

9.2 Diffraction & Interference

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	9. Superposition
Topic	9.2 Diffraction & Interference
Difficulty	Medium

Time allowed: 10

Score: /10

Percentage: /100

Question 1

Monochromatic light produces interference fringes with a separation of x on a screen with distance D with a pair of slits with separation a .

The student doubles a and D .

What would be the new fringe separation?

A $2x$

B $4x$

C x

D

$\frac{x}{2}$

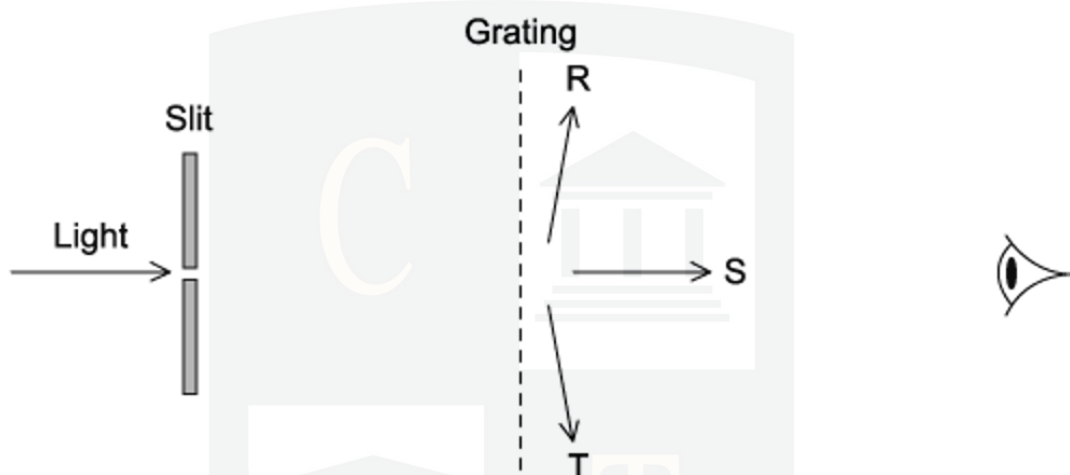
[1 mark]



Question 2

Monochromatic light with a wavelength of 600 nm is observed through a diffraction grating with 500 lines per mm.

The light is passed through a narrow slit the lines from the slit is parallel to the grating. The light goes through the slit then the grating.



The observer changes position to; R – parallel with the grating, S – opposite the slit, T – parallel to the grating on the opposite side.

What is the number of images he would see?

A 7

B 6

C 4

D 3

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[1 mark]

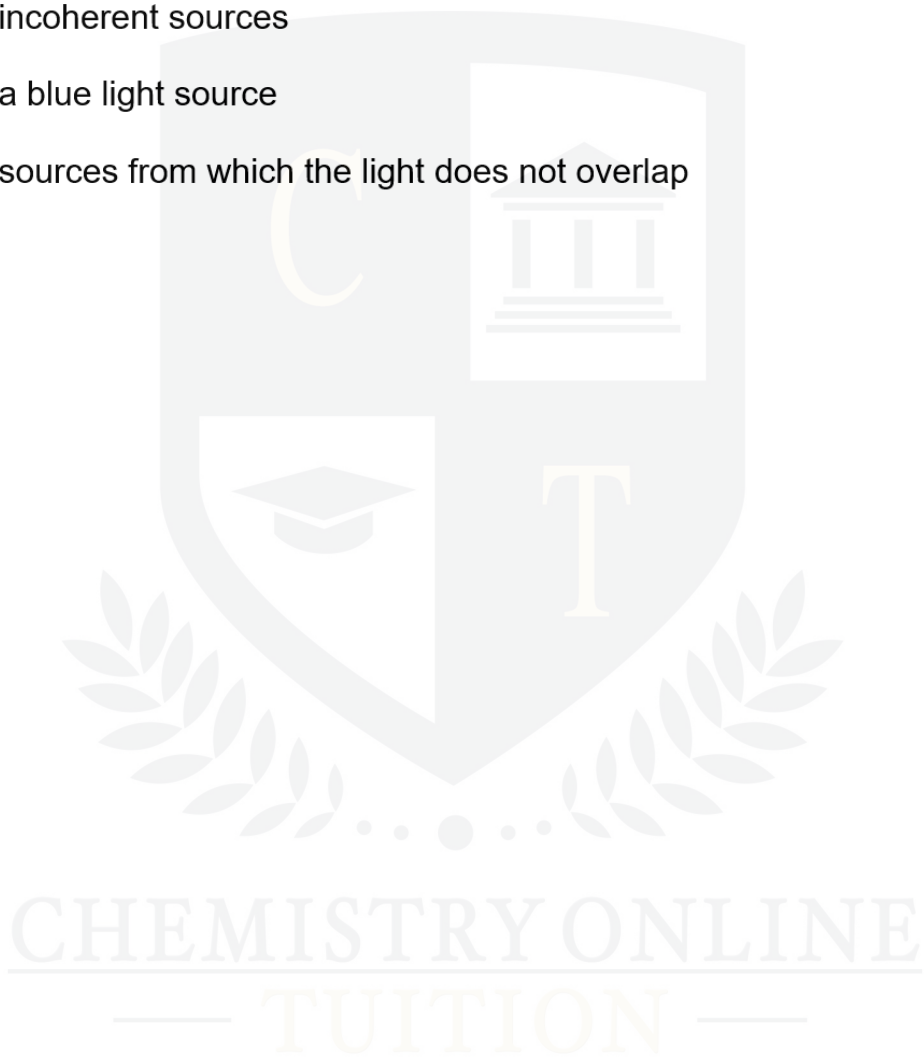
Question 3

Certain circumstances will produce visible interference fringes from two light sources.

Which of the following conditions will enable visible interference fringes to be seen?

- A** using one light which is polarised at right angles to light from the other source
- B** using incoherent sources
- C** using a blue light source
- D** using sources from which the light does not overlap

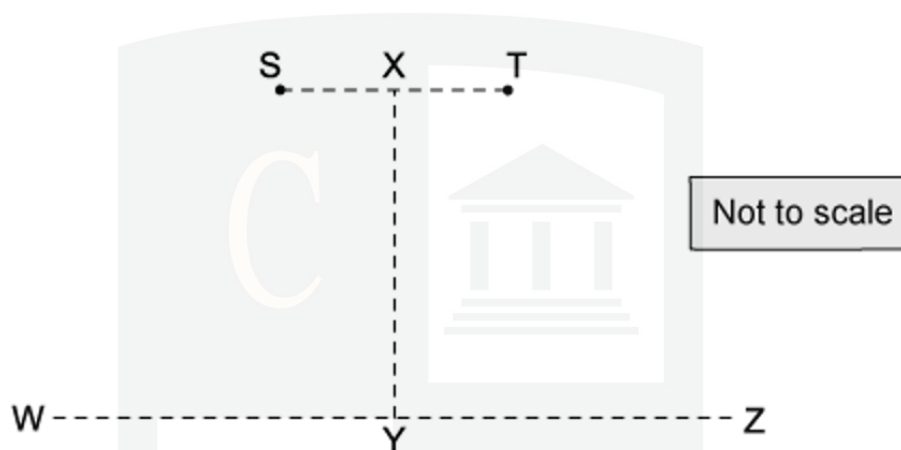
[1 mark]



Question 4

A student is investigating the interference of waves. They set up coherent waves produced at points S and T and travel outwards in all directions.

The line XY is halfway between S and T and perpendicular to the joining line S and T. The distance XY is much greater than the distance ST.



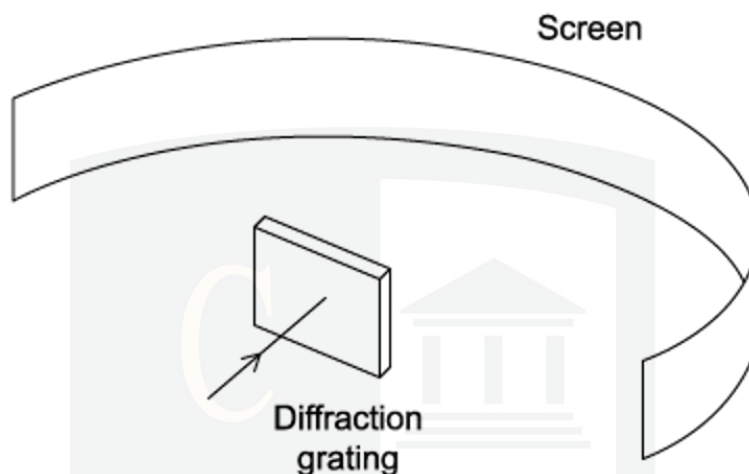
Which line or lines would an interference pattern be seen?

- A WZ only
- B XY only
- C Both XY and WZ
- D Neither XY or WZ

[1 mark]

Question 5

A beam of monochromatic light with a wavelength of 690 nm is directed at a diffraction grating with 300 lines per mm as shown in the diagram



This set up produces a series of maxima on the screen, what is the greatest number that can be observed?

A 9

B 8

C 5

D 4

[1 mark]

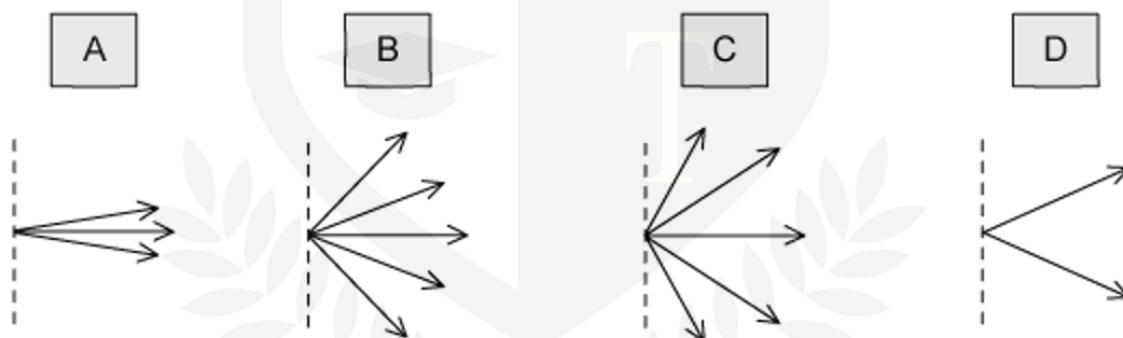
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Question 6

A beam of monochromatic light is directed at a diffraction grating as shown in the diagram



Which of the following diagrams show the possible directions of the light that will give maximum intensity?

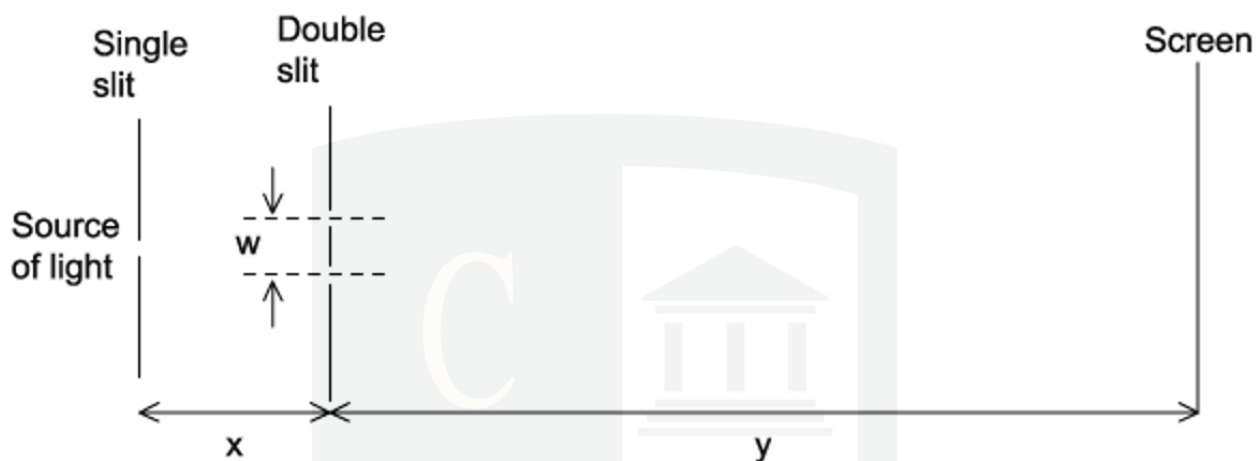


[1 mark]

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Question 7

The equipment was set up as in the diagram to investigate the interference of a double slit.



Which of the following changes would increase the fringe spacing?

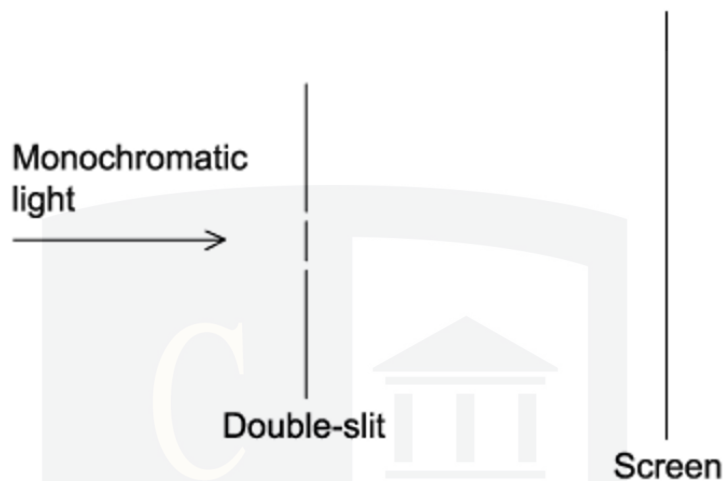
- A** decreasing the wavelength of the light
- B** decreasing distance y
- C** decreasing distance x
- D** decreasing the distance w

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[1 mark]

Question 8

The effect of a double slit on monochromatic light is observed by set up in the diagram



Interference fringes are seen on the screen.

Which of the following changes would increase the distance between the adjacent fringes?

- A** decrease the width of each slit
- B** decrease the distance between the two slits
- C** use light of a higher frequency
- D** move the screen closer to the double-slit

[1 mark]

Question 9

A diffraction grating with 1000 lines per cm has light passed through it. An identical light source is also passed through two slits 0.5 mm apart.

Both will produce intensity maxima and minima on a screen.

Which of the following statements about the separation and sharpness of the maxima is correct?

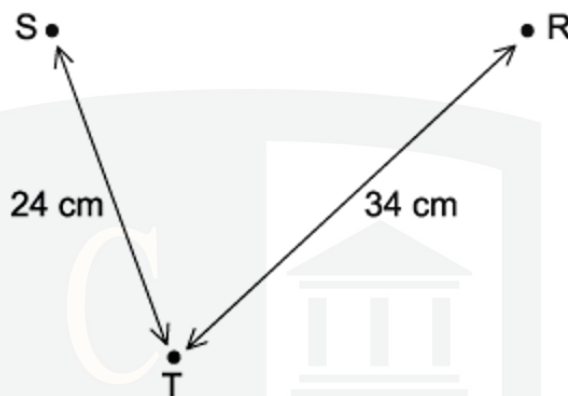
- A** the diffraction grating maxima are more widely spaced and are less sharp than the two-slit maxima
- B** the diffraction grating maxima are less widely spaced and are sharper than the two-slit maxima
- C** the diffraction grating maxima are more widely spaced and are sharper than the two-slit maxima
- D** the diffraction grating maxima are less widely spaced and are less sharp than the two-slit maxima

[1 mark]

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Question 10

Two wave generators are placed at points S and R to produce water waves with an identical wavelength. At point T both waves have the same amplitude. The distances from S to T and R to T are shown on the diagram below



As the student walks between S to T she notices that the loudness of the sound increases then decreases repeatedly.

What is the wavelength of the waves when the wave generators are in phase and the amplitude at T is zero?

- A** 6 cm **B** 4 cm **C** 3 cm **D** 2 cm

[1 mark]

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