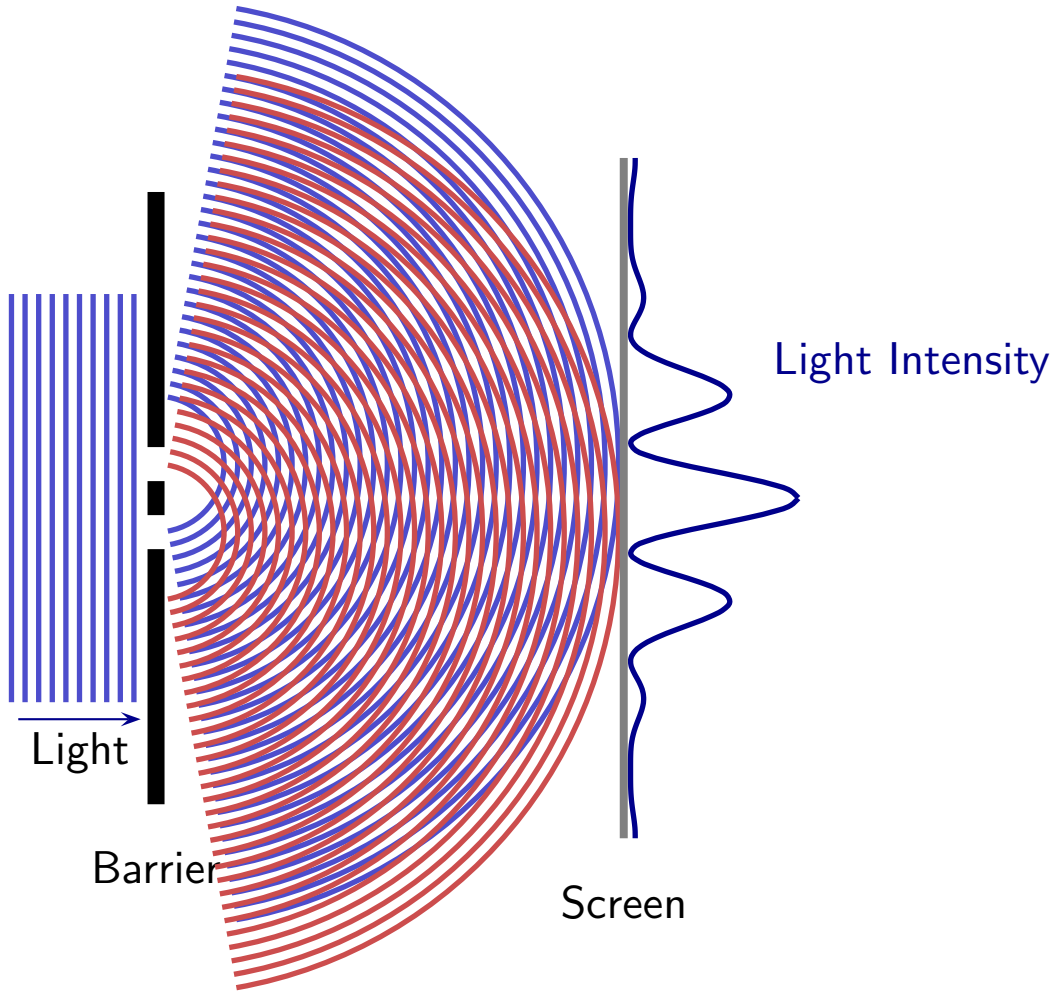
Warm Up Question 1

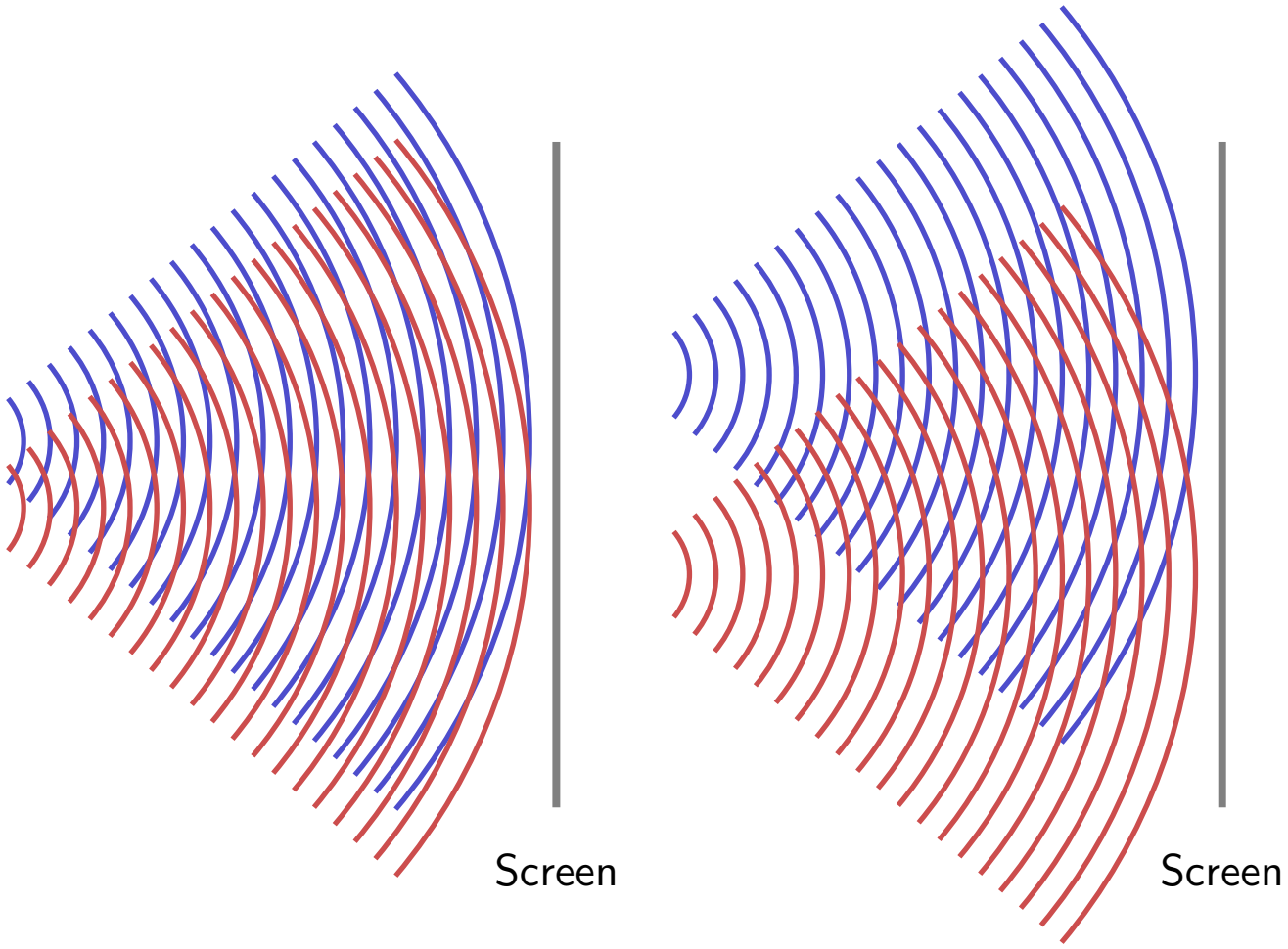
Light is incident upon two narrow slits. Consider possibilities for how the light might pass beyond a slit. Suppose that it traveled as rays, not spreading as they pass through the slits. Would the pattern of Fig. 17.6 occur if this were true? Explain your answer.

1. No. The entire screen will be illuminated.
2. No. There would be no overlapping. Just a single bright line.
3. No. There would be two bright spots on the screen.
4. Yes. There will still be regions where they interfere.

Overlapping Waves from a Double Slit



Overlapping Waves from a Double Slit



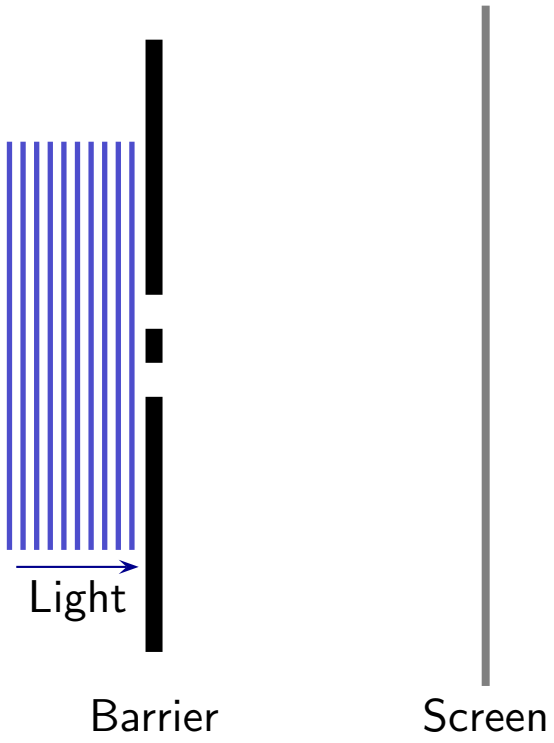
Warm Up Question 2

An interference pattern produced in a double slit experiment is shown in Fig. 17.6. At each point on the screen light has traveled in two paths; one from the upper slit and one from the lower slit. These paths may have different lengths. What is the difference in path length for light reaching the central maximum? What is the difference in path length (e.g. 0.5, 1, 1.5 wavelengths different) for light reaching the maximum labeled m=1? Explain your answers.

1. Central fringe zero difference. $m = 1$ fringe zero difference.
2. Central fringe zero difference. $m = 1$ fringe half wavelength difference.
3. Central fringe zero difference. $m = 1$ fringe one wavelength difference.
4. Central fringe zero difference. $m = 1$ fringe some other difference.
5. Central fringe one wavelength difference. $m = 1$ fringe some other difference.
6. Largest for the central fringe. Smaller for the others.

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.