

PHYS 1303 - Fundamentals of Physics

EXEMPLARY HOMEWORK

Problem

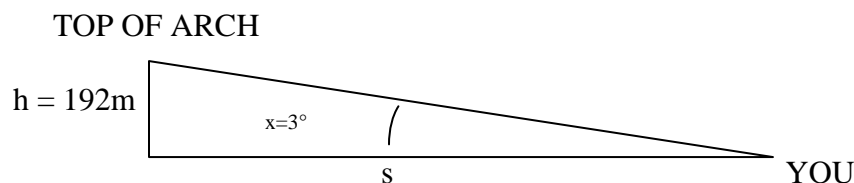
You are driving into St. Louis and in the distance you see the famous Gateway-to-the-West arch. From your guide book you know that this monument rises to a height of 192m. You estimate your line of sight with the top of the arch to be 3 degrees above the horizontal. Approximately how far (in kilometers)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

Answer 4 km

Solution

(STEP 1 - Draw a diagram, if it helps explain)

(STEP 2 - Define symbols, in words and/or on diagram)



h = height, x = angle, s = distance

(STEP 3 – Show the general formulas and the algebra you use to get to a solution)

$$\begin{aligned}\tan x &= h / s \\ s \tan x &= h \\ s &= h / \tan x\end{aligned}$$

(STEP 4 – Put the numbers in. Do not round until the end.)

$$\begin{aligned}s &= 192 / \tan 3^\circ \\ &= 192 / 0.05 \\ &= 3840\end{aligned}$$

(STEP 5 – Put **units** on the answer; justify the precision from the **least precise** data used, in this case, 3° is 1 s.f.)

$$s = 4 \text{ km (1 s.f.)}$$

A GUIDE FOR PROBLEM SOLVING

