

# MALUS'S LAW

## Student Worksheet



Learning objectives:

- Recall Malus's Law for transmitted intensity of light from a polarising filter.
- Carry out an experiment to verify Malus's Law.
- Apply Malus's Law for transmitted intensity of light from a polarising filter.

1.
  - a. Explain what is meant by the term 'Plane Polarisation'.
  - b. Polarisation is a property of what type of wave?
  - c. Other than a polarising filter, give one way in which visible light may be polarised.
2. Given that the analyser produces a non-zero result when the two Polaroids are crossed how can we correct for this?
3. On a separate piece of paper draw a table for your results, include the following headings and don't forget to include your units.
  - $\theta$
  - $V$
  - $V_c$  (Corrected  $V$ )
  - $V_c/V_0$
  - $\cos^2\theta$

Ensure you leave enough space for angles ranging from  $-90^\circ$  to  $90^\circ$
4. After taking your results plot a graph of  $\frac{V}{V_0}$  against  $\cos^2\theta$  and complete with a line of best fit.
5. Calculate the gradient of your graph. Use the value for your gradient and draw a conclusion about Malus's law from it. (Hint: Write an expression in the form  $y=mx+c$ )

6. Summary Questions

a) State Malus's law.

b) State the significance of the  $\cos^2\theta$  in the expression for Malus's Law

c) Vertically polarised light of intensity  $50\text{Wm}^{-2}$  is incident on a polarising filter whose axis is rotated  $15^\circ$  to the vertical. Calculate the intensity of transmitted light.