FREE REVISION PACK

Luminosity & Black-Body Radiation

Pearson Edexcel International Advanced Level Physics · Unit 5 (WPH15) · Specification points 161–164

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Peak wavelength as a metal bar cools	Edexcel IAL January 2021 · Unit 5 · Q4	1 mark
2	Easy	Comparing the intensity received from two stars	Edexcel IAL January 2021 · Unit 5 · Q6	1 mark
3	Easy	Luminosity of stars with the same temperature	Edexcel IAL January 2021 · Unit 5 · Q8	1 mark
4	Easy	Two stars of equal luminosity	Edexcel IAL June 2025 · Unit 5 · Q8	1 mark
5	Easy	Temperature from black-body curves	Edexcel IAL January 2024 · Unit 5 · Q9	1 mark

Key ideas to have ready

- Stefan–Boltzmann: $L = \sigma A T^4 = \sigma 4\pi r^2 T^4$.
- Wien: $\lambda_{max} T = 2.898 \times 10^{-3}$ m K; hotter means a shorter peak wavelength.
- Intensity at Earth: $I = L/(4\pi d^2)$.
- Same temperature: $L \propto r^2$. Same radius: $L \propto T^4$.

How to use this pack

1. The questions are grouped into levels (Easy). 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 1–5

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

Edexcel IAL January 2021 · Unit 5 · Q4

1 A metal bar is heated, then allowed to cool. The wavelength λ_{max} at which peak radiation emission occurs is determined.

Which of the following statements is correct?

- ☒ **A** λ_{max} decreases as the metal bar cools.
- ☒ **B** λ_{max} increases as the metal bar cools.
- ☒ **C** λ_{max} increases as the metal bar is heated.
- ☒ **D** λ_{max} stays constant as the metal bar is heated.

Edexcel IAL January 2021 · Unit 5 · Q6

2 The star Vega has a luminosity 5 times the luminosity of the star Altair. The distance of Vega from the Earth is 1.5 times the distance of Altair from the Earth.

The intensity of radiation received on Earth from Vega is I_V.
The intensity of radiation received on Earth from Altair is I_A.

The ratio I_V / I_A is about

- ☒ **A** 0.5
- ☒ **B** 1.5
- ☒ **C** 2
- ☒ **D** 5

Edexcel IAL January 2021 · Unit 5 · Q8

3 Two stars, X and Y, have the same surface temperature. X has a radius 25% larger than the radius of Y.

The luminosity of X is L_X. The luminosity of Y is L_Y.

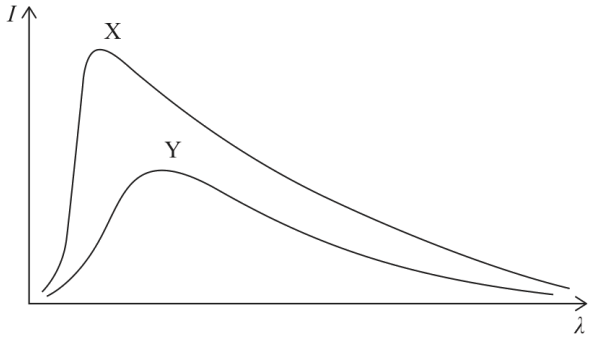
Which of the following is the ratio L_X / L_Y?

- ☒ **A** 1.0
- ☒ **B** 1.3
- ☒ **C** 1.6
- ☒ **D** 2.0

Edexcel IAL June 2025 · Unit 5 · Q8

4 Two stars, X and Y, have the same luminosity.

The graph shows how the intensity I of radiation received at Earth from star X and star Y varies with wavelength λ.



Which of the following statements can be deduced from the graph?

☒ **A** Star X has a higher surface temperature and is closer than star Y.

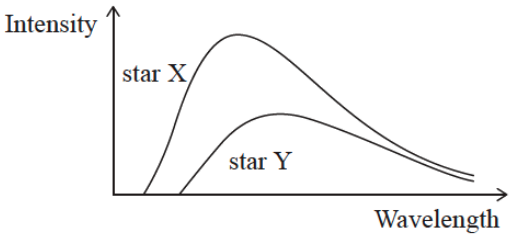
☒ **B** Star X has a lower surface temperature and is closer than star Y.

☒ **C** Star X has a higher surface temperature and is further away than star Y.

☒ **D** Star X has a lower surface temperature and is further away than star Y.

Edexcel IAL January 2024 · Unit 5 · Q9

5 The graphs show how the radiation intensity varies with wavelength for star X and star Y. The surface temperature of star X is T_X and the surface temperature of star Y is T_Y.



Which of the following statements is correct?

☒ **A** $T_Y > T_X$ because the peak intensity for star Y is at the lower frequency.

☒ **B** $T_Y > T_X$ because the peak intensity for star Y is at the higher frequency.

☒ **C** $T_X > T_Y$ because the peak intensity for star X is at the lower frequency.

☒ **D** $T_X > T_Y$ because the peak intensity for star X is at the higher frequency.

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