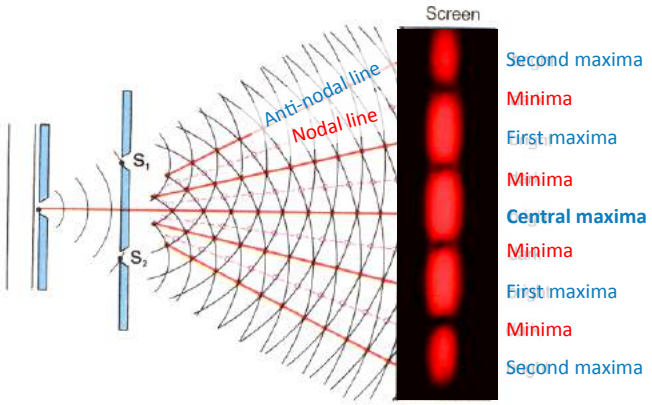
# VIDEO SUMMARIES: WAVES

## MULTI-SLIT INTERFERENCE

**What you need to know:**

*Last year:*

- Constructive interference
- Destructive interference
- Diffraction
- Interference patterns (nodes, antinodes, maxima, minima, in/out of phase)

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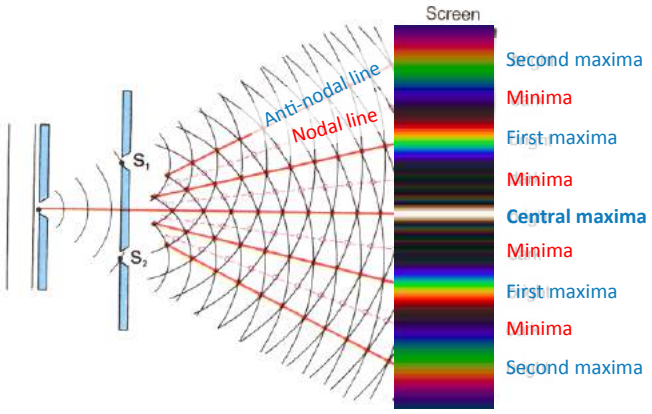
## MULTI-SLIT INTERFERENCE


**What you need to know:**

*This year:*

1. If there are multiple frequencies, there will be multiple interference patterns showing





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# VIDEO SUMMARIES: WAVES

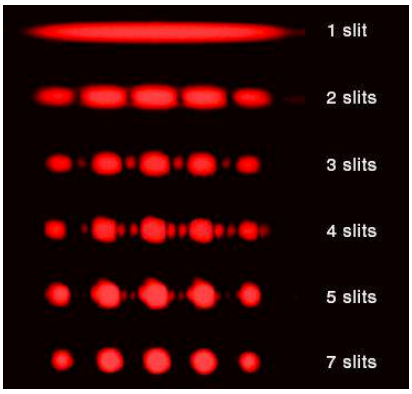
## MULTI-SLIT INTERFERENCE

**What you need to know:**

*This year:*

1. If there are multiple frequencies, there will be multiple interference patterns showing
2. Multiple slits show:
   - More pronounced maxima
   - More minima (between maxima)

   This is because:
   - More light sources = More points of destructive + stronger constructive

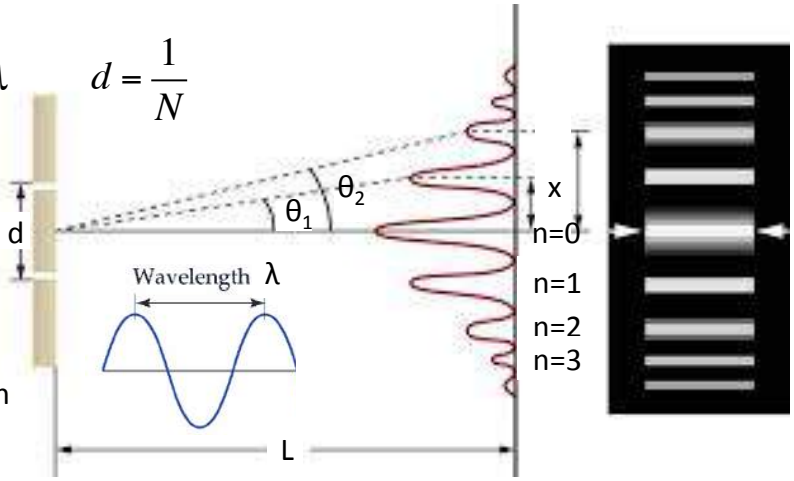





## MULTI-SLIT CALCULATIONS

$$n\lambda = \frac{dx}{L} \qquad d\sin\theta = n\lambda \qquad d = \frac{1}{N}$$

d = distance between slits
θ = angle of diffraction
n = number of maxima
λ = wavelength
x = distance to maxima *(from centre)*
L = distance from slit to screen
N = number of slits (/mm)



# VIDEO SUMMARIES: WAVES

## STANDING WAVES

**What you need to know:**

- Waves reflect back & overlap
- Nodes and antinodes
- Have resonance ($v=f\lambda$)

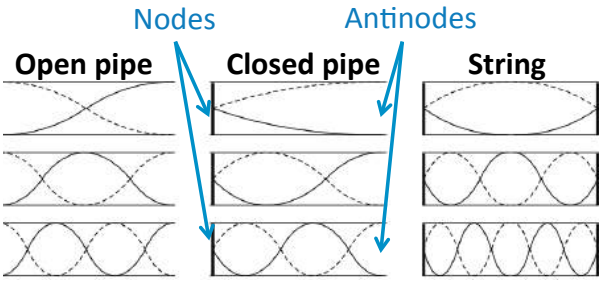
- $v$ can be altered with :
  1. Different medium (e.g. heavier rope)
  2. Different tension
- $v$ relates to pitch, $f$ :
  - lower $v$ = lower $f$ (So lower pitch)



## STANDING WAVES

**What you need to know:**

- Waves reflect back & overlap
- Nodes and antinodes
- Have resonance ($v=f\lambda$)
- 3 types of standing wave
  - String (2 nodes)
  - Closed pipe (1 node)
  - Open pipe (2 antinodes)

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# VIDEO SUMMARIES: WAVES

## STANDING WAVE HARMONICS

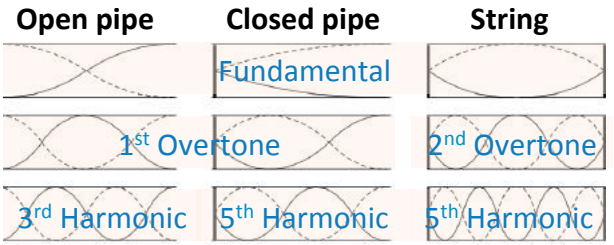
**What you need to know:**

**Fundamental frequency**
- *The lowest frequency produced in any standing wave*

**Overtone**
- *A frequency higher than the fundamental*

**Harmonics**
- *A multiple of the fundamental frequency*

Wavelength can be calculated from the length of pipe (or vice versa)

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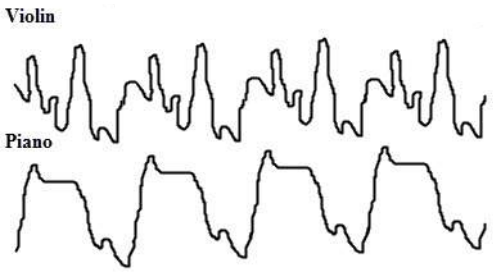
## STANDING WAVE HARMONICS

**What you need to know:**

The same note can sound different when played by different instruments

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# VIDEO SUMMARIES: WAVES

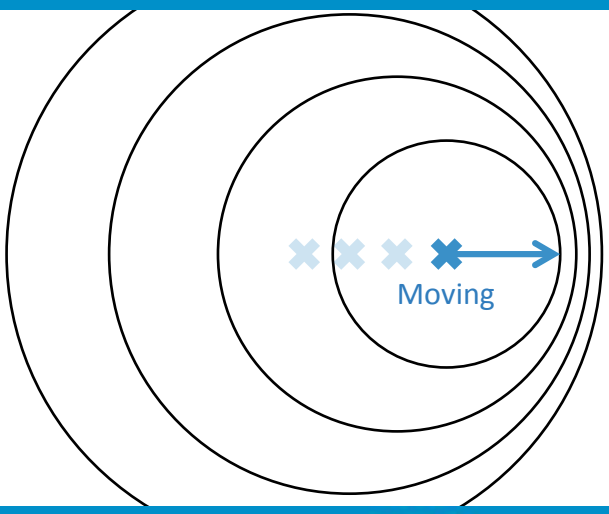
## DOPPLER EFFECT

### What you need to know:

- **Doppler effect**, when a wave source is moving, it changes the frequency of the waves

**Formula:** $v = f\lambda$

- Speed of wave, $v$, remains the same
- Wavelength, $\lambda$, changes
- Because $v = f\lambda$, frequency, $f$, changes






## DOPPLER CALCULATIONS

### What you need to know:

**Equation:** $$f' = f\frac{v_w}{v_w \pm v_s}$$

$f'$ is the altered frequency
$f$ is the frequency emitted
$v_w$ is the speed of the wave
$v_s$ is the speed of the source
$\pm$ (use + behind/away, use – in front/towards)

**Beats:**

When two sounds of different frequencies overlap, they interfere.

This creates beats.

The number of beats per second equals the difference in frequency.

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