FREE REVISION PACK

Quarks & Antiquarks

AQA A-level Physics · 7407 / 7408 · Specification 3.2.1.6

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Quark structure of an antiproton	AQA June 2016 · AS Paper 2 · Q8	1 mark
2	Easy	Pion quark structure and category	AQA June 2019 · AS Paper 2 · Q8	1 mark
3	Easy	Identifying a particle in a strong interaction	AQA June 2025 · A-level Paper 1 · Q9	1 mark
4	Easy	Which quark combination can exist?	AQA June 2022 · A-level Paper 1 · Q13	1 mark
5	Medium	Antiparticle of the K^+	AQA June 2024 · AS Paper 2 · Q16	1 mark

Key ideas to have ready

- Quark charges: u = +⅔e, d = −⅓e, s = −⅓e. Antiquarks have the opposite charge (and strangeness).
- Baryons are three quarks: proton uud, neutron udd. Antibaryons are three antiquarks: antiproton $\bar{u}\bar{u}\bar{d}$.
- Mesons are a quark–antiquark pair: $\pi^+ = u\bar{d}$, $\pi^- = d\bar{u}$, $\pi^0 = u\bar{u}$ or $d\bar{d}$, $K^+ = u\bar{s}$, $K^- = s\bar{u}$.
- Strangeness: s quark = −1, $\bar{s}$ antiquark = +1.

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 AQA'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 1–4

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2016 · AS Paper 2 · Q8

1 What is the quark structure for antiprotons?

[1 mark]

A $\bar{u}\bar{d}$ ⬭

B $\bar{d}\bar{d}\bar{s}$ ⬭

C $\bar{d}\bar{d}\bar{u}$ ⬭

D $\bar{u}\bar{u}\bar{d}$ ⬭

AQA June 2019 · AS Paper 2 · Q8

2 Which row gives a particle with its quark combination and category?

[1 mark]

	Particle	Quark combination	Category	
A	Negative pion	$d\bar{u}$	baryon	⬭
B	Positive pion	$u\bar{d}$	hadron	⬭
C	Negative pion	$u\bar{d}$	meson	⬭
D	Positive pion	$d\bar{u}$	hadron	⬭

AQA June 2025 · A-level Paper 1 · Q9

3 The following equation represents a strong interaction between particle **X** and a proton.

$$\mathbf{X} + p \rightarrow n + \pi^0$$

What is the quark configuration of **X**?

[1 mark]

A $\bar{u}\bar{u}\bar{d}$ ⬭

B $s\bar{u}$ ⬭

C $d\bar{u}$ ⬭

D $u\bar{d}$ ⬭

AQA June 2022 · A-level Paper 1 · Q13

4 Which combination of quarks is possible?

[1 mark]

A sd ⬭

B sū ⬭

C sūd ⬭

D ud ⬭

Medium Two or three steps. Roughly a third to a half of students get these right. **Question 5**

AQA June 2024 · AS Paper 2 · Q16

5 The quark structure of the antiparticle of the K^+ meson is

[1 mark]

A $u\bar{s}$ ⬭

B $\bar{u}d$ ⬭

C $\bar{u}s$ ⬭

D $\bar{d}s$ ⬭

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