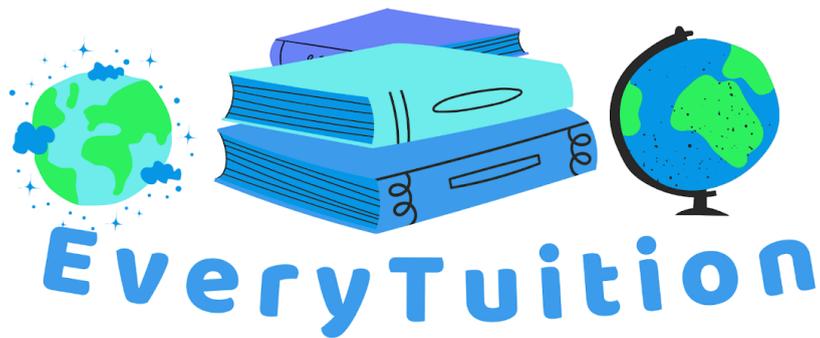


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GCSE Physics Topic 4 AQA: Atomic Structure

Exam Questions/Mock Exam Questions



Questions For Foundation, Higher, and Triple Science [\(scroll down for questions for higher and triple science only\)](#):

(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

Q1.

Jack is learning about the structure of the atom.

(a) Name the three subatomic particles found in an atom.

[3]

Q2.

Harry is studying the history of the atom.

(a) State the model of the atom proposed by J.J. Thomson.

[1]

(b) Describe one feature of this model.

[2]

[Total: 3 marks]

Q3.

Ben is revising atomic structure.

(a) State the relative charge of a proton.

[1]

(b) State the relative charge of an electron.

[1]

[Total: 2 marks]

Q4.

Daniel looks at the periodic table.

(a) What does the atomic number of an element represent?

[1]

(b) What does the mass number represent?

[2]

[Total: 3 marks]

Q5.

Oliver learns about isotopes.

(a) Define the term *isotope*.

[2]

(b) Carbon-12 and Carbon-14 are isotopes. Explain one similarity and one difference between them.

Similarity: _____

Difference: _____

[2]

[Total: 4 marks]

Q6.

Ethan studies atoms.

(a) Where is most of the mass of an atom found?

[1]

(b) Why do atoms have no overall charge?

[2]

[Total: 3 marks]

Q7.

Sam is looking at models of the atom.

(a) Who carried out the gold foil experiment?

[1]

(b) State one conclusion from this experiment.

[2]

[Total: 3 marks]

Q8.

Charlie studies the nucleus.

(a) State the relative mass of a neutron.

[1]

(b) State the relative mass of an electron.

[1]

[Total: 2 marks]

Q9.

Noah compares nuclear models.

(a) State one way in which Rutherford's model differed from the plum pudding model.

[2]

(b) Who later adapted the nuclear model to include electron shells?

[1]

[Total: 3 marks]

Q10.

Jacob is revising radiation.

(a) Name three types of nuclear radiation.

[3]

Q11.

William investigates alpha particles.

(a) State the charge of an alpha particle.

[1]

(b) State what an alpha particle consists of.

[2]

[Total: 3 marks]

Q12.

Alex looks at beta radiation.

(a) What is the charge on a beta particle?

[1]

(b) State what a beta particle is.

[2]

[Total: 3 marks]

Q13.

Luke compares radiation types.

(a) Which type of radiation is stopped by paper?

[1]

(b) Which type of radiation is most penetrating?

[1]

[Total: 2 marks]

Q14.

James is learning about half-life.

(a) Define the term *half-life*.

[2]

(b) State one way half-life data is used in medicine.

[2]

[Total: 4 marks]

Q15.

Tom researches uses of radiation.

(a) State one use of gamma radiation in medicine.

[1]

(b) State one precaution that should be taken when handling radioactive sources.

[2]

[Total: 3 marks]

Higher Tier

Q16.

Jack studies the structure of atoms.

(a) State the relative charges of a proton and a neutron.

[2]

(b) State where electrons are found in the atom.

[1]

[Total: 3 marks]

Q17.

Harry is revising isotopes.

(a) Define the term *isotope*.

[2]

(b) Explain why isotopes of the same element have similar chemical properties.

[2]

[Total: 4 marks]

Q18.

Ben is learning about the development of the atomic model.

(a) State one feature of the plum pudding model.

[2]

(b) Explain how the gold foil experiment led to the nuclear model.

[3]

[Total: 5 marks]

Q19.

Daniel studies electron arrangements.

(a) Draw the electronic structure of a sodium atom (atomic number 11).

[2]

(b) Explain why sodium reacts in a similar way to lithium.

[2]

[Total: 4 marks]

Q20.

Oliver is revising radioactive decay.

(a) Name the three main types of nuclear radiation.

[3]

(b) Explain why radioactive decay is described as a random process.

[2]

[Total: 5 marks]

Q21.

Ethan studies alpha radiation.

(a) State what an alpha particle consists of.

[1]

(b) Explain why alpha radiation is strongly ionising.

[2]

[Total: 3 marks]

Q22.

Sam investigates beta radiation.

(a) Describe what happens inside the nucleus during beta decay.

[2]

(b) State the charge on a beta particle.

[1]

[Total: 3 marks]

Q23.

Charlie studies gamma radiation.

(a) What is released during gamma decay?

[1]

(b) Explain why gamma radiation is highly penetrating.

[2]

[Total: 3 marks]

Q24.

Noah investigates radiation absorption.

(a) State which type of radiation is stopped by paper.

[1]

(b) State which type of radiation is most penetrating.

[1]

(c) Suggest one use of each type of radiation in industry or medicine.

Alpha: _____

Beta: _____

Gamma: _____

[3]

[Total: 5 marks]

Q25.

Jacob looks at ionising radiation.

Explain why ionising radiation can damage living cells.

[3]

Q26.

William studies half-life.

(a) Define the term *half-life*.

[2]

(b) Explain how half-life makes radioactive isotopes useful in medicine.

[2]

[Total: 4 marks]

Q27.

Alex is learning about background radiation.

(a) State two natural sources of background radiation.

[2]

(b) State one man-made source of background radiation.

[1]

[Total: 3 marks]

Q28.

Luke studies the dangers of radiation.

(a) State one short-term effect of high radiation exposure.

[1]

(b) State one long-term effect of radiation exposure.

[1]

(c) Give one precaution used to protect workers from radiation.

[1]

[Total: 3 marks]

Q29.

James investigates radioactive tracers.

(a) State one property of isotopes used as tracers in medicine.

[1]

(b) Suggest one advantage and one disadvantage of using radioactive tracers.

Advantage: _____

Disadvantage: _____

[2]

[Total: 3 marks]

Q30.

Tom researches nuclear equations.

Write the nuclear equation for the alpha decay of uranium-238.

[2]

Q31.

Jack is learning about nuclear fission.

(a) State what is meant by nuclear fission.

[2]

(b) Describe what happens when uranium-235 undergoes fission.

[3]

[Total: 5 marks]

Q32.

Harry investigates chain reactions.

(a) Explain what is meant by a chain reaction in nuclear fission.

[2]

(b) Explain why control rods are used in a nuclear reactor.

[2]

[Total: 4 marks]

Q33.

Ben studies nuclear fusion.

(a) State what is meant by nuclear fusion.

[1]

(b) Explain why very high temperatures are needed for nuclear fusion.

[2]

[Total: 3 marks]

Q34.

Daniel compares fission and fusion.

Give one similarity and one difference between nuclear fission and nuclear fusion.

Similarity: _____

Difference: _____

[2]

Q35.

Oliver looks at radiation safety.

Evaluate the risks and benefits of using nuclear power to generate electricity.

[6]

Q36.

Ethan calculates radioactive decay.

A sample has a half-life of 3 hours. The initial activity is 800 Bq.

Calculate the activity after 9 hours.

[3]

Q37.

Sam studies nuclear accidents.

Suggest two environmental consequences of a nuclear power station accident.

[2]

Q38.

Charlie is revising nuclear medicine.

Explain why isotopes with a short half-life are safer to use in medical tracers.

[2]

Q39.

Noah looks at energy from nuclear reactions.

(a) Name the process that powers the Sun.

[1]

(b) Explain why scientists are trying to develop nuclear fusion reactors on Earth.

[2]

[Total: 3 marks]

Q40.

Jacob is learning about radioactive waste.

Describe one problem with disposing of radioactive waste safely.

[2]

Triple Science

Q41.

William studies atomic structure.

(a) State the approximate radius of an atom.

[1]

(b) State the approximate radius of a nucleus.

[1]

(c) Explain why most of the atom is empty space.

[2]

[Total: 4 marks]

Q42.

Alex investigates ionisation.

(a) Explain how ionising radiation causes atoms to form ions.

[2]

(b) Compare the ionising power of alpha, beta and gamma radiation.

[3]

[Total: 5 marks]

Q43.

Luke studies nuclear equations.

Write the nuclear equation for the beta decay of carbon-14.

[2]

Q44.

James is investigating activity.

(a) Define the term *activity* in radioactivity.

[1]

(b) State the unit of activity.

[1]

(c) Explain how activity changes over time.

[2]

[Total: 4 marks]

Q45.

Tom measures radiation dose.

(a) State what is meant by absorbed dose.

[1]

(b) State the unit of dose equivalent.

[1]

(c) Explain why dose equivalent is used instead of absorbed dose alone.

[2]

[Total: 4 marks]

Q46.

Jack studies contamination and irradiation.

(a) Define the term *irradiation*.

[1]

(b) Define the term *contamination*.

[1]

(c) Suggest why contamination is more dangerous than irradiation.

[2]

[Total: 4 marks]

Q47.

Harry looks at alpha particles.

Explain why alpha emitters are more dangerous inside the body than outside.

[3]

Q48.

Ben studies radiation monitoring.

Describe one method used to monitor radiation exposure in workers.

[2]

Q49.

Daniel investigates nuclear fission.

(a) Explain how the kinetic energy of fission products can be used to generate electricity.

[2]

(b) State one way in which energy is transferred in a nuclear reactor.

[1]

[Total: 3 marks]

Q50.

Oliver studies chain reactions.

(a) Explain how a chain reaction is controlled in a nuclear reactor.

[2]

(b) Explain why an uncontrolled chain reaction is dangerous.

[2]

[Total: 4 marks]

Q51.

Ethan looks at fusion reactors.

(a) State one advantage of nuclear fusion over nuclear fission.

[1]

(b) Explain why it is difficult to achieve nuclear fusion on Earth.

[2]

[Total: 3 marks]

Q52.

Sam investigates radiation in industry.

Explain how beta radiation is used to monitor the thickness of materials in factories.

[3]

Q53.

Charlie looks at background radiation.

(a) State one factor that can cause variation in background radiation levels.

[1]

(b) Suggest why people living in areas with high radon levels may receive a higher dose of radiation.

[2]

[Total: 3 marks]

Q54.

Noah studies radioactive dating.

Explain how the half-life of carbon-14 is used to date ancient remains.

[3]

Q55.

Jacob evaluates nuclear energy.

Discuss the advantages and disadvantages of using nuclear power stations to generate electricity.

[6]