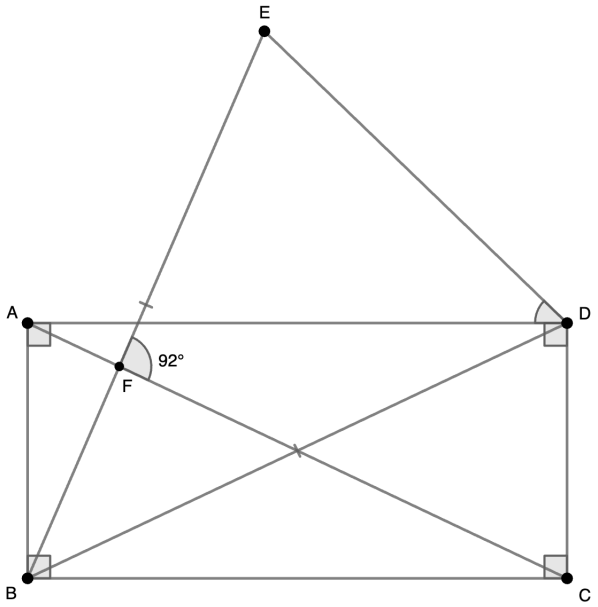
In the figure below, $ABCD$ is a rectangle. Additionally, segment $BD = BE$, and $\angle EFC = 92°$. Find the measure of $\angle ADE$.[1]



[1]Seiun Senior High School, Nagasaki

Solution

Answer : 44°

Proof: We first let $\angle ADE = \angle x$, $\angle ADB = \angle y$, and mark the intersection of AD and BE as Point G. Since $BD = BE$, $\angle E = \angle BDE = \angle x + \angle y$. Also, $\angle DAC = \angle ADB = \angle y$. In triangle AFG, from $\angle GAF + \angle AGF = \angle GFC$, $\angle y + \angle EGD = 92°$. Therefore, $\angle EGD = 92° - \angle y$. Focusing on the interior angles of triangle DEG: from $\angle GDE + \angle B + \angle EGD = 180°$, $\angle x + (\angle x + \angle y) + (92° - \angle y) = 180°$. Simplifying this equation, we get: $2\angle x = 190° - 92° = 88°$. Solving for x, $\angle \mathbf{ADE} = \angle \mathbf{x} = \mathbf{44}°$.