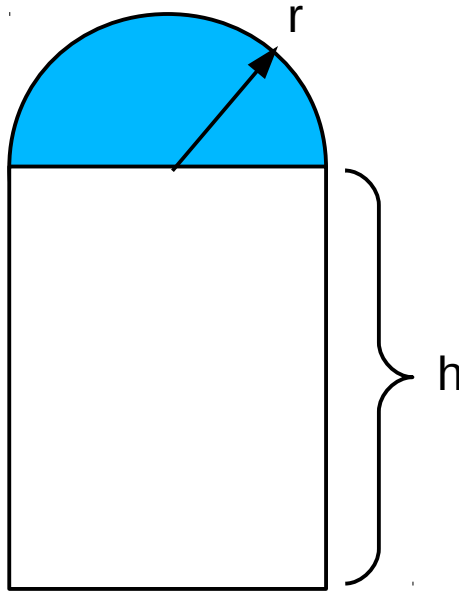


A church window consists of a blue semicircular section surmounting a clear rectangular section as shown. The blue semicircular glass lets through half the light (per unit area) as the rectangular section glass (it is half as transparent or twice opaque). Find the radius 'r' of the window that admits the most light if the perimeter of the entire window is P.



I have tried minimizing the ratio

$$A_{\text{blue}}/A_{\text{white}} = [(1/2)\pi r^2] / [2hr] = \pi r / 4h, \text{ where } A_{\text{--}} \text{ denotes area.}$$

My reasoning is that if I minimize the blue area then the white area will be maximized for some perimeter P and the maximum light will be admitted.

I used the perimeter $P = 2h + 2r + \pi r$ to replace the factor 'h' in the ratio (I mean I sub'd $h = [P - 2r - \pi r]/2$) and then set $d(A_{\text{blue}}/A_{\text{white}})/dr = 0$ and solve. But the answer is

$$r = 2P/(3\pi + 8)$$

and I don't get anything close to that (I got $r = P/4$ among others). Can anyone suggest some hints to kick start this? I think I am just getting it wrong from the start.