# Thin Film Interference

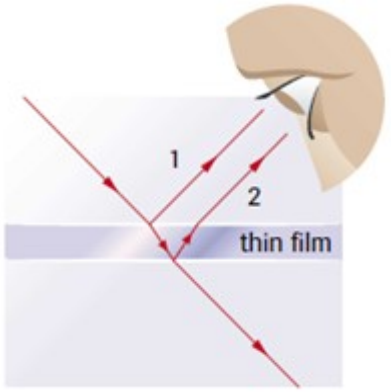
SPH4U

Consider a thin film like a soap bubble.

Some light will be _____ through the film and some light will be _____ from the _____.

Light will _____ be reflected from the _____.

These two reflections can _____.




Recall that waves reflecting from a _____ medium are _____.

and from a _____ medium are _____.

If the film's thickness *t* is _____ than the _____, the _____ is minimal and the _____ at the first interface means that the reflections will interfere _____.

If the thickness is _____, the path difference will be _____ and the inverted and non-inverted reflections will interfere _____.

If the thickness is _____, the path difference will be _____ and the inverted and non-inverted reflections will interfere _____.

Constructive interference will occur again when: _____

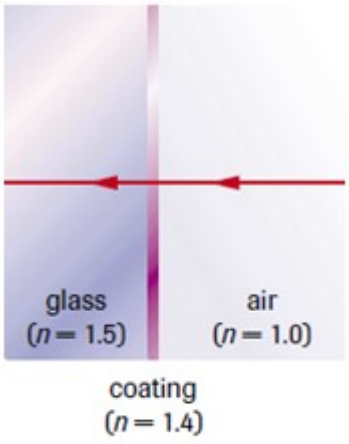
Destructive interference will occur again when: _____

Example: What is the minimum thickness of a soap bubble ($n = 1.33$) in air that will produce reflected constructive interference when illuminated with red light of wavelength 640 nm?

If the film is _____ material

(e.g., a coating on glass), there will be

_____.




_____ → constructive

_____ → destructive

_____ → constructive

Example: What minimum thickness of coating ($n$ = 1.4) on glass ($n$ = 1.5) would be required to minimally reflect light of wavelength 550 nm?

_____ on glasses are one application of thin films.

Another is _____, placed on machined metal to check if it is flat.

Interference patterns indicate areas with air gaps in need of further machining.

Interference can also be seen in the transmitted light because of _____

within the film. Note that the interference pattern is opposite that produced by reflection.