AQA (GCSE Notes)

Chapter 2: Electricity

Q1. What is the role of a potential difference in a closed circuit?

Q2. Define electric current in terms of charge flow.

Q3. Describe the conditions needed for an electric current to flow in a circuit.

Q4. What happens to the electric current if the circuit is not closed?

Q5. Write the equation that links charge flow, current and time.

Q6. Explain what each symbol represents in the equation $Q = I \times t$.

Q7. What unit is used to measure charge flow?

Q8. In what unit is current measured, and what is its symbol?

Q9. Why must a source of potential difference be included in a circuit?

Q10. How does increasing the time affect the total charge transferred in a circuit?

Q11. What is the current in a wire if 6 C of charge passes in 2 seconds?

Q12. A circuit has a current of 3 A for 4 seconds. How much charge flows through it?

Q13. Explain why the current is the same at every point in a simple closed loop.

Q14. If a current of 2 A flows for 10 seconds, how much charge has passed?

Q15. How can you increase the current in a circuit without changing the time?

Q16. What is the relationship between potential difference and current?

Q17. Describe how current behaves in a series circuit.

Q18. Why is a potential difference needed to push charges through a wire?

Q19. In a closed loop, what would you expect the current to be at different points in the loop?

Q20. What does a straight wire symbol represent in a circuit diagram?

Q21. How would you draw a circuit with a battery, switch, and lamp?

Q22. How do you show a component is connected in series in a diagram?

Q23. How do you show a voltmeter connected correctly in a circuit diagram?

Q24. What does the symbol for a resistor look like?

Q25. What is the purpose of a fuse in a circuit, and how is it represented?

Q26. Explain how to measure current in a circuit using an ammeter.

Q27. Why must an ammeter be connected in series?

Q28. How is a battery represented in a circuit diagram?

Q29. Why do we use standard circuit symbols in diagrams?

Q30. What happens to the current if the potential difference increases and resistance remains the same?

Q31. How is a closed circuit different from an open circuit?

Q32. Why does current stop flowing when a switch is opened?

Q33. Describe how current flows from the positive terminal to the negative terminal.

Q34. If no potential difference is applied to a circuit, what happens to the current?

Q35. What happens to the current when you add more resistors in series?

Q36. If a charge of 10 C flows in 5 seconds, what is the current?

Q37. How would you calculate the time if you know the charge flow and current?

Q38. A charge of 24 C passes in 6 seconds. What is the value of the current?

Q39. What symbol is used to represent time in the charge flow equation?

Q40. How would the current be affected if the time doubled but charge stayed the same?

Q41. Draw a circuit with a battery, resistor, and an open switch.

Q42. Which part of the circuit provides the energy needed for charge to move?

Q43. Why does a bulb not light up when a switch is open?

Q44. What do you understand by the term “closed circuit”?

Q45. Why is it important to learn standard circuit symbols?

Q46. What does the unit ampere represent in practical terms?

Q47. What causes electric charge to flow in a circuit?

Q48. Can current exist in a circuit without potential difference? Explain.

Q49. How does the length of time current flows affect the total charge moved?

Q50. Explain what is meant by the term ‘electric charge’.

Q51. What is the relationship between current, resistance, and potential difference?

Q52. Write the equation that links potential difference, current, and resistance.

Q53. Define potential difference in terms of current and resistance.

Q54. What unit is used to measure resistance?

Q55. What happens to the current in a circuit if the resistance increases but the potential difference stays the same?

Q56. What is the effect of increasing potential difference while keeping resistance the same?

Q57. Describe how to calculate resistance if you know the current and the potential difference.

Q58. A component has a current of 2 A and a potential difference of 10 V. What is its resistance?

Q59. How does the current change if resistance is doubled and potential difference stays the same?

Q60. What is meant by an ohmic conductor?

Q61. How does the resistance of an ohmic conductor behave at constant temperature?

Q62. Give an example of a component that is an ohmic conductor.

Q63. How does the resistance of a filament lamp change as the current increases?

Q64. What happens to the temperature of a filament lamp when current flows through it?

Q65. Describe the current-potential difference graph for an ohmic conductor.

Q66. Describe the current-potential difference graph for a filament lamp.

Q67. Why does the resistance of a filament lamp increase as it gets hotter?

Q68. What is the direction of current flow through a diode?

Q69. Why does a diode have high resistance in the reverse direction?

Q70. Sketch the current-potential difference graph for a diode.

Q71. What is a thermistor?

Q72. How does the resistance of a thermistor change with temperature?

Q73. What is a practical application of a thermistor?

Q74. Describe a circuit where a thermistor is used in a thermostat.

Q75. What is an LDR?

Q76. How does the resistance of an LDR change with light intensity?

Q77. Give one example where an LDR is used in real life.

Q78. How can an LDR be used to automatically switch on lights in the dark?

Q79. What happens to the resistance of an LDR in bright sunlight?

Q80. Why is it useful that the resistance of a thermistor decreases when it gets hot?

Q81. What does a linear component mean in terms of resistance?

Q82. How can you tell from a graph if a component is non-linear?

Q83. How would you set up a circuit to measure the resistance of a component?

Q84. What instruments do you need to measure resistance in a circuit?

Q85. Why must you measure both current and potential difference to calculate resistance?

Q86. Draw a circuit diagram for measuring the resistance of a resistor.

Q87. In what part of the circuit should you place the ammeter?

Q88. In what part of the circuit should you place the voltmeter?

Q89. Why must the voltmeter be connected in parallel?

Q90. Why should the wire be kept at constant temperature in resistance investigations?

Q91. How does increasing the length of a wire affect its resistance?

Q92. What type of wire would have the lowest resistance?

Q93. Why is it important to use the same wire material when testing wire length and resistance?

Q94. How would you investigate the effect of wire length on resistance?

Q95. What safety precautions should you take when investigating wire resistance?

Q96. How do resistors behave when placed in series in a circuit?

Q97. How does adding more resistors in series affect total resistance?

Q98. How does adding more resistors in parallel affect total resistance?

Q99. Explain how current behaves in a parallel circuit with two resistors.

Q100. Explain how the total resistance in a series circuit is calculated.

Q101. Explain how the total resistance in a parallel circuit is calculated.

Q102. How would you use a graph to identify if a component is ohmic or non-ohmic?

Q103. What would a curved line on a current-potential difference graph suggest about the component?

Q104. What does it mean if a component shows a straight line through the origin on a current-potential difference graph?

Q105. What is the resistance if a potential difference of 12 V causes a current of 3 A to flow?

Q106. If a component has a resistance of 4 Ω and the current is 2 A, what is the potential difference across it?

Q107. What is the current when the potential difference is 15 V and the resistance is 5 Ω?

Q108. Why does a diode conduct only in one direction?

Q109. How can you tell from a graph that a diode only allows current in one direction?

Q110. How would the resistance of a thermistor behave if placed in a cold environment?

Q111. How does the function of a thermistor help in regulating heating systems?

Q112. What does the symbol for a diode look like and what does the arrow show?

Q113. Why does a light bulb glow brighter as the current increases?

Q114. How does increasing the resistance affect the brightness of a bulb?

Q115. What happens to total resistance when identical resistors are placed in parallel?

Q116. How would you explain to someone why LDRs are useful in automatic lighting systems?

Q117. Why is it incorrect to assume resistance is always constant in every component?

Q118. Why is it necessary to repeat readings and take averages when investigating resistance?

Q119. What would you expect the graph of resistance vs. temperature for a thermistor to look like?

Q120. Why do non-ohmic components not obey Ohm's law?

Q121. What is the difference between a series and a parallel circuit?

Q122. In a series circuit, what happens to the current at each component?

Q123. In a parallel circuit, how does the potential difference across each component behave?

Q124. What is the formula to calculate total resistance in a series circuit?

Q125. Why does adding more resistors in series increase total resistance?

Q126. Why does adding resistors in parallel reduce the total resistance?

Q127. What happens to the total current in a parallel circuit when more branches are added?

Q128. In a series circuit, how is the total potential difference of the power supply divided?

Q129. In a parallel circuit, what remains constant across all components?

Q130. What does the term "equivalent resistance" mean in a circuit?

Q131. If one bulb breaks in a series circuit, what happens to the rest of the circuit?

Q132. If one bulb breaks in a parallel circuit, what happens to the rest of the circuit?

Q133. How do you calculate current in different branches of a parallel circuit?

Q134. Why is it easier to add more components in a parallel circuit than in series?

Q135. What type of circuit is commonly used in domestic lighting and why?

Q136. Describe how energy is shared between components in a series circuit.

Q137. What happens to the brightness of bulbs in a series circuit if more bulbs are added?

Q138. Why do components in a parallel circuit get full potential difference?

Q139. How does current behave at junctions in a parallel circuit?

Q140. What is a common use of series circuits in everyday devices?

Q141. Why is the total resistance in a parallel circuit always lower than the smallest resistor?

Q142. In a series circuit with 2 resistors, how is the current affected if one resistor is doubled?

Q143. Describe a method to test if two resistors are connected in series or parallel.

Q144. How does current behave in a complete series loop?

Q145. What must remain equal in all components of a series circuit?

Q146. In parallel, how is total current related to branch currents?

Q147. What is the main difference in energy distribution between series and parallel circuits?

Q148. What happens to the total resistance if you connect identical resistors in series?

Q149. Explain the design of a basic dc series circuit used for testing components.

Q150. How would you construct a circuit to measure total resistance in a series circuit?

Q151. Why can series circuits be useful for safety alarms?

Q152. What makes a parallel circuit more suitable for household wiring?

Q153. Why is it important to understand equivalent resistance in circuits?

Q154. What does a frequency of 50 Hz mean in terms of alternating current?

Q155. What is the potential difference of mains electricity in the UK?

Q156. What is the role of the live wire in a three-pin plug?

Q157. What does the neutral wire do in a mains circuit?

Q158. What is the purpose of the earth wire in electrical safety?

Q159. What are the colour codes for the three wires in a three-core cable?

Q160. Why is the earth wire connected to the metal casing of some appliances?

Q161. What danger exists even when a switch is off in a mains circuit?

Q162. Why is the live wire the most dangerous part of the mains supply?

Q163. What could happen if the live wire touches a metal case without an earth connection?

Q164. Why is there no current in the earth wire during normal operation?

Q165. What does it mean for the neutral wire to be at “earth potential”?

Q166. How does the earth wire prevent electric shocks?

Q167. What would happen if the live and earth wires were connected directly?

Q168. Why is touching a live wire dangerous even if the appliance is off?

Q169. Why must appliances have a properly wired plug?

Q170. What safety features are included in UK plug design?

Q171. What role does fuse or circuit breaker play in protecting the mains circuit?

Q172. What happens if you touch the live wire while standing on the ground?

Q173. How does mains electricity differ from battery electricity?

Q174. Why is ac used for mains instead of dc?

Q175. What should you check before wiring a plug?

Q176. What might happen if the earth wire is disconnected?

Q177. Why must electrical appliances be earthed if they have a metal case?

Q178. How does the live wire cause electric shock?

Q179. How do fuses protect the circuit from too much current?

Q180. Why do we use insulation on each wire in a three-core cable?

Q181. What is the equation that links power, potential difference, and current?

Q182. Write the equation that links power, current, and resistance.

Q183. Define power in terms of electrical circuits.

Q184. How does increasing the potential difference affect power if current stays the same?

Q185. How does power change if the current is doubled and resistance stays the same?

Q186. What unit is used to measure electrical power?

Q187. If a device has a high current and low resistance, what can you say about its power?

Q188. Describe how to calculate power using current and resistance.

Q189. What happens to the power if the current increases and resistance remains constant?

Q190. Why do we use two different equations to calculate power?

Q191. What is meant by energy transferred in an electric circuit?

Q192. How is energy transferred related to power and time?

Q193. Write the equation that links energy transferred, charge flow, and potential difference.

Q194. If a device is switched on for a longer time, how does this affect the energy transferred?

Q195. What is the unit for energy transferred?

Q196. If an appliance uses more power, what happens to the energy it transfers in a given time?

Q197. How do you calculate the energy used by a 100 W appliance in 1 hour?

Q198. Why is it useful to know the power rating of a domestic appliance?

Q199. What does a 2 kW power rating mean for an appliance?

Q200. What is the relationship between charge flow and energy transferred?

Q201. How does a fan transfer energy when it is switched on?

Q202. Give an example of a device that transfers electrical energy to heat.

Q203. Why do some appliances need a higher power rating than others?

Q204. What does the power rating of an appliance tell you about its energy use?

Q205. How can two appliances use the same amount of energy but have different power ratings?

Q206. Why is it important to switch off appliances when not in use?

Q207. What happens to energy when electrical work is done in a circuit?

Q208. How does energy transfer differ in a battery-powered device compared to a mains-powered one?

Q209. Describe how a toaster transfers energy during use.

Q210. Explain how electrical energy is transferred to kinetic energy in a washing machine.

Q211. What is the National Grid and what is its purpose?

Q212. How does electrical power travel from power stations to homes?

Q213. Why is a step-up transformer used at a power station?

Q214. What does a step-down transformer do in the National Grid?

Q215. Why is it efficient to use a high potential difference to transfer electricity?

Q216. What happens to current when potential difference is increased in transmission lines?

Q217. How does reducing current help make energy transfer more efficient?

Q218. What is the role of transformers in the National Grid?

Q219. Why is energy lost as heat in transmission lines?

Q220. What is the advantage of using cables with low resistance in the National Grid?

Q221. What happens when two insulating materials are rubbed together?

Q222. What kind of particles are transferred during rubbing of insulating materials?

Q223. What charge does a material have if it gains electrons?

Q224. What charge does a material have if it loses electrons?

Q225. Why does rubbing a balloon on your hair cause it to stick to a wall?

Q226. What is the name of the force between two charged objects that are not touching?

Q227. What happens when two objects with the same charge are brought close together?

Q228. What happens when two objects with opposite charges are near each other?

Q229. What is meant by a non-contact force?

Q230. How can you show that charged objects attract or repel without touching?

Q231. What causes sparking between two charged objects?

Q232. Why can static electricity be dangerous in certain places?

Q233. How can static electricity be reduced in aircraft fuel lines?

Q234. What everyday situations can cause a build-up of static charge?

Q235. Why is a person more likely to get a static shock in dry weather?

Q236. What is the difference between static electricity and current electricity?

Q237. Why does a plastic ruler attract small pieces of paper after being rubbed?

Q238. What is the result of unequal distribution of electrons between two materials?

Q239. What safety precautions can be taken to avoid static sparks in petrol stations?

Q240. What happens to electrons in static charge build-up?

Q241. What is an electric field?

Q242. How does the strength of an electric field change with distance from a charged object?

Q243. What direction do electric field lines point for a positively charged object?

Q244. What direction do electric field lines point for a negatively charged object?

Q245. What shape is the electric field around a single charged sphere?

Q246. How do electric fields explain the attraction between charged objects?

Q247. How do electric fields explain repulsion between objects with like charges?

Q248. How can we draw an electric field to show its strength?

Q249. Why is the electric field stronger closer to the charged object?

Q250. What is the link between electric fields and the force on a nearby charged object?

Q251. How can electric fields cause sparking between objects?

Q252. Why does a charged object influence another object without touching it?

Q253. What would happen to the electric field if the charge of the object increases?

Q254. How can field lines show the difference between strong and weak electric fields?

Q255. What is the shape of the electric field between two oppositely charged plates?

Q256. Why are electric field lines never crossed or broken?

Q257. What does the spacing between electric field lines tell us?

Q258. How can the idea of electric fields help to understand lightning?

Q259. What causes the force between a charged balloon and a neutral wall?

Q260. How does a charged rod cause small bits of paper to jump toward it?