x^2 + x - 12 = 0$

$(x+4)(x-3) = 0$

$x = -4$ or 3

c. $x^2 - 12x = -36$

$x^2 - 12x + 36 = 0$

$(x-6)(x-6) = 0$

$x = 6$

2. Suppose that a box has a base with a width of x, a length of $x + 1$, and a height of 2 in. It is cut from a rectangular sheet of material with an area of 182 in.^{2}. Find the dimensions of the box.