

Triple Physics Knowledge quizzes June 2022


Tips:

- Learn one quiz at a time. Cover the right hand side and go through each question, checking the answers as you go.
- Get a friend or family member to quiz you – in random order
- When you are feeling confident, cover the right side and write the answers to all the ones you can, then check.

Energy Stores and Transfers

Question	Answer
1. Name the 8 different energy 'stores'	thermal, kinetic, gravitational potential, nuclear, electrostatic, magnetic, chemical, elastic potential
2. What is a 'closed system'?	One where neither matter or energy can enter or leave
3. Name the two general ways energy can be transferred	By heating or doing work
4. What is the equation to calculate kinetic energy?	$KE = 1/2 \text{mass} \times \text{velocity}^2$
5. What is the equation to calculate Gravitational Potential Energy?	$GPE = \text{mass} \times \text{height} \times \text{gravitational field strength}$
6. What is the equation to calculate the energy stored in an object that is stretched or compressed?	$E = 0.5 \times \text{spring constant} \times \text{extension}^2$
7. What is 'Specific heat capacity'?	The amount of energy needed to raise the temperature of 1Kg of a substance by 1°C
8. How do you calculate the specific heat capacity of a material?	$E = \text{SHC} \times \text{mass} \times \text{temperature change}$
9. Give two things you would need to keep the same if you were investigating the specific heat capacity of materials.	Power of heater, time of heating, surface area of substance, insulation
10. What are the energy transfers when an object falls from a height?	Object's GPE store decreases, object's kinetic store increases & thermal store of environment increases
11. Why is the maximum theoretical velocity of an object never reached?	Because some energy is always lost to the thermal store of the environment (usually by friction)
12. Which energy store is filled when a spring is stretched or squashed?	Elastic potential store
13. What is a 'renewable' energy resource?	One that can be replenished as it is used
14. What is the equation linking energy transferred, power and time?	$\text{Energy transferred} = \text{power} \times \text{time}$
15. What is the unit for work done?	Joule (J)
16. Suggest two ways of reducing unwanted energy transfers	Lubrication of surfaces in contact with each other, thermal insulation
17. Give two disadvantages of using fossil fuels to generate electricity.	They produce CO ₂ which is increasing the greenhouse effect, they produce Sulphur dioxide which contributes to acid rain, they are non-renewable
18. What is 1 Watt equivalent to?	1 Joule of energy transferred per second
19. Give three examples of renewable energy resources	Solar cells, wind turbines, hydroelectric stations, wave turbines
20. Why are renewable sources less reliable than non-renewable ones?	They often rely on changing conditions - e.g solar cells won't work at night, wind turbines don't produce electricity when it isn't windy.

Electricity

Question	Answer
1. What is a series circuit?	A circuit containing only one possible route from one end of the battery back to the other
2. Draw the symbol for a resistor.	
3. What is 'resistance'?	Anything that limits the flow of charge
4. What is the equation linking charge, current and time?	Charge = current x time
5. What are the units for charge?	Coulombs
6. What is 'Ohm's Law'?	Potential difference = current x resistance
7. What is an 'ohmic conductor'?	One where the resistance is constant – it doesn't change with temperature
8. What happens to the wires in a filament lamp as a current passes through?	They get hot
9. Describe current in a series circuit	Same at all points
10. Describe current in a parallel circuit	Shared between components
11. Describe potential difference in a series circuit	Splits down the strands
12. Describe potential difference in a parallel circuit	Same across all components
13. What is the total resistance in a series circuit with multiple resistors?	Total resistance in series is the sum of all individual resistors
14. What happens to resistance when there are multiple components in parallel?	When there are multiple components in parallel, resistance is less than the resistance of the smallest resistor
15. What is direct current?	DC is current that always flows in the same direction
16. What is the unit for power?	Watts (W)
17. What is the equation to calculate the energy use of an appliance of a given power rating?	Energy = power (W) x time (in seconds)
18. What is the 'National Grid'?	The National Grid is a system of cables and transformers that transfers electrical power from power stations to consumers
19. What do step up transformers do?	Step up transformers increase the pd so that the current can be decreased
20. Why is it cheaper to carry electricity at low current?	Less energy is lost in heating the wires
21. What is the equation linking power, voltage and current?	Power = Voltage X current ($P=IV$)
22. What is the equation linking power, resistance and current?	$P= I^2R$
23. What equation links energy, voltage and charge?	Energy = charge x pd or $E=QV$
24. What happens to the resistance of an LDR as light intensity increases?	As light intensity increases, resistance of the LDR decreases.
25. What is the pd and frequency of the UK mains supply?	230V and 50Hz
26. Name and state the colours of the three wires seen in a plug. For each one, states its pd.	Live wire, brown, 230V Neutral, blue, 0V Earth, green & yellow, 0V

27. State 3 equations that can be used to calculate electrical power.	$P = E/t$; $P = VI$; $P = I^2R$
28. Why is electricity transferred by the national grid at high pd AND low current?	High pd keeps the current low, which reduced the energy lost by heating wires and the surroundings.
29. A transformer has an input pd of 100V an output pd of 20V. What type of transformer is it? Explain your answer.	A step down transformer – the output pd is lower than the input pd.
30. Explain why a polythene rod becomes negatively charged when rubbed with a cloth duster.	Electrons are scraped off the cloth and transferred to the polythene rod. The rod gains electrons and has a negative static charged
31. When electrical charge builds up on an object and the pd between the object and an earthed object is high enough, it causes a spark. Explain why.	A high pd causes a strong electric field between the charged object and the earth object. The strong electric field ionises the air particle (removes electrons from it) When the air is ionised/charged, it can conduct. Current flows through the ionised air, from the charged object to the earth object – this is the spark.

Particles

Question	Answer
1. What is the equation to calculate density?	Density = mass/volume
2. How do you calculate the volume of a regular object?	Length x breadth x height
3. How can the volume of an irregular object be found?	Immerse in water in a displacement can and catch and measure the volume of water displaced
4. The energy needed to raise the temperature of 1Kg of a material by 1°C is known as.....	Specific heat capacity
5. What is specific latent heat?	The energy needed to change the state of 1Kg of a substance Energy = specific latent heat x mass (Kg)
6. What happens to mass during a change of state?	It stays the same
7. What is gas pressure?	The pressure exerted on the walls of a container by gas particles
8. Name the change of state from a gas to a liquid	Condensing
9. What is the specific latent heat of vaporisation?	The amount of energy needed to change 1Kg of a substance from liquid to gas (or the amount of energy released when 1Kg of a substance changes from gas to liquid)
10. What is the specific latent heat of fusion?	The amount of energy needed change 1kg of a substance from a solid into a liquid
11. Compare the arrangement and energy of the particles in a solid and a gas	The arrangement of particles in a solid is neat and ordered in rows, with particles all closely packed and touching, whereas in a gas the arrangement is random and particles are spread far apart. In a solid, the particles are only vibrating in a fixed position, whereas in a gas they are moving around and have a lot more kinetic energy.
12. What happens to temperature during a change of state?	Stays the same
13. What is internal energy?	Energy stored by the particles that make up a system
14. What determines the temperature of a substance?	The average energy in the kinetic stores of the particle
15. What is the equation to calculation density?	$\rho = m/ v$ density = mass/ volume
16. How do you measure the volume of a regular solid?	Measure the width, height and length with ruler(or Vernier calliper) and multiply all 3 together to calculate its volume.L x w x h
17. Which two pieces of equipment are needed to measure the volume of an irregular solid?	Measuring cylinder and Eureka (displacement)can

Atomic Structure and Radioactivity

Question	Answer
1. Where is all the mass in the atom?	Nucleus
2. Who discovered electrons?	JJ Thomson
3. What did Rutherford fire at gold foil?	Alpha particles
4. What can cause electrons to move further from the nucleus?	Absorbing EM radiation
5. When can electrons move closer to the nucleus?	Emitting EM radiation
6. What is 'ionising radiation'?	Radiation that can cause other materials to become ions – e.g to lose electrons
7. Which is the most ionising form of radiation?	Alpha
8. Which is the most penetrating?	Gamma
9. Which piece of equipment measures radiation levels?	GM tube
10. What happens to levels of radioactivity over time?	It decreases
11. Exposure to alpha, beta or gamma radiation is Whereas getting radioactive atoms into or onto an object is	Irradiation , contamination
12. What is an alpha particle?	2 neutrons and 2 protons (a helium nucleus)
13. What is a beta particle?	A fast moving electron
14. What is gamma wave?	An EM wave
15. How far can an alpha particle travel?	cm
16. How far can a beta particle travel?	A few metres
17. How far can gamma travel?	many metres
18. What is an alpha particle stopped by?	paper
19. What is a beta particle stopped by?	aluminium
20. What is gamma stopped by?	Thick lead or concrete
21. How is the nucleus changed when an alpha particle is emitted?	Proton number decreases by 2, mass number decreases by 4
22. How is the nucleus changed when a beta particle is emitted?	Proton number increases, mass number stays the same
23. How is the nucleus changed when gamma is emitted?	Nucleus stays the same
24. Explain what might have happened in an atom if the electrons move closer to the nucleus	The atom may have emitted EM radiation (e.g. gamma) causing the electrons to move closer to the nucleus
25. What is the name of the radiation from space?	Cosmic rays
26. Name 3 natural sources of background radiation	Rocks, food, air, building materials
27. Name 2 man-made sources of background radiation	Medical equipment, nuclear bomb testing
28. Which type of radiation is least dangerous outside the body?	Alpha

29. Which type of radioactive source is generally used in medical tracers?	Gamma
30. What is nuclear fission?	The splitting of the <u>nucleus</u> of an atom
31. What is fired at atoms of uranium to start the fission process?	Neutrons
32. What can be used to slow down the fission process in nuclear reactors?	Control rods
33. What is nuclear fusion?	The joining together of the <u>nuclei</u> of two smaller atoms to make a larger atom
34. Where does nuclear fusion take place commonly?	Stars
35. Describe the dangers of different levels of radiation	Radiation can ionise cells and cause tissue damage. Large doses can kill cells completely and cause radiation sickness. Smaller doses can cause cell damage which can later lead to mutations and cancer.
36. Describe what a chain reaction is, and what happens when it is uncontrolled	When neutrons emitted from a fission reaction go on to be absorbed by other unstable nuclei to cause further fission reactions