FREE REVISION PACK

Energy Levels & Line Spectra

Pearson Edexcel International Advanced Level Physics · Unit 2 (WPH12) · Specification points 63

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Lowest frequency emitted	Edexcel IAL October 2023 · Unit 2 · Q9	1 mark
2	Easy	How many frequencies can be emitted	Edexcel IAL January 2025 · Unit 2 · Q9	1 mark
3	Easy	Energy of the upper level from the photon emitted	Edexcel IAL January 2024 · Unit 2 · Q10	1 mark
4	Medium	Number of emission lines from n = 3	Edexcel IAL January 2023 · Unit 2 · Q7	1 mark
5	Medium	Transition giving the longest wavelength	Edexcel IAL October 2022 · Unit 2 · Q2	1 mark

Key ideas to have ready

- When an electron drops between levels, a photon of energy $hf = E_1 - E_2$ is emitted.
- Bigger energy gap → higher frequency → shorter wavelength.
- From level n, the number of possible lines = $n(n - 1)/2$ (count every downward jump).
- Convert eV to J by multiplying by 1.60×10^{-19}.

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

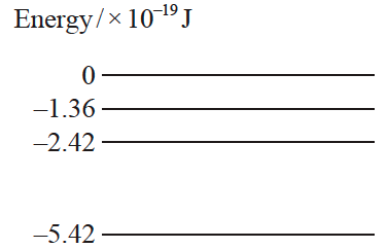
Definitions and one-step ideas. Most students get these right.

Questions 1–3

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

Edexcel IAL October 2023 · Unit 2 · Q9

1 The diagram shows some of the energy levels for a hydrogen atom.



Which of the following expressions is equal to the lowest frequency of light possible from a transition between these energy levels?

☒ **A** $\frac{5.42 \times 10^{-19}}{6.63 \times 10^{-34}}$

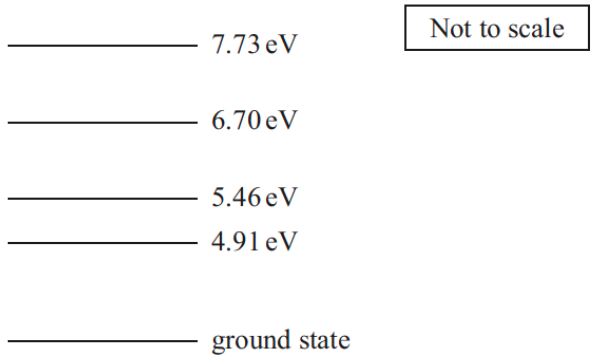
☒ **B** $\frac{1.36 \times 10^{-19}}{6.63 \times 10^{-34}}$

☒ **C** $\frac{2.42 \times 10^{-19} + 1.36 \times 10^{-19}}{6.63 \times 10^{-34}}$

☒ **D** $\frac{2.42 \times 10^{-19} - 1.36 \times 10^{-19}}{6.63 \times 10^{-34}}$

Edexcel IAL January 2025 · Unit 2 · Q9

2 The diagram shows the energy needed for an electron in the ground state of a mercury atom to move to different energy levels.



Photons transfer 8.74×10^{-19} J to electrons in the ground state of mercury atoms.

Which of the following gives the number of different frequencies of light that could be emitted?

☒ **A** 1

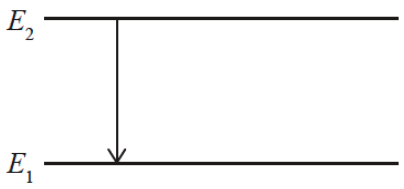
☒ **B** 3

☒ **C** 6

☒ **D** 10

Edexcel IAL January 2024 · Unit 2 · Q10

3 In an atom, an electron drops from energy level E_2 to energy level E_1, as shown.



A photon of wavelength λ is emitted.

Which of the following expressions gives the energy E_2?

☒ **A** $\frac{hc}{\lambda} - E_1$

☒ **B** $\frac{hc}{\lambda} + E_1$

☒ **C** $\frac{h\lambda}{c} - E_1$

☒ **D** $\frac{h\lambda}{c} + E_1$

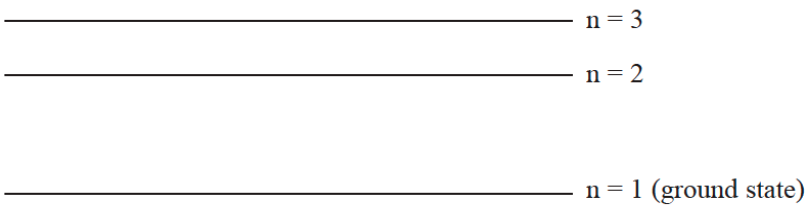
Medium

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

Questions 4–5

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4 The diagram shows some of the energy levels in an atom.



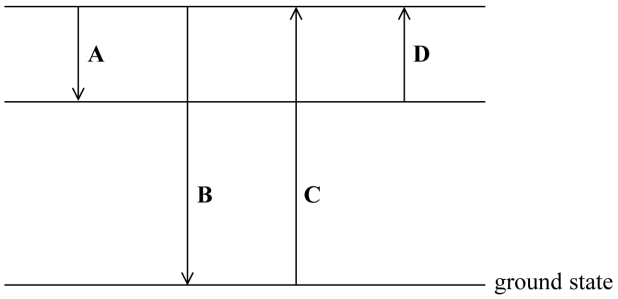
Electrons in this atom are excited from the ground state to the energy level n = 3.

How many different frequencies of radiation can be emitted from this atom as electrons return to the ground state?

- ☒ **A** 1
- ☒ **B** 2
- ☒ **C** 3
- ☒ **D** 4

Edexcel IAL October 2022 · Unit 2 · Q2

5 The diagram shows four possible transitions of electrons in an atom.



Which of the transitions will result in the emission of a photon with the longest wavelength?

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

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