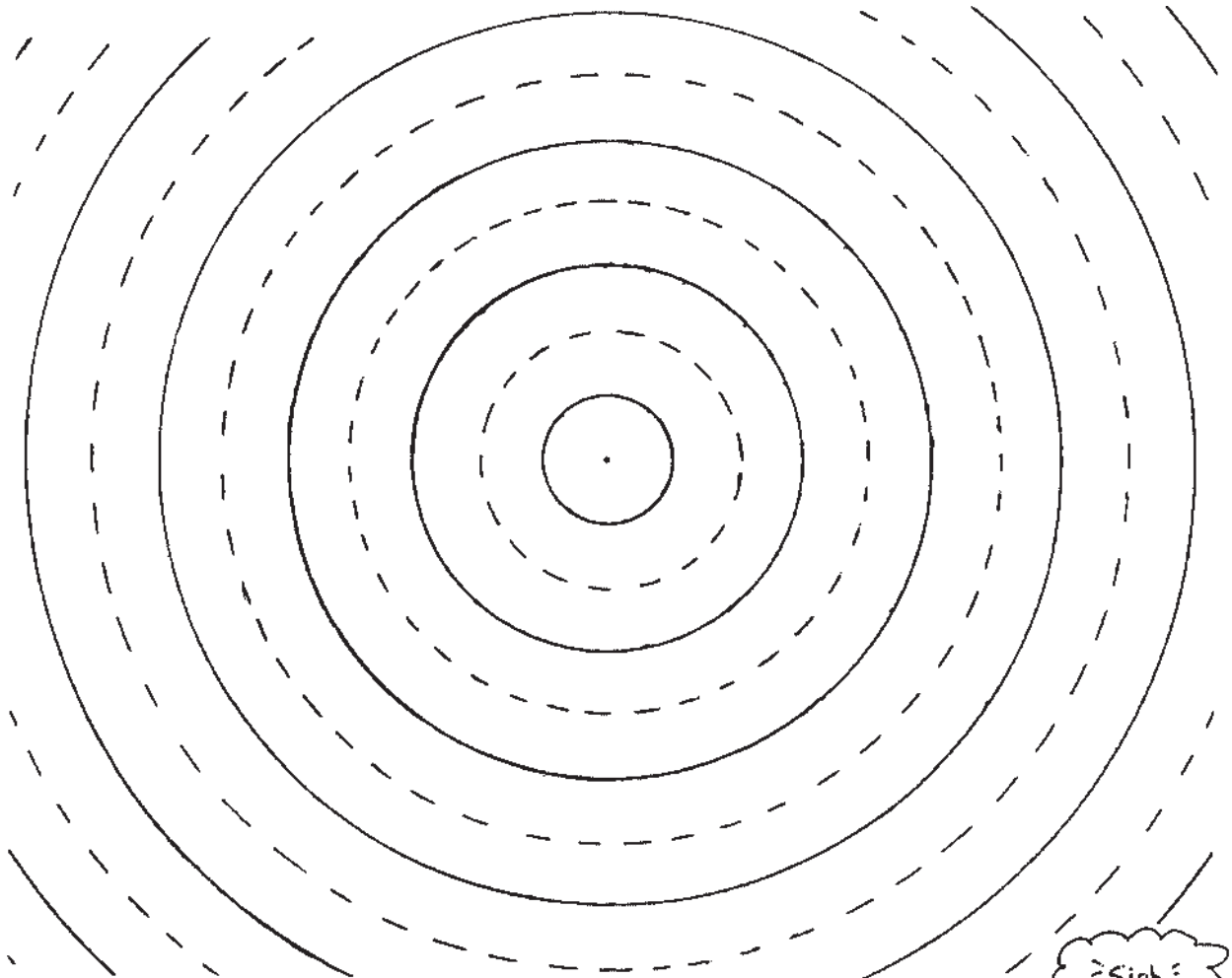


***Diffraction and Interference***

1. Shown below are concentric solid and dashed circles, each different in radius by 1 cm. Consider the circular pattern of a top view of water waves, where the solid circles are crests and the dashed circles are troughs.
  - a. Draw another set of the same concentric circles with a compass. Choose any part of the paper for your center (except the present central point). Let the circles run off the edge of the paper.
  - b. Find where a dashed line crosses a solid line and draw a large dot at the intersection. Do this for ALL places where a solid and dashed line intersect.
  - c. With a wide felt marker, connect the dots with smooth lines. These *nodal lines* lie in regions where the waves have canceled — where the crest of one wave overlaps the trough of another (see Figures 25.11 and 31.12 in the textbook).



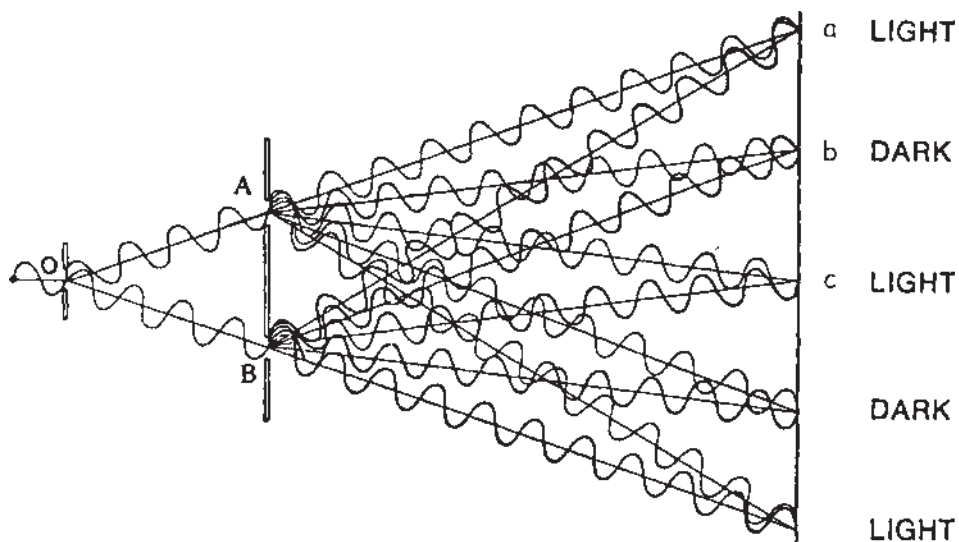
2. Look at the construction of overlapping circles on your classmates' papers. Some will have more nodal lines than others, due to different starting points. How does the number of nodal lines in a pattern relate to the distance between the centers of the circles (or sources of waves)?

---



---

3. Figure 31.15 from your text is repeated below. Carefully count the number of wavelengths (same as the number of wave crests) along the following paths between the slits and the screen.



- Number of wavelengths between slit A and point a = \_\_\_\_\_
- Number of wavelengths between slit B and point a = \_\_\_\_\_
- Number of wavelengths between slit A and point b = \_\_\_\_\_
- Number of wavelengths between slit B and point b = \_\_\_\_\_
- Number of wavelengths between slit A and point c = \_\_\_\_\_
- Number of wave crests between slit B and point c = \_\_\_\_\_

When the number of wavelengths along each path is the same or differs by one or more whole wavelengths, interference is

(constructive) (destructive)

and when the number of wavelengths differs by a half wavelength (or odd multiples of a half wavelength), interference is

(constructive) (destructive).