# About Sine Waves

NOVA Activity **Volcano's Deadly Warning**

A sine wave represents a wave, whether it be a water wave traveling toward a beach or a sound wave created by a single musical note. The figure below shows the components of a simple sine wave. In a volcano, many such waves combine, creating complex sine waves.
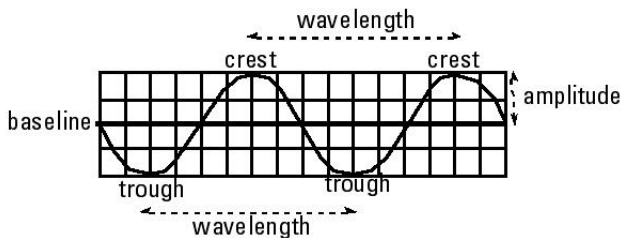


### Wave Interference

When waves overlap they interfere with each other, forming what is called an interference pattern. If the waves' crests and troughs overlap, the resulting effect is that the waves reinforce each other. This is called *constructive interference*. If the opposite occurs and one wave's crest overlaps the other's trough, the waves cancel out each other. This is known as *destructive interference*.
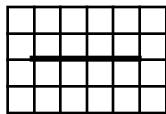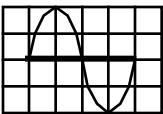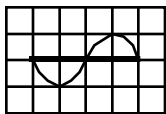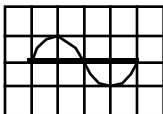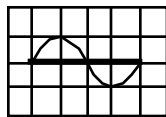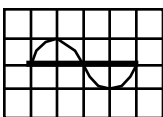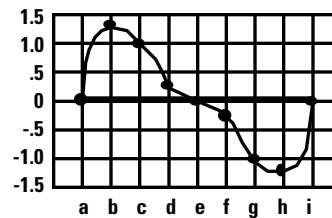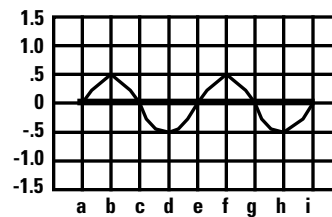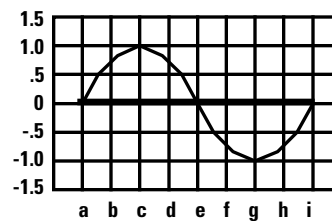


**Constructive Interference**

**Destructive Interference**

### Adding Sine Waves

This example shows how points on two simple sine waves can be combined to determine the point on the complex sine wave. Values above the baseline are positive; those below are negative.



| | |
|---|---|
| **a** | 0.00 + 0.00 = 0.00 |
| **b** | 1.50 + 1.00 = 2.50 |
| **c** | 2.00 + 0.00 = 2.00 |
| **d** | 1.50 + -1.00 = 0.50 |
| **e** | 0.00 + 0.00 = 0.00 |
| **f** | -1.50 + 1.00 = -0.50 |
| **g** | -2.00 + 0.00 = -2.00 |
| **h** | -1.50 + -1.00 = -2.50 |
| **i** | 0.00 + 0.00 = 0.00 |