The King's CHURCH OF ENGLAND SCHOOL KIDSGROVE

Curriculum plan: Engineering

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INTENT:

"'The way you learn anything is that something fails, and you figure out how not to have it fail again."

Robert Arrighi

Studying Engineering at The King's allows students to understand the mechanical and physical environments of their surroundings. It helps students to foster a sense of inquisitiveness, appreciating how problems are solved and in what environment these solutions can continue to be developed so they remain in tune with our ever changing world.

As a department, we aim to provide our students with the necessary theoretical knowledge, understanding and practical skills to manufacture solutions to realistic world problems and scenarios. The strong emphasis on problem solving is linked intrinsically with creativity where students are encouraged to push boundaries, challenge the status quo and continually think 'outside of the box'.

Sharing our passion and deep subject knowledge equips our students with high quality learning experiences which will inspire, ensure outstanding progress and provide them with a range of skills to enable them to be effective participators in society. They will study a wide range of topics and have learning experiences which will widen their understanding of the mechanical and physical world. Students will be challenged by difficult tasks and be asked to respond to a range of demanding activities which will push students to value creativity and harness a deep knowledge of materials, properties and manufacturing processes.

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Half term points

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
9	**The sectors of engineering** **Learning to include:** **Aerospace industry** • Automotive • Communications • Electric/electronic • Mechanical • Transport **Different engineering companies** • Boeing UK • Toyota • Sky TV plc • Siemens • Olympus engineering • Transport		**Product manufacturing processes** **Learning to include:** **Processes** • casting • forging • shearing • machining • extrusion • injection moulding • vacuum forming **Engineering jobs roles and interconnectivity** • aerospace engineer • automotive engineer • communications engineer • electrical/electronic engineer • mechanical engineer • transport engineer		**The design process.** **Learning to include:** How to… • define the problem. • collect information. • brainstorm and analyse ideas. • develop solutions. • gather feedback. • existing product analysis • use ACCESS FM (aesthetics, cost, customer. environment, safety, size, function, materials)	

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Half term points

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
10	**Sketching and modelling** **Learning to include:** • how to engage with 2d sketching • how to engage with 3d sketching • peer assessment and review • computer aided design • computer aided manufacture		**Understand materials, components and processes for a given engineered product** Bitesize Bitesize Bitesize **Learning to include:** **Materials** • ferrous metals • non-ferrous metals. e.g. aluminium, titanium, copper, silver and zinc. • thermosetting polymers. e.g. phenol-formaldehyde, polyamides and polyurethane • thermoforming polymers. e.g. polyethylene, polypropylene and acrylic **Properties of engineering materials** • strength • hardness. • toughness • characteristics of engineering materials. • machinability • workability • durability **Components**. • proprietary components • characteristics of components •		**Investigate a given engineered product using disassembly techniques** Bitesize Bitesize Bitesize **Learning to include:** • developing practical recording skills, learning how to comment on: o visual features. o surface features. o mass. o colour o degradation. o identification marks • develop measuring skills o measuring diameter. o measuring linear dimensions. o use of comparative techniques. • knowledge of component values e.g. resistors. • appraisal/interpretation skills, such as justification and reasoning. • removal of semi-permanent fixing • parts removal and layout	

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Half term points

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
11	**Carry out a process** Bitesize Bitesize Bitesize **Learning will include:** • developing an understanding of practical procedures and explore how to record, collect and interpret data in an engineering context • allowing planned procedures. • using and testing a prototype/model. • assembling, handling and using materials, equipment and machinery • recording the process. • measuring and recording data with accuracy and precision, using appropriate units. • tabulating appropriate data with accuracy and precision, units appropriate units. • displaying appropriate data graphically with accuracy: • Identifying anomalous results or sources of error. • comparison of trends/patterns in data, to include tables, charts and graphs. • evaluating the process, to incite testing processes used, recording/processing results. • drawing valid conclusions. • making recommendations related to engineering briefs.		**Redesign** Bitesize Bitesize Bitesize **Learning to include:** • identifying relevant issues with existing design. • designing sketching, designing for manufacture, • designing ideas e.g.. variation in form, variation in approach, use of different methods, use of different components • reviewing the credibility of the design ideas given the needs of their brief • selecting the most appropriate design solution • justifying the design solution • justifying of the processes to be use • providing solutions to meet the needs of an engineering brief • developing an understanding of how to analyse information in an engineering context and explore how to select a suitable solution and implement it to meet the brief. • analysing engineering information with the problem • interpreting patterns and trends related to the engineering information • identifying issues and causes associate with the problem		**Problem solution** Bitesize Bitesize Bitesize **Learning to include:** • Identifying resources required and their use, to include materials, tools, components, equipment, apparatus, e.g. instruments, sensors • Identifying designs of solutions, to include diagrams, sketches, including measurements, levels/annotation. • developing processes, to include following the steps needed to create a prototype solution. E.g. rapid prototyping • developing processes to follow, e.g. in relation to using tools and equipment , and health and safety. • developing manufacturing processes to use, e.g. casting, forging , use of jigs and tools. • completing data collections requirements, to include what quantitative data must be recorded, resource materials, data sources. • developing data analysis and quality to include trends, meeting specifications, possible solutions. • Making safety considerations, to include hazards and requirements of Control of Substances Hazardous to Health (COSHH) Regulations 2002 where appropriate • Considering timescales.	

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