# The Geometry of Interference and Diffraction
SPH4U

Consider the interference pattern for two point sources in phase (e.g., two slits).

Along the line halfway between the two slits, the waves will be ______________________ because the

_________________________ is the _____________.

A ___________________________ would appear on the screen.

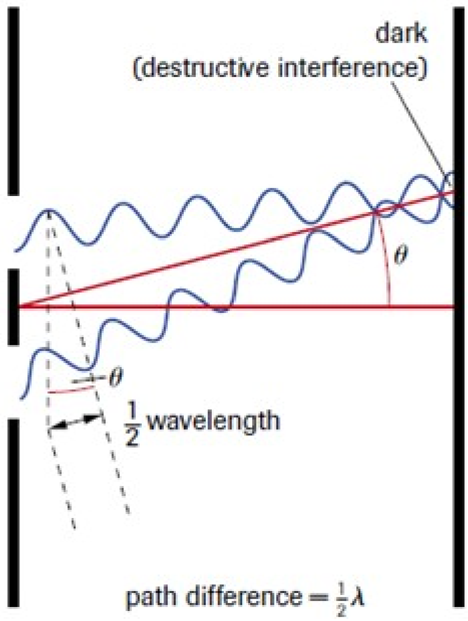
This bright spot is called the _________________________________.

A little ______________________ of the central maximum (at an

angle $\theta$), the path difference between the waves is

________, and the waves will arrive ___________________,

creating a dark spot.




A little bit further to the side and the path difference is _______.

The waves will be ___________________ again, creating

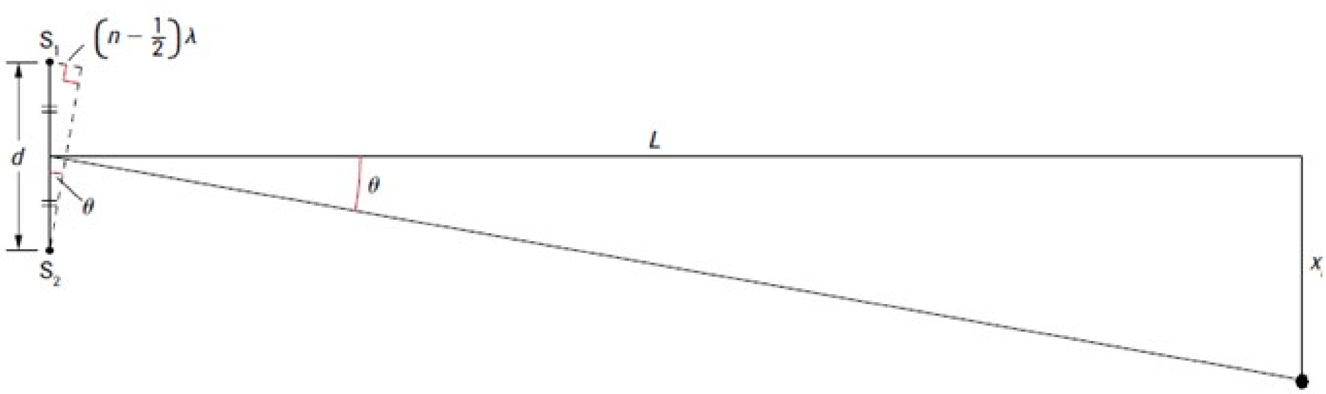
_________________________________________.

Let's find the position of each of the dark spots, where the path

difference is ___________________.

$n$ = ______________________________________ $d$ = _________________________________________

$L$ = ______________________________________ $x_n$ = _________________________________________

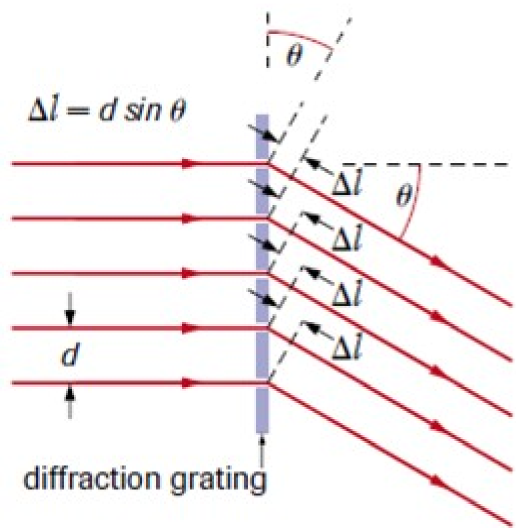


Example: Light from a monochromatic source is directed through two slits separated by 0.22 mm and an interference pattern is created on a screen 3.0 m away. If the separation between the first and seventh nodal lines is 5.0 cm, what is the wavelength of the light?

Similarly, for bright spots away from the central maximum:

A ________________________________________ has a ___________________________ of equally spaced ___________ and a similar interference pattern.

The primary difference between the patterns is that the maxima are much ____________________ and ____________________.

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Diffraction through a single slit may be analyzed similarly.

Consider each of the ________________________________ as a point source of ________________.

The wavelets will all be _______________ at the ____________________________.

At some angle $\theta$, there is a $\lambda$ path difference between the top

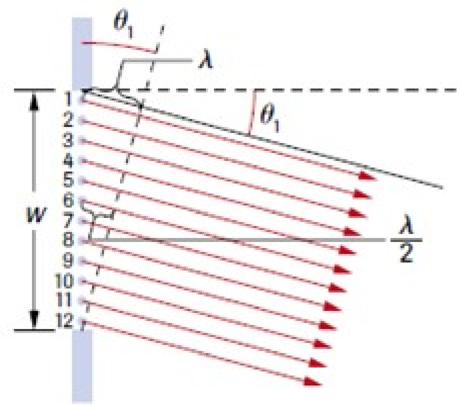
and bottom of the slit.

Each point therefore has a ____________________________:

1 and 7, 2 and 8, etc.,

resulting in __________________________________.

The minima occur at




Example: Monochromatic light of wavelength 670 nm passes through a slit width of 12 µm. A screen is placed 0.30 m away. What is the width of the central maximum?

_________________ is the ability of an instrument to _________________________________ of

two objects.

The ______________________________, the ___________________________________ and the

_______________________________________.