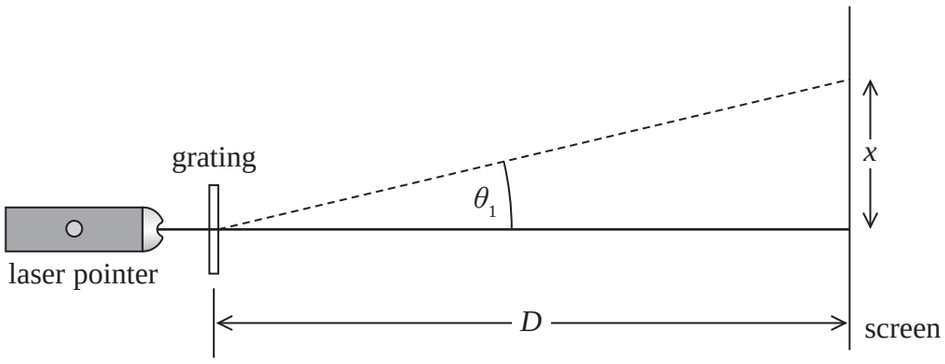
1 A student used a laser pointer to direct monochromatic light normal to the plane of a diffraction grating as shown.



A diffraction pattern was produced on the 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) The diffraction grating had 300 lines per mm.
The laser pen was marked with $\lambda = 520\,\text{nm}$.

Determine whether the spacing of the diffraction pattern was consistent with these values.

$x = 43.5\,\text{cm}$
$D = 2.75\,\text{m}$

(4)

(b) The student wrote the following conclusion:

"The value of x was measured with a metre rule. A metre rule has a precision of 0.1 cm, so this value was determined with a high degree of accuracy."

Comment on this conclusion.

(3)

(Total for Question 1 = 7 marks)