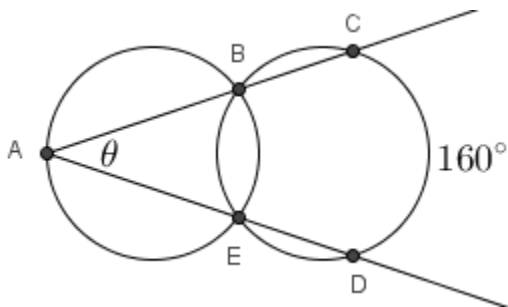# Problem 31

Two congruent circles intersect at points B and E. Rays $\overrightarrow{ABC}$ and $\overrightarrow{AED}$ are drawn, where points C and D also lie on the 2nd circle. If the degree measure of minor arc $\overset{\frown}{CD} = 160°$, what is θ (the value of $m\angle BAE$)?

Answer

$\boxed{40°}$

Explanation

Angle θ is both an inscribed angle to circle 1, as well as an exterior angle to circle 2.

Since the measure of an inscribed angle is $\frac{1}{2}$ the intercepted arc, $m\overset{\frown}{BE_1} = 2\theta$

Since the two circles are congruent, $m\overset{\frown}{BE_1} = m\overset{\frown}{BE_2} \Rightarrow m\overset{\frown}{BE_2} = 2\theta$

Since the measure of an exterior angle is $\frac{1}{2}(\text{maj arc} - \text{min arc})$, we have:

$$\theta = \frac{160° - 2\theta}{2} \Rightarrow \theta = 80° - \theta \Rightarrow 2\theta = 80° \Rightarrow \theta = 40°$$