

Meden School Curriculum Planning							
Subject	CNAT Engineering Design	Year Group	Y10	Sequence No.	1	Topic	RO39 Communicating Designs

Retrieval	Core Knowledge	Student Thinking
What do teachers need retrieve from students before they start teaching new content ?	What specific ambitious knowledge do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to development of our students thinking, encouraging them to see the inequalities around them and 'do something about them!'
<p>The following knowledge and understanding should be retrieved:</p> <ul style="list-style-type: none"> <input type="checkbox"/> If students experience the Graphics module at KS3 then they will have prior knowledge of thick and thin line technique, some rendering techniques, crating and isometric and so this knowledge should be retrieved. <input type="checkbox"/> Students will have developed rendering skills in other areas of school, particularly in art lessons at ks3 and so this knowledge should be retrieved. <input type="checkbox"/> Annotation best practice and skills will have been taught at KS3 and so that 	<p>The following ambitious knowledge needs to be taught:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Know that unless designers and engineers can communicate their ideas to others it is unlikely their engineering ability and designs will be fully appreciated. <p><u>Teaching for Task 1</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Know the rules for how to correctly apply thick and thin line technique to a 3D drawing using thin lines where both faces creating the edge/line can be seen and using thick lines where only one face can be seen. <input type="checkbox"/> Know methods for how to give the appearance of a texture on a drawn 3d shape. <input type="checkbox"/> Know how to use just a pencil to create tone/shading on a 3D shape. <input type="checkbox"/> Know how to use colour pencils combined with black and white pencils to create coloured renderings. <input type="checkbox"/> Know how to use surrounding technique to highlight a 3D drawing. <input type="checkbox"/> Know what 'crating' is and how to use it to support the production of Isometric sketches. <input type="checkbox"/> Know how to use an Isometric underlay to support the production of more accurate isometric sketches. <input type="checkbox"/> Know how to draw cubes, rectangular blocks, hollow blocks/areas and cylinders in isometric. <input type="checkbox"/> Know that annotation should be done in full sentences and that it should: <ul style="list-style-type: none"> - Explain key features of the design. 	<ul style="list-style-type: none"> <input type="checkbox"/> Discuss the issues relating to 'gender inequality' in the working world of graphic design, and design in general. These issues are highlighted in the document "Design's gender problem, and what you can do about it" on the shared drive. Work through the document and the activity with students.

<p>prior learning should be retrieved to support learning here.</p> <p><input type="checkbox"/> The preparatory learning (above) is essential to this assignment work and so should be regularly retrieved.</p> <p><input type="checkbox"/> KS3 D&T will have given the knowledge of a range of materials and so elements of that prior learning should be retrieved here.</p> <p><input type="checkbox"/> Students have experience Tinkercad before during KS3 and so that prior learning and knowledge should be retrieved here to support progress and learning at this stage.</p>	<ul style="list-style-type: none"> - Explain the functions of different parts/features. - Explain the materials selected and the reason for their selection. <p><input type="checkbox"/> Know how to add dimensional information to a 2D or 3D sketch.</p> <p><u>Assessed NEA Element</u> <u>Topic Area 1 – (Set Assignment Task 1)</u></p> <p><input type="checkbox"/> Know the nature of the product the examiner is requiring you to design, (e.g. remote control).</p> <p><input type="checkbox"/> Know the content of the Design Specification for the product.</p> <p><input type="checkbox"/> Know how to create and present, (using all the methods learnt in the earlier teaching) FOUR different design proposals.</p> <p><input type="checkbox"/> Know the extent to which each of the design proposals does and does not comply with the specification and be able to justify why a design does or does not comply with each point.</p> <p><input type="checkbox"/> Know the key features of each design and how to explain these features in well-articulated annotation.</p> <p><input type="checkbox"/> Know the function of the different parts of each design and how to explain this information in well-articulated annotation.</p> <p><input type="checkbox"/> Know the materials to be used for each of the parts of each design and how to explain why these materials have been selected in well-articulated annotation.</p> <p><input type="checkbox"/> Know which is your preferred design proposal and be able to explain its selection.</p> <p><u>Teaching for Task 4</u></p> <p><input type="checkbox"/> Know how to log into the ‘Class’ on tinkercad using the class code and individual nickname.</p> <p><input type="checkbox"/> The layout and key elements of the initial tinkercad screen.</p> <p><input type="checkbox"/> The concept of ‘workplanes’ and how workplanes are used in tinkercad.</p> <p><input type="checkbox"/> How to select and add blocks from the menu.</p> <p><input type="checkbox"/> How to specify and alter the dimensions of a block, (using both the mouse and by typing figures into the dimensions).</p> <p><input type="checkbox"/> How to use the view cube to navigate around the block.</p> <p><input type="checkbox"/> How to use the ‘duplicate’ (understanding of the word ‘duplicate’) tool to replicate a part.</p>	<p><input type="checkbox"/> View the “Graphics is Powerful” PowerPoint on the shared curriculum drive. Each slide contains an image designed by graphic designers. Each one is highlighting a social issue or injustice. After viewing the slides, (and possibly putting paper copies on each table) ask students the following:</p> <ul style="list-style-type: none"> - What do you think each one is trying to say? - Which do you think is the most powerful/effective and why? <p>Discuss student ideas.</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>
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<p><input type="checkbox"/> The preparatory learning (above) is essential to this assignment work and so should be regularly retrieved.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> How to then drag and drop that block to a different location. Make sure they understand that when they clicked duplicate it placed the new block onto the existing one – and that to see it they need to drag it away from the original. <input type="checkbox"/> Using the align tool (understanding of the word ‘align’) to position blocks in relation to each other. <input type="checkbox"/> Know how to use the flip tool to create a mirror image of a part – and understand that this is VERY helpful in creating a symmetrical design, and in reducing having to draw lots of parts /features twice. <input type="checkbox"/> Know how to ‘fillet’ (radius) unedited blocks using the radius editing tool. <input type="checkbox"/> Know how to fillet edges by creating a fillet block and merging it with the corner of elements of the design. <input type="checkbox"/> Know how to create a more complex shape, or a hole/cut away (by specifying that a block is a hole rather than a solid) and by then grouping blocks. <input type="checkbox"/> Know that the correct term for the action of making these more complex shapes by combining/subtracting simple shapes is that the actions are called ‘Boolean Operations’. <input type="checkbox"/> Know how to move the workplane onto a blocks surface in order to ‘build’ onto existing blocks. <input type="checkbox"/> Changing the colour of blocks so that the design can more closely reflect the designer’s intention. <input type="checkbox"/> Using the block control tools to twist, tilt, rotate, raise and lower blocks. <input type="checkbox"/> Know how to ‘shell parts of a design to create hollow components. <input type="checkbox"/> Know how to switch between perspective and orthographic view and the use of the orthographic view for capturing 2D views. <input type="checkbox"/> Know how to import and incorporate pre-drawn elements for inclusion in the design. <input type="checkbox"/> Know that these pre-drawn elements will need to be credited if used in the assignment work. <input type="checkbox"/> Know how to apply the knowledge learnt above to create a 3D model of the chosen NEA Design. <p><u>Assessed NEA Element</u> <u>Topic Area 3 – (Set Assignment Task 4)</u> <input type="checkbox"/> Know how to use the tinkercad learning above in order to combine shapes and to create a virtual 3D block model of the chosen design.</p>	
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<p><input type="checkbox"/> Students will have very probably seen exploded views etc of products in wider life (e.g. in Ikea furniture assembly instructions) and so those links should be made to aid understanding here.</p> <p><input type="checkbox"/> Students may have encountered the expression 'cross section' before and that prior knowledge should be retrieved to support the understanding here of what a sectional view is.</p> <p><input type="checkbox"/> The preparatory learning (above) is essential to this assignment work and so should be regularly retrieved.</p>	<p><input type="checkbox"/> Know how to 'shell' that block design to make a hollow form.</p> <p><input type="checkbox"/> Know how to duplicate that hollow form and remove the top half from one part, and the lower half from another in order to create two halves that would re-join to create the whole.</p> <p><input type="checkbox"/> Use tinkercad to create at least two other elements of the product.</p> <p><input type="checkbox"/> Know how to arrange the various parts within tinkercad to create an assembled whole.</p> <p><input type="checkbox"/> Know how to 'hide' the workplane and then use the snipping tool to capture images of the assembled whole and do so from a wide variety of angles, (2D and 3D).</p> <p><input type="checkbox"/> Know how to send the assembled design to fusion and to then add dimensions in fusion.</p> <p><input type="checkbox"/> Know how to send a tinkercad design into fusion and then to be able to render it.</p> <p><input type="checkbox"/> Know how to arrange the various parts in an 'exploded view arrangement'.</p> <p><input type="checkbox"/> Know how to 'hide' the workplane and then use the snipping tool to capture images of the exploded view and do so from a wide variety of angles, (2D and 3D).</p> <p><u>Teaching for Task 2</u></p> <p><input type="checkbox"/> Know how to use some of the screen shot images from the previous activity to support the creation of an exploded sketch of the developed concept.</p> <p><input type="checkbox"/> Know how to effectively annotate and label a developed drawing.</p> <p><input type="checkbox"/> Know how to use the scribble and shade technique to create a hand drawn and rendered image of the developed concept.</p> <p><input type="checkbox"/> Know what a sectional view of a product is and the information/details it can show.</p> <p><u>Assessed NEA Element</u></p> <p><u>Topic Area 3 – (Set Assignment Task 2)</u></p> <p><input type="checkbox"/> Know how to sketch a 3d view of the assembled product proposal, (supported by the use of images from the above activity if this is useful).</p> <p><input type="checkbox"/> Know how to render the 3D assembled view using the scribble and shade technique.</p> <p><input type="checkbox"/> Know how to sketch a 3d exploded view of the product proposal, (supported by the use of images from the above activity if this is useful).</p>	
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<p><input type="checkbox"/> Students should have an introductory understanding of what orthographic drawing is from their KS3 studies and the train module in particular. That understanding should be retrieved here to support progress and learning.</p> <p><input type="checkbox"/> Students should have an understanding of 'scale' and 'line types' is from their KS3 studies and the train module in particular. That understanding should be retrieved here to support progress and learning.</p> <p><input type="checkbox"/> The preparatory learning (above) is essential to this assignment work and so should be regularly retrieved</p>	<p><input type="checkbox"/> Know how to sketch a 2d sectional view of the assembled product proposal, (supported by the use of images from the above activity if this is useful).</p> <p><input type="checkbox"/> Know how to thoroughly annotate the exploded view and the sectional view explaining all the features and developments of the proposal.</p> <p><input type="checkbox"/> Know how to fully explain and justify how the design complies with the specification.</p> <p>Teaching for Task 3</p> <p><input type="checkbox"/> Know what 3rd angle orthographic is and the basic rules that govern its use including:</p> <ul style="list-style-type: none"> - Three 2D views, (front, plan and side) - The views have to be correctly aligned with each other. - The views are drawn 'to the side from which that view would be seen' in relation to the primary view. - Drawings must be drawn to scale. <p><input type="checkbox"/> Know the different line types that are used in a typical orthographic drawing.</p> <p><input type="checkbox"/> Know what is mean by 'drawing to scale'.</p> <p><input type="checkbox"/> Know what is meant by 'dimensioning' and the conventions for dimensioning.</p> <p><input type="checkbox"/> Know the conventions for producing an assembly drawing of using isometric.</p> <p><input type="checkbox"/> Know how to export the tinkercad designs into fusion and to then be able to view them in isometric and perspective, (by right clicking on the view cube).</p> <p><input type="checkbox"/> Know the details and information to put into a parts list.</p> <p><u>Assessed NEA Element</u></p> <p><u>Topic Area 3 – (Set Assignment Task 3)</u></p> <p><input type="checkbox"/> Know how to use the tinkercad design exported into fusion to create an orthographic drawing and add key dimensions to that drawing.</p> <p><input type="checkbox"/> Know how to produce an assembly drawing and add details of part numbers and details etc.</p>	
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