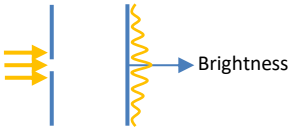
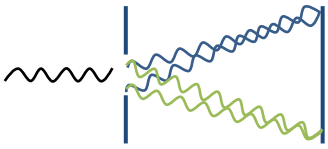
CONCEPT: SINGLE SLIT DIFFRACTION

- Light shone through a double slit has unexpected results if you do not consider diffraction
  - Likewise, light shone through a single slit also displays a diffraction pattern



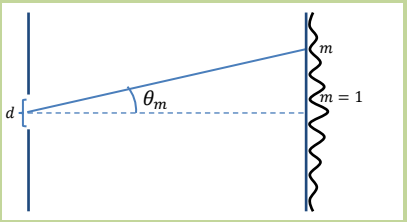
- The big difference between double slits and single slits is the central bright spot
  - In a double slit, the central bright spot is the same width as the others
  - In a single slit, the central bright spot is TWICE as wide as the others

- Like in a double slit, the diffraction pattern is due to _____
  - When light is exiting the slit, light leaves different parts of slit at different angles
  - Light that constructively interferes → [DARK / BRIGHT] fringes
  - Light that destructively interferes → [DARK / BRIGHT] fringes



- DARK FRINGES are located at angles given by

$\sin\theta_m =$ _____ for $m = 1, 2, 3, \ldots$



EXAMPLE: A 450 nm laser is shown through a single slit of width 0.1 mm. If the screen is a distance of 140 cm away from the slit, how wide is the central bright spot?

PRACTICE: WIDTH OF AN UNKNOWN SINGLE SLIT

Light from a 600 nm laser is shown through a single slit of unknown width. If a screen is placed 4.5 m behind the slit captures a diffraction patter with a central bright fringe of width 20 mm, what is the width of the single slit?

EXAMPLE: NUMBER OF DARK FRINGES ON A SCREEN

Light from a 500 nm laser is shown through a single slit of width 0.5 mm, with a screen placed 3.5 m from the slit. If the screen is 2 cm wide, how many dark fringes can fit on the screen?