

CHAPTER OVERVIEW

2: Waves in Two and Three Dimensions

In this chapter we extend the ideas of the previous chapter to the case of waves in more than one dimension. The extension of the sine wave to higher dimensions is the *plane wave*. Wave packets in two and three dimensions arise when plane waves moving in different directions are superimposed.

Diffraction results from the disruption of a wave which is impinging upon an object. Those parts of the wave front hitting the object are scattered, modified, or destroyed. The resulting *diffraction pattern* comes from the subsequent interference of the various pieces of the modified wave. A knowledge of diffraction is necessary to understand the behavior and limitations of optical instruments such as telescopes.

Diffraction and interference in two and three dimensions can be manipulated to produce useful devices such as the *diffraction grating*.

[2.1: Math Tutorial — Vectors](#)

[2.2: Plane Waves](#)

[2.3: Superposition of Plane Waves](#)

[2.4: Diffraction Through a Single Slit](#)

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