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Year 8 Overview 2024-25 – *Physics*

Date	Wk	Week	Units Studied & Learning Outcomes	Key Concepts & Assessment
8 weeks (?? Lessons) (38Days)				
Tues 2-Sep 9-Sep 16-Sep* 23-Sep 30-Sep 7-Oct 14-Oct 21-Oct	A B A B A B A B	1 2 3 4 5 6 7 8	• <u>Overview of Unit/No. lessons</u> **Electricity and Magnetism/ 14 lessons** • <u>Lesson **Sequence** of Content</u>: Lesson 1- Introduction to Electricity Lesson 2- Series and Parallel Circuits Lesson 3- Current in Series Lesson 4- Current in Parallel Lesson 5- Voltage in Series Lesson 6- Voltage in Parallel Lesson 7- Resistance Lesson 8- Magnets Lesson 9- Magnetic Fields Lesson 10- Electromagnetism Lesson 11- DC Motors Lesson 12- Static Electricity Lesson 13- Quick quiz assessment and Application Lesson 14- Long answer question • <u>Unit Learning Outcomes</u>: • **GW**: Draw circuit diagrams using symbols and be able to recall definitions for key terms current, voltage and resistance. Describe the difference between parallel and series circuits and what happens to voltage and current in them. • **BI:** Describe what resistance is and how it is calculated. Be able to draw magnetic fields around bar magnets and know the impact of Earth's magnetic field. • **EW:** Describe the magnetic effect of a current and how this is applied to Electromagnets and D.C. motors. Explain static electricity in terms of separation of positive or negative charges when objects are rubbed together via transfer of electrons. **Assessment** ○ Students should be able to explain findings using their Science knowledge ○ End of unit quiz ○ Long answer extension question at the end of the unit ○ Application task	**Foundational Concepts:** Energy & circuits **Outcomes** • Know some standard circuit symbols and what is meant by an electric current • State the definitions of current, potential difference and resistance • Know the difference between series and parallel circuits • Describe what happens to current and voltage in series and parallel circuits • Be able to apply the equation linking voltage, current and resistance • Complete a simple practical investigating a factor that affects the resistance in a circuit • Describe how to measure resistance in a circuit • Know what is meant by a magnet and the magnetic elements • Know the shape of a magnetic field around a bar magnet • Describe Earth's magnetic field and the impact it has on our Planet. • Understand what is meant by an electromagnet and how they are used • Describe the magnetic effect of a current and how this is applied to D.C. motors. • Recognise the effects of static charge. **Skills used/learned** • Analysis skills • Interpretation skills • Evaluation skills • Practical skills • Mathematical skills • **KW:** Electron, series, parallel, circuit, current, voltage, resistance, charge, magnet, magnetic fields, electromagnets, repel, attract, static, motors. **Links to root words- Etymology** ○ Circuit- from Latin circuitus "a going around," from stem of circuire, circumire "go around," from circum "round" ○ Parallel- from Latin parallelus, from Greek parallēlos "parallel," from para allēlois "beside one another,"

Prior	Current	Next
Year 6- •Making simple circuits •Drawing circuit diagrams	•Current Electricity •Magnetic fields and basic magnetism •Introduction to electromagnetism and DC motors •Introduction to static electricity	Year 10 – •Electromagnetism and motor effect •Applications of electromagnetism in devices Year 11- •Series and parallel circuit rules •Circuit calculations •Control in circuits •Fleming's LH rule & electric motors (H) •Induced potential transformers •Static Electricity Year 12 – •Resistivity •Parallel resistance •EMF & internal resistance •Ideal ammeters and voltmeters.

- Resistance- from Late Latin resistentia, from present participle stem of Latin resistere "make a stand against, oppose"
- Motor- from Late Latin motor, literally "mover," agent noun from past-participle stem of Latin movere "to move"

Tier 2/3 Vocabulary
Referenced on PowerPoint slides, quick quizzes

History

- The history of magnets begins with the first discoveries of magnetic stones or lodestones – starting from 1845 this kind of stone was called magnetite. It is a mostly black mineral of iron and oxygen or iron hydroxide, which develops in a natural way by volcanic activity and has its own magnetic property.
- You can debate who founded 'Electricity'.

- **Links to culture**
  - Electricity is all around them- lighting, they use it to charge their phones, TVs, laptops etc.
  - Magnets are used to make a tight seal on the doors to refrigerators and freezers. They power speakers in stereos, earphones, and televisions. Magnets are used to store data in computers and are important in scanning machines called MRIs.

- **Career ideas**- Electricians, Line Installers and Repairers, Electrical and Electronics Engineers, Construction Managers, Power Plant Operators, Distributors and Dispatchers, Cardiovascular Technicians, MRI Technologist

- ***Equality Diversity and Inclusion (EDI) links?***

EDI links:

Irène Curie-Joliot (1897-1956) discovered of artificial radioactivity.
George Radda- Uses of magnets
Edith Clark – first female electrical engineer

Parent and Carers month/Black History month
3/9 World afro day
23/9 International day of sign languages
10/10 world mental health day
5/10 world teachers day
6/10 World cerebal palsy day

- **Assessment** (Quiz/Tests/application tasks/ ST: Including foundational concepts, wider disciplinary knowledge, key content.)

Half-Term	**7** weeks (?? lessons) (35 Days)

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4-Nov	A	9		• ***Equality Diversity and Inclusion (EDI) links?*** *Mens health awareness month/disability confident month* *1/11 Diwali* *12/11 Remembrance Sunday* *13/11-19/11 Transgender awareness week* *14/11 World Diabetes Day* *1/12 World AIDS day* *25/12 Christmas Day*
11-Nov	B	ST1		
18-Nov	A	ST1		
25-Nov	B	12		
2-Dec	A	13		
9-Dec	B	14		
16-Dec	A	15		
Christmas Holiday			6 weeks (?? lessons) (30 Days)	
6-Jan	B	16	Overview of Unit/No. lessons **Waves & Light/ 11 lessons** • Lesson **Sequence** of Content: Lesson 1- Luminous & non-luminous objects Lesson 2- Transparent, translucent & opaque Lesson 3- Shadows Lesson 4- Reflection Lesson 5- Refraction Lesson 6- The eye Lesson 7- Dispersion and Colour Lesson 8- Coloured light and filters Lesson 9- Water waves and superposition Lesson 10- Quick quiz Lesson 11- Long answer	**Foundational Concepts:** Waves **Outcomes** • Know that light travels in straight lines and the evidence for this. Be able to produce a ray diagram showing how we see objects • Know that light can travel through a vacuum and the speed of light • Know the relationship between the angle of reflection and angle of incidence • Know the difference between specular and diffuse reflection • Know what is meant by refraction and draw a diagram to show it • Be able to draw ray diagrams • Compare the structure of the eye to cameras • Know what is meant by dispersion and the colours in the visible light spectrum • Be able to explain what colour filters do to light • Be able to explain the difference between primary and secondary colours • Know that waves can be reflected, and add or cancel- superposition **Skills used/learned** • Analysis skills • Interpretation skills • Evaluation skills • Practical skills • Mathematical skills • **KW:** luminous, non-luminous, light, opaque, transparent, translucent, reflection, incidence, refraction, dispersion, specular, diffusion, optical, lens, cornea, primary, secondary, wavelength, frequency, amplitude **Links to root words- Etymology**
13-Jan	A	17		
20-Jan	B	18		
27-Jan	A	19		
3-Feb	B	20		
10-Feb	A	21		

Prior	Current	Next
Year 6 – reflection, shadows and how light travels	Understand how we see objects. Understand reflection, refraction & dispersion. Understand the difference between primary & secondary colours. Also links to P6: Sound	Y9: key definitions of waves; core practical Y10: ray diagrams; Wave front diagrams (H); Reflection, Sound waves, Uses of waves, Lenses & light, Black body radiation Y12: Travelling &

					stationary waves; diffraction, superposition, interference	• "Luminous" from Latin "lumen" meaning light and now a measure of brightness. **Tier 2/3 Vocabulary** Referenced on PowerPoint slides, quick quizzes **History** • Monet – able to see UV light after his lenses were removed, hence change in colours of his painting towards the blue end • Herschel – discovery of infrared "radiation **Links to culture** • Harry Potter spell "lumos" to give light. • Note "Illuminati" (popular conspiracy theories, from Dan Brown novels) meaning "the enlightened ones". • Rainbows and pots of gold! Neither are real … **Career ideas-** • Laser scientist; Astronomer; radiographer; optician; Supersonic aircraft designer; Ship designer; renewable energy (PV and marine) engineer; radar technicians (civil and military). • ***Equality Diversity and Inclusion (EDI) links?*** **EDI links:** • Scientists form different nationalities • Light Physics- Isaac Newton 'The clockword god' saw his demonstration of the regularity of the universe as having great religious significance. Newton's ideas were initially seen as very supportive of religion; yet within 50 years, they were being seen in a very different light. *LGBT+ History month* *27/1 Holocaust memorial day* *1/2 World Hijab Day* *6/2-12/2 Children's mental health week.* *7/2 Safer internet day* *10/2 Chinese New Year*
			• **GW:** state how we see objects, state what reflection, refraction and dispersion are • **BI:** Describe how we see different objects, describe reflection, refraction & dispersion. Describe how shadows form **EW**: explain reflection, refraction & dispersion. Explain what coloured filters do. Explain water waves using terms wavelength, frequency & amplitude **Assessment** ○ Students should be able to explain findings using their Science knowledge ○ End of unit quiz ○ Long answer extension question at the end of the unit Application task			
Half-Term			6 weeks (?? lessons) (29 Days)			
25-Feb	B	22	INSET 24th Feb			• ***Equality Diversity and Inclusion (EDI) links?*** *Women's history month* *Ramadhan begins 1/3* *21/3 World Down Syndrome day*
3-Mar	A	23				
10-Mar	B	24				

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17-Mar	A	25		*31/3 Transgender day of visibility*
24-Mar	B	ST2		
31-Mar	A	ST2		
Easter Holiday			5 weeks (?? lessons) (23 Days)	
22-Apr	B	28	Overview of Unit/No. lessons **Sound/9 lessons** • Lesson **Sequence** of Content: **Sound** Lesson 1- Introduction to Sound Lesson 2- Describing sound waves Lesson 3- Measuring the speed of sound Lesson 4- How sound travels through materials Lesson 5- Reflection and absorption of sound Lesson 6- The Ear Lesson 7- Uses of sound waves Lesson 8- Quick quiz Lesson 9- Long answer **Prior**: Observation of slinkies **Current**: Understand how sound travels. Understand how we hear. Link to P5: waves. **Next**: Y10: Sound waves Y12: Travelling & stationary waves; diffraction, superposition, interference • **GW:** state how sound travels • **BI:** Describe how sound travels and describe parts of a wave • **EW:** explain how sound travels and how we hear. Explain how sound waves can be used. **Assessment** ○ Students should be able to explain findings using their Science knowledge ○ End of unit quiz ○ Long answer extension question at the end of the unit Easter Monday 21st Early May bank hol 6/5	**Foundational Concepts:** Particles **Outcomes** • Know that sound waves are longitudinal and are caused by vibrations. • Be able to draw diagrams showing compression and refraction • Know the key terms pitch, amplitude, frequency • Be able to label a wave using the key terms above and also include wavelength. • Be able to describe how sound travels at different speeds in different mediums • Be able to describe an experiment to calculate the speed of sound using echoes • Know how sound can reflect and absorb • Be able to calculate the speed of sound using an equation • Know some uses of sound. E.g. (Ultrasound, echo location) • Know some parts of the ear • Know the auditory range of humans and animals • Describe the function of different parts of the ear • Describe how the ear allows us to hear sound. **Skills used/learned** • Analysis skills • Interpretation skills • Evaluation skills • Practical skills • Mathematical skills • **KW:** particles, vibrate, longitudinal, wavelength, frequency, amplitude, pitch, echo, echolocation, ultrasound, pinna, ear canal, ear drum, anvil, stirrup, hammer, cochlea, semi-circular canal, auditory nerve **Links to root words- Etymology** • "Sound" – from Latin "Sonus" (note speaker technology by "sonos") **Tier 2/3 Vocabulary** Referenced on PowerPoint slides, quick quizzes **History** • Beethoven unable to hear properly from about age 26, so used sound waves transmitted through a solid to feel vibrations.
28-Apr	A	29		
5-May	B	30		
12-May	A	31		
19-May	B	32		

				• Chuck Yeager first to break the "Sound Barrier"; Felix Baumgartner first to freefall through sound barrier. **Links to culture** • Sonar: "Sound navigation and Ranging" • Natural Sonar in echolocation – e.g. bats and dolphins. Note, possible in humans – video in "Teaching videos" directory • Problems with using a sound to time the start of a race – link to speed of sound. • Link to waves being created by all musical instruments; need to "tune" those waves in e.g. violin • "Knocking" in central heating being sound waves in solid pipes • **Career ideas-** Musician; Sound engineer; musical instrument manufacturer; ultrasound technician; ENT doctor; plumber • ***Equality Diversity and Inclusion (EDI) links?*** **EDI links:** • Scientists from different nationalities • Frequency of hearing changes with age *Good Friday 18/4* *Easter Sunday 20/4* *Autism and stress awareness month.* *25/4 World Malaria Day* *26/4 Lesbian visibility day* *UK national walking month.* *1/5-7/5 Deaf awareness week* *23/05 Vesak*
Half-Term			7 weeks (?? lessons) (34 Days)	
2-Jun	A	33	Overview of Unit/No. lessons **Calculations in Physics/ 7 lessons** • Lesson **Sequence** of Content: **Calculations in Physics** Lesson 1- Moments Lesson 2- Work Done Lesson 3- Pressure in a solid calculations Lesson 4- Pressure in a gas theory Lesson 5- Pressure in a liquid theory Lesson 6- Power Lesson 7- Energy costs in the home	**Foundational concepts:** Particles & Energy **Outcomes** • State and use the law of moments by simple calculation • Describe how turning forces can be increased • Understand the application of moments • Recognise situations where work is done • Describe the relationship work done= force x distance • Apply the work done equation to different situations • Identify the factors that determine the size of pressure on a solid • Calculate the size of pressure exerted • Describe how pressure in a liquid alters with depth and how it increases in relation to particles and gravity • Explain how the pressure in a gas varies with height above the Earth • Describe what is meant by 'rate of energy transfer' • Recall and use the correct units for rate of energy transfer
9-Jun	B	34		
16-Jun	A	35		
23-Jun	B	36		
30-Jun	A	37		
7-Jul	B	38		
14-Jul	A	39		

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Prior	Current	Next
Year 7 – Forces Year 7– Energy transfers	Calculations Fuel Costs Pressure in fluids Work done and energy changes Moments	Year 9 – power equation. Energy stores with qualitative transfers Year 10 –Work done. Energy stores with quantitative transfers Year 11: *Moments, levers, gears. Pressure in fluids. Pressure in a gas linked to kinetic theory. Work to increase pressure/temperature of a gas (H)* Y12/13 – Turning points in physics

- **GW**: Identify units for calculations.
- **BI**: Substitute in values to perform calculations. Convert units.
- **EW**: Apply and rearrange the appropriate equations. Apply calculations to real-world contexts.

Assessment

- Students should be able to link calculations to prior learning
- Exam questions
- Pupils should be able to discuss and link these ideas to everyday situations.

SJBF INSET 4/7

- Calculate quantities of energy transferred when change happens
- Analysis typical fuel bills
- Explain and use the units used on a fuel bill
- Explain how the cost of energy used can be calculated

Skills used/learned

- Analysis skills
- Mathematical skills
- Problem solving skills

- **KW:** Moments, power, pressure, work done, force, lever, pivot, newton, energy transfer, rate, fuel, conservation, effort, load, kilowatt-hour, pascal.

- **Links to root words (etymology):**
  - Dissipated – from the latin – *dissipat – 'scattered'*
  - Lever- Old French levier (12c.) "a lifter, a lever, crowbar," agent noun from lever "to raise" (10c.), from Latin levare "to raise,"
  - Pressure- directly from Latin pressura "action of pressing," from pressus, past participle of premere "to press, hold fast, cover, crowd, compress"
  - Moment- directly from Latin momentum "movement, motion; moving power; alteration, change;" also "short time, instant"

History

- The concept of moment in physics is derived from the mathematical concept of moments. The principle of moments is derived from Archimedes' discovery of the operating principle of the lever.
- Pascal- The unit is named after Blaise Pascal, noted for his contributions to hydrodynamics and hydrostatics, and experiments with a barometer. The name pascal was adopted for the SI unit newton per square metre (N/m^2) by the 14th General Conference on Weights and Measures in 1971.
- Watt- James Watt who was a Scottish inventor and mechanical engineer, renowned for his improvements in steam engine technology, died on 19 August 1819. A unit of measurement of electrical and mechanical power - the watt - is named in his honour.

Links to culture:

- Discuss why it is important to review fuel bills- costs so may change suppliers or source of fuel. (Can get from renewable source)
- Moments- used for cranes. Simple machines 'levers'-spanner, wheelbarrow.

				• Explore the uses of pressure in everyday life e.g. Camels feet can walk on soft sand, easy to cut vegetables with a sharp knife than a blunt one, ice skates are more suited for the ice than roller blades. • Need specialised deep-sea diving capsules t explore great depths of the oceans due to pressure. • Expanding crisp packets when flying. • Explore uses of energy transfers by food and fuels in everyday life. **Career ideas-** Line installers and repairers, construction managers, electricians, ski blade designer, bridge engineer, submarine engineer. • ***Equality Diversity and Inclusion (EDI) links?*** **EDI links:** • Scientists from different nationalities *LGBTQ+ pride month.* *Gypsy, Roma and Traveller history month.* *12/6 world day against child labour* *18/6 autistic pride day* *20/6 World refugee day*
(Total: 189 Days)				

Overview of Year 8	
Based on your Flight Path	**By the end of Year 8, students will have learned**
GW:	• Know some standard circuit symbols and what is meant by an electric current • State the definitions of current, potential difference and resistance • Know the difference between series and parallel circuits • Know what is meant by a magnet and the magnetic elements • Know the shape of a magnetic field around a bar magnet • Recognise the effects of static charge. • Know that light travels in straight lines and the evidence for this. Be able to produce a ray diagram showing how we see objects • Know that light can travel through a vacuum and the speed of light • Know what is meant by dispersion and the colours in the visible light spectrum • Know that sound waves are longitudinal and are caused by vibrations. • Be able to draw diagrams showing compression and refraction • Know the key terms pitch, amplitude, frequency • Be able to label a wave using the key terms above and also include wavelength. • Know how sound can reflect and absorb • Know some uses of sound. E.g. (Ultrasound, echo location) • Know some parts of the ear • Know the auditory range of humans and animals
BI:	• Describe what happens to current and voltage in series and parallel circuits • Complete a simple practical investigating a factor that affects the resistance in a circuit • Describe how to measure resistance in a circuit • Describe Earth's magnetic field and the impact it has on our Planet. • Know the relationship between the angle of reflection and angle of incidence • Know the difference between specular and diffuse reflection

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	• Know what is meant by refraction and draw a diagram to show it • Be able to draw ray diagrams • Know that sound waves are longitudinal and are caused by vibrations. • Be able to draw diagrams showing compression and refraction • Be able to describe how sound travels at different speeds in different mediums • Describe the function of different parts of the ear • Describe how the ear allows us to hear sound.
EW:	• Be able to apply the equation linking voltage, current and resistance • Understand what is meant by an electromagnet and how they are used • Describe the magnetic effect of a current and how this is applied to D.C. motors. • Compare the structure of the eye to cameras • Be able to explain what colour filters do to light • Be able to explain the difference between primary and secondary colours • Know that waves can be reflected, and add or cancel- superposition • Know that sound waves are longitudinal and are caused by vibrations. • Be able to draw diagrams showing compression and refraction • Be able to describe an experiment to calculate the speed of sound using echoes • Be able to calculate the speed of sound using an equation

Prompt Questions

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Please revisit the prompts from last year:

- What are the Key concepts for this unit?
- How will it link to wider disciplinary knowledge/cultural capital: history, culture, authentic artefacts, music, art, literature?
- How does it build on prior knowledge and link to other units, concepts, years, GCSE?
- What is it intended students will have learned?
  - For each Unit? By the end of the Year?
    - GW: ; BI: ; EW
- Is it worth summarising in a knowledge organiser?
- **Assessment: how do you know they have learned the foundational concepts, curriculum and wider disciplinary knowledge? Does assessment look like GCSE light? Should it?**
- Skills used/learned
- Tier 2/3 vocabulary ((Etymology e.g. of Greek/Latin)