6 Light of a single frequency is incident normally on a diffraction grating. An interference pattern of bright and dark fringes forms on the semicircular screen shown in Fig. 6.1.

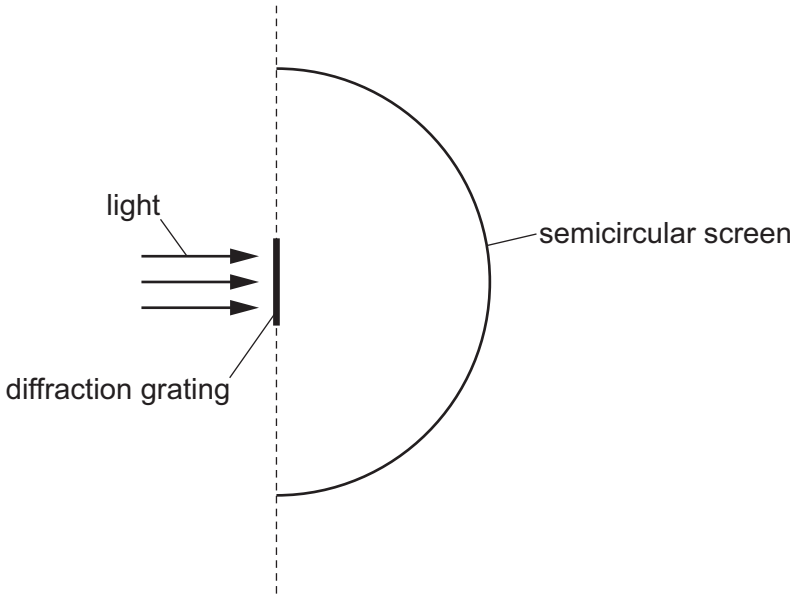

Fig. 6.1 (not to scale)

The light has wavelength 520 nm.
The separation of the lines in the grating is 3.8×10^{-6} m.

(a) Determine the total number of bright fringes formed on the screen.

number of bright fringes = ... [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

(b) The light is replaced with red light of a single frequency.

(i) State whether the frequency of the red light is greater than, less than or the same as the frequency of the original light.

..... [1]

(ii) State and explain the effect of this change on the number of bright fringes formed on the screen. A calculation is not required.

.....

.....

.....

..... [2]

[Total: 6]