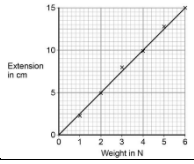
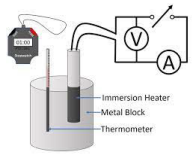
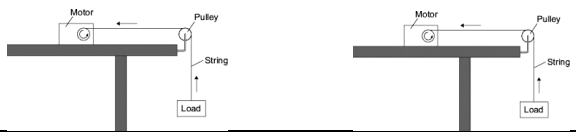
Paper One Triple Physics Knowledge quizzes

Tips:

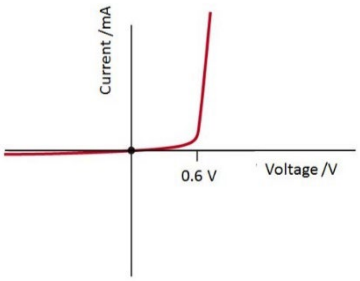
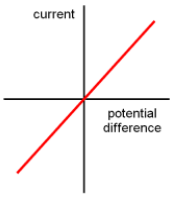
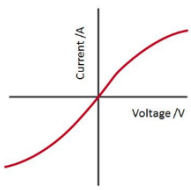
- Learn one quiz at a time. Cover the right hand side and go through each question, checking the answers as you go.
- Get a friend or family member to quiz you – in random order
- When you are feeling confident, cover the right side and write the answers to all the ones you can, then check.

Question	Answer
1. Name the 8 energy stores	Kinetic, magnetic, nuclear, electrostatic, gravitational potential, elastic potential, chemical, thermal
2. Which energy store is filled when an object is lifted upwards?	Gravitational potential
3. Which energy store is filled when an elastic object is stretched or squashed?	Elastic potential
4. Which energy store is filled when an object is moving?	Kinetic
5. If an object falls from a height, which energy store decreases?	Gravitational potential
6. If an object falls from a height, which energy store fills?	Kinetic
7. During an energy transfer, which store is filled when energy is 'wasted' or dissipated?	Thermal store of the environment
8. What unit should mass always be in for a calculation?	Kilograms
9. What is the unit for velocity?	m/s
10. What sort of relationship is shown by the graph: 	Directly proportional
11. What is the specific heat capacity?	The amount of energy needed to raise the temperature of 1Kg of a substance by 1°C
Q 12 – 16 relate to the equipment below, which is used to calculate the specific heat capacity of the block. 	
12. How is the mass of the block measured?	Using a balance / weighing scales
13. Why is water placed in the hole with the thermometer?	To improve the contact with the block (air is an insulator)
14. What is the heater for?	To transfer energy to the block
15. Why would the value calculated for specific heat capacity using this method be much higher than the true value?	A lot of energy is transferred from the block to the thermal store of the environment
16. Name one improvement to the method.	Insulate the block
17. What is power?	The rate at which energy is transferred
18. What is the unit for power?	Watts (W)
19. What is 1 Watt equivalent to in joules?	1 joule per second
20. If the motors shown below both lift the same object, but one is more powerful, what would be the difference? 	One would lift faster

Energy Stores and Transfers

Question	Answer
What is a 'closed system'?	One where neither matter or energy can enter or leave
Name the two general ways energy can be transferred	By heating or doing work
What is the equation to calculate kinetic energy?	KE = 1/2mass x velocity^2
What is the equation to calculate Gravitational Potential Energy?	GPE = mass x height x gravitational field strength
What is the equation to calculate the energy stored in an object that is stretched or compressed?	E= 0.5 x spring constant x extension^2
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
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)
Which energy store is filled when a spring is stretched or squashed?	Elastic potential store
What is a 'renewable' energy resource?	One that can be replenished as it is used
What is the equation linking energy transferred, power and time?	Energy transferred = power x time
What is the unit for work done?	Joule (J)
Suggest two ways of reducing unwanted energy transfers	Lubrication of surfaces in contact with each other, thermal insulation
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
What is 1 Watt equivalent to?	1 Joule of energy transferred per second
What are the main uses of our energy resources?	Generating electricity, transport and heating
Give three examples of renewable energy resources	Solar cells, wind turbines, hydroelectric stations, wave turbines
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.
Why are transfers rarely 100% efficient?	Some energy is transferred to the thermal store of the surroundings
Define elastic potential energy	The energy stored in a compressed or stretched elastic object

Electricity

Question	Answer
What is a series circuit?	A circuit containing only one possible route from one end of the battery back to the other
Draw the symbol for a resistor.	
What is 'resistance'?	Anything that limits the flow of charge
What is an electric current?	Current is the flow of charge
What determines the size of the current?	It is determined by the rate of flow of charge
What affects the flow of current through a component?	The resistance of a component affects the rate of flow
What is the equation linking charge, current and time?	Charge = current x time
What are the units for charge?	Coulombs
What is 'Ohm's Law'?	Potential difference = current x resistance
What is an 'ohmic conductor'?	One where the resistance is constant – it doesn't change with temperature
What happens to the wires in a filament lamp as a current passes through?	They get hot
Describe current in a series circuit	Same at all points
Describe current in a parallel circuit	Shared between components
Describe potential difference in a series circuit	Splits down the strands
Describe potential difference in a parallel circuit	Same across all components
What is the total resistance in a series circuit with multiple resistors?	Total resistance in series is the sum of all individual resistors
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
Describe and explain the shape of the following graphs 	Almost no current flows when potential difference is negative, because the diode has a very high resistance to a negative current The current remains low below the threshold potential difference , as it has a high resistance . When potential difference is positive and above the threshold potential difference, the diode allows a current to flow because the diode has a low resistance to a positive current.
Describe and explain the shape of the following graphs 	Current is proportional to pd in both directions, because the resistance is constant
Describe and explain the shape of the following graphs 	The resistance increases as potential difference increase in both directions, because the filament gets hotter as current increases, and increasing temperature increases resistance. This is because at higher temperatures, the ions in the metal have more energy and vibrate faster. This makes it more difficult for the electrons to flow.

What is direct current?	DC is current that always flows in the same direction
What is alternating current?	Current that continually changes in both size and direction
What is the unit for power?	Watts (W)
What is the equation to calculate the energy use of an appliance of a given power rating?	Energy = power (W) x time (in seconds)
What is the 'National Grid'?	The National Grid is a system of cables and transformers that transfers electrical power from power stations to consumers
What do step up transformers do?	Step up transformers increase the pd so that the current can be decreased
Why is it cheaper to carry electricity at low current?	Less energy is lost in heating the wires
What two factors determine how much energy a device transfers?	The power of the appliance How long the appliance is used for
What is the equation linking power, pd and current?	Power = Voltage X current (P=IV)
In a circuit where the resistance is fixed, describe what would happen to current if the pd is doubled.	Current would also double because it is directly proportional to pd.
What is the equation linking power, resistance and current?	$P= I^2R$
What happens to the resistance of a thermistor as its temperature increases?	As T increases, the resistance of the thermistor decreases
What happens to the resistance of an LDR as light intensity increases?	As light intensity increases, resistance of the LDR decreases.
What is the national grid?	The national grid is the series of pylons and transformers that distribute electricity across the UK.
Why does demand for electricity vary throughout the day?	Homes and industry and business use different amounts of electricity throughout the day
What is the pd and frequency of the UK mains supply?	230V and 50Hz
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
What would happen if a person touched the live wire?	They would be electrocuted. A large current would pass through their body
How does the Earth wire prevent electrocution?	The Earth wire provides a low resistance path to the ground. The live current would then follow this path to the ground instead of passing through a person.
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.
A transformer has an input pd of 100V an output pd of 20V. What type of transformer is it?	A step down transformer – the output pd is lower than the input pd.
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
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
What is the equation to calculate density?	Density = mass/volume
How do you calculate the volume of a regular object?	Length x breadth x height
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
If an object floats on water what can you say about the object's density?	The object is less dense than water
Which words describe the motion of particles in a solid?	Vibrate about their fixed position
The energy needed to raise the temperature of 1Kg of a material by 1°C is known as…..	Specific heat capacity
What is specific latent heat?	The energy needed to **change the state** of **1Kg** of a substance
What happens to mass during a change of state?	It stays the same
Explain why the temperature remains constant when a change of state is occurring	When a change of state is occurring, the energy transferred to the kinetic stores of the particles does not increase their speed – it is used for overcoming bonds between the particles
What is gas pressure?	The pressure exerted on the walls of a container by gas particles
Why does increasing the temperature increase the pressure of a gas?	Increasing temperature, increases the speed of particles. This leads to more frequent collisions and harder collision with the container's inner surface, resulting in an increased pressure.
Name the change of state from a gas to a liquid	Condensing
What is needed to change the state of a material (e.g to turn ice into water?)	Energy
What needs to happen to the particles in order for a solid to become a liquid?	The particles have to have enough energy to overcome the forces of attraction to allow them to break free of the solid lattice
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)
What is the specific latent heat of fusion?	The amount of energy needed change 1kg of a substance from a solid into a liquid
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.
What happens to temperature during a change of state?	Stays the same
What is internal energy?	Energy stored by the particles that make up a system
What determines the temperature of a substance?	The average energy in the kinetic stores of the particle
What is specific heat capacity?	The energy required to raise the temperature of 1kg of a substance by 1°C

Atomic Structure and Radioactivity

Question	Answer
Where is all the mass in the atom?	Nucleus
What is the overall charge of an atom?	Zero/ neutral
What happens to an electron in an atom that causes the atom to emit electromagnetic radiation?	It moves closer to the nucleus, to a lower energy level
Who provided evidence to suggest the existence of the neutron?	James Chadwick
Which characteristic defines what element an atom is?	The number of protons
What is the definition of an isotope?	Atoms that have the same number of protons (same atomic number) but a different number of neutrons in the nucleus
Who discovered electrons?	JJ Thomson
What did Rutherford fire at gold foil?	Alpha particles
What can cause electrons to move further from the nucleus?	Absorbing EM radiation
When can electrons move closer to the nucleus?	Emitting EM radiation
What is 'ionising radiation'?	Radiation that can cause other materials to become ions – e.g to lose electrons
Which is the most ionising form of radiation?	Alpha
Which is the most penetrating?	Gamma
Which piece of equipment measures radiation levels?	GM tube
What happens to levels of radioactivity over time?	It decreases
Exposure to alpha, beta or gamma radiation is …… Whereas getting radioactive atoms into or onto an object is ……	Irradiation , contamination
Put α, β and γ radiation in order of ionising power, from lowest to highest.	α, β, γ
Put α, β and γ radiation in order of their range in air, from shortest to longest.	α, β, γ
What is an alpha particle?	2 neutrons and 2 protons (a helium nucleus)
What is a beta particle?	A fast moving electron
What is gamma wave?	An EM wave
How far can an alpha particle travel?	cm
How far can a beta particle travel?	A few metres
How far can gamma travel?	many metres
What is an alpha particle stopped by?	paper
What is a beta particle stopped by?	aluminium
What is gamma stopped by?	Thick lead or concrete
How is the nucleus changed when an alpha particle is emitted?	Proton number decreases by 2, mass number decreases by 4
How is the nucleus changed when a beta particle is emitted?	Proton number increases, mass number stays the same
How is the nucleus changed when gamma is emitted?	Nucleus stays the same
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
What is the name of the radiation from space?	Cosmic rays

Name 3 natural sources of background radiation	Rocks, food, air, building materials
Name 2 man-made sources of background radiation	Medical equipment, nuclear bomb testing
Which type of radiation is least dangerous outside the body?	Alpha
Which type of radioactive source is generally used in medical tracers?	Gamma
Define irradiation	Leaving an object exposed to nuclear radiation
Define contamination	The unwanted presence of materials containing radioactive atoms on other materials
State a protective measure to prevent irradiation when working with radioactive sources	Stand behind barriers that will absorb radiation & keep the source as far away from you as possible e.g hold it at arm's length
State a protective measure to prevent contamination when handling radioactive sources	Wear gloves & use tongs when handling
What is nuclear fission?	The splitting of the nucleus of an atom
What is fired at atoms of uranium to start the fission process?	Neutrons
What can be used to slow down the fission process in nuclear reactors?	Control rods
What is nuclear fusion?	The joining together of the nuclei of two smaller atoms to make a larger atom
Where does nuclear fusion take place commonly?	Stars
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.
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