GET BETTER AT PHYSICS · MARK SCHEME

Cosmology: tiered multiple choice

Edexcel IAL Physics · Unit 5 (WPH15) · Specification points 171 · 5 questions · 5 marks

1 mark per correct letter | Worked reasoning for every question

How students did = from Pearson examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5
B	B	D	B	C

Easy

Questions 1–5

1 **B**

Density and the fate of the universe · Edexcel IAL October 2024 · Unit 5 · Q7

If the average density of the universe is greater than the critical density, gravity is strong enough to stop the expansion and the universe will eventually contract. Equal to the critical density gives expansion that slows towards zero; less gives expansion forever. The condition is about density, not total mass.

How students did: Examiners reported that at least 60% of students got this right in October 2024.

2 **B**

Condition for an open universe · Edexcel IAL June 2023 · Unit 5 · Q1

If the average density of the universe is less than the critical density, gravity cannot stop the expansion and the universe expands forever (an open universe). It is density, not total mass, that is compared with a critical value.

3 **D**

New age of the universe from a new Hubble constant · Edexcel IAL January 2025 · Unit 5 · Q7

Age $\approx 1/H_0$, so age $\propto 1/H_0$. The new value is smaller by a factor of $1.5 \times 10^{-17} \div 2.1 \times 10^{-18} \approx 7.1$, so the age is 7.1 times larger: 7.1T.

Watch out: A smaller Hubble constant means slower expansion and so an older universe.

How students did: Examiners reported that more than 70% of students got this right in January 2025.

4 **B**

What dark matter is · Edexcel IAL January 2021 · Unit 5 · Q2

Dark matter has mass and exerts a gravitational force, but it does not emit (or noticeably absorb) electromagnetic radiation, which is why we cannot see it directly. It is not antimatter.

How students did: 68% of students got this right in January 2021.

5 **C**

Hubble constant from the age of the universe · Edexcel IAL October 2025 · Unit 5 · Q4

Age $\approx 1/H_0$, so $H_0 \approx 1/\text{age}$, with the age in seconds: 1.37×10^{10} years $\times 3.15 \times 10^{7}$ s per year. $H_0 = 1/(1.37 \times 10^{10} \times 3.15 \times 10^{7})\ s^{-1}$.

End of mark scheme. Answers from Pearson's published mark schemes; explanations written for this pack. Pearson Edexcel material is © Pearson Education Ltd. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

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