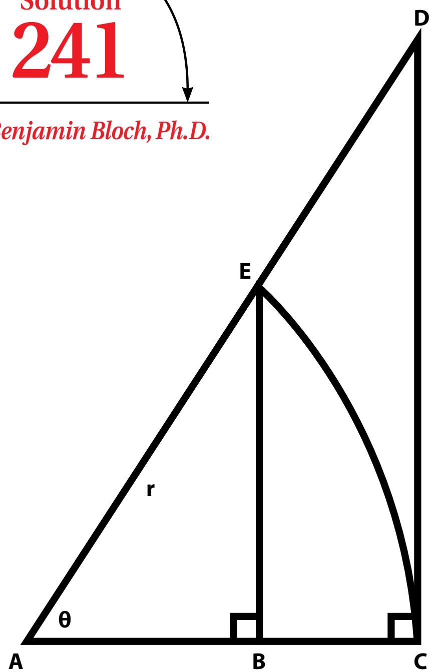
Solution
241

by Benjamin Bloch, Ph.D.



(Diagram not drawn to scale)

1. The area of triangle ABE = 1/2 AB x EB = 1/2 r^2 cosθ sinθ

To find the maximum of this area with respect to θ, take the derivative of the area (which we shall call A'), with respect to θ, and set equal to 0, and solve for θ.
N.B. This is the same math procedure as problem 239.

Thus, set dA'/dθ =d(1/2 r^2 cosθ sin θ)/dθ = 0 (r is a constant).
Now d(cosθ)/dθ = - sinθ, and d(sinθ)/dθ = cosθ

Also, the derivative of a product equals the first term times the derivative of the second term plus the second term times the derivative of the first term.

This gives us the equation 1/2 r^2 (- $\sin^2 \theta + \cos^2 \theta$) = 0.

Therefore, sinθ = cosθ and θ = 45 degrees.

2. For this value of θ = 45 degrees, A' = 1/4 r^2