

## Thin Film Interference WS 6

For colors this worksheet assumes if a color is canceled out the complementary color will be seen at that location. If there is constructive interference for a color that color is likely to be seen.

1. Light reflects off a thin film of oil on top of water. The oil has an index of refraction of 1.50, and you are looking at light hitting where the thickness of the film is  $\frac{1}{2}$  of a wavelength of blue light thick.

Sketch:

- a) Will the light reflect off the top of the film in phase or  $\frac{1}{2}$  wave out of phase?
  - b) Will light reflect off the bottom of the film in phase or  $\frac{1}{2}$  wave out of phase?
  - c) Will there be constructive or destructive interference for the blue light at that location?
  - d) What color will your eye see at this location?
  - e) Will there be constructive or destructive interference at a location  $\frac{1}{4}$  wavelength thick?
  - f) What color would be seen at the location in "e"?
  - g) Give another thickness in wavelengths where constructive interference will occur?
2. Light reflects off a thin layer of air between two glass slides. You are looking at light hitting where the thickness of the air is  $\frac{3}{4}$  of a wavelength of red light thick.

Sketch:

- a) Will the light reflect off the top of the film in phase or  $\frac{1}{2}$  wave out of phase?
- b) Will light reflect off the bottom of the film in phase or  $\frac{1}{2}$  wave out of phase?

- c) Will there be constructive or destructive interference for the red light at that location?
- d) What color will your eye see at this location?
- e) Will there be constructive or destructive interference at a location  $\frac{1}{2}$  wavelength thick?
- f) What color would be seen at the location in “e”?
- g) Give another thickness in wavelengths where destructive interference will occur?

3. Light reflects off a soap bubble. You are looking at light hitting where the thickness of the bubble is  $\frac{1}{4}$  of a wavelength of green light thick.

Sketch:

- a) Will the light reflect off the top of the film in phase or  $\frac{1}{2}$  wave out of phase?
- b) Will light reflect off the bottom of the film in phase or  $\frac{1}{2}$  wave out of phase?
- c) Will there be constructive or destructive interference for the green light at that location?
- d) What color will your eye see at this location?
- e) Will there be constructive or destructive interference at a location  $\frac{1}{2}$  wavelength thick?
- f) What color would be seen at the location in “e”?