FREE REVISION PACK

Diffraction & Gratings

Pearson Edexcel International Advanced Level Physics · Unit 2 (WPH12) · Specification points 50–53

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Meaning of d in nλ = d sin θ	Edexcel IAL January 2023 · Unit 2 · Q4	1 mark
2	Easy	Naming the spreading of waves	Edexcel IAL June 2023 · Unit 2 · Q1	1 mark
3	Easy	Wavelength from a diffraction grating set-up	Edexcel IAL June 2022 · Unit 2 · Q5	1 mark
4	Medium	Moving the first-order maximum closer	Edexcel IAL June 2023 · Unit 2 · Q8	1 mark
5	Medium	Spreading the maxima further apart	Edexcel IAL October 2019 · Unit 2 · Q10	1 mark

Key ideas to have ready

- Diffraction: spreading of waves through a gap or round an obstacle; greatest when the gap ≈ wavelength.
- Grating equation: nλ = d sin θ, with d = 1/(lines per metre).
- Smaller d or longer λ spreads the maxima further apart.
- sin θ = (distance on screen from centre) ÷ (hypotenuse to the maximum).

How to use this pack

1. The questions are grouped into levels (Easy and Medium). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in Pearson's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–3

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL January 2023 · Unit 2 · Q4

1 The equation $n\lambda = d\sin\theta$ can be used to determine the wavelength of laser light that has passed through a diffraction grating.

Which of the following is represented by d in the equation?

- ☒ **A** distance between adjacent lines on the diffraction grating
- ☒ **B** distance between the diffraction grating and the screen
- ☒ **C** number of lines per metre on the diffraction grating
- ☒ **D** order of the maximum observed on the screen

Edexcel IAL June 2023 · Unit 2 · Q1

2 Waves may spread out as they pass an object.

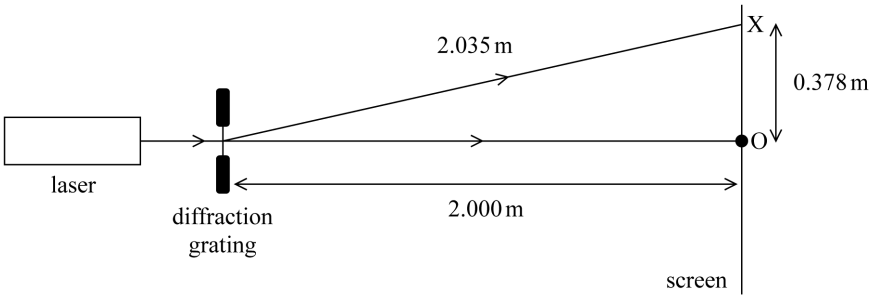
Which of the following is the name of this process?

- ☒ **A** diffraction
- ☒ **B** interference
- ☒ **C** reflection
- ☒ **D** refraction

Edexcel IAL June 2022 · Unit 2 · Q5

3 A laser, diffraction grating and screen are set up as shown. The position of the central maximum is O and the position of the first order maximum is X.

The diffraction grating has 300 lines per mm.



Which of the following expressions gives the wavelength of the laser light?

☐ **A** $(300\,000) \times \left(\frac{0.378}{2.000}\right)$

☐ **B** $(300\,000) \times \left(\frac{0.378}{2.035}\right)$

☐ **C** $\left(\frac{1}{300\,000}\right) \times \left(\frac{0.378}{2.000}\right)$

☐ **D** $\left(\frac{1}{300\,000}\right) \times \left(\frac{0.378}{2.035}\right)$

Medium

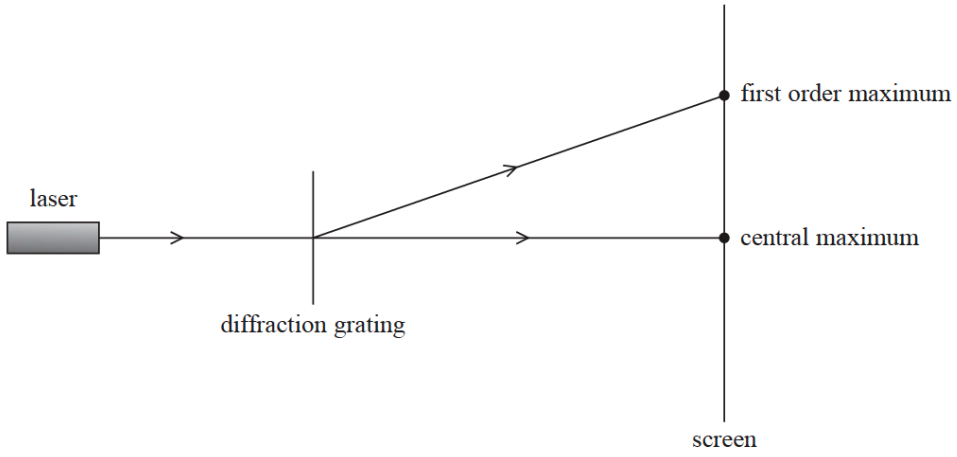
Two or three steps. Roughly a third to a half of students get these right.

Questions 4–5

Edexcel IAL June 2023 · Unit 2 · Q8

4 Light from a laser is incident on a diffraction grating, causing a series of maxima to be seen on a screen.

The positions of the central maximum and first order maximum are shown.



Which of the following changes would decrease the distance between the central maximum and the first order maximum?

- ☒ **A** Decreasing the distance from the laser to the diffraction grating
- ☒ **B** Increasing the distance from the diffraction grating to the screen
- ☒ **C** Using a diffraction grating with more lines per millimetre
- ☒ **D** Using light with a smaller wavelength

Edexcel IAL October 2019 · Unit 2 · Q10

5 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?

- ☒ **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.

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
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