PHYS 1303
EXEMPLARY SOLUTION

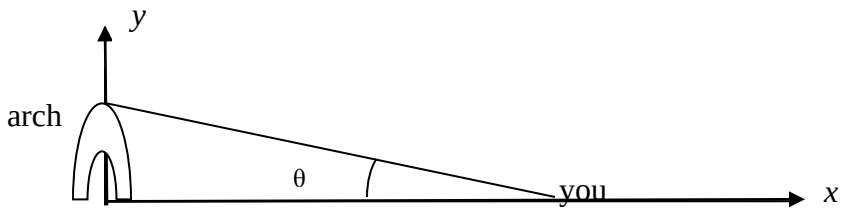
Problem

You are driving into St. Louis and in the distance you see the famous Gateway-to-the-West arch. From your guide book you know that this monument rises to a height of 192m. You estimate your line of sight with the top of the arch to be 3 degrees above the horizontal. Approximately how far in kilometers are you from the base of the arch?

Solution (DIANA)

DEFINITIONS – define symbols for unknowns sought and data given
DIAGRAM – label with your symbols, include a directed coordinate system
IDEA – what fundamental idea/equation will you use?
ALGEBRA – symbolically derive the unknown you want
NUMBERS – substitute data for the knowns.
ANSWER – round to appropriate precision, put units

D



Knowns: y = height of arch = 192 m, θ = angle of sight = 3^o
Unknown: x = horizontal distance from base of arch

I $\tan\theta$ = Opp/Adj = y / x

A *Hint: put one line above the other, do not snake algebra across the page*

$x \tan\theta = y$
$x = y / \tan\theta$

N $x = 192 / \tan 3°$
$= 192 / 0.05 = 3840$

A *Hint: use precision from the least precise data used*

x = 4 km (1 s.f.)