To Find the Wavelength of Laser Light Using a Diffraction Grating

Date

Grating labelled 300 lines mm^{-1} $= 300 \times 10^3\ m^{-1}$

$$d = 3.33 \times 10^{-6}\ m$$

Laser has a hand written label with ~~$\lambda = 633$~~ $\lambda = 632.8\ nm$

Apparatus set up as given in the lab manual. Laser and grating adjusted so that x between $n=1$ and $n=0$ is the same on both sides (ensures ligt is at 90° to screen or grating is parallel with screen.

For $n=3$

D/m	x/m
± 0.005	± 0.002
1.000	0.698
1.200	0.828
1.400	0.978
1.600	1.110
1.800	1.249
2.000	1.383

Rulers were placed on the desk and the grating is $\simeq$ 20 cm above so difficult to measure exactly what D is
The 'dots' are up to 5mm across so have to judge by eye where the centre is.

Error bars are not significantly large and all points are within ±1mm of line of best fit so no max/min gradient is possible.

$$\text{Gradient} = \frac{1.382 - 0.700}{2.00 - 1.00} = 0.682$$

$$\theta = \tan^{-1}(0.682) = 34.3°$$

$$\lambda = \frac{d \sin\theta}{n} = \frac{3.33 \times 10^{-6} \times \sin(34.3)}{3}$$

$$= 6.25 \times 10^{-7} \text{ m}$$

$$= \underline{625 \text{ nm}}$$

The laser is identified as a Unilab class 2 laser "432.051".
The catalogue states a wavelength of 635 nm

625nm is $\frac{10}{635} \times 100\% = 1.6\%$ away.