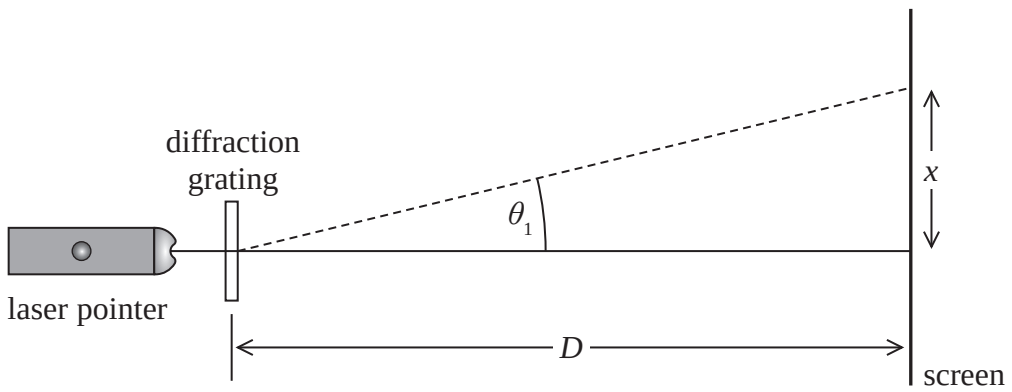
11 Light from a laser pointer was passed through a diffraction grating. The light was perpendicular to the diffraction grating as shown. A diffraction pattern was produced on a screen.



The distance between the first order maximum and the central maximum of the diffraction pattern was x. The distance between the diffraction grating and the screen was D.

(a) Distance x was measured to be 0.500 m with a metre rule. The wavelength of light λ_1 from the laser pointer was 650 nm.

The laser pointer was replaced with one that produced light of a different wavelength. The new distance x was measured to be 0.400 m.

$D = 1.45$ m

Calculate the wavelength λ_2 of the light emitted by the replacement laser pointer.

(5)

(b) Explain one modification to this method that would decrease the uncertainty in the calculated value of λ_2.

(2)

(c) In another experiment, the light from the laser pointer was not quite perpendicular to the screen.

Explain how this would change the diffraction pattern produced on the screen.

(3)

(Total for Question 11 = 10 marks)