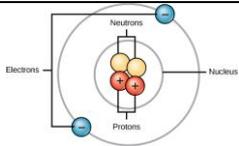


1. What is the difference between d.c. and a.c?	Direct current passes in the same direction Alternating current constantly changes direction.
2. How does a circuit breaker work?	When a current is too great the live wire breaks in the circuit breaker.
3. What is the advantage of a circuit breaker over a fuse?	You can reset a circuit breaker rather than having to replace a whole fuse.
4. How does a fuse work?	If the current in a fuse is too high the fuse melts breaking the circuit.
5. What does $P = I \times V$ work out?	Power = current x voltage
6. What does $P = E / t$ work out?	Power = energy / time
7. Draw and label the structure of an atom	
8. How are ions formed?	An atom loses or gains electrons
9. How can we identify an alpha particle?	2 neutrons + 2 protons. The same as a helium nucleus.
10. How can we identify a beta particle?	Electron from the nucleus
11. What is the half life of a substance?	Average time for the number of nuclei of the isotope in a sample to halve.
12. What is nuclear fission?	Splitting of an atomic nucleus

13. What is nuclear fusion?	Joining of two atomic nuclei together
14. How do alpha, beta and gamma radiation differ in penetration power?	Alpha and beta can be deflected by both electric and magnetic fields. Gamma cannot.
15. What is an isotope?	An atom with a different number of neutrons, but same number of protons and electrons.
16. How can we identify a gamma particle?	EM radiation
17. What must happen for nuclear fission to occur in a radioactive sample?	Must absorb a neutron.
18. What happens to material that gains electrons?	It becomes negatively charged.
19. What happens for an insulator to become negatively charged?	An excess of electrons
20. What material gains a charge?	An insulator
21. What happens for an insulator to become positively charged?	A lack of electrons relative to protons
22. What happens when you bring together two objects with like charges?	They repel
23. What happens when you bring together two objects with opposite charges?	They attract
24. How would you calculate resistance?	Potential difference = current x resistance
25. What is the purpose of defibrillation?	Delivers a controlled electric shock to a heart to restart it.

26. What does the electric shock do to the heart in defibrillation?	Restart it
27. How does the operator of a defibrillator ensure there is a good electrical contact with the patients chest?	Uses a gel Removes clothing
28. Give two advantages of having charged paint droplets in an electrostatic paint sprayer?	Less waste and therefore less cost More even finish
29. Why does the paint spread out on leaving the electrostatic paint sprayer?	The positively charged paint droplets repel each other.
30. Why are bicycle frames / cars given the opposite charge to the paint?	So that the positively charged paint droplets stick to the frame/car
31. Why is an electrostatic precipitator placed in power station and factory chimneys?	Reduce pollution and removes harmful particles
32. What type(s) of power station need an electrostatic precipitator?	Fossil fuels
33. What should you look for if a lamp does not light?	Is there a gap in the circuit
34. What effect does a variable resistance have on the brightness of a lamp?	It can either increase resistance or decrease resistance. Decreasing resistance, increases current and increases the brightness of the lamp
35. How should a voltmeter be placed into a circuit?	In parallel
36. What type of wire brings the electrical supply into the house?	Live (brown)
37. What type of wire provides the return path for the electrical supply in the house?	Neutral (blue)
38. What are the colours and roles of the 3 different wires in a plug?	Live (brown) – carries high voltage into the house Neutral (blue) – completes the circuit Earth (yellow/green) – connect to case to prevent it becoming live

39. If there are only 2 wires in a plug which ones are included? Why could only 2 wires be in the plug?	Brown and blue. Why? Because the Earth wire is not needed with a 'double insulated' appliance
40. Which wire is the safety wire?	A fuse
41. Why is a fuse a good safety device?	The fuse is a thin wire which melts if the current is too high. This stops the current flowing and avoids damage or electrocution.
42. How do you know which fuse to choose?	Choose a fuse with a slightly high amps (A) than the normal current of the appliance.
43. What is ultrasound?	A high frequency pressure wave containing compressions and rarefactions.
44. What is meant by a longitudinal wave?	The wave direction is parallel to the vibrations
45. What is meant by the frequency of a wave?	The number of waves over a set period of time.
46. Explain how sound travels through the air to reach your ear	Air particles vibrate. Compressions of air particles in between periods of rarefaction send the sound to the ear.
47. How does the frequency of a note change if its pitch increases? (goes higher)	The frequency increases
48. What happens if you change the amplitude of a wave?	The sound becomes louder
49. Give two other uses of ultrasound than for baby scans	Investigate tumours Measure the speed of blood flow
50. What is the advantage of a pregnant woman having an ultrasound scan?	Ultrasound does not harm living cells like an x ray. Ultrasound have good resolution – you can measure tissues.
51. In medicine, what is the difference between diagnosis and therapy?	Diagnosis is identifying a problem Therapy is the treatment

52. Give one similarity and one difference between x-rays and gamma rays.	Both ionising electromagnetic waves Have similar wavelengths
53. Why are X-rays and gamma rays suitable to treat cancer patients?	They kill cells
54. Why are alpha and beta particles not suitable to treat cancer patients?	Alpha radiation is absorbed by the skin Beta radiation doesn't pass through bone.
55. Give another use (than radiotherapy) of gamma radiation in hospitals	Sterilising medical instruments and equipment (make very clean)
56. What is a radioactive tracer?	A substance used to investigate a patient's body without surgery
57. Why is a radioactive tracer used?	You can detect the tracers movement with a gamma camera. Allows you to identify where there is a problem without the need for surgery.
58. Why would a short half life be useful for a radioactive tracer?	The tracer would be in the body whilst it is tracked. The tracer won't last in the body and potentially cause problems.
59. Which type of nuclear radiation is stopped by several sheets of paper?	Gamma rays
60. What is meant by background radiation?	Radiation always present in the environment
61. Suggest two natural sources of background radiation	Cosmic rays from space Man-made sources from hospitals and industry Present in rock
62. Why is alpha radiation more suitable than either gamma or beta radiation for use in a smoke alarm?	Alpha particles are blocked by smoke meaning the current can't pass through and the alarm sounds
63. Explain how the smoke alarm works	<u>Without smoke</u> , alpha particles leave <u>ions in the air</u> which <u>allow a current</u> to pass around inside. <u>With smoke</u> the <u>alpha</u> particles are <u>blocked</u> and the <u>current can't travel</u> . An <u>alarm sounds</u> .
64. Explain how a power station makes electricity	The <u>source of energy</u> provides <u>heat</u> to boil the <u>water</u> to produce <u>steam</u> . The pressure of the <u>steam</u> turns the <u>turbine</u> which turns the <u>generator</u> making electricity.

65. What element is used as the fuel in a nuclear power station?	Uranium fuel rods
66. What is meant by fission?	Splitting of a nuclei
67. What is the difference between a nuclear reactor in a power station and a nuclear bomb?	Nuclear reactor is a controlled fission (splitting) A bomb is uncontrolled
68. How can materials be made radioactive?	Bombard the atoms with neutrons
69. Suggest one method of disposing of lower level radioactive waste	The waste is covered in concrete and put in the sea.
70. How can you get an electrostatic shock?	If you become charged and then become earthed.
71. What happens if you put like charges together?	They repel
72. What happens if you put unlike charges together?	They attract
73. What causes electrostatic events (phenomena)?	Transfer of electrons
74. How do you have a positive charge?	Due to an excess of electrons
75. How do you have a negative charge?	Due to a lack of electrons
76. Explain how static electricity can be dangerous. (2)	Explosions can occur if static electricity occurs in inflammable gases or with high concentrations of oxygen. In situations where large amounts of charge can flow through the body to earth

77. Explain how static electricity can be annoying (2)	Dirt and dust can become attracted to Tv monitors Cause clothing to cling.
78. How can you reduce the chance of getting an electric shock?	Correct earthing Use of insulating mats Using shoes with insulating soles Bonding fuel tanker to aircraft
79. Explain how static electricity can be useful for electrostatic dust precipitators to remove smoke particles from chimneys	Dust passes through charged metal grids Dust particles become charged Plates are charged opposite to grid Dust particles are attracted to plates Plates stuck and dust falls to collector
80. Explain how static electricity can be useful for paint spraying	Spray gun charged Paint particles charged the same so repel giving a fine spray/coat Object charged oppositely to paint Attracts paint to the object giving an even coat with less waste
81. Explain how static electricity can be useful for restarting the heart	Paddles charged Electrical contact with patient's chest Charge passed through patient to make heart contract
82. What happens to the resistance/current in a circuit if you make a wire longer?	The resistance becomes greater The current is lowered
83. What happens to the resistance/current in a circuit if you make a wire thicker?	The resistance is reduced The current increases (think that there is more space for the electrons to pass through and they do so easier)
84. What is resistance measured in?	Ohms
85. A 'double insulated' appliance means what?	It does not need to be earthed. The appliance is a non-conductor and cannot become live.
86. How to calculate the distance using echos?	Use the echo time and speed of sound. Remember to divide by two as the sound goes to the object and back.
87. Recognise that ultrasound can be used in medicine for diagnostic purposes (find out what is there)	Look inside people by scanning the body Measure the speed of blood flow in the body

88. Describe the features of longitudinal waves	Wavelength (how long between waves) Frequency (the number) Compression (region of higher pressure) Rarefaction (region of lower pressure)
89. Why can we not hear ultrasound?	The frequency is higher than the upper threshold of human hearing (20,000 Hz)
90. Give uses of ultrasound	Detecting babies Diagnose problems inside the body Produce images of soft tissues Break down kidney stones
91. How can we measure radioactivity?	Measure the number of nuclear decays emitted per second
92. What makes an ion?	Either losing an electron or gaining an electron
93. What happens to a nucleus when an alpha particle is emitted?	Mass number decreases by 4 The atomic number decreases by 2 Nucleus has 2 fewer neutrons and 2 fewer protons.
94. Describe what happens to a nucleus when a beta particle is emitted	Mass number is unchanged The nucleus has one less neutron, nucleus has one more proton. New element is formed.
95. How are tracers used?	To track waste dispersal To find leaks/blockages in underground pipes To track the passage of food/liquid in the body – look for blockages
96. Where does background radiation comes from?	Rocks and cosmic rays Some from industry and hospitals
97. What sources are used in smoke detectors?	Alpha sources
98. How does a smoke detector work?	Smoke particles hit by alpha radiation Less ionisation of air particles Current is reduced causing alarm to sound
99. Explain how radioactive dating of rocks works	Work out the uranium/lead ratio.

100. Explain how measurements of the activity of radioactive carbon can be used to work out the age of a material	When an object dies exchange of air stops As the carbon-14 decays in the sample The ratio from living matter is used to calculate the age within known limits
101. Describe some similarities between x-rays and gamma rays	Both are ionising electromagnetic waves Have similar wavelengths Produced in different ways
102. How is nuclear radiation used in medicine?	Treatment of cancer using gamma rays Sterilisation of equipment
103. What radioactive particles can pass through skin?	Beta and gamma rays
104. Describe some differences between x-rays and gamma rays	X-rays are made by firing high speed electrons at metal targets X-rays are easier to control the gamma rays.
105. Describe how electricity is generated at a nuclear power station	Nuclear reaction Produces heat Heating water produces steam Spin a turbine Driving a generator
106. How does uranium release energy	Uranium nucleus hit by neutron Causes nucleus to split Energy released More neutrons released
107. What is different about a nuclear bomb and a nuclear reactor for electricity?	A nuclear bomb has radioactive chain reactions that have gone out of control
108. Explain what is meant by a chain reaction	Uranium nucleus splits more than one neutron is given out These neutrons can cause further uranium nuclei to split
109. How do scientists stop nuclear reactions going out of control?	Rods placed in the reaction Absorb some of the neutrons Allowing enough neutrons to remain to keep the process operating
110. Describe how nuclear fusion releases energy	Fusion happens when 2 nuclei join together Fusion produces large amount of heat energy Fusion happens at extremely high temperatures
111. Describe why fusion for power is difficult	Needs high temperatures High temperatures have to be safely managed
112. How does fusion happen in stars?	Extremely high temperatures and pressures

