Physics paper one (foundation tier)

Knowledge organiser:

Learn each of the quiz questions and answers off by heart. This could be done by:

- Turning them into flash cards and testing yourself
- Using 'look, cover, write, check'
- Asking a friend or family member to quiz you

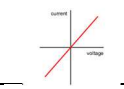
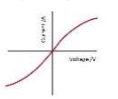
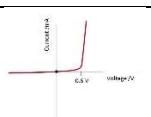
	Paper:	**P1**
	Topic:	**Energy Types (P.1)**
1	What type of energy do all moving objects have?	Kinetic energy
2	The law of conservation of energy states what three things that can happen to energy	Transferred usefully, stored or dissipated
3	Which word means 'wasted into the surroundings'?	Dissipated
4	When energy is wasted, it is usually which energy types?	Thermal and sound
5	The law of conservation of energy states that which two things cannot happen to energy?	Created or destroyed
6	What can be done to moving parts in a system to reduce heat loss by friction?	Lubrication (adding oil/grease)
7	What name is given to a material which does not conduct thermal energy well?	Thermal insulator
8	What name is given to a material which allows thermal energy to pass through it easily?	Thermal conductor
9	What is the unit for energy?	Joules (J)
10	What type of heat transfer travels through solids?	Conduction
11	What type of heat transfer happens only in fluids (gas and liquids)?	Convection
12	Which is the only type of thermal energy transfer can occur in a vacuum?	Radiation
13	Which dissipates less thermal energy? Thin walls or thick walls?	Thick
14	Which dissipates less thermal energy? Walls with large or small area	Small
15	Which dissipates less thermal energy? Large or small temperature difference	Small
	Topic:	**Work power and efficiency (P.2)**
1	Equation for work done.	Work done =Force x distance
2	Units for work done.	Joules (J)
3	What is work done?	Energy transferred.
4	Units for power.	Watts (W)
5	Equation for power.	Power = Energy transferred/time
6	Units for time.	seconds (s)
7	Define power.	Rate at which energy is transferred.
8	One watt is the same as…	1 joule per second.
9	Equation for efficiency in terms of energy	efficiency = useful output energy transfer/total input energy transfer
10	Equation for efficiency in terms of power	efficiency = useful output power/total input power
11	Units for efficiency	No units
12	Units for force	Newtons (N)
13	One Joule is the same as…	one Newton-metre
14	The minimum value of efficiency	0
15	The maximum value of efficiency	1
	Topic:	**Elastic objects and potential Energy (P.3)**
1	What is the equation for elastic potential energy?	Ee=1/2ke2 Elastic potential energy (J) = 1/2 x spring constant (N/m) x extension (m)
2	What is the equation for kinetic energy?	Ek = 1/2 mv2 Kinetic energy (J) = 1/2 x mass (Kg) x velocity2 (m/s)

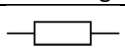
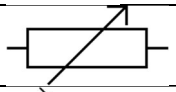
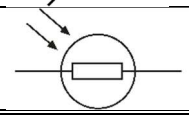
3	What is the equation for gravitational potential energy?	Eg=mgh Gravitational potential energy (J) = mass (kg) x gravitational field strength (N/kg) x height (m)
4	Which equation describes Hooke's Law?	F = ke Force (N) = spring constant (N/m) x extension (m)
5	What type of energy is stored in a stretched elastic band?	Elastic potential energy
6	What type of energy is stored in a squashed up tennis ball?	Elastic potential energy
7	What needs to be applied for an object to change shape?	A force
8	Define the term for an object returning to its original shape after being stretched	Elastic deformation
9	Define the term for an object not returning to its original shape after being stretched	Inelastic deformation
10	Identify the Law: "The extension of a spring is directly proportional to the force applied to it."	Hooke's Law
11	What sort of energy is stored in a bungee cord?	Elastic potential energy
12	What do you call the point at which Hooke's Law no longer applies?	The limit of proportionality
13	In a graph of Hooke's Law, what happens at the limit of proportionality?	Line no longer straight, it will curve
14	What is the equation for "gravitational potential energy"?	Eg = mgh
15	What is the equation for Kinetic Energy?	Ek=1/2mv2
	Topic:	**Nuclear physics (P.21)**
1	What is the size of the atom?	1 x 10^{-10}m
2	Which two sub atomic particles are found in the nucleus?	Protons and neutrons
3	What is the radius of nucleus compared to radius of atom?	1/10000 of the size (one ten thousandth of the size)
6	Are atoms positive, negative or neutral?	Neutral
7	What is the atomic number?	Number of protons
8	What is the mass number?	Number of protons AND neutrons.
9	What is an "ion"?	A charged atom (lost or gained electrons)
10	What are isotopes?	Atoms of the same element with the SAME number of protons but a DIFFERENT number of neutrons.
11	Describe the plum pudding model	The atom is a ball of positive charge with negative electrons embedded in it
12	What is the name of the current model of the atom?	Nuclear model
13	State two conclusions from the alpha scattering experiment	1) mass of an atom is concentrated in a nucleus in the centre 2) nucleus is positive
14	State the conclusion provided by Niels Bohr	Electrons orbit the nucleus
15	State the conclusion provided by James Chadwick	Discovered neutrons
	Topic:	**Radioactive decay and radiation (P.22)**
1	What two words can we use to describe the process of radioactive decay?	Random and unpredictable
2	What is the word to describe the rate at which a source of unstable nuclei decays	Activity
3	What is the word to describe the number of decays recorded each second by a detector	Count rate
4	What is the equipment for measuring radiation?	Geiger-Muller tube
5	Name the four types of nuclear radiation	alpha particle, beta particle, gamma ray, neutron
6	Describe the structure of an alpha particle	2 neutrons & 2 protons (helium nucleus)
7	What is a beta particle?	A negative electron
8	What is a gamma ray?	An electromagnetic wave
9	Three main types of radiation in order of high to low ionising power.	alpha, beta, gamma
10	Three main types of radiation in order of high to low penetrating power.	gamma, beta, alpha
11	Which materials are able to stop each type of radiation?	Alpha = paper, beta = aluminium, gamma = nothing, thick lead absorbs some of it
12	Distances alpha, beta and gamma can go in air.	Alpha: 3-5cm, Beta: 15cm, Gamma: several metres.
13	Define "irradiation"	Exposing an object to nuclear radiation. The irradiated object does not become radioactive.

14	Define "half-life"	The time it takes for the number of unstable nuclei of the isotope in a sample to halve
15	Define "radioactive contamination"	The unwanted presence of radioactive atoms on other materials
	Topic:	**Density (P.25)**
1	State the equation for density	ρ =m/v Density (kg/m3) = mass (kg) / volume (m3)
2	State the units for density	Kilograms per metre cubed (kg/m3)
3	State the units for volume	Meters cubed, (m3)
4	How do you calculate the volume of a cube?	V = lxlxl or l3 Volume (m3) = length (m) x length (m) x length (m)
5	How do you calculate the volume of a cuboid?	V = l x w x h Volume (m3) = length (m) x width (m) x height (m)
6	State two drawbacks of the particle model	1) assumes particles are all small solid spheres 2) doesn't show bonds between atoms
7	Describe the particle model of solids	Particles all touching (bonded) in rows
8	Describe the particle model of liquids	Particles randomly placed, almost all particles touching.
9	Describe the particle model of gases	Particles placed randomly, none or very few touching.
10	Name the five changes of state	Sublimation, condensing, boiling, freezing and melting
11	Describe the state change in sublimation	Solid to gas
12	How do the particles move in a solid?	Vibrate in a fixed position
13	How do you calculate the density of an irregular shape?	Submerge in water to calculate the volume, use a balance to measure the mass.
14	How do you calculate the density of a regular shape?	Calculate the volume using l x b x h, use a balance to measure the mass
15	How do the particles move in a gas?	Randomly, in all directions
	Topic:	**Changes of state, latent heat and specific heat capacity (P.26)**
1	Define 'conservation of mass'	Total mass is the same before and after a reaction
2	Why does temperature not change during a state change?	Energy used to make/break bonds increasing the internal energy not temperature
3	Define "internal energy"	Energy stored inside a system by the particles
4	How do we calculate internal energy?	Sum kinetic and potential energy of all particles
5	How does heating affect the internal energy of a system?	It increases it
6	State the equation for change in thermal energy	Δ E = m c Δ θ Change in energy (J) = mass (kg) x specific heat capacity (J/Kg°C) x change in temperature (°C)
7	State the units for specific heat capacity	Joules per kilogram per degree Celsius, J/kg °C
8	Define "specific heat capacity"	Amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius.
9	Define "latent heat"	The energy needed for a substance to change state
10	Define "specific latent heat of vaporisation"	The amount of energy required to boil one kilogram of the substance with no change in temperature
11	Define "specific latent heat of fusion"	The amount of energy required to freeze one kilogram of the substance with no change in temperature
12	Equation for specific latent heat.	E = m L Energy (J) = mass (kg) x specific latent heat (J/kg)
13	State the units for specific latent heat	Joules per kilogram, J/kg
14	Describe the key property of a substance with a high specific heat capacity	Will store a lot of energy per kilogram
15	What does a flat section on a heating and cooling graph represent?	Changes of state
	Topic:	**Gas and fluid pressure (paper 1) (P.27)**
1	Describe the motion of particles in a gas.	Random movement
2	How do we determine the temperature of a gas?	Average kinetic energy of the molecules
3	State two factors that will influence gas pressure	1) temperature, 2) volume
4	If a gas is held at a constant volume, describe the relationship between temperature and pressure	Directly proportional
5	Why does increasing temperature increase the pressure of a gas (if held at a constant volume)?	Particles collide with the side of the container: (a) more frequently and (b) with more energy

	Topic:	Electricity introduction (P.29)
1	What does LED stand for?	Light emitting diode.
2	What does LDR stand for?	Light dependent resistor.
3	State the equation for charge flow	Q=It Charge flow © = current (A) x time (S)
4	State the units for charge flow	Coulombs (C)
5	Define 'electrical current'	Flow of electrical charge
6	What do the symbols I, t and Q represent?	I - current, t - time, Q - charge flow.
7	State the units for resistance	Ohms (Ω)
8	How does resistance affect current?	The higher the resistance, the lower the current (inversely proportional)
9	What is an ohmic conductor?	Electrical component where current and voltage are DIRECTLY PROPORTIONAL
10	What is a non-ohmic conductor?	Electrical component where current and voltage are NOT directly proportional
11	Write Ohm's law as an equation	V=IR
12	Units for potential difference.	Volts (V)
13	State the units for current.	Amperes (A)
14	Which piece of equipment is used to measure current in a circuit?	Ammeter
15	Which piece of equipment is used to measure voltage in a circuit?	Voltmeter

	Topic:	Series and parallel circuits (P.30)
1	Do series circuits have one loop or multiple loops?	1 loop
2	Do parallel circuits have one loop or multiple loops?	Multiple loops
3	Describe the distribution of current in a series circuit	It is the same everywhere
4	Describe the distribution of potential difference in a series circuit	Split between components
5	Describe the distribution of current in a parallel circuit	Split up in the different loops
6	Describe the distribution of potential difference in a parallel circuit	The same in each loop
7	Name the component used to measure current	Ammeter
8	Name the component used to measure voltage	Voltmeter
9	Are voltmeters connected in series or parallel?	in parallel
10	Are ammeters connected in series or parallel?	In series
11	State the equation for calculating resistance in a series circuit	Rtotal = R1 +R2
12	How do you calculate total resistance in a series circuit?	Sum the resistance of each component
13	What affect does adding resistors have in a series circuit on the resistance?	Increases the total resistance
14	What affect does adding resistors have in a parallel circuit on the resistance?	Decreases the total resistance
15	Equation for resistance in a parallel circuit:	1/Rtotal = 1/R1 + 1/R2

	Topic:	Ohmic/non-ohmic types of resistors (P.31)
1	In ohmic components, which two variables are directly proportional?	Current and potential difference
2	If current and potential difference are directly proportional, what does this tell us about the resistance?	It is constant (gradient on IV graph).
3	Sketch an IV graph for an ohmic conductor	
4	Sketch a graph an IV for a filament bulb.	
5	Sketch a graph an IV graph for a diode.	
6	Name 4 non-ohmic conductors	Filament bulb, diodes, thermistors, LDRs
7	Why are filament light bulbs non-ohmic?	Current ↑, temperature ↑, resistance ↑

8	Describe the relationship between current and potential difference for a diode.	Current only flows in one direction (has a very high resistance in the other direction)
9	Describe the relationship between temperature and resistance in a thermistor.	Temperature ↑, resistance ↓
10	State one use of a thermistor	Thermostat
11	Describe the relationship between light intensity and resistance in an LDR	Light intensity ↑, resistance ↓
12	State a use of an LDR	Switching lights on when it gets dark e.g. street lamps.
13	Draw the symbol of a resistor.	
14	Symbol of a variable resistor.	
15	Symbol of LDR	
	Topic:	**Mains electricity (P.32)**
1	Is mains electricity AC or DC?	AC
2	What do AC and DC mean?	Alternating current Direct current.
3	State the frequency of UK mains supply	50Hz
4	State the potential difference of UK mains supply	230V
5	What are the names of the three wires in a three core cable	Live, neutral, earth.
6	State the colour of a)earth wire, b)live wire, c) neutral wire	a)Green and yellow stripes, b)brown, c)blue
7	State the function of the live wire.	Carries alternating potential difference from the supply
8	State the function of the neutral wire.	Completes the circuit
9	Function of the earth wire.	Safety wire to remove excess potential difference (to stop the appliance becoming live)
10	State the potential difference between the live wire and earth wire.	230V
11	State the potential difference of the neutral wire.	At or close to 0V
12	State the potential difference of the earth wire.	0V unless there is a fault.
13	State the equation for electrical power (that uses potential difference)	P= IV
14	State two things that affect the amount of energy an appliance transfers	Power and time (E=Pt)
15	State the equation we use to calculate the energy transferred by a device that uses charge flow	E = QV
	Topic:	**Energy and power of electricity and the National Grid (P.33)**
1	State the equation that links current, potential difference and power	P = IV power (W) = current (I) x potential difference (V)
2	State the equation that links current, power and resistance	P = I2R Power (W) = current2 (A) x resistance (Ω)
3	State the two most commonly wasted forms of energy	Thermal and sound
4	When energy is wasted, what happens to it?	It is dissipated into the environment
5	State the equation that links time, energy and power	E=Pt energy (J) = power (W) x time (s)
6	State the equation that links energy, potential difference and charge flow	E = QV energy (J) = charge flow (C) x potential difference (V)
7	What is the national grid composed of?	Cables and transformers linking power stations to consumers.
8	What is the national grid used for?	Supplying electrify to houses
9	State the effect of step up transformers on potential difference	Increases p.d.
10	State the effect of step down transformers on potential difference	Decreases p.d.
11	State the effect of step up transformers on current.	Decreases current.
12	State the effect of step down transformers on current.	Increases current.
13	Why are step up transformers used?	To reduce energy loss from cables (thermal)

14	Why are step down transformers used?	To reduce the potential difference to make it safe for domestic use.
15	Why is the national grid efficient?	Transformers reduces heat loss from wires when electricity travels long distances