Science Knowledge Organiser

Year:	**10**
Term:	**Sp2**

	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
4	State the units for charge flow	Coulombs (C)
5	Define 'electrical current'	Rate of 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		0
4	Sketch a graph an IV for a filament bulb.		0
5	Sketch a graph an IV graph for a diode.		0
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.		0
14	Symbol of a variable resistor.		0
15	Symbol of LDR		0

	Topic:	**Mains electricity (P.32)**
1	Is mains electricity AC or DC?	AC
2	What do AC and DC mean?	Alternating 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
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
2	State the equation that links current, power and resistance	P = I2R
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
6	State the equation that links energy, potential difference and charge flow	E = QV
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

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	Topic:	**Transformers (separate only) (P.34)**
1	What makes up a transformer? (separate only)	Primary coil, secondary coil and iron core.
2	Why is iron used in a transformer? (separate only)	Iron is easily magnetised.
3	Recall the transformer equation (separate only)	Vp/Vs = Np/Ns
4	If Vs > Vp, is this a step up or step down transformer?	Step up transformer.
5	If Vs < Vp, is this a step up or step down transformer?	Step down transformer.
6	Recall the equation relating current and potential difference in each coil.	VsIs = VpIp
7	What does Vs stand for?	Potential difference in secondary coil
8	What does Is stand for?	Current in secondary coil
9	What does Vp stand for?	Potential difference in primary coil
10	What does Ip stand for?	Current in primary coil
11	State the effect of step up transformers on current and potential difference	↑ p.d., ↓ current
12	State the effect of step down transformers on current and potential difference	↓ p.d., ↑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

	Topic:	**Astrophysics and cosmology 1 (separate only) (P.35)**
1	What makes up our solar system?	The sun (a star), eight planets, their moons & dwarf planets.
2	Give one example of natural satellites?	Moons
3	Which galaxy is our solar system in?	The Milky Way
4	How was the Sun formed?	A cloud of dust and gas pulled together by gravitational attraction.
5	What is a nebula?	A cloud of dust and gas.
6	Name the stages in the life cycle of a small star (e.g. the sun)	Nebula -> protostar -> main sequence star -> red giant -> white dwarf -> black dwarf
7	Name the stages in the life cycle of a massive star.	Nebula -> protostar -> main sequence star -> red giant -> supernova -> neutron star OR black hole.
8	How are all naturally occurring chemical elements produced?	Fusion in stars.
9	How are elements heavier than iron produced?	Fusion in supernovae
10	How are elements distributed throughout the universe?	In supernovae explosions
11	Which force maintains planets and satellites in circular orbits?	Gravity
12	Describe the forces acting upon a star	Fusion energy causes expansion, graviataional pull causes collapse
13	State a difference between a planet and a moon	Planets orbits sun, moons orbit planets
14	Give an example of a natural satellite	Our moon
15	Give a difference between a natural satellite and an artificial satellite	Artificial satellites put into orbit by man

	Topic:	**Astrophysics and cosmology 2 (separate only) (P.36)**
1	What is the general name for a force causing circular motion?	centripetal force (acting towards to the centre)
2	Which force is the centripetal force causing a massive object to orbit another massive object	Gravitational force (towards centre)
3	In circular motion, why is the speed constant but the velocity not?	direction is constantly changing
4	To keep the time for one orbit constant, if the speed increases what happens to the radius?	increases
5	Describe what happens to the speed of galaxies as they get further apart	Increases
6	How does the distance of a galaxy affect the wavelength of observed light?	Increases it even more.
7	What is red shift?	An observed increase in the wavelength of light from most distant galaxies (light appears red)
8	What does red-shift provide evidence for?	Space is expanding
9	What does red-shift provide support for?	The Big Bang theory
10	What is the Big Bang theory?	The universe began from a very small region that was extremely hot and dense
11	What does blue-shift suggest?	That an object in space is moving closer to us
12	State two areas of space research that are still not understood by scientists	Dark mass and dark energy
13	State the order of the colours of light	Red, orange, yellow, green, blue, indigo, violet
14	Which colour of light has the longest wavelength?	Red
15	Which colour of light has the shortest wavelength?	Violet

	Topic:	**Black body radiation (separate only) (P.37)**	
1	All objects _____ and _____ infrared radiation	Emit and absorb	
2	What is the relationship between temperature of an object and the amount of infrared radiation it emits?	Hotter -> increased infrared radiation	
3	What does "incident on it" mean?	Hitting it	
4	Define a perfect "black body"	An object that absorbs all of the radiation incident on it and is the best possible emitter	
5	State two variables of infrared radiation that are dependent on the temperature of a body	Intensity and wavelength	
6	Describe the relationship between absorbing and emitting radiation for a body at a constant temperature	Occurs at same rate	
7	When does the temperature of a body increase?	Absorbs radiation quicker than it emits it	
8	State 3 factors that effect the temperature of the Earth	1) Rate of absorption, 2) rate of emission, 3) reflection of radiation into space	
9		0	0
10		0	0
11		0	0
12		0	0
13		0	0
14		0	0
15		0	0

	Topic:	**Generator effect & Transformers (separate only) (P.40)**
1	How is a potential difference 'induced' in a wire?	An electrical conductor moves in a magnetic field or a magnet is moved into a coil of wire
2	When does an induced potential difference cause an induced current?	When the wire is in a complete circuit
3	What is the name given to a current being induced in a conductor?	The generator effect
4	When a current is induced in a wire, what is produced?	A magnetic field that opposes the original change
5	What effects the direction of induced potential difference/induced current	Direction of the movement of the conductor or magnet
6	State 3 factors that increase the induced potential difference/current	1) increased speed of movement, 2) increased magentic field strength, 3) number of coils increases
7	State one device that makes use of the generator effect	Microphones
8	How does a microphone work?	Air particles oscillate (sound wave) which causes diaphragm of microphone to oscilate which causes a
9	What is a transformer made out of?	A primary and secondary coil
10	What is used to make the core of the transformer?	Iron
11	Why is an iron core used?	Easily magnetised
12	What is the equation used to calculate current and voltage in the primary and secondary coil?	V(s) x I (s) = V (p) x I (p)
13	How does a transformer work?	A.C. in primary coil -> alternating magnetic field -> induced alternating P.D. in secondary coil
14	Which has more coils in a step-up transformer?	Secondary coil
15	Which has more coils in a step-down transformer?	Primary coil

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	Topic:	**RP: Resistance (P3) (P.43)**
1	This experiment aims to see the effect of wire length on resistance. What is the IV?	Wire length
2	This experiment aims to see the effect of wire length on resistance. What is the DV?	Resistance
3	This experiment aims to see the effect of wire length on resistance. What is a CV?	Thickness of the wire
4	Which piece of equipment provides the electrical energy into the circuit?	Powerpack
5	Which piece of equipment measures the current?	Ammeter
6	Which piece of equipment measures the potential difference?	Voltmeter
7	How should the ammeter be placed into the circuit?	In series
8	How should the voltmeter be placed into the circuit?	In parallel
9	How do you calculate resistance?	V = IR
10	Why is the powerpack turned off between readings?	So that wire doesn't get hot as this increases resistance
11	What is the expected result for the relationship between wire length and resistance?	As wire length increases, resistance increases
12	What is the unit for resistance?	Ohms
13	How do you callculate the resistance of a resistor in a circuit?	Measure current & potential difference and calculate using V=IR
14	What is the expected relationship for resistance of resistors in a series circuit?	Total resistance = R1 + R2
15	What is the expected relationship for resistance of resistors in a parallel circuit?	Total resistance < resistance of smallest resistor

	Topic:	**RP: Ohm's Law (P4) (P.44)**
1	This practical is investigating the impact of increasing the potential difference on the current through a component.	Potential difference
2	This practical is investigating the impact of increasing the potential difference on the current through a component.	Current
3	Why is a variable power pack used?	So that potential difference can be changed
4	Why are the wires switched around after the first set of readings are taken?	To investigate the effect of using negative potential difference
5	What is the expected relationship between current and potnetial difference for a filament light bulb?	NOT directly proportional
6	What is the expected relationship between current and potnetial difference for a fixed resistor?	Directly proportional
7	What is the expected results for a diode when using negative potential difference?	No current
8	What is the expected results for a diode when using positive potential difference?	Not directly proportional
9	Why is a milliammeter used when testing the diode?	Current is very small
10	Why are current and potential different not directly proportional in a filament bulb?	It heats up and resistance increases
11	What does it mean if a component is described as ohmic?	Current and potential difference are directly proportional
12	Is a filament bulb ohmic?	No
13	Is a fixed resistor ohmic?	Yes
14	Is a diode ohmic?	No
15	Which symbol means directly proportional?	∝