Interference

Why is my TV reception poor?

What causes television interference?

Television signals can be subject to interference.

Click the "**on**" button on the television or click "**play**" to find out more about what can cause this interference.

Why is my radio reception poor?

What causes radio interference?

Radio signals can be subject to interference.

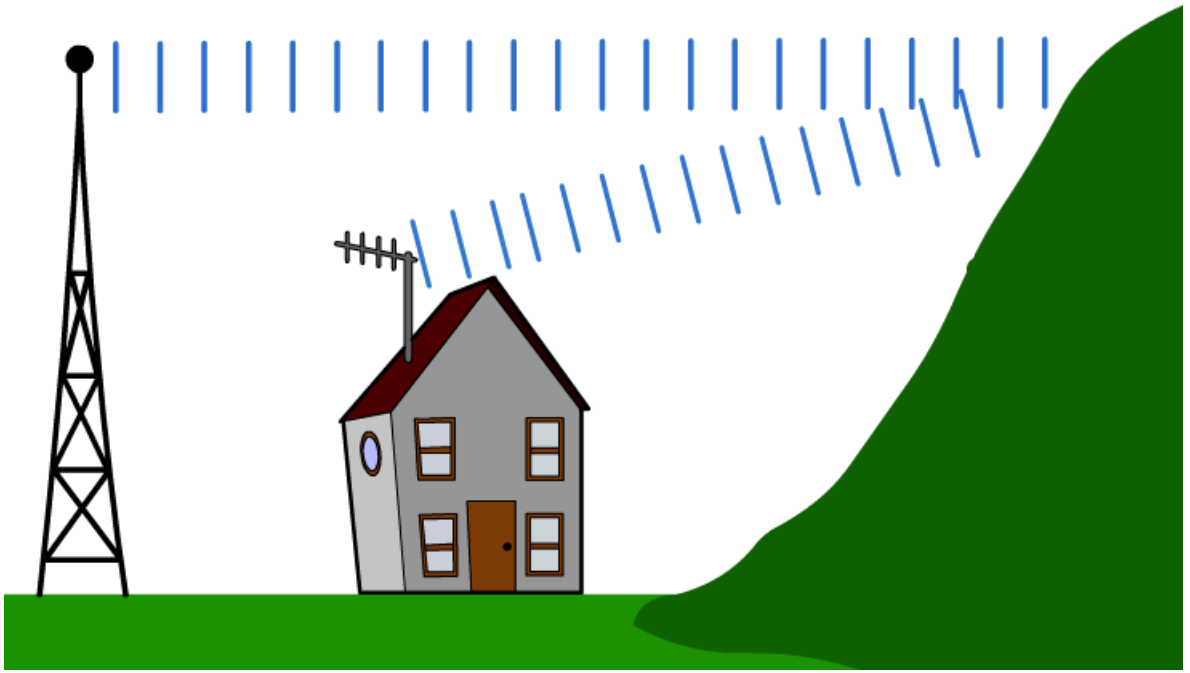
Click the "**on**" button on the radio or click "**play**" to find out more about what can cause this interference.

Can radio waves travel through walls?

Radio waves are not absorbed strongly by walls, which is why radio (and television) signals can be received indoors.

Tall objects, like buildings and hills, can prevent radio waves from traveling directly from a transmitter, but this is not always a problem.

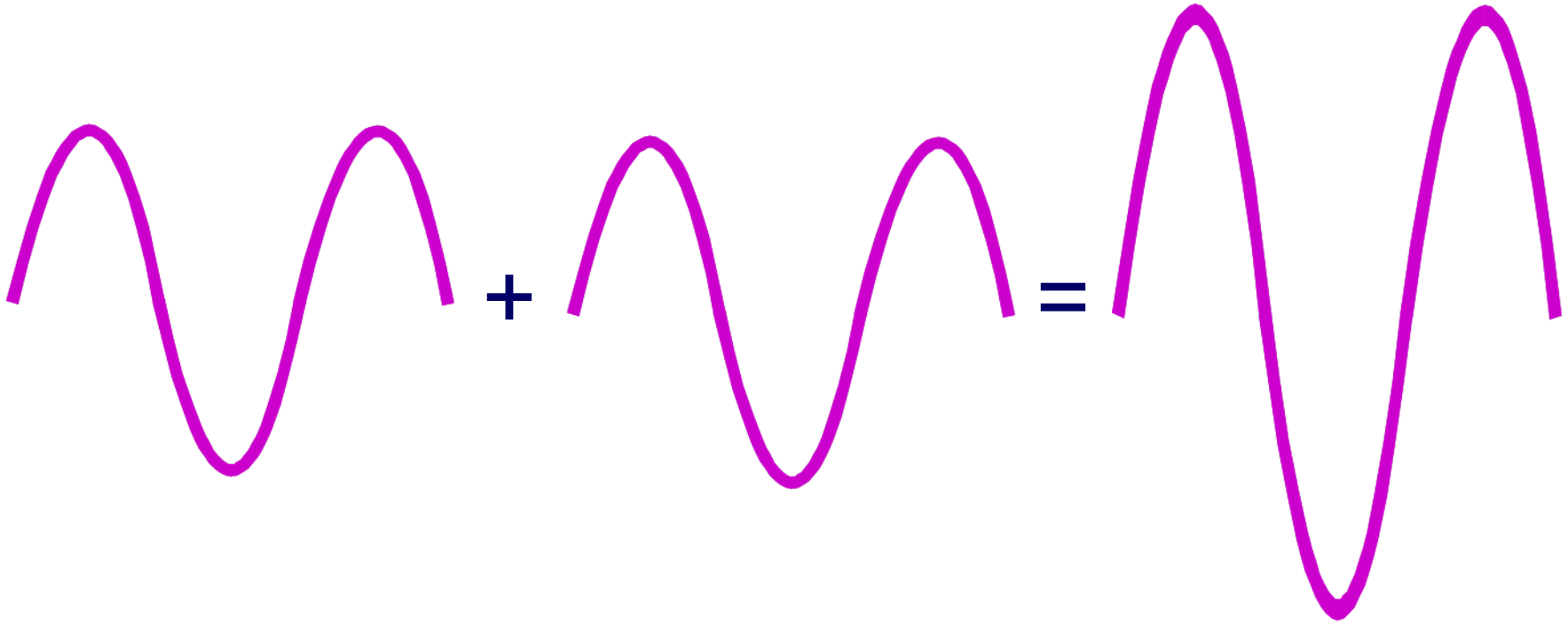
In some areas, the reflection of waves off other buildings or hills can actually lead to improved radio reception.



Constructive interference

When two waves meet, they **interfere** with each other.

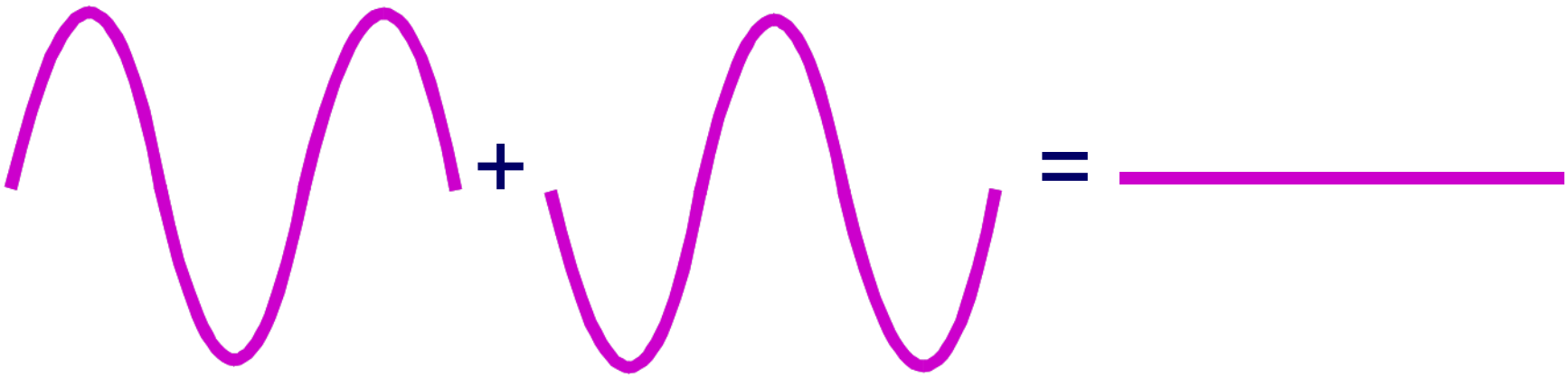
If they meet each other exactly in phase, the amplitudes "add up" to produce large crests and troughs.



This is called **constructive interference**.

Destructive interference

If two waves meet each other exactly out of phase, the amplitudes “subtract” to produce **no** crests and troughs.

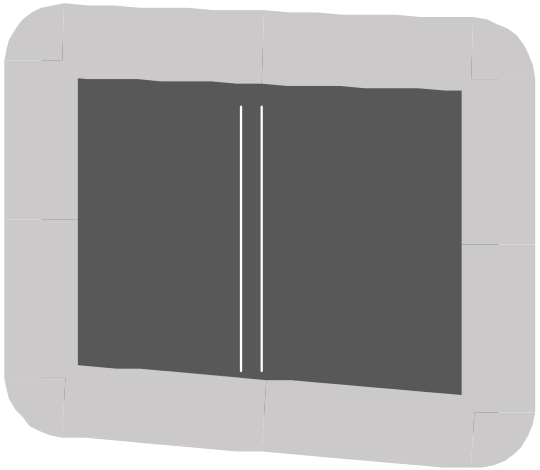


This is called **destructive interference**.

Young's slits

To get two waves of light to interfere, the waves must be very similar.

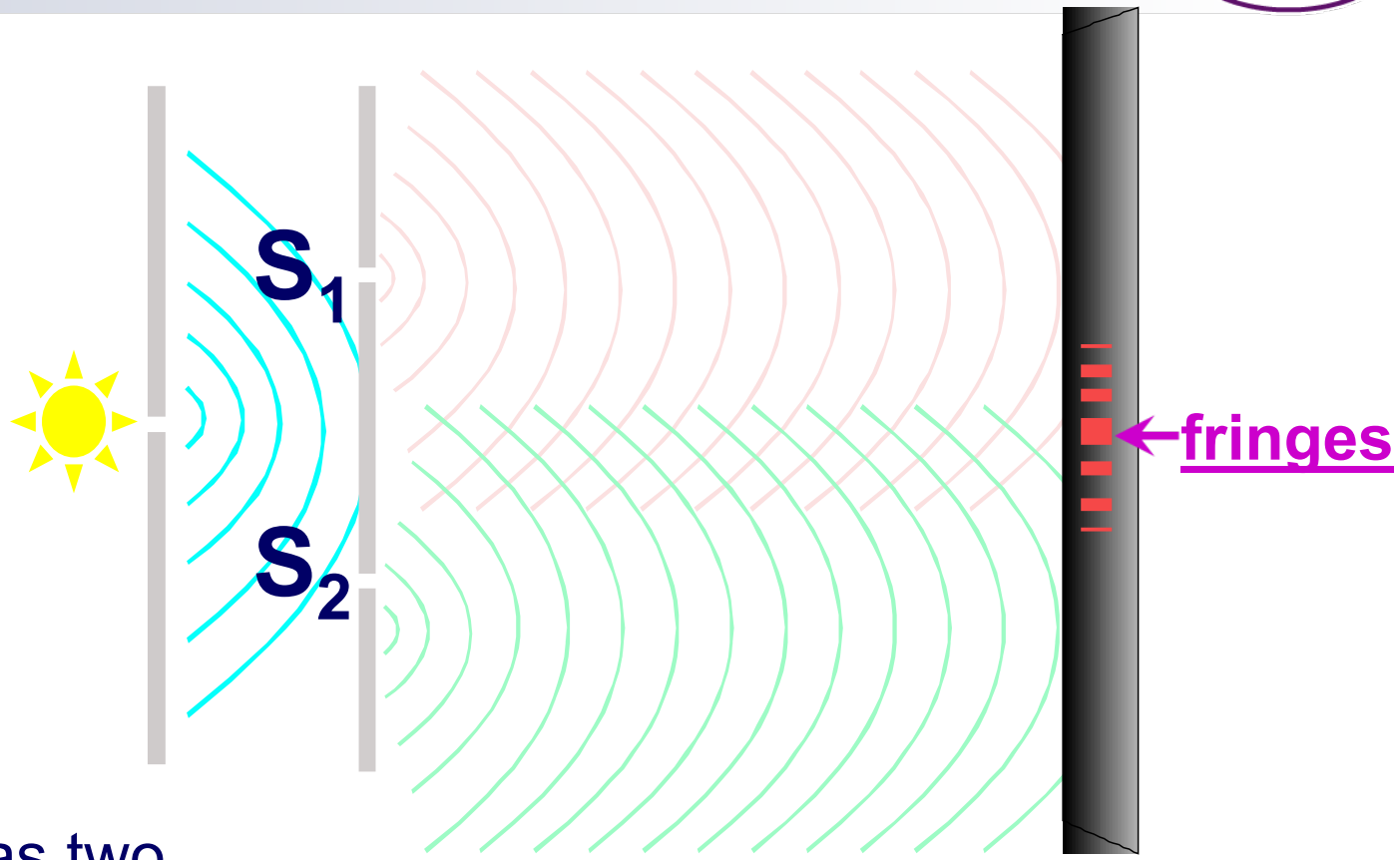
A single source of **monochromatic** light is used, and split into two waves by using a diffraction grating like this:



In 1801, the English physicist Thomas Young first performed this classic investigation, which showed the interference of light waves.

Diffraction and interference

The light source emits rays of light, which diffract towards the double slit.

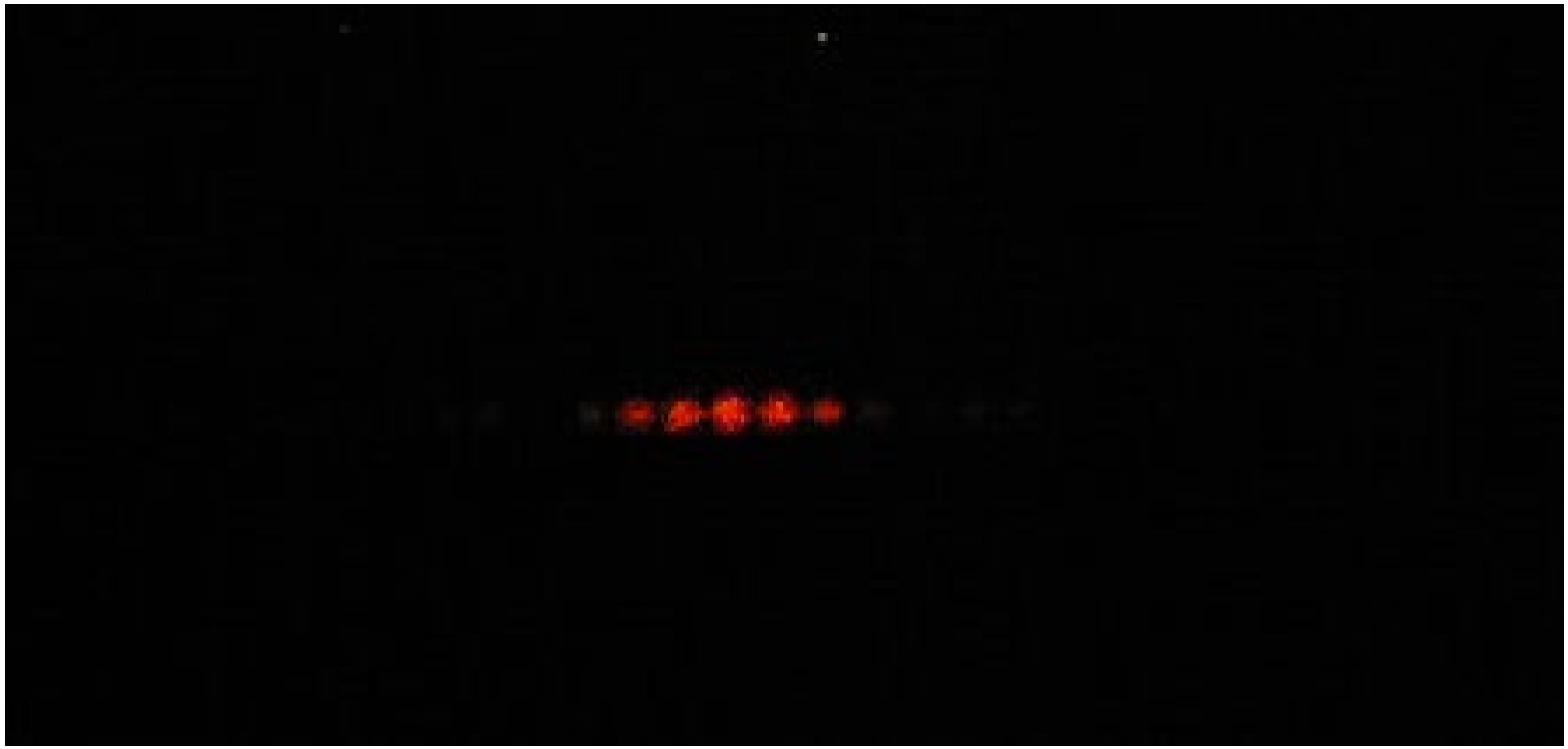


S_1 and S_2 act as two light sources.

The waves interfere: constructively (bright fringes)
destructively (dark fringes)

Diffraction patterns

This is the front view of fringes produced by Young's slits.



What would the fringes look like if white light was used as the source instead?

Diffraction effects

The colored fringes on this CD are the result of interference.

Light reflecting from the aluminum coating diffracts and interferes.

Some colors are diffracted more than others.

Resonance

All objects have a natural frequency of vibration.

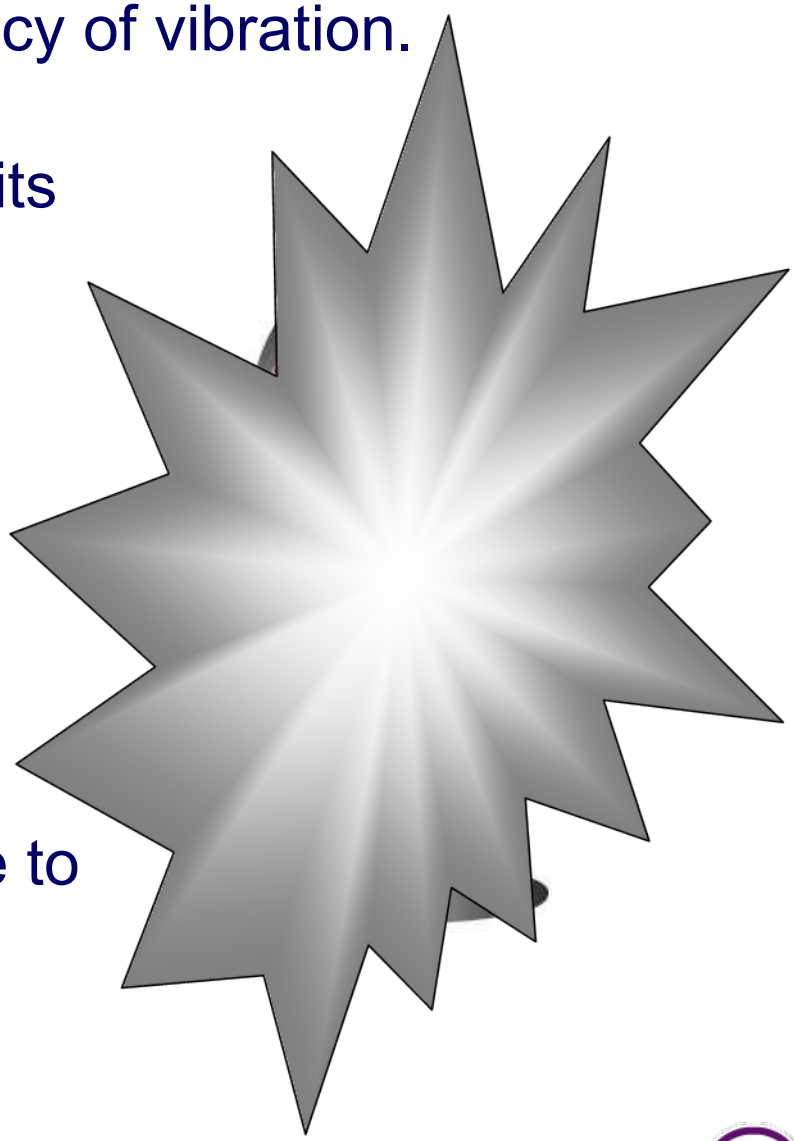
If an object is forced to vibrate at its natural frequency, it will vibrate at its maximum amplitude.

This effect is called **resonance**.

The larger the mass of an object, the lower its natural frequency.

What will happen to a glass made to vibrate at its natural frequency?

Resonance causes it to shatter!



Waves, diffraction and interference

Are these statements about diffraction and interference true or false?

1. You can hear around corners because of interference.	
2. Waves become curved when they are diffracted.	
3. Two waves in phase cancel each other out.	
4. Wavelength decreases when a wave diffracts.	
5. Long wavelengths diffract more than short wavelengths.	
6. Resonance is caused by diffraction.	

true false