FREE REVISION PACK

Conservation Laws & Particle Equations

AQA A-level Physics · 7407 / 7408 · Specification 3.2.1.7

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	The particle emitted with a β^- particle	AQA June 2018 · A-level Paper 1 · Q12	1 mark
2	Easy	Products of a neutral kaon decay	AQA June 2018 · AS Paper 2 · Q8	1 mark
3	Easy	Quark composition from a strong interaction	AQA June 2018 · A-level Paper 1 · Q11	1 mark
4	Easy	Products of free neutron decay	AQA June 2023 · AS Paper 2 · Q16	1 mark
5	Easy	Which K^+ decay is possible?	AQA 2020 · AS Paper 2 · Q9	1 mark

Key ideas to have ready

- In every interaction, charge, baryon number and lepton number (electron and muon lepton numbers separately) are conserved.
- Strangeness is conserved in strong interactions but can change by ±1 in weak interactions.
- Lepton number: e^-, ν_e = +1; e^+, $\bar{\nu}_e$ = −1. Baryon number: baryons +1, antibaryons −1, mesons 0.
- Count quarks on each side of a strong interaction: the number of each quark type minus its antiquarks is unchanged.

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 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 1–5

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

AQA June 2018 · A-level Paper 1 · Q12

1 An iodine nucleus decays into a nucleus of Xe−131, a beta-minus particle and particle Y.

$$^{131}_{53}\mathrm{I} \rightarrow ^{131}_{54}\mathrm{Xe} + {}^{0}_{-1}\mathrm{e} + \mathrm{Y}$$

Which is a property of particle Y?

[1 mark]

A It has a lepton number of +1 ○

B It is an antiparticle ○

C It is negatively charged ○

D It experiences the strong interaction ○

AQA June 2018 · AS Paper 2 · Q8

2 The decay of a neutral kaon K^0 is given by the equation

$$K^0 \rightarrow X + Y + \bar{\nu}_e$$

What are **X** and **Y**?

[1 mark]

	X and Y	
A	e^+ and e^-	○
B	μ^+ and e^-	○
C	π^+ and e^-	○
D	π^- and e^+	○

AQA June 2018 · A-level Paper 1 · Q11

3 The Σ^0 baryon, composed of the quark combination uds, is produced through the strong interaction between a π^+ meson and a neutron.

$$\pi^+ + n \rightarrow \Sigma^0 + X$$

What is the quark composition of X?

[1 mark]

A $u\bar{s}$ ⬭

B ud ⬭

C $u\bar{d}$ ⬭

D $ud\bar{s}$ ⬭

AQA June 2023 · AS Paper 2 · Q16

4 A free neutron decays to produce a proton and

[1 mark]

A an electron and an antineutrino. ⬭

B an electron and a neutrino. ⬭

C a positron and an antineutrino. ⬭

D a positron and a neutrino. ⬭

AQA 2020 · AS Paper 2 · Q9

5 Which decay of a positive kaon (K^+) particle is possible?

[1 mark]

A $K^+ \rightarrow \pi^0 + e^+ + \bar{\nu}_e$ ⬭

B $K^+ \rightarrow p + \nu_\mu$ ⬭

C $K^+ \rightarrow \pi^+ + \pi^+ + \pi^0$ ⬭

D $K^+ \rightarrow \mu^+ + \nu_\mu$ ⬭

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