

**TERMS**

Be able to define or discuss the following terms with their SI units, if any.

1. diffraction
2. diffraction pattern
3. Fresnel (or near-field) diffraction
4. Fraunhofer (or far-field) diffraction
5. diffraction grating
6. order, order number  $m$
7. chromatic resolving power  $R$
8. x-ray diffraction
9. Rayleigh's criterion
10. hologram

**EQUATIONS**

Understand the meaning and know the SI units of all the symbols in these equations—and be able to use the equations to solve problems.

1. Eq. (36.2)
2. Eq. (36.12)
3. Eq. (36.13)
4.  $R \equiv \frac{\lambda}{\Delta\lambda} = Nm$
5. Eq. (36.17), where  $\tan \theta_1 = \frac{y_1}{s}$

**SKILLS**

Use the material in these sections to be able to:

1. use the fact that  $\frac{1}{d}$  equals the number of slits per distance for a diffraction grating.
2. solve missing orders problems (in which a diffraction zero occurs at the same angle as an otherwise expected interference maximum).
3. apply Rayleigh's criterion and  $\tan \theta_1 = \frac{y_1}{s}$  to determine whether the images of two distant point sources can be resolved under ideal conditions. (The two sources are a distance  $s$  from the circular aperture and are separated by a transverse distance  $y_1$ .)
4. state our two reasons for using large aperture telescopes.

Page 1186, second sentence: “You couldn't hear ...” ignores reflection.

Page 1188, eight lines up from the bottom of text: Insert “or more” after “85%” (e.g., it's 100% if  $\lambda \geq a$ ), seven lines up from the bottom of text: Change “proportional” to “related” (it's inversely proportional only for small angles), and Fig. 36.3b: The drawn diffraction pattern is not to scale (see photographic Fig. 36.6).

Page 1198, bottom: I don't believe the DVD stuff is completely correct, but CDs and DVDs do act as reflection gratings.

Page 1199, Example 36.4: Again, outside of the 400 to 700 nm range, human vision sensitivity is extremely low.

Our assignment in life is to find our strengths—and then nurture with integrity those that benefit the world.  
—Emilie Hall Sandin