

Nature of Light

Question Paper

Level	International A Level
Subject	Physics
Exam Board	Edexcel
Topic	Nature of Light
Sub Topic	
Booklet	Question Paper

Time Allowed: 41 minutes

Score: /34

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1 In an experiment to determine the Planck constant, a student uses light of wavelength $\lambda = 471 \text{ nm}$. Which of the following is the correct value of λ^{-1} ?

- A 2.12 nm
- B $2.12 \times 10^{-6} \text{ nm}^{-1}$
- C $2.12 \times 10^6 \text{ nm}^{-1}$
- D $2.12 \times 10^6 \text{ m}^{-1}$

(Total for Question 1 = 1 mark)

2 In an experiment to determine the Planck constant a student uses light of wavelength $\lambda = 595 \text{ nm}$. Which of the following is the correct value of λ^{-1} ?

- A 1.68 nm
- B $1.68 \times 10^{-6} \text{ nm}^{-1}$
- C $1.68 \times 10^6 \text{ nm}^{-1}$
- D $1.68 \times 10^6 \text{ m}^{-1}$

(Total for Question 2 = 1 mark)

- 3 In an investigation of the inverse square law for light, a student measured the radiation flux I of the light at different distances d from a light bulb.

Her results table is shown below.

d/m	I/Wm^{-2}	$\frac{1}{d^2} /$
0.125	996	64.0
0.25	276	16.0
0.375	109.3	7.1
0.5	48	4.0
0.75	18	
1	3.3	

- (a) Add a unit for $\frac{1}{d^2}$ to the table. (1)

- (b) Criticise the results table. (2)

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- (c) Complete the table. (2)

- (d) The relationship between I and d is given by

$$I = \frac{k}{d^2}$$

where k is a constant.

Explain why a graph of I on the y -axis against $\frac{1}{d^2}$ on the x -axis should be a straight line through the origin.

(2)

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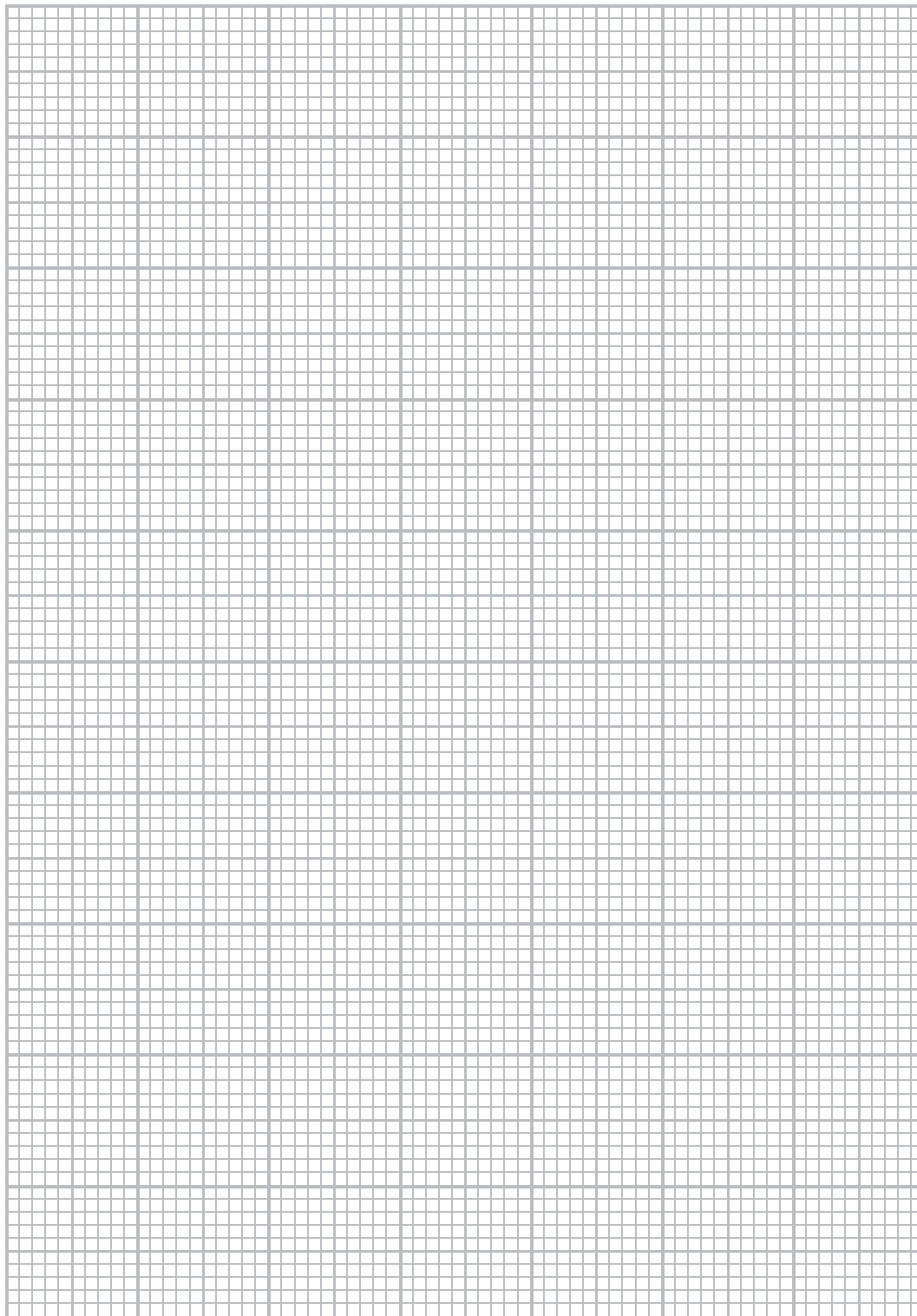
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- (e) Plot a graph of I on the y -axis against $\frac{1}{d^2}$ on the x -axis on the grid provided and draw a line of best fit.

(5)



(f) Use your graph to determine I when $d = 20$ cm.

(2)

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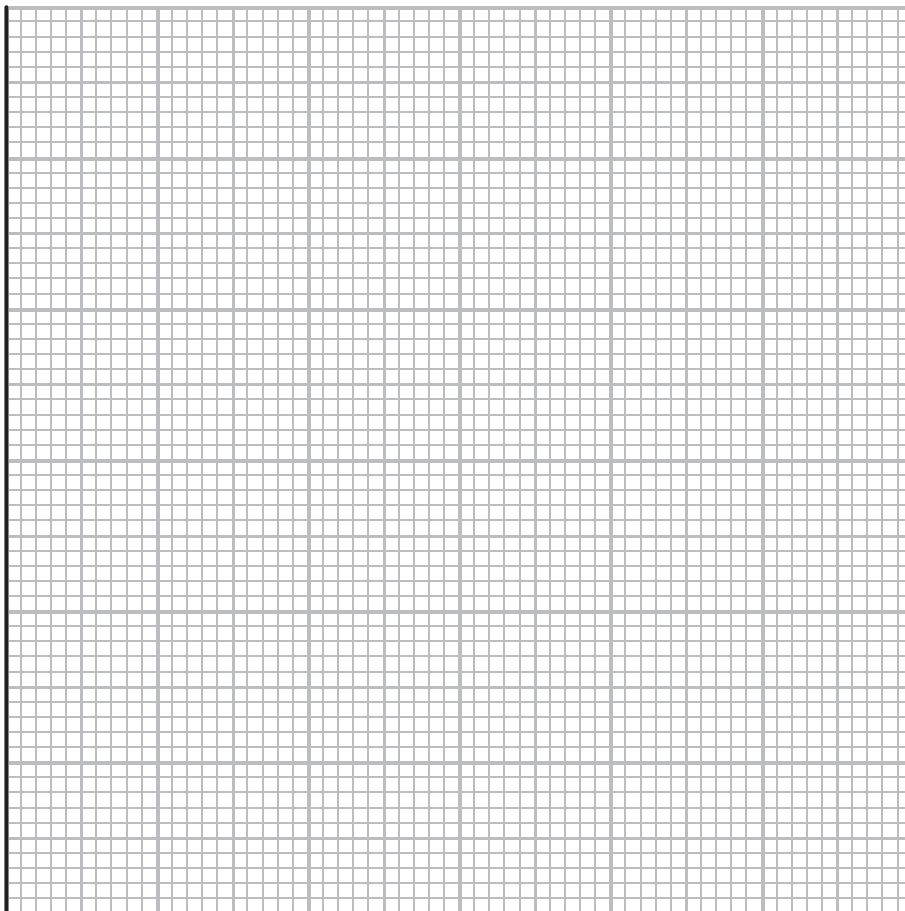
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$I = \dots\dots\dots \text{W m}^{-2}$

(Total for Question 3 = 14 marks)

(c) Plot the graph on the grid provided and draw a line of best fit.

(5)



(d) Use your graph to find a value for the gradient and use it to calculate a value for h .

(6)

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$$h = \dots\dots\dots$$

(e) The accepted value for h is 6.63×10^{-34} J s.

Assuming your calculations are correct, suggest why there is a difference between your value for h and the accepted value.

(1)

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(Total for Question 4 = 18 marks)
