HW S1. Geometric Series. Show that

$$S_n = 1 + r + r^2 + r^3 + \ldots + r^n = \frac{r^{n+1} - 1}{r - 1}$$

Then apply your general formula to show the following result you will need in Problem HW S2.

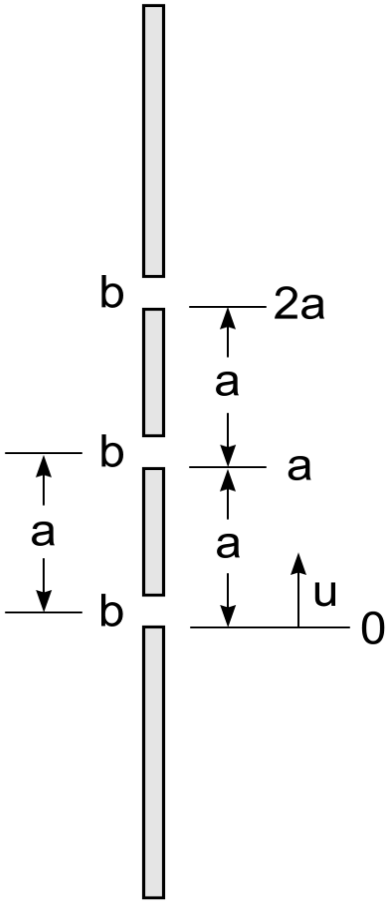
$$1 + e^{i\alpha} + e^{2i\alpha} = \frac{e^{3i\alpha} - 1}{e^{i\alpha} - 1}$$

HW S2. Triple-Slit Diffraction. Adapt the single-slit Fraunhofer diffraction formula

$$E_p = Ch \int_{-b/2}^{b/2} e^{ik(r_o + u\sin\theta)} du$$

to a the triple slit shown in the figure. Define

$$\alpha = \frac{ka\sin\theta}{2} \quad \text{and} \quad \beta = \frac{kb\sin\theta}{2}.$$



Show that the irradiance is given by the formula below.

$$I = I_o \left[\frac{\sin(\beta)}{\beta}\right]^2 \left[\frac{\sin(3\alpha)}{3\sin\alpha}\right]^2$$

Justify that indeed $I_o = I(0°)$ using L'Hôpital's Rule.