Amqa Secondary School
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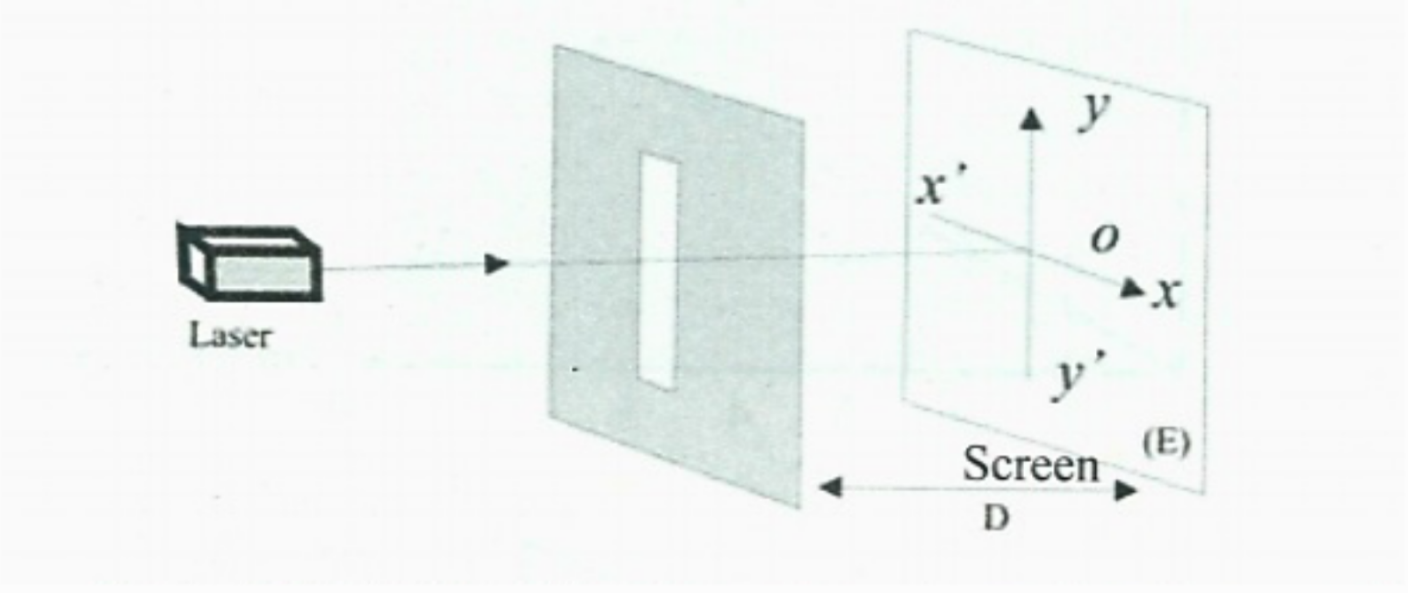
Grade: 12/LS: ----.
Diffraction Worksheet

Exercise: Diffraction

A thin slit of width a is illuminated successively by a source of wavelength λ_1=632.8 nm in vacuum, then with another source of wavelength λ_1.
The diffraction pattern is observed on a screen (E) placed at a distance D behind the plane of the slit .
The angles obtained are considered very small



1.1) Describe the diffraction pattern observed on the screen (E)
1.2) What conditions should be satisfied to obtain a diffraction pattern ?

2) With the first source, the width of the central bright fringe is L=6 cm, and L'=5.4 cm when using the second source.

2.1) Show that the angular width of center bright fringe

$$\alpha = 2\lambda_1/a$$

2.2) Determine the expression of the width L of the central fringe in
terms of λ_1, D and a
2.3) Show that $L/L' = \lambda_1/\lambda_2$
2.4) Deduce the wavelength λ_2 of the second source.

3) We repearted the same experiment in water of index of refraction 1.3 with the first source of $\lambda_1 = 632.8nm$
3.1) will the frequency change? Justify.
3.2) show that the new linear $L_1 = L/n$
3.3) Deduce the value of L_1.

4) If both lights of wavelength λ_1 considered blue and λ_2 considered yellow are illuminated and the color of the dichromatic light of λ_1 and λ_2 is green. Determine with justification
4.1) The color at L_1
4.2) the color of the edges of L_2

5) upon using diffraction with λ_1 what will happen to linear width of central bright fringe if
5.1) the width of slit is doubled with the same distance from screen.
5.2) the distance from slit to screen is doubled with the same slit width.
5.3) both the slit width and distance from slit to screen are doubled