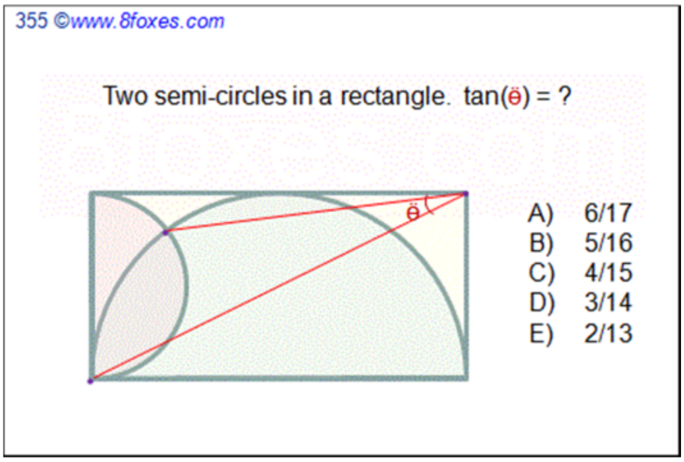
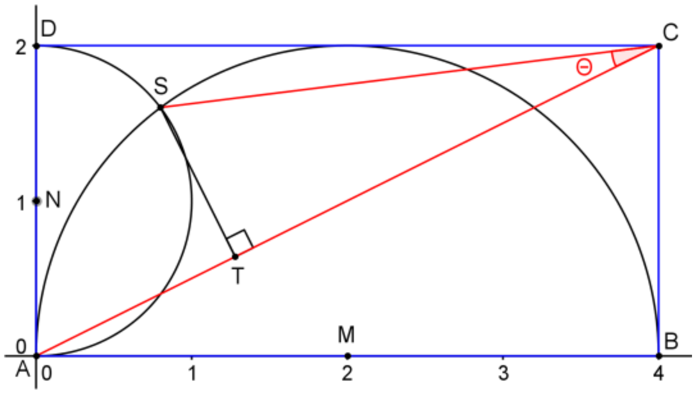
Solution





Add a coordinate system.

Take $AD = BC = 2$ and $AB = CD = 4$.
So $A(0, 0)$, $B(4, 0)$, $C(4, 2)$ and $D(0, 2)$.

Big semicircle: $(x-2)^2 + y^2 = 4$
Small semicircle: $x^2 + (y-1)^2 = 1$

$$\begin{cases} x^2-4x+4+y^2=4 \\ x^2+y^2-2y+1=1 \end{cases} \longrightarrow \begin{cases} x^2+y^2-4x=0 \\ x^2+y^2-2y=0 \end{cases} \longrightarrow -4x+2y=0 \longrightarrow y=2x$$

$(x-2)^2 + (2x)^2 = 4 \rightarrow x^2 - 4x + 4 + 4x^2 = 4 \rightarrow 5x^2 - 4x = 0 \rightarrow x(5x-4) = 0$

So for point S it gives $5x - 4 = 0 \rightarrow x = {}^4/_5$ and $y = 2\cdot{}^4/_5 = {}^8/_5 \rightarrow S(\tfrac{4}{5},\tfrac{8}{5}) = (\tfrac{20}{25},\tfrac{40}{25})$.

T lies on line AC, with ST perpendicular to line AC.

$\overrightarrow{AC} = \begin{pmatrix}4\\2\end{pmatrix}$ so $\begin{pmatrix}2\\1\end{pmatrix}$ is a normal vector of line ST $\rightarrow$ equation line ST is $2x + y = {}^8/_5 + {}^8/_5 = {}^{16}/_5$.

Intersect lines ST and AC with equation $y = ½x$:
$2x + ½x = {}^{16}/_5 \rightarrow 25x = 32 \rightarrow x = {}^{32}/_{25}$; $y = {}^{16}/_{25} \rightarrow T(\tfrac{32}{25},\tfrac{16}{25})$.

$$ST = \sqrt{(\tfrac{32}{25}-\tfrac{20}{25})^2+(\tfrac{16}{25}-\tfrac{40}{25})^2} = \sqrt{(\tfrac{12}{25})^2+(-\tfrac{24}{25})^2} = \sqrt{(\tfrac{12}{25})^2\cdot(1^2+2^2)} = \tfrac{12}{25}\sqrt{5}$$

$$TC = \sqrt{(4-\tfrac{32}{25})^2+(2-\tfrac{16}{25})^2} = \sqrt{(\tfrac{68}{25})^2+(\tfrac{34}{25})^2} = \sqrt{(\tfrac{34}{25})^2\cdot(2^2+1^2)} = \tfrac{34}{25}\sqrt{5}$$

$$\tan\Theta = \frac{ST}{TC} = \frac{\tfrac{12}{25}\sqrt{5}}{\tfrac{34}{25}\sqrt{5}} = \frac{12}{34} = \frac{6}{17}$$

So the correct answer is **A**.