Which color bends MORE when passing through a diffraction grating?

A) Red
B) Blue

Laser light, wavelength λ, illuminates a mask with 2 slits. You see exactly 3 bright spots (a central one, +1 on each side). What can you conclude about the slit spacing d?

A) d>λ and I (and/or my group) are confident
B) d>λ (not so confident!)
C) d<λ and I (and/or my group) are confident
D) d<λ (not so confident!)

Laser light illuminates a mask with a 2 slits. As the slit spacing gets larger and larger, until it starts become "macroscopic" (>> λ), what happens to the interference pattern?

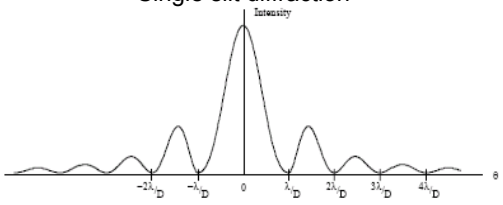
A) More and more bright spots, which get closer and closer together

B) More and more bright spots, which get farther and farther apart

C) Fewer and fewer bright spots, but the ones you have get closer and closer together

D) Fewer and fewer bright spots, which get farther and farther apart.

Single slit diffraction



$$\theta = \frac{m\lambda}{D}$$

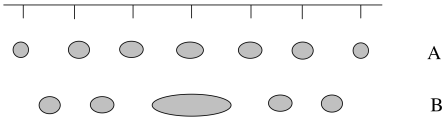
Minima of dark spots in single slit pattern

The Hubble Space Telescope has a "lens" (actually a mirror) of diameter of a couple of meter.
For which color light will the HST have the BEST resolution?

A) Blue B) Yellow C) Red
D) Resolution is independent of color.

Laser light illuminates two different samples, one is "single slit" with width D, one is "two-slit" diffraction grating with tiny slits, that are ”D" apart.

Which pattern arises from the "two-slit" grating?



A laser shines through a double slit and the interference pattern is measured. The room is then filled with water and the experiment is repeated (the laser is water-proof). The separation of intensity maxima on the screen...

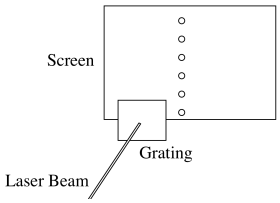
A) increases B) decreases
C) stays the same.

Hint: wave speed $v = \lambda f$ and the frequency of light remains constant as light passes from one medium to another.

Light illuminates a single slit whose width is 2.5 times the wavelength of the light ($D = 2.5\ \lambda$). How many minima will appear to each side of the central maximum?

A) 0
B) 1
C) 2
D) 3
E) > 3

What is the orientation of the grating producing this pattern?



A) Vert. slits 

B) Horiz. slits 

C) Grid 

White light (rather than a monochromatic laser) illuminates a diffraction grating. What does the pattern on the screen look like?

A) Bright white dots at various angles (given by the usual formula)
B) "Rainbows" at various angles
C) One central maximum is a white dot, surrounded by rainbows
D) Something else.

Gratings demo

Nominal track separation on a CD is 1.6 μm (1.6 E-6 m). Is it possible to separate visible light (400-700 nm, 1 nm = 1E-9 m) with it?

A) Yes, of course !
B) Yes, I guess.
C) No, of course not !
D) No, I guess.
E) I do not know how to answer this question.

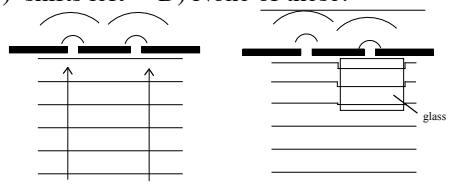
Track separation on a CD is about 2 μm (2 E-6 m).
Is it possible to separate visible light (λ=400-700 nm, 1 nm = 1E-9 m) with it?

A) Yes, of course !
B) Yes, I guess.
C) No, of course not !
D) No, I guess.
E) I do not know how to answer this question.

A small piece of glass is in front of the right slit. (the right slit thus emits a wavefront a little later than the left slit) After the glass is inserted, the intensity pattern on the screen is...

A) unchanged B) shifts to the right

C) shifts left D) None of these.



Light scattering off molecules
"Rayleigh scattering"
(NOT off of dust or water!)

Intensity of scattering ~1/ λ^4

Intensity of scattering ~ $1/\lambda^4$

If white light hits the earth's atmosphere,
which color scatters MORE?
A) Red light
B) Blue light