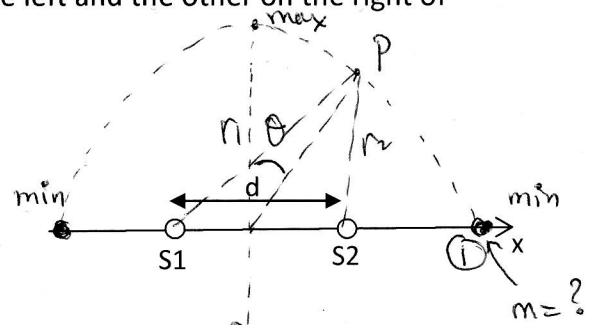
KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
PHYSICS DEPARTMENT
PHYS 201- Term 112
QUIZ #5 – CHAPTER 35

Wednesday 11 April 2012

Name: Key ID#:

1. In the figure, two isotropic point sources S1 and S2 emit identical light waves in phase at wavelength λ. The sources lie at separation d on an x-axis, and a light detector is moved in a circle of large radius around the midpoint between them. It detects 30 points of zero intensity, including two on the x axis, one on the left and the other on the right of the sources. What is the value of d/λ?



minimum: $d \sin\theta = (m+\frac{1}{2})\lambda$

when $\theta = 90°$ $\quad d = (m+\frac{1}{2})\lambda$

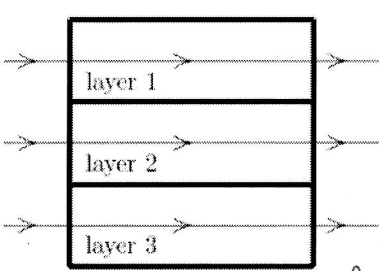
This is the point labelled ①.

what is the value of m for that point?

There are 7 minima in the first quadrant excluding the point labelled ①. $m = 0$ for the first minima $m=1$ for the second $m = 6$ for the 7th minima so $m = 7$ for the point labelled ① $\Rightarrow$ $\frac{d}{\lambda} = 7+\frac{1}{2} = \underline{7.5}$

2. The light waves represented by the three rays shown in the diagram all have the same frequency. 4.7 wavelengths fit into layer 1, 3.2 wavelengths fit into layer 2, and 5.3 wavelengths fit into layer 3. Rank the layers according to the speeds of the waves, least to greatest.

A. 1, 2, 3
B. 2, 1, 3
C. 3, 1, 2
D. 3, 2, 1
E. 1, 3, 2



large # of wavelength $\Rightarrow$ λ is small $\Rightarrow$ n is large
$\Rightarrow$ v is small.

$\Rightarrow$ 3, 1, 2