EXAM PAPERS PRACTICE

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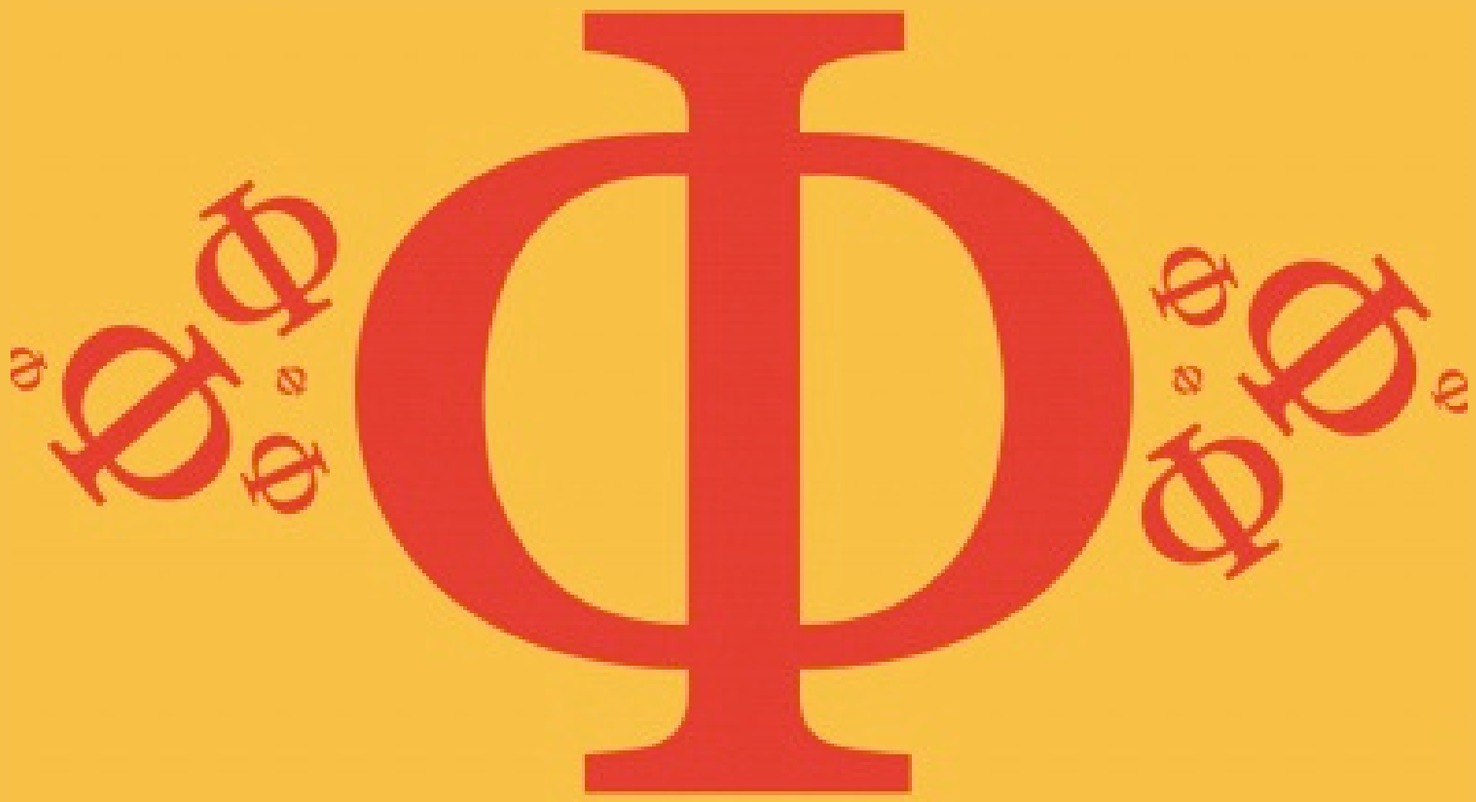
12.1 The Interaction of Matter with Radiation

Easy



PHYSICS

IB HL

EXAM PAPERS PRACTICE

12.1 The Interaction of Matter with Radiation

Question Paper

Course	DP IB Physics
Section	12. Quantum & Nuclear Physics (HL only)
Topic	12.1 The Interaction of Matter with Radiation
Difficulty	Easy

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Which expression states the minimum energy of a photon before undergoing pair production?

A. mc^2

B. $2mc^2$

C. $\frac{1}{2}mc^2$

D. $3mc^2$

[1 mark]

Question 2

As a consequence of the uncertainty principle, which two quantities cannot be known at the same time?

A. Energy and momentum

B. Position and energy

C. Energy and time

D. Time and momentum

[1 mark]

Question 3

Which of the following is evidence for the wave nature of electrons?

A. Electron diffraction from crystals

B. The photoelectric effect

C. Continuous energy spectrum in β^- decay

D. Pair production

[1 mark]

Question 4

Which of the following experiments provides evidence for the particle nature of light?

A. Gamma decay

B. Young's double slit

C. The photoelectric effect

D. Electron diffraction

[1 mark]

Question 5

According to the de Broglie equation, the wavelength of the electron is

A. directly proportional to the mass of the electron

B. inversely proportional to the square of the velocity of the electron

C. directly proportional to the velocity of the electron

D. inversely proportional to the mass of the electron

[1 mark]

Question 6

Which of the following statements about quantum tunnelling is incorrect?

A. Increasing the barrier length decreases the effect of tunnelling probability

B. The wavefunction can travel through a finite barrier

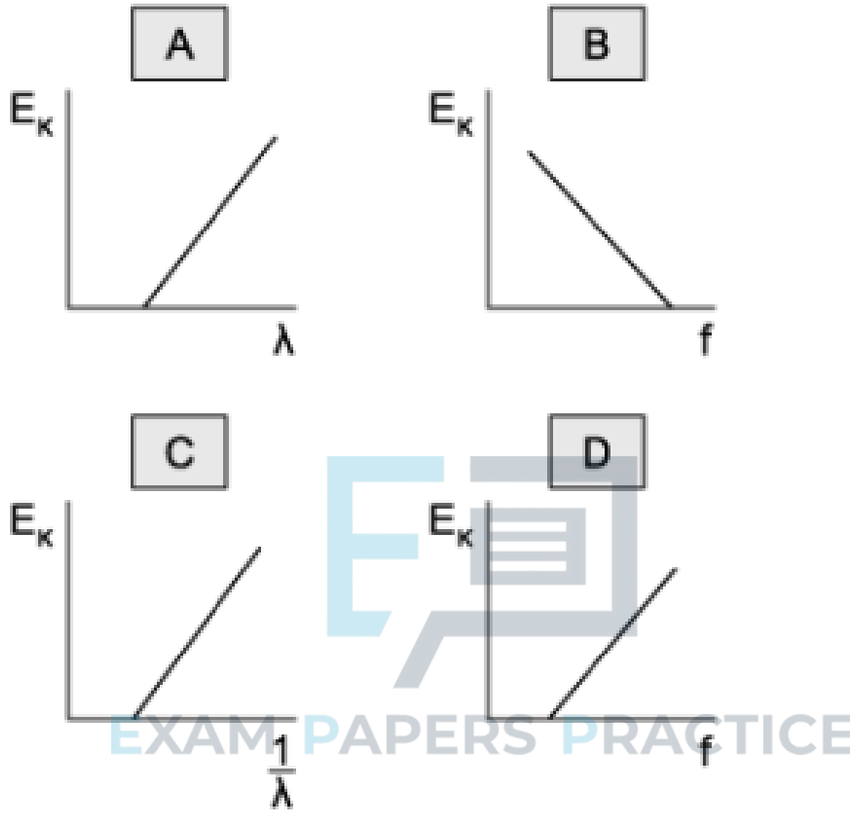
C. The probability of finding a particle in a particular region is its wavefunction squared

D. The wavefunction can travel through an infinite barrier

[1 mark]

Question 7

Which graph has a gradient equal to *hc*?



Question 8

Which of the following metals will exhibit the photoelectric effect most readily?

	metal	work function / eV
A	sodium	2.3
B	caesium	2.1
C	calcium	2.9
D	silver	4.3

[1 mark]

Question 9

Three statements about the wavefunction are

I. It is normalised

II. The square of the wavefunction gives the probability of finding the particle in that region

III. The wavefunction is equal to 1 outside an infinite square well

Which of the statement(s) are true?

A. I and III

B. I and II

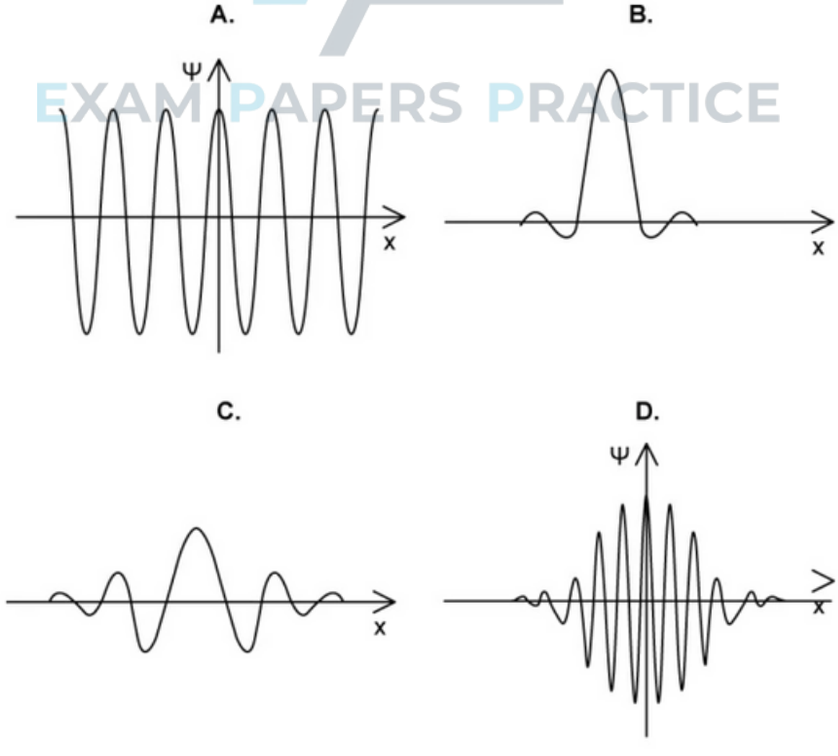
C. II and III

D. II only

[1 mark]

Question 10

Identify the electron with the lowest uncertainty in momentum.



[1 mark]