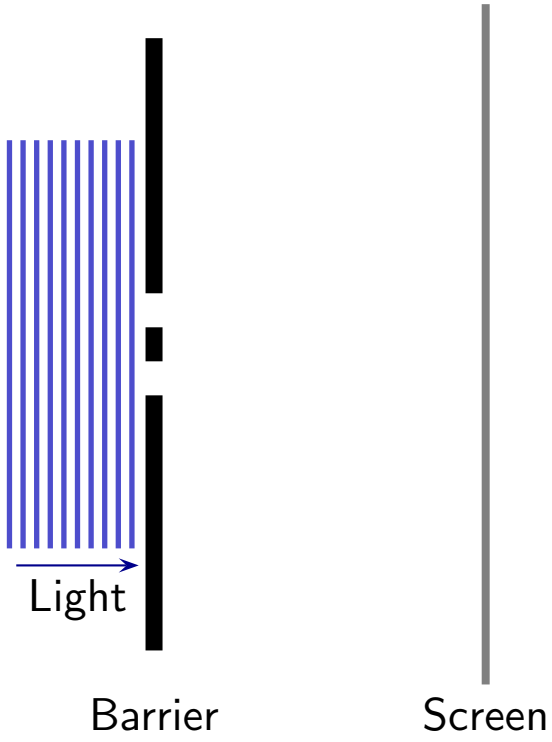
Question 1

Monochromatic light (of just one wavelength) is incident upon a double slit.



The wavelength of the light increases. Which of the following describes what happens to the bright fringes?

1. Stay the same.
2. Spread out.
3. Squash together.
4. Stay in the same location but diminish in brightness.
5. Stay in the same location but increase in brightness.

Question 2

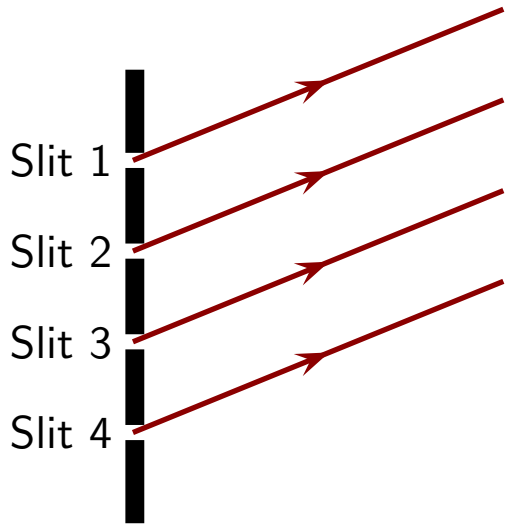
White light is a combination of light waves of many different frequencies. The wavelengths of the light range from largest for red to smallest for blue. A beam of white light is incident upon a double-slit.

Which of the following is true?

1. There is a white central bright fringe.
2. There is a bright blue fringe at the center.
3. There are only red fringes to the left of center and blue fringes to the right of center.
4. Outer bright fringes contain a range of color bands - red are further out than blue.
5. Outer bright fringes contain a range of color bands - blue are further out than red.

Question 3

Consider four equally spaced slits and consider light waves that travel to one particular screen location. Suppose that the discrepancy in the distance traveled by the waves between adjacent slits is one wavelength.

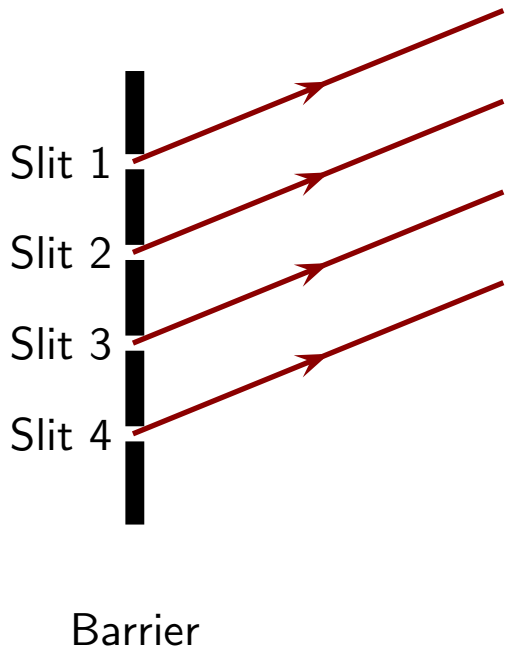


Which of the following is true regarding the difference in the distance traveled between the waves emanating from slit 1 and slit 4?

1. 2λ
2. 2.5λ
3. 3λ
4. 3.5λ
5. 4λ

Question 4

Consider four equally spaced slits and consider light waves that travel to one particular screen location. Suppose that the discrepancy in the distance traveled by the waves between adjacent slits is $\frac{\lambda}{2}$.

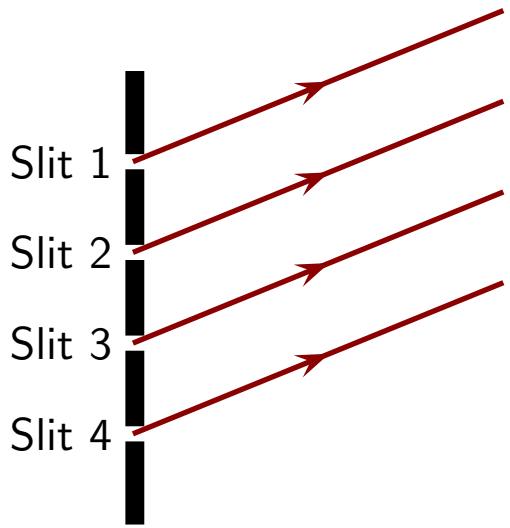


Which of the following is true? *(Hint: consider combinations of various pairs of waves, e.g. wave 1 and wave 2, then wave 3 and wave 4.)*

1. The waves interfere destructively $\Rightarrow$ dark fringe.
2. The waves interfere constructively $\Rightarrow$ bright fringe.
3. Some waves interfere destructively others constructively $\Rightarrow$ intermediate fringe.

Question 5

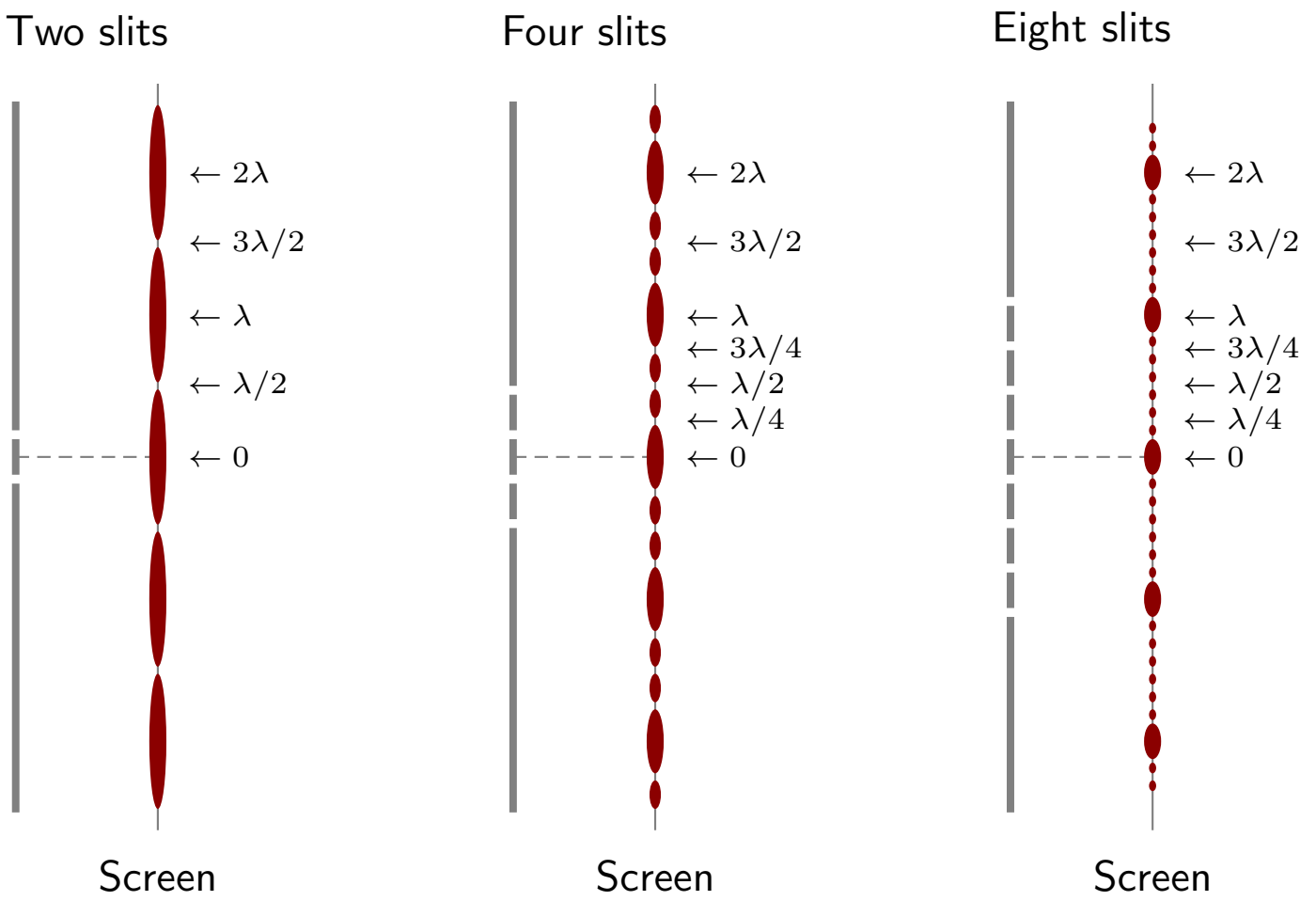
Consider four equally spaced slits and consider light waves that travel to one particular screen location. Suppose that the discrepancy in the distance traveled by the waves between adjacent slits is $\frac{\lambda}{4}$.



Which of the following is true? *(Hint: consider combinations of various pairs of waves)*

1. The waves interfere destructively $\Rightarrow$ dark fringe.
2. The waves interfere constructively $\Rightarrow$ bright fringe.
3. Some waves interfere destructively others constructively $\Rightarrow$ intermediate fringe.

Multiple slit patterns



Question 6

A narrow beam of white light is viewed through a diffraction grating whose slits are vertical. Wavelengths of light are typically 650 nm for red light 480 nm for violet.

Which of the following is true in the vicinity of the region immediately opposite the beam of light?

1. The light will split into a rainbow pattern with the violet on the left and red on the right.
2. The light will split into a rainbow pattern with the violet on the right and red on the left.
3. The light will split into a rainbow pattern with the violet further from the center than red.
4. The light will split into a rainbow pattern with the violet closer to the center than red.