Engineering
Long Term Learning Plan

Subject:	
"Magic and Gift" of the subject	Engineering is the basis for how the world has been created around you; engineers solve the issues of the physical world through high quality design. The chair you sit in, the bike you ride, the phone, tablet or computer you use, sports equipment you play with, the bridge you travelled over, the boats, the aeroplane... all designed and created by engineers.
Careers (salaries)	Mechanical Engineering, Electrical, Petroleum, Aerospace, Automotive, Chemical, Naval, Explosives, Civil, Structural, Biological, Architecture, Finance, Sports Equipment, Medical, Product Design, Communication Starting salaries: £27,000 Average salaries: £40,000 Up to: £100,000+
Notable high profile alumni (Park School and "famous")	**Amit Gupta:** Electrical engineer Gupta has worked for Bechtel Corporation, Samsung Heavy Industries, Delphi Automotive Systems, and Vestas Wind Systems. **Alan Turing:** Turing was a mathematician and computer scientist. **Dame Jocelyn Bell Burnell:** Northern Irish astrophysicist Bell-Burnell discovered the first radio pulsars in 1967 when she was a postgraduate student. **Elon Musk:** Musk became interested in computer programming at school in South Africa, then emigrated to Canada to study Physics and Economics at Queen's University. **Isambard Kingdom Brunel:** A civil and mechanical engineer, Brunel is known as one of the greatest figures of the Industrial Revolution. **Nikola Tesla:** In 1882 Tesla started working for the Continental Edison Company in Paris on the installation of incandescent lighting across the city.
Degrees and Best Universities (Global?)	**Universities:** **UK:** Oxford, Cambridge, Imperial College London, Bristol, Swansea **International:** Californian Institute Of Technology, Harvard, Massachusetts Institute Of Technology, ETH Zurich, University Of Singapore **Degrees (and degree level apprenticeships):** Mechanical Engineering, Electrical, Aerospace, Automotive, Chemical, Naval, Explosives, Civil, Structural, Biological, Architecture, Finance, Sports Equipment, Medical, Product Design, Communication,

	Petroleum
Post 16 Courses and Destinations	**Universities:** **UK:** Oxford, Cambridge, Imperial College London, Bristol, Swansea **International:** Californian Institute Of Technology, Harvard, Massachusetts Institute Of Technology, ETH Zurich, University Of Singapore **Degrees (and degree level apprenticeships):** Mechanical Engineering, Electrical, Aerospace, Automotive, Chemical, Naval, Explosives, Civil, Structural, Biological, Architecture, Finance, Sports Equipment, Medical, Product Design, Communication, Petroleum
BTEC Specification	Pearson BTEC Level 1/Level 2 Tech Award in Engineering
Assessment Objectives and Percentages in Examination	**Component 1: Exploring Engineering Sectors and Design Applications** **Levels: 1/2 Assessment type: Internal Guided learning hours: 36** Learning aim A: Understand engineering sectors, products and organisations, and how they interrelate A1 Engineering sectors, engineered products and interconnections A2 Engineering organisations, functions, job roles and career progression Learning aim B: Explore engineering skills through the design process B1 The design process **Component 2: Investigating an Engineering Project** **Levels: 1/2 Assessment type: Internal Guided learning hours: 36** Learning aim A: Understand materials, components and processes for a given engineered product. A1 Materials A2 Components A3 Processes Types of engineering processes Learning aim B: Investigate a given engineered product using disassembly techniques B1 Practical engineering skills. B2 Disassembly techniques

Pearson BTEC Level 1/Level 2 Award in Engineering

Component number	Component title	GLH	Level	How assessed
1	Exploring Engineering Sectors and Design Applications	36	1/2	Internal
2	Investigating an Engineering Project	36	1/2	Internal
3	Responding to an Engineering Brief	48	1/2	External Synoptic

	B3 Product design specification (PDS) Learning aim C: Plan the manufacture of and safely reproduce/inspect/test a given engineered component C1 Engineering make C2 Develop a production plan **Component 3: Responding to an Engineering Brief Levels: 1/2 Assessment type: External synoptic Guided learning hours: 48** Component in brief: Learners will investigate and create solutions to problems in response to given engineering briefs. Assessment objectives AO1 Understand how to respond to an engineering brief AO2 Select skills and techniques in response to an engineering brief AO3 Apply skills and techniques in response to an engineering brief AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief

Year by Year Intent	**Cycle by Cycle Intent - Clear Areas of Knowledge (big topics), Skills and Assessment Objectives (linked to GCSE Spec), Cross Curricular Links and Opportunities (where is this topic/knowledge delivered elsewhere in the school (and is that department more "expert").**	**Where will this cycle be revisited/ where has is been taught before (interleaving)?**
Year 11: Completion of component 2. Preparation for component 3's two exams	**Component 1: Exploring Engineering Sectors and Design Applications and Component 2: Investigating an Engineering Project, internally assessed coursework project.** **Component 3: Responding to an Engineering Brief, two externally set and assessed exams.**	
	Cycle 15 Component 3: Responding to an Engineering Brief Revision and exam practice based around the following 2 assessment objectives. AO3 Apply skills and techniques in response to an engineering brief AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief Complete external assessment in summer series in May/June	Elements of the Part 2 paper are taught throughout both component 1 and component 2. Designing, evaluating and analysing are key aspects of the coursework that is completed.

	PART 1 (exam paper 1) crosses over with science experiments and maths, with recording and interpreting data.	
	Cycle 14 Component 2: Investigating an Engineering Project C: Plan the manufacture of and safely reproduce/inspect/test a given engineered component. Coursework task, practical project. Students will plan to manufacture a female barrel bolt which was a component of the multi tool they disassembled in Component 2 Part B. The students must then safely follow their plan and physically make the barrel bolt using a range of different processes, documenting each stage of the make. Component 3: Responding to an Engineering Brief Revision and exam practice based around the following 2 assessment objectives. AO1 Understand how to respond to an engineering brief AO2 Select skills and techniques in response to an engineering brief	Quality assurance/quality control which is covered in part C of component 2 will be taught again as part of component 3 of the course. It will help the students complete Parts 1 and 2 of the external assessments. Cycle 10 has a practical element which will help students prepare for part C of component 2.
	Cycle 13 Component 2: Investigating an Engineering Project A: Understand materials, components and processes for a given engineered product Cousework task, investigation and research into the materials and processes used to create the ultegra brake system on a road bicycle. Students will put together a presentation of their research to demonstrate their understanding of how engineering has been used to create this product. B: Investigate a given engineered product using disassembly techniques Coursework task, disassembly of a multitool designed for use with a bicycle. Students systematically disassemble the tool and then document how each of the components fit	The materials and processes will be taught again as part of component 3 of the course. It will help the students complete the Part 2 of the external assessments. Cycle 10 has an introduction to materials and some processes including a practical element.

	together. Students present this in a slideshow with written commentary and photographs to support their work.	
Year 10: An introduction to engineering. Students will learn about the different skills and knowledge needed to complete their course work. They will then complete their first piece of course work during cycles 11 and 12.	Cycle 12 Component 1: Exploring Engineering Sectors and Design Applications B Explore engineering skills through the design process. Coursework task, using a given design brief (to design a bicycle stand for a touring bike) the students must design and then prototype a product using both physical modelling and also CAD (computer aided design). Once completed the students have to present and pitch their design to a panel of peers to receive real live feedback on their work.	The design aspect will be taught again as part of component 3 of the course. It will help the students complete the Part 2 of the external assessments. Cycle 10 has a small design and prototype task to introduce the students to the process. The materials cycle of year 8 is all based around the iterative design process.
	Cycle 11 Component 1: Exploring Engineering Sectors and Design Applications A: Understand engineering sectors, products and organisations, and how they interrelate. Coursework task, research into the different sectors of engineering, the products they produce and job opportunities within the engineering industry. Students create a project researching the braking system of a car and the engineering sectors involved in both its design and manufacture.	This will not be taught again once the coursework is completed. Cycle 10 covers a basic introduction to the different sectors of engineering and the students complete a mini research task to help them develop their skills.
	Cycle 10 An introduction to engineering: CAD: SketchUp, 2D design, Flashprint CAM: Laser cutter, 3D printer Theory and practical Other types of CAM/CNC Working drawings: Orthographic, scale, isometric, exploded, schematic maps Tools and equipment, processes and, materials used in engineering. Designing an engineering product Clients, design briefs, production plans and quality control. Sectors in engineering.	Most aspects of this cycle will be covered in both components of coursework and also externally assessed elements of the course. KS3 Materials and textiles will teach the students the basics of many of theses topics