GET BETTER AT PHYSICS · MARK SCHEME

Quarks & Antiquarks: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.2.1.6 · 5 questions · 5 marks

1 mark per correct letter | Worked reasoning for every question | **How students did** = from AQA examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5
D	B	C	B	C

Easy

Questions 1–4

1 **D**

Quark structure of an antiproton · AQA June 2016 · AS Paper 2 · Q8

A proton is uud. Its antiparticle is made of the matching antiquarks: $\bar{u}\bar{u}\bar{d}$.

How students did: 95% of students got this right in June 2016.

2 **B**

Pion quark structure and category · AQA June 2019 · AS Paper 2 · Q8

The positive pion is $u\bar{d}$: charge $+\frac{2}{3} + \frac{1}{3} = +1$. It is a meson, and all mesons are hadrons. The negative pion is $d\bar{u}$, and pions are never baryons.

Watch out: C gives the right category (meson) but the wrong quarks for a negative pion: $u\bar{d}$ has charge +1.

How students did: Almost 70% of students got this right in June 2019.

3 **C**

Identifying a particle in a strong interaction · AQA June 2025 · A-level Paper 1 · Q9

Charge: X + 1 = 0 + 0, so X has charge −1. Baryon number: X + 1 = 1 + 0, so X has baryon number 0: it is a meson. A strong interaction conserves strangeness, and nothing on the right is strange, so X has no strange quark. X is the negative pion, $d\bar{u}$.

Watch out: $s\bar{u}$ (B) has the right charge but is strange, which the strong interaction cannot produce here.

4 **B**

Which quark combination can exist? · AQA June 2022 · A-level Paper 1 · Q13

Hadrons are either three quarks (baryons), three antiquarks (antibaryons) or a quark–antiquark pair (mesons). $s\bar{u}$ is a quark–antiquark pair (the K^-), so it can exist. sd and ud are two quarks, and $s\bar{u}d$ mixes two quarks with an antiquark: none of these is allowed.

How students did: This was one of the easiest questions on the June 2022 paper.

Medium

Question 5

5 **C**

Antiparticle of the K^+ · AQA June 2024 · AS Paper 2 · Q16

K^+ is $u\bar{s}$. Its antiparticle swaps every quark for its antiquark: $\bar{u}s$ (the K^-).

Watch out: A is the K^+ itself. Replace each quark with its antiquark; don't just swap the order.

How students did: This was one of the less successful questions in June 2024; a wrong answer was the most popular choice.

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

GET BETTER AT PHYSICS · WHAT NEXT?

Got some of these wrong?

Good. The questions you got wrong show you exactly what to work on next. The quickest way to fix them is to work through them with someone who marks these papers.

Book a free 15-minute call

Tell me which questions caught you out. We'll talk about what's going wrong and whether 1-to-1 or small-group tuition would help. There's no obligation.

Book your free call

calendly.com/getbetteratphysics/freechat

Scan to book

Current AQA examiner
I know what the mark schemes reward and where marks are lost.

Matched to your exam board
Sessions follow your specification and the topics you find hardest.

Pay per session
No block booking. 1-to-1 or small groups of up to 4.

More free packs

Tiered past-paper questions with full mark schemes, sorted by topic.
getbetteratphysics.co.uk/free-revision-packs

Masterclasses are coming

Want to hear first? Email **helpme@getbetteratphysics.co.uk** and I'll let you know when dates are announced.

Parents: I use these packs in my own tutoring sessions. Tuition options and prices:
getbetteratphysics.co.uk/tuitionpricing