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| Year 9 Graphics | **Topic: 3D Printing and Prototyping****Period: 8 – 10 Weeks** |
| **Overview of topic:**This half term, in their second rotation of Technology, Year 9 will have the opportunity to experiment with 3D printing. They will investigate the main four types of manufacturing and will look closely at the possibilities of additive manufacturing. Students will begin by creating a small ‘pencil topper’ product that they will have 3D printed and in doing so will gain the skills to negotiate their main design challenge. Students’ main project will be to design and make a prototype for a new product that will help protect and rejuvenate our natural environment. Students will begin by evaluating and adapting the functions of existing products and will move on to create their own 3D printed prototype. This project also presents an opportunity for students to have their engineering solutions seen by representatives from BAE, an organisation that the Technology department at WLD is working with to deliver this project. |
| **Key** **knowledge:****The Design Process**: Students will build on previous knowledge about how the design process works.**A.C.C.E.S.S.F.M**: The considerations that all designers make when developing products of all kinds. **End User**: Students will understand the importance of considering and researching the end user when designing products that are fit-for-purpose.**CAD/CAM**: Students will revisit and develop further learning about **Computer Aided Design** and **Computer Aided Manufacture.****Manufacturing processes:** Students will know about additive, subtractive, moulding and forming industrial processes.**Design Strategies**: Students will be shown a range of design strategies including collaborative and iterative approaches. **Key vocabulary:**

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| **Tier 2** | **Tier 3** |
| MouldingFormingTarget MarketDesignDevelopSketchPlanResearchCopyrightDocumentRevolve | AdditiveSpecificationClient/End UserAesthetic FunctionalityInitial IdeasDevelopmentPlagiarismPrototypeDemographicAssociationsConnotationsExtrude |

 | **Key skills:** ***Know how to…*****Write a Specification:** Students will know how to interpret a design brief in order to write a specification.**Initial Sketches**: Students will build on earlier learning in sketching and drawing and will develop skills in visually communicating their ideas.**Develop Sketches**: Students will develop a rage of techniques to experiment with improving and refining their initial idea sketches to better align them to client/end user needs.**Techsoft 2D Design**: Students will develop their skills in using ‘2D Design’ to create design drawings that can then be used to make products using CAM machinery.OnShape: Students will use the online 3D modelling software **Modelling**: Students will develop their creativity using a range of materials to make models that communicate their design ideas.Design and Development: Students will design and develop their ideas towards a final design.**Document Progress**: Documenting progress through a project is important, particularly at GCSE. Students will learn how to do this using screenshots, photographs and written accounts during this project.**Evaluation**: Students will build on previous learning on how to effectively evaluate their project and will use frameworks such as a design specification to help them assess the success of their work. |
| **Co-curricular opportunities: *(ASPIRE Day, Careers, clubs, competitions etc)***Graphics ClubSTEM Aspire Day (later in the year)Further inter-form STEM competition throughout the year.  | **Key reading skills taught *(clarify, question, summarise, predict)* and key texts:**Students will **clarify** and **summarise** what they read in the design brief and will begin to **predict** how a specification should be constructed. This will lead to further **questioning** and research in order to develop their prototype.**Wider Reading Opportunities/Links:**<https://youtu.be/bcTzyx35odY> <https://www.createeducation.com/learn-3d-printing/>Sign up for your own OnShape account and further your 3D modelling skills at home for free: <https://www.onshape.com/en/education/sign-up> |
| **How can I use this information at home?*** Conversation starters with your children to discuss their learning
* Support your child in carrying out independent research around the topic
* Visit your local library (or BorrowBox), museums, or other locations to explore the topic
* Promote books/other texts that explore this topic (see reading section)
* Help your child to learn the key vocabulary
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