Diffraction - Questions by Topic

Q1.

In an experiment, laser light is shone through a diffraction grating so that a series of bright dots appears on a screen. The equation $n\lambda = d \sin\theta$ can be used to determine the wavelength of the laser light.

Which of the following is a **correct** description of how the experiment should be performed?

☐ **A** The angle θ is measured using a protractor.

☐ **B** The diffraction grating is set up so that it is parallel to the laser light beam.

☐ **C** The diffraction grating is set up so that it is parallel to the screen.

☐ **D** The distance between the bright dots is measured with a micrometer.

(Total for question = 1 mark)

Q2.

When laser light is shone through a diffraction grating a series of maxima is formed on a screen.

Assuming all other factors remain constant, which of the following changes would increase the distance between adjacent maxima?

(1)

☐ **A** Decreasing the distance between the diffraction grating and the screen.

☐ **B** Decreasing the distance between the lines on the diffraction grating.

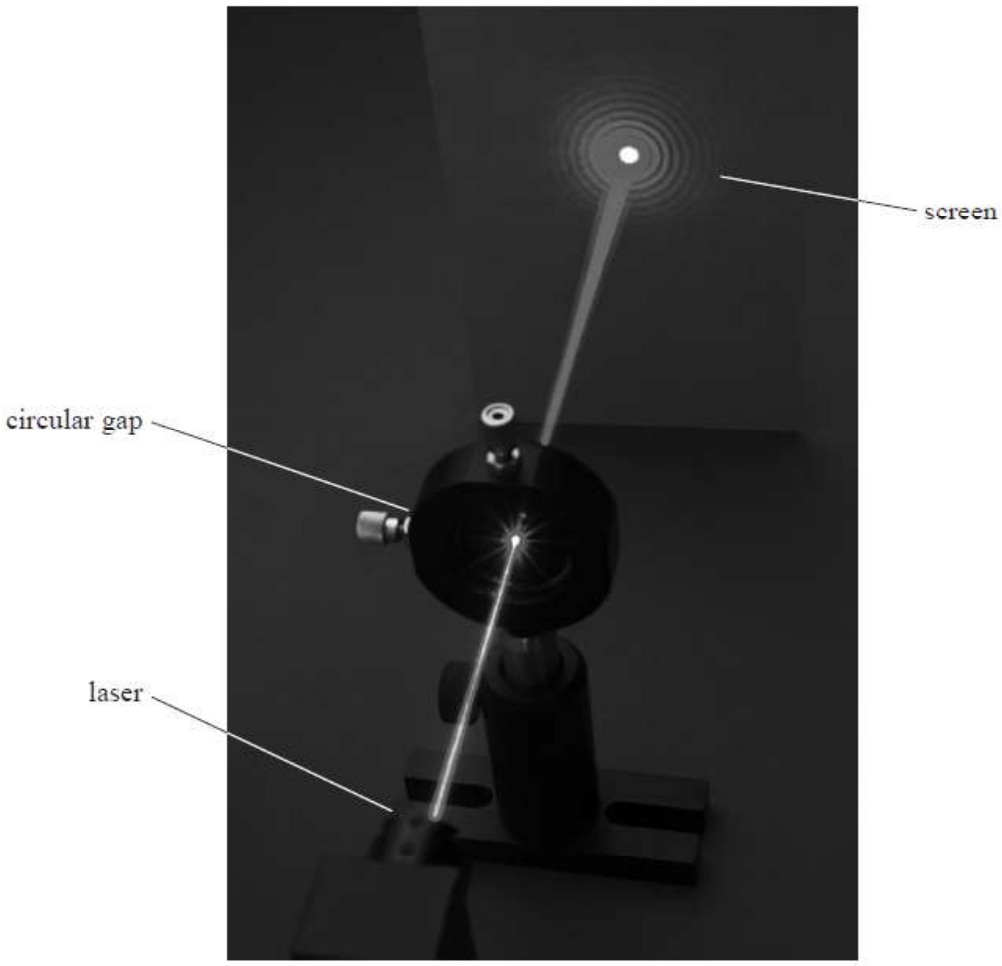
☐ **C** Decreasing the intensity of the laser light used.

☐ **D** Decreasing the wavelength of the laser light used.

(Total for question = 1 mark)

Q3.

When laser light is directed through a small circular gap, a diffraction pattern can be observed on a screen as shown.



(Source: © GIPHOTOSTOCK / SCIENCE PHOTO LIBRARY)

(a) Explain, using Huygens' construction, how diffraction occurs as waves pass through a gap.

(2)

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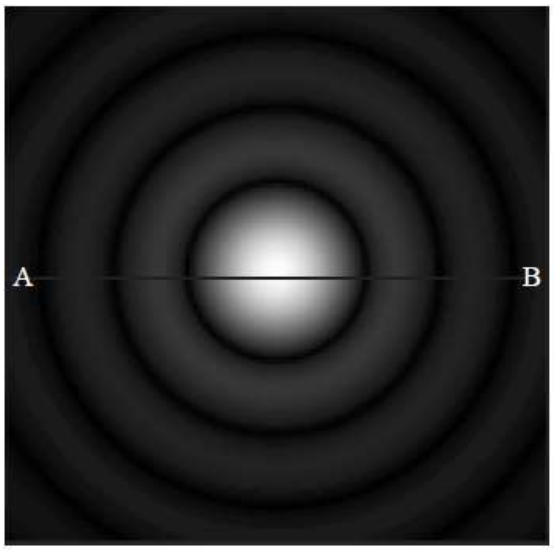
(b) The diffraction pattern consists of a central bright spot surrounded by concentric circles of light of decreasing intensity. A close-up of the pattern is shown below.



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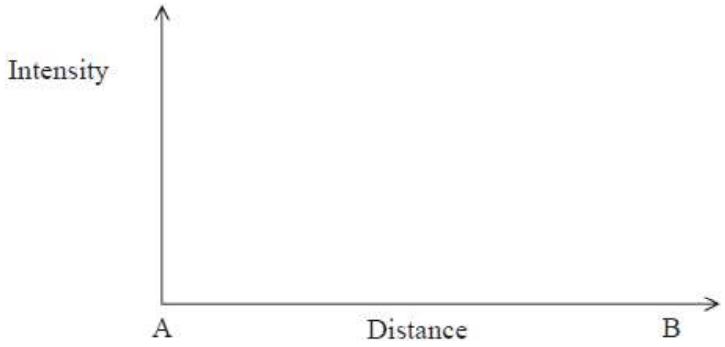
Sketch a graph showing how the intensity of the light in the diffraction pattern on the screen varies along the line AB.

(3)



(Total for question = 5 marks)