FREE REVISION PACK

Nuclear Reactors

AQA A-level Physics · 7408 · Specification 3.8.1.7–3.8.1.8

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Which substance can be a moderator?	AQA June 2018 · A-level Paper 2 · Q32	1 mark
2	Easy	Main purpose of a moderator	AQA November 2021 · A-level Paper 2 · Q29	1 mark
3	Easy	What water is not used for	AQA June 2025 · A-level Paper 2 · Q29	1 mark
4	Medium	Induced fission in a thermal reactor	AQA June 2022 · A-level Paper 2 · Q31	1 mark
5	Medium	Why waste is stored underground	AQA June 2023 · A-level Paper 2 · Q25	1 mark

Key ideas to have ready

- Thermal reactors use slow (thermal) neutrons, which are much more likely to cause fission of U-235.
- Moderator (e.g. water, graphite): slows neutrons down by elastic collisions. Control rods (e.g. boron): absorb neutrons to control the reaction rate. Coolant: removes heat.
- Critical mass: the minimum mass of fuel for a self-sustaining chain reaction.
- Spent fuel is highly radioactive. Long-lived (small decay constant) gamma emitters need long-term shielded storage.

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 1–3

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 2 · Q32

1 Which of the following substances can be used as a moderator in a nuclear reactor?

[1 mark]

A Boron ⬭

B Concrete ⬭

C Uranium-238 ⬭

D Water ⬭

AQA November 2021 · A-level Paper 2 · Q29

2 What is the main purpose of a moderator in a thermal nuclear reactor?

[1 mark]

A to shield the surroundings from ionising radiations ⬭

B to decrease the number of fission chain reactions ⬭

C to decrease neutron speeds ⬭

D to prevent the core from overheating ⬭

AQA June 2025 · A-level Paper 2 · Q29

3 Which is **not** a use of water in the nuclear industry?

[1 mark]

A to absorb neutrons released from fission ⬭

B to cool a nuclear reactor ⬭

C to shield radiation produced by nuclear waste ⬭

D to slow neutrons to thermal speeds ⬭

Medium

Two or three steps. Roughly a third to a half of students get these right.

Questions 4–5

AQA June 2022 · A-level Paper 2 · Q31

4 In a thermal reactor, induced fission occurs when a $^{235}_{92}\mathrm{U}$ nucleus captures a neutron.

Which statement is true?

[1 mark]

A The moderator absorbs excess neutrons. ⬭

B A large number of neutrons should be produced per fission to sustain the reaction. ⬭

C Slow neutrons are required for this induced fission. ⬭

D The control rods slow down neutrons. ⬭

AQA June 2023 · A-level Paper 2 · Q25

5 After radioactive waste is removed from a cooling pond, it is often stored in underground caves.
This is to protect workers from the effects of

A alpha particles from nuclides with a large decay constant. ⬭

B alpha particles from nuclides with a small decay constant. ⬭

C gamma radiation from nuclides with a large decay constant. ⬭

D gamma radiation from nuclides with a small decay constant. ⬭

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