Biddulph High School Curriculum Intent

To deliver a broad and enriching curriculum through engaging and challenging lessons that provide a wide range of opportunities for all students to achieve their potential.
Students will all be prepared to take their next steps in a diverse and ever changing future ready to make a positive contribution to society.
Through a broad programme of extracurricular activities students will have the opportunities to showcase their talents and experience new challenges.
We value individuals and all that they can offer as well as supporting each other with kindness and empathy.

Curriculum Intent for Science:

The lessons in the Science department provoke students' curiosity through exciting lessons; creating an environment where students will need to critically think and provide logical reasoning using various methods of investigation, such as observation, comparison, experimentation, and mathematical manipulation of data.

All teachers will follow the schemes of work and resources provided by the department. This will ensure that all students receive the same high-quality provision. All units of work will provide a clear outline of the knowledge and skills required and assessments will ensure that this knowledge has been retained and that skills can be evidenced.

Teachers will ensure that gaps are closed through regular monitoring within the classroom. DINT activities will allow for interleaving and recap of previous learning. Misconceptions will be identified through effective questioning and the regular inspection of student work.

Physics **Long Term Overview**						
Year Group	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
9	KS3 Energy, Calculations and transfers	KS3 Renewables, generating electricity, Magnets and waves	KS3 Colour and filters KS3 Review P1.1 – P1.2.4	P1.2.1-1.3.5 OCR P1 Quiz OCR P1 Review	P3.1.1 -3.2.7 Electricity	OCR P3 Quiz OCR P3 Review PAG 1 Materials PAG 5 Specific heat capacity
10						
11					Examinations	
12						
13						

Physics **Medium Term Overview**			
Year 9	***Autumn Term 1***	**Unit Title: ENERGY KS3**	**No of Lessons: 10**
Overview **Assessment**	**This unit builds on the work from Y7 &8. It teaches a range of skills that will be utilised in the GCSE specification that follows. Students will look at 'Energy'. Students will look at energy types, transfers, conservation and how we can insulate to better make use of the energy we have available. Students will be able to see the real world benefits of being energy aware. This will lead to students questioning the efficiency of energy transfers and how we can better make use of energy in the future.**		

	Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology.

<u>Essential Knowledge (what must students know):</u> Students will be able to answer the following questions: What is energy? How is energy transferred thermally? What are the different types of energy? How do we assess energy transfers practically? **Terminology:** **Key terms**: Conduction, convection, radiation, efficiency, conservation of energy, Heat vs temperature **Practical skills**: planning a method, collecting reliable data, evaluating the data and its merits/drawbacks **Examination technique:** understanding key command words within examination style questions to build confidence in student responses	**<u>Essential Skills (what must students be able to demonstrate):</u>** **Students will be able to:** • **Explain conduction** • **Explain convection** • **Explain radiation** • **List the types of energy** • **Calculate the amount of energy in a system and across a transfer** • **Explain and calculate efficiency** • **Understand the importance of energy conservation and improving how we use energy in the future.**	**Lessons to cover** 1. **Conduction and convection** 2. **Radiation and energy from the sun** 3. **Heat energy and temperature** 4. **Energy conservation and insulation** 5. **Energy types** 6. **Energy transfers** 7. **Energy transfer investigation (planning)** 8. **Energy transfer investigation (carry out)** 9. **Energy calculation** 10. **efficiency** **Homework** Students will be asked at the start of the module to research ways in which you can insulate the home. This can then be used to aid their planning of the energy transfer practical. They will then write a piece after the practical to show their understanding of how a home should be insulated and what the benefits of this are financially and for the environment.
<u>Careers Link</u> Students will look at the efficiency of houses and where energy is lost. This will be linked to construction and the selection of materials to meet building specifications. Students will research these materials as part of an extended homework piece. The importance of material selection and how this	**<u>Enrichment</u>**	**<u>MY PB</u>** **Social Me- active listening, speaking effectively, working with others** Practical work will require aspects of the social me strand **Thinking Me – evaluating & creativity** Evaluation will be utilised when assessing data from the energy investigations

ties to construction will then be highlighted during the practical work.		**This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons

Physics **Medium Term Overview**			
Year 9	***Autumn Term 2***	**Unit Title: Electricity, Magnets and waves KS3**	**No of Lessons:10**
Overview **Assessment**	**This unit builds on the work from Y7 &8. It teaches a range of skills that will be utilised in the GCSE specification that follows. Students will look at 'Electricity, Magnets and waves'. Students will look at electricity generation, the cost of electricity, electromagnets and magnetic fields, motors and waves in matter. Students will be able to see the real world costs of electricity, why magnetism is important and how waves interact with the matter in the world around us. This will lead to students questioning the efficiency of electric generation, use and how we can better make use of energy in the future.** **Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology.**		
<u>Essential Knowledge (what must students know):</u> Students will be able to answer the following questions: What is renewable energy? How do we know how much electricity costs us? How do electromagnets work? What is the law of reflection? Why does light change direction as it travels through different media? **Terminology:** **Key terms**: renewable, non-renewable, kilowatt-hour,	**<u>Essential Skills (what must students be able to demonstrate):</u>** **Students will be able to:** • **list renewable and non-renewable types of energy.** • **Define renewable** • **Explain how we produce electricity** • **Calculate the cost of electricity** • **Understand electromagnetism** • **Draw a magnetic field pattern** • **Identify the key parts of a waveform** • **Understand the law of reflection** • **Explain why light refracts as it travels through different media**		**Lessons to cover** 1. **renewable energy** 2. **generating electricity** 3. **electricity use and cost** 4. **electromagnets** 5. **magnetic poles and fields** 6. **Dc motors including practical** 7. **Pressure waves** 8. **Waves in water** 9. **Light and matter (reflection practical)** 10. **Light and matter (refraction practical)** **Homework** students will be asked to look at the

electromagnet, induced magnetism, peak/crest, trough, amplitude wavelength, frequency **Practical skills**: planning a method, collecting reliable data, evaluating the data and its merits/drawbacks **Examination technique:** understanding key command words within examination style questions to build confidence in student responses		energy bill of their own home. Can they find out what a kilowatt-hour is? Whys do we use this unit? Why is the cost of electricity so important to them and their future?
Careers Link energy costs will be linked directly to energy providers, this will allow discussions around how energy is billed and how a company would calculate the cost, the need to read meters and why people may want to work in the energy sector	**Enrichment**	**MY PB** **Social Me- active listening, speaking effectively, working with others** Practical work will require aspects of the social me strand **Thinking Me – evaluating & creativity** Evaluation will be utilised when assessing data from the practical work **This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self- management when looking at the assessed points across the lessons

Physics **Medium Term Overview**

Year 9	***Spring Term 1***	**Unit Title: Module energy**	**No of Lessons:9**
Overview	**Students should be able to consolidate and demonstrate their understanding of the concept of energy which emerged in the 19th century. The idea was used to explain the work output of steam engines and then generalised to understand other heat engines. It also**		

<table>
<tr><td>Assessment</td><td colspan="2">became a key tool for understanding chemical reactions and biological systems. Limits to the use of fossil fuels and global warming are critical problems for this century. Physicists and engineers are working hard to identify ways to reduce our energy usage.

Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology, as well as an assessment task at the end of the unit</td></tr>
<tr><td><u>Essential Knowledge (what must students know):</u>
Students will be able to answer the following questions:
What is the current accepted atomic model?
How has this model changed over time?
What allowed scientists to find evidence for these changes to the atomic model?
What is Density?
How do we calculate density?
How could we carry out an experiment to find the density of an object?
What is specific heat capacity?
How can we calculate specific heat capacity?
How could we carry out an experiment to find the specific heat capacity of a material?
What is specific latent heat?
How do we calculate specific latent heat?

Terminology:</td><td><u>Essential Skills (what must students be able to demonstrate):</u>

Students will be able to:

• Students should be able to calculate the amount of energy associated with a moving object, a stretched spring and an object raised above ground level.

• Students should be able to recall and apply this equation.
$kinetic\ energy = 0.5 \times mass \times (speed)^2$
$[E_k = \frac{1}{2} m v^2]$

• Students should be able to apply this equation which is given on the Physics equation sheet.
$elastic\ potential\ energy = 0.5 \times spring\ constant \times (extension)^2$
$[E_e = \frac{1}{2} k e^2]$

• Students should be able to recall and apply this equation.
$g.p.e. = mass \times gravitational\ field\ strength \times height$
$[E_p = m g h]$

• Students should be able to recall and apply this equation.</td><td>Lessons to cover

1.1.1.Energy stores and systems L1 Energy stores and transfers
1.1.1.Energy stores and systems L1 Energy stores and transfers
1.1.2 Chnages in Energy L2 Kinetic and Gravitational energy
1.1.2 Chnages in Energy L2 Kinetic and Gravitational energy
1.1.3 Energy changes in systems L3 Specific Heat Capacity
Specific heat capacity required practical
1.1.4 Power L4 Work Done and Power
1.1.4 Power L4 Work Done and Power
1.2.1 Energy Transfers L5 Useful and Wasted Energy

Homework

Seneca topic-based homework to be set on rotation. This will be selected to consolidate current learning and to retrieve past content. Over the course of the module the number of retrieval questions will increase, if the students that achieve blow expectations will be issued with an additional assignment</td></tr>
</table>

Key terms: Peer review, billiard model, Plum pudding model, Nuclear atom, orbital shells **Practical skills**: planning a method, collecting reliable data, evaluating the data and its merits/drawbacks **Examination technique:** understanding key command words within examination style questions to build confidence in student responses	*change in thermal energy* = *mass* × *specific heat capacity* × *temperature change* $[\Delta E = m\, c\, \Delta\theta]$ change in thermal energy, ΔE, in joules, J mass, m, in kilograms, kg specific heat capacity, c, in joules per kilogram per degree Celsius, J/kg °C temperature change, $\Delta\theta$, in degrees Celsius, °C The specific heat capacity of a substance is the amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius.	
Careers Link Materials selection in construction – specific heat capacity of water is important in its selection for use in plumbing due to its high specific capacity.	**Enrichment**	**MY PB** **Social Me- active listening, speaking effectively, working with others** Practical work will require aspects of the social me strand **Thinking Me – evaluating & creativity** Evaluation will be utilised when assessing data from the density and specific heat capacity investigations **This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self- management when looking at the assessed points across the lessons

Physics **Medium Term Overview**

<table>
<tr><td>Year 9</td><td>Spring Term 2</td><td colspan="2">Unit Title: Module 1 Energy</td><td>No of Lessons: 9</td></tr>
<tr><td>Overview

Assessment</td><td colspan="4">Students should be able to explain what pressure is and how external factors such as temperature can have an effect upon pressure. Students will explore the links between volume and pressure, how the atmosphere creates pressure and how this compares to the pressure created by liquids. This unit will build directly upon the last further developing the students understanding of the particle models for solids liquids and gases and how the density of these states of matter has an impact on the pressure they may create.

Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology, as well as an assessment task at the end of the unit</td></tr>
<tr><td colspan="2"><u>Essential Knowledge (what must students know):</u>
Students will be able to answer the following questions:
What is pressure?
How do gases create pressure?
What happens to pressure as volume changes?
Why is pressure and volume an example of an inversely proportional relationship?
What creates atmospheric pressure?
What is liquid pressure?
What causes an object to float?
What causes an object to sink?

Terminology:
Key terms: Pascals, density, collisions, kinetic energy, speed, velocity, weight, upthrust.

Practical skills: evaluating the equipment used to measure and interpret pressure

Examination technique: understanding key command words within examination style questions to build confidence in student responses</td><td colspan="2"><u>Essential Skills (what must students be able to demonstrate):</u>

Students will be able to:

Students should be able to explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation. The higher the thermal conductivity of a material the higher the rate of energy transfer by conduction across the material. Students should be able to describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls.
Students should be able to: • describe the main energy sources available • distinguish between energy resources that are renewable and energy resources that are non-renewable • compare ways that different energy resources are used, the uses to include transport, electricity generation and heating • understand</td><td>Lessons to cover
1.2.1 Energy Transfers L5 Understanding Useful and Wasted Energy
1.2.1 Energy Transfers L6 Thermal Conduction
1.2.1 Energy Transfers L6 Thermal Conductivity and insulation
1.2.2 Efficiency L7 Energy Efficiency
1.2.2 Efficiency L7 Increasing Energy Efficiency
1.3.1 National and Global challenges L8 Non renewable
1.3.1 National and Global challenges L9 Renewable
Energy Teat 1.1.- 1.3
Energy test Intervention STAR and DIRT

Homework

Seneca topic based homework to be set every fortnight. This will be selected to consolidate current learning and to retrieve past content. Over the course of the module the number of retrieval questions will increase, if the Students that achieve blow expectations will be issued with an additional assignment</td></tr>
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	why some energy resources are more reliable than others WS 4.4 • describe the environmental impact arising from the use of different energy resources WS 1.3, 1.4 • explain patterns and trends in the use of energy resources. Students should be able to: • consider the environmental issues that may arise from the use of different energy resources • show that science has the ability to identify environmental issues arising from the use of energy resources but not always the power to deal with the issues because of political, social, ethical or economic considerations.	
Careers Link Links made to careers in green industries to provide the energy required to meet the needs of our ever changing population	**Enrichment**	**MY PB** **Social Me- active listening, speaking effectively, working with others** Practical work will require aspects of the social me strand **Thinking Me – evaluating & creativity** Evaluation will be utilised when assessing data from the density and specific heat capacity investigations **This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons

<table>
<tr><td colspan="4">Physics Medium Term Overview</td></tr>
<tr><td>Year 9</td><td>Summer Term 1</td><td>Unit Title: Electricity</td><td>No of Lessons:9</td></tr>
<tr><td>Overview

Assessment</td><td colspan="3">Students should be able to explain fundamental principles around electrostatics and charge. This will then develop to show how charges move and how an electrical current is developed by the movement of electrons. Circuit characteristics will be analysed for both series and parallel circuits. Circuit components and their symbols will be used to show how circuits would be constructed and what affects these components would have on the potential difference and current within the circuit. Students will then be able to look at these circuits practically and will be able to gain data to show how series and parallel circuits are affected by the addition of various components.

Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology, as well as an assessment task at the end of the module</td></tr>
<tr><td><u>Essential Knowledge (what must students know):</u>
Students will be able to answer the following questions:
How is a static charge generated?
When is static charge useful?
When can static charge be a nuisance?
What conditions are needed for an electrical current to flow?
What happens to the P.d in a series circuit?
What happens to the current in a series circuit?
What happens to the P.d in a parallel circuit?
What happens to the current in a parallel circuit?
How does a thermistor work?</td><td colspan="2"><u>Essential Skills (what must students be able to demonstrate):</u>

Students will be able to:

• Students should be able to recall and apply this equation.
$potential\ difference = current \times resistance$
$[\ V = I\ R\ ]$
potential difference, V, in volts, V
current, I, in amperes, A (amp is acceptable for ampere)
resistance, R, in ohms, Ω
• Students should be able to explain that, for some resistors, the value of R remains constant but that in others it can change as the current changes.
• Students should be able to: WS 1.2, 1.4 • explain the design and use of a circuit to measure the resistance of a component by</td><td>Lessons to cover
2.1.1 Circuit symbols, Electrical Charge and Current L1 Circuits, Current and Charge
2.1.3 Current, Resistance and Potential Difference L2 Current, Potential Difference and Resistance
2.1.4 Resistors L3 Resistors and Ohms Law (Ohmic conductors)
Required practical I-V Characteristics
2.2.1 Series and Parallel Circuits L4 Series and Parallel Circuits
Homework

Seneca topic-based homework to be set on rotation. This will be selected to consolidate current learning and to retrieve past content. Over the course of the module the number of retrieval questions will increase,</td></tr>
</table>

How does and LDR work? Why are LDR's and thermistors useful in sensing circuits **Terminology:** **Key terms**: Point charge, electric field, resistor, filament bulb, diode, variable resistor, light dependant resistor, thermistor, voltmeter, ammeter insulator **Practical skills**: planning a method, collecting reliable data, evaluating the data and its merits/drawbacks **Examination technique:** understanding key command words within examination style questions to build confidence in student responses	**measuring the current through, and potential difference across, the component** • **Draw an appropriate circuit diagram using correct circuit symbols** • **Students should be able to: MS 1c, 3b, 3c, 3d** **• use circuit diagrams to construct and check series and parallel circuits that include a variety of common circuit components** **• describe the difference between series and parallel circuits** **• explain qualitatively why adding resistors in series increases the total resistance whilst adding resistors in parallel decreases the total resistance AT 7** **• explain the design and use of dc series circuits for measurement and testing purposes WS 1.4** **• calculate the currents, potential differences and resistances in dc series circuits • solve problems for circuits which include resistors in series using the concept of equivalent resistance.**	if the students that achieve blow expectations will be issued with an additional assignment
<u>Careers Link</u> Electrical engineering – these principles form the basic understanding to go on and study to become an electrician/ to progress into the world of electrical engineering. This is highlighted through the future pathway slides in the Physics scheme of work	**<u>Enrichment</u>** Directing students to become involved with the first tech robotic opportunities open to them	**<u>MY PB</u>** **Social Me- active listening, speaking effectively, working with others** Practical work will require aspects of the social me strand **Thinking Me – evaluating & creativity** Evaluation will be utilised when assessing data from the density and specific heat capacity investigations **This is Me – Resilience, responsibility, self-motivation, integrity, self-management**

		Students will need to demonstrate resilience and self- management when looking at the assessed points across the lessons

Physics **Medium Term Overview**			
Year 9	***Summer Term 2***	**Unit Title: Electricity 2**	**No of Lessons: 10**
Overview **Assessment**	**Student should be able to consolidate their knowledge from the electricity module. Form this the unit will focus on the practical elements that will be incorporated into the GCSE examinations. The focus will be to build the students ability to plan carry out and evaluate an experiment. This will be carried out using the materials provided by the examination board to show students what OCR want them to understand and articulate. This skill set will then be developed moving into year 10 and 11.** **Students will be assessed through a series of small tests to identify any misconceptions and the correct use of key scientific terminology, as well as an assessment task at the end of the module**		
<u>Essential Knowledge (what must students know):</u> Students will be able to answer the following questions: **Terminology:** **Key terms**: Point charge, electric field, resistor, filament bulb, diode, variable resistor, light dependant resistor, thermistor, voltmeter, ammeter insulator **Practical skills**: planning a method, collecting reliable data, evaluating the data and its merits/drawbacks **Examination technique:** understanding key command words within examination style	**<u>Essential Skills (what must students be able to demonstrate):</u>** **Students will be able to:** **Students should be able to explain:** **• that a live wire may be dangerous even when a switch in the mains circuit is open** **• the dangers of providing any connection between the live wire and earth.** **Students should be able to recall and apply both equations.**	**Lessons to cover** **Assessment for DD2** **Intervention** **2.3.1 Mains Electricity L5 Mains Electricity AC and DC current** **2.3.1 Mains Electricity L5 Mains Electricity Plugs and Safety** **2.4.1 Power L6 Energy Transfers and Power Appliances** **2.4.2 Power L6 Energy Transfers and Power More about Power** **2.4.3 The National Grid L7 National Grid** **2.4.4 Static L8 Static Electricity** **2.4.5 Electric Fields L9 Electric Fields** **Homework**	

questions to build confidence in student responses	$power = potential\ difference \times current$ $[P = V\ I]$ $power = (\text{current})^2 \times resistance$ $\left[P = I^2 R\right]$ power, P, in watts, W potential difference, V, in volts, V current, I, in amperes, A (amp is acceptable for ampere) resistance, R, in ohms, Ω **Students should be able to explain how the power of a circuit device is related to:** **• the potential difference across it and the current through it** **• the energy transferred over a given time. Students should be able to describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.** **• describe the production of static electricity, and sparking, by rubbing surfaces** **• describe evidence that charged objects exert forces of attraction or repulsion on one another when not in contact** **• explain how the transfer of electrons between objects can explain the phenomena of static electricity.** **• draw the electric field pattern for an isolated charged sphere** **• explain the concept of an electric field** **• explain how the concept of an electric field helps to explain the non-contact force between charged objects as well as other electrostatic phenomena such as sparking.**	Seneca topic-based homework to be set on rotation. This will be selected to consolidate current learning and to retrieve past content. Over the course of the module the number of retrieval questions will increase, if the students that achieve blow expectations will be issued with an additional assignment
Careers Link Electrical engineering – these principles	**Enrichment**	**MY PB**

form the basic understanding to go on and study to become an electrician/ to progress into the world of electrical engineering. This is highlighted through the future pathway slides in the Physics scheme of work Materials selection in construction – specific heat capacity of water is important in its selection for use in plumbing due to its high specific capacity.	End of year trips that are based in science – physics of theme park rides The big bang science fair	**Social Me- active listening, speaking effectively, working with others** Practical work will require aspects of the social me strand **Thinking Me – evaluating & creativity** Evaluation will be utilised when assessing data from the density and specific heat capacity investigations **This is Me – Resilience, responsibility, self-motivation, integrity, self-management** Students will need to demonstrate resilience and self- management when looking at the assessed points across the lessons