GET BETTER AT PHYSICS · MARK SCHEME

Gravitational Fields: tiered multiple choice

Edexcel IAL Physics · Unit 5 (WPH15) · Specification points 154–157 · 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	A	B	B	B

Easy

Questions 1–4

1 **B**

Force and potential energy as the Moon moves away · Edexcel IAL January 2025 · Unit 5 · Q9

$F = GMm/r^2$, so the force decreases as r increases. Gravitational potential energy is $-GMm/r$, which becomes less negative as r increases, so the potential energy increases.

> **Watch out:** Gravitational potential energy is negative, and it increases (towards zero) as objects move apart.

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

2 **A**

Comparing g on Earth and Mars · Edexcel IAL January 2024 · Unit 5 · Q10

$g = GM/r^2$. For Earth, M is 10 times larger and r is 2 times larger, so $g_E = 10/2^2 \times g_M = 2.5g_M$.

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

3 **B**

Weight of a satellite in orbit · Edexcel IAL January 2021 · Unit 5 · Q7

Gravitational field strength follows an inverse square law, $g \propto 1/r^2$. At twice the Earth's radius, g is a quarter of 9.81 N kg^{-1}, so the weight is $245 \times 9.81/4 \approx 600$ N.

> **Watch out:** An orbiting satellite is not weightless: gravity is what keeps it in orbit.

How students did: 56% of students got this right in January 2021. Option A was a strong distractor: many believed an orbiting object is weightless.

4 **B**

Weight of a satellite at a height of one Earth radius · Edexcel IAL October 2023 · Unit 5 · Q7

At a height equal to the Earth's radius, the satellite is 2R from the Earth's centre. $g \propto 1/r^2$, so g is a quarter of its surface value: weight $\approx 122 \times 9.81/4 \approx 300$ N.

> **Watch out:** Measure r from the centre of the Earth, not from its surface.

How students did: Examiners reported that fewer than 60% of students got this right in October 2023. A common error was confusing weight with apparent weight.

Medium

Question 5

5 **B**

g on a planet of the same density but twice the radius · Edexcel IAL June 2022 · Unit 5 · Q6

$g = GM/r^2$ and $M = \rho \times (4/3)\pi r^3$, so $g = (4/3)\pi G\rho r$. With the same density, $g \propto r$, so twice the radius gives 2g.

Watch out: Doubling the radius makes the mass 8 times bigger, not 2 times.

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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