p313 #32. A woman at point A wants to reach point C. She can row at 2 mi/h and walk at 4 mi/hr. How should she travel (to minimize time)?

The quantity we care about is total time \( T \) of travel. Call that time \( T \).

The choice she makes is what angle to row as shown in figure. Call that angle \( \theta \).

To find the time of travel for a particular \( \theta \), we need to find the row and walk distances for that \( \theta \).

To find the walk distance we remember that the length of an arc is the radius times the angle measure (from center) in radians. The angle at the center is twice the angle from the edge (i.e., \( \angle BOC = 2 \angle BAC \)). So the distance walked is \( 2\theta \).

The distance rowed can be found from the fact that \( \triangle ABC \) is a right triangle. So

\[ \cos \theta = \frac{\text{row distance}}{4} \]

\[ \text{row distance} = 4 \cos \theta \]