Pearson Edexcel GCE Physics

Additional Support Worksheets

The A Level Physics worksheet series are designed to provide support to students in grasping foundational level knowledge of key terms and concepts. By engaging with these materials, students can build strong foundations in key principles. The series encourages active learning through thought provoking questions, so learners can reflect on their understanding and boost confidence.

Contents

1 Which of the following statements is correct for a sodium atom $^{23}_{11}Na$?

[x] **A** Proton number 11, neutron number 23

[x] **B** proton number 23, neutron number 11

[x] **C** Nucleon number 23, proton number 11

[x] **D** Nucleon number 23, proton number 12

(Total for Question 1 = 1 mark)

---

2 Which of the following statements is correct for isotopes?

[x] **A** Isotopes have the same number of protons but a different number of nucleons.

[x] **B** Isotopes have the same number of protons and the same number of nucleons

[x] **C** Isotopes have the same number of neutrons but a different number of nucleons

[x] **D** Isotopes have the same number of neutroins but a different number of nucleons

(Total for Question 2 = 1 mark)

---

3 In the Rutherford large- angle alpha particle scattering experiment a very small fraction of alpha particles were scattered at angles greater than 90°.

Which of the following is a correct conclusion for this observation?

[x] **A** The nucleus contains neutrons

[x] **B** Electrons are responsible for the scattering

[x] **C** The nucleus contains most of the atom's volume

[x] **D** The nucleus is very dense

(Total for Question 3 = 1 mark)

---

4 In the Rutherford large- angle alpha particle scattering experiment observations led to conclusions about the structure of the atom.

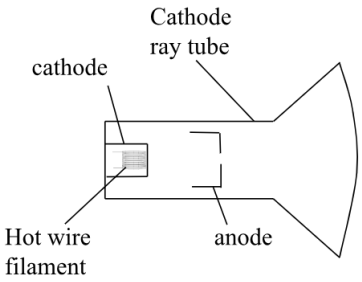
Which row in the table does **not** correctly links the observation to the conclusion?

	Observation	Conclusion
[x] **A**	Most alpha particles passed straight through the foil	The atom is mostly empty space
[x] **B**	A very small fraction of alpha particles were deflected through	The nucleus contains most of the atom's mass

	angles > 90°	
[x] **C**	Some alpha particles were deflected through small angles	The nucleus is positively charged
[x] **D**	A few alpha particles lost speed as they passed through the foil	The nucleus must contain electrons

(Total for Question 4= 1 mark)

5 In a cathode ray tube a hot metal filament can emit electrons by thermionic emission, as shown.



Which of the following will increase the emission rate of electrons?

[x] **A** Increasing the filament temperature

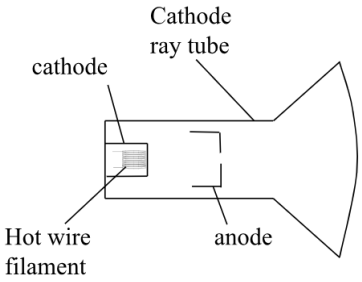
[x] **B** Increasing the distance between the filament and the anode

[x] **C** Applying a negative potential to the anode

[x] **D** Using a metal with a larger value of work function

(Total for Question 5 = 1 mark)

6 In a cathode ray tube, which of the following accelerates the electrons after thermionic emission?



[x] **A** A magnetic field

[x] **B** An electric field between the cathode and anode

[x] **C** Thermal energy supplied to the cathode

[x] **D** The hot wire filament

(Total for Question 6 = 1 mark)

7 Which of the following statements about a cyclotron is correct?

[x] **A** The particles are accelerated by a constant electric field

[x] **B** The particles are accelerated when inside a Dee

[x] **C** The particles are made to move in a spiral by a constant magnetic field

[x] **D** the magnetic field in a cyclotron directly increases particle kinetic energy

(Total for Question 7 = 1 mark)

---

8 In a linear accelerator (Linac) which of the following describes the primary role of the electric field between the drift tubes?

[x] **A** Keeps the particles in a focused beam

[x] **B** Accelerates the particles by increasing their kinetic energy when they cross gaps

[x] **C** Maintains a constant velocity within the drift tubes

[x] **D** Provides a centripetal force

(Total for Question 8 = 1 mark)

---

9 A moving proton undergoes an elastic collision with a stationary proton.

Which row of the table is correct for this collision?

	Momentum	**Kinetic energy**
[x] **A**	conserved	not conserved
[x] **B**	not conserved	conserved
[x] **C**	not conserved	not conserved
[x] **D**	conserved	conserved

(Total for Question 9 = 1 mark)

---

10 A radioactive source is placed in a cloud chamber and straight tracks are observed. The same source is placed 15 cm from a G-M tube and a count rate is detected.

When a thin sheet of aluminium is placed between the source and the G-m tube the count rate falls to background count rate.

Which of the following types of radiation are emitted from the source?

[x] **A** alpha, beta and gamma

[x] **B** alpha and gamma

[x] **C** alpha and beta

[x] **D** beta and gamma

(Total for Question 10 = 1 mark)

---

11 A stationary particle of mass $2m$ decays into two identical particles, each of mass m. One particle moves with velocity v.

Which of the following gives the velocity of the second particle?

[x] **A** v

[x] **B** $-v$

[x] **C** $\frac{v}{2}$

[x] **D** $2v$

(Total for Question 11= 1 mark)

---

12 Which of the following particles is best for investigating nucleon structure?

[x] **A** Low-energy electron

[x] **B** high-energy electron

[x] **C** Low-energy proton

[x] **D** high energy proton

(Total for Question12 = 1 mark)

---

13 A proton and antiproton, each of mass *m,* annihilate to produce a gamma photon.

Which of the following equations correctly gives the energy *E* of the gamma photon?

[x] **A** mc^2

[x] **B** $2mc^2$

[x] **C** $\frac{1}{2}mc^2$

[x] **D** mc

(Total for Question 13 = 1 mark)

14 Energy is used to create a particle- antiparticle pair.

The combined mass of the particle and anti-particle is 3×10^{-27} Kg.

Which of the following expressions gives the minimum energy in J required to create this particle-antiparticle pair?

[x] **A** 2.7×10^{-10}

[x] **B** 5.4×10^{-10}

[x] **C** 1.35×10^{-10}

[x] **D** 2.7×10^{-11}

(Total for Question 14 = 1 mark)

15 **T**he rest mass of an electron is 0.511 MeV$/c^2$.

Which of the flowing expressions gives its mass in kg?

[x] **A** 4.56×10^{-13}

[x] **B** 9.11×10^{-28}

[x] **C** 5.11×10^{-28}

[x] **D** 9.11×10^{-31}

(Total for Question 15 = 1 mark)

16 Two muons are created in the upper atmosphere. Muon X moves at 0.9c and muon Y moves at 0.8c.

Which of the following statements is correct?

[x] **A** muon X has a much longer lifetime as observed on Earth

[x] **B** muon X and muon Y have the same observed lifetime

[x] **C** muon Y experiences a larger time dilation than muon X

[x] **D** muon Y reaches the surface of the earth and muon X does not

(Total for Question 16 = 1 mark)

17 Which of the following particles is a baryon?

[x] **A** Pion

[x] **B** Electron

[x] **C** Neutrino

[x] **D** Proton

(Total for Question 17 = 1 mark)

---

18 Which of the following statements describes **a meson**?

[x] **A** Made of three quarks

[x] **B** Made of a quark and an antiquark

[x] **C** Made of two quarks

[x] **D** Made of a quark and a lepton

(Total for Question 18 = 1 mark)

---

19 Which of the following series of three particles are all leptons?

[x] **A** electron, muon, neutrino

[x] **B** electron, proton, neutron

[x] **C** proton, pion, muon

[x] **D** neutron, pion, photon

(Total for Question 19= 1 mark)

---

20 Which of the following statements are true for an antiproton compared to proton?

[x] **A** same charge and same baryon number

[x] **B** same charge and opposite baryon number

[x] **C** opposite charge and opposite baryon number

[x] **D** opposite charge and same baryon number

(Total for Question 20 = 1 mark)
