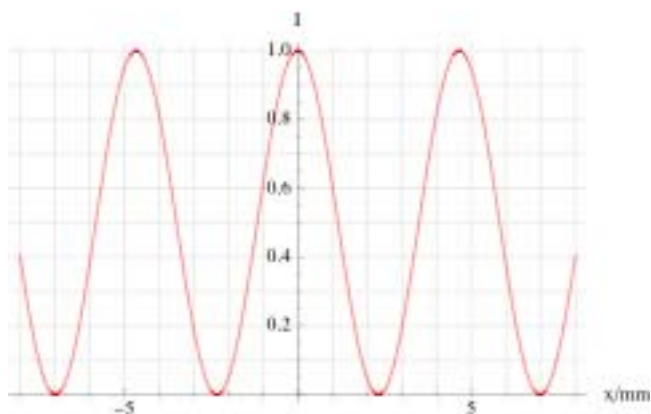


Mark scheme for Support Worksheet – Option G, Worksheet 2

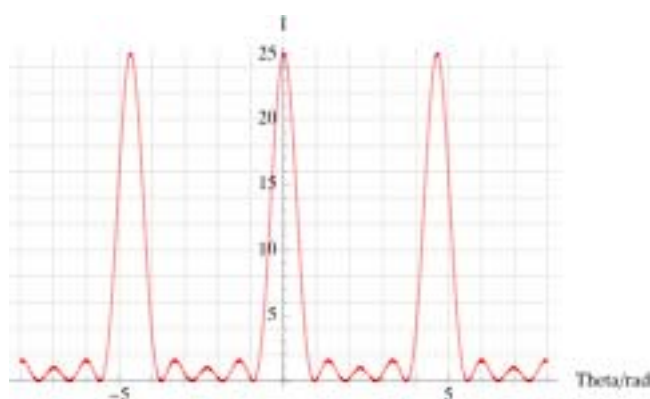
- 1 **a** No; because the two filament lamps are not coherent sources of radiation. [2]
- b** No; because the phase difference between the two lasers changes. [2]
- 2 Apply $s = \frac{\lambda D}{d}$ to get $s = \frac{620 \times 10^{-9} \times 1.80}{0.24 \times 10^{-3}}$; i.e. $s = 4.6$ mm; [2]
- 3 See graph below. The units on the vertical axis are arbitrary. Notice the correct distance between consecutive maxima.



[2]

- 4 The width of the maxima decreases but their separation stays the same; the intensity of the maxima increases; there are secondary maxima in between the primary maxima. [3]

(The graph that follows illustrates these points. The units on the vertical axes are consistent with those in the previous graph, which corresponds to 5 slits.)



- 5 The accelerated electrons suffer accelerations when they strike the target atoms; accelerated charges radiate EM waves with a wavelength that depends on the acceleration; since acceleration is involved a range of wavelengths is emitted. [3]



- 6** The accelerated electrons may collide with electrons in the inner energy states of the target atoms and eject them from the atoms; electrons in higher energy states in the target atoms will make transitions to the inner energy states emitting photons in the process; these photons will have specific wavelengths depending on the energy differences between the levels involved.

[3]

- 7** At the reflection at the top surface.

[1]