Lesson 1	**Design brief and user requirements**		
Objectives	To about the design brief		
Outcomes	Understand user requirements		
Time frame	1 hour	Assessment	Detail in mind map and user requirements
Prior learning	Design ideas, concepts and modelling Year 8 design brief Year 7 target market		
Key vocabulary	Modelling, prototype, shape, design, specification, environmentally friendly, carbon footprint, proposal, aesthetics		
Character and cultural development	User centred design requirements		
Skills Coverage	Research skills, analytical, materials properties		
Extension / challenge	Draw a floor plan of your home and suggest improvements to it _ justify why you think these improvements are necessary. Comment on type of materials		

Lesson Breakdown

- Understanding and introduction into design brief design brief and design problem
- What is a home ?
- Homes in Britain ? style, shapes function, user needs
- Discover the different types of houses around the world with photos of homes made in distinctive local styles
- What are the similarities and differences between your home and selection of different cultural homes (see PowerPoint)
- Produce a chart that looks at the types of materials uses - justify why that material might have been used
- **urban and rural settlements**
- Explain their function, suitability, climate

what is an eco-house? Does anyone live in one? *An ecologically friendly house – not harmful to the environment, it reduces wasteful energy use.* Discuss the features that would like to see in an eco house that would be suitable for a family of four. List these on f/c. Alternative energy sources - wind, solar power, loft insulation and geo-thermal heating are some of the ideas that could be included. What other features might be suitable? Different building materials such as adobe/mud brick walls, reinforced concrete, reinforced polystyrene block, stone/rock walls, straw bale and timber framing could be used. Double glazing, wall insulation, a system to collect rainwater for human use such as bathing, cleaning, watering the plants, and washing the dishes are all possibilities. Reed beds allow water to be cleaned. Other possible energy-efficient features are dual flush toilets, energy saving light bulbs, and appliances with high energy efficiency codes accreditation. Large windows provide natural lighting.

Homework – What is your home like?draw a picture of your home. Write **key details** about your home in the black boxes.

For example:
+ What materials is your home made of? **+** How many rooms does it have?
+ Do you have a garden? **+** Any thing else you think is important.

<table>
<tr><td>Lesson 2</td><td colspan="3">Design proposal</td><td rowspan="8">Lesson Breakdown

● Explanation of eco home ? similarities and difference in eco home design
● Importance of design an eco home – why ?
● Sustainable energy sources
● Building materials
Insulation – sheep’s wool, etc.
● Windows & doors
● Heating – alternative energy, wind, solar, etc.
● Plumbing – water, toilets, reed beds, etc.
.Land use – garden, etc

● Development in design technology – environment - alternative energy
● Repairability of designers, engineers and technologists
● write a proposal for an eco house build using the knowledge of Eco housing and reasoning behind building one.

Details of eco houses

http://www.environmentcity.org.uk/article.asp?articleID=120&parentID=105

http://wwwsimondale.net/house/ and

http://tinyhouseblog.com/earthcob/simonshouse/ built by the owners

http://www.cat.org.uk/information/aboutcatx.tmpl?init=1 Centre for Alternative Technology</td></tr>
<tr><td>Objectives</td><td colspan="3">To produce a proposal and specification for an eco-house to meet the needs of the customer.</td></tr>
<tr><td>Outcomes</td><td colspan="3">Students to produce a design specification</td></tr>
<tr><td>Time frame</td><td>1 hour</td><td>Assessment</td><td>Quality of specification</td></tr>
<tr><td>Prior learning</td><td colspan="3">Materials of homes</td></tr>
<tr><td>Key vocabulary</td><td colspan="3">Sketchup, accessfm, CAD/CAM, Laser cutter, 3D printer, Line tool, select tool, Delete tool</td></tr>
<tr><td>Character and cultural development</td><td colspan="3">Industry standard technical drawings carried out in design/CAD/CAM industry</td></tr>
<tr><td>Skills Coverage</td><td colspan="3">CAD/CAM, Specification, Accessfm</td></tr>
<tr><td>Extension / challenge</td><td colspan="3">- alternative eco friendly matricula – bamboo, straw bales</td><td>Homework – what’s your area like ?</td></tr>
</table>

<table>
<tr><td>Lesson 3</td><td colspan="3">Past and present house designs to broaden understanding of materials and shapes</td><td rowspan="10">Lesson Breakdown

• Teacher to present students with a range of eco houses and discuss in details what makes them different to traditional homes
• Students to analyse two different types of homes and collect examples to include in design ideas
• Watch examples of eco-friendly products on grand designs
• Teacher to demonstrate how to draw and include examples into designs
• Students to continue to develop design ideas

Choose one architect:

• Daniel Libeskind b.1946
• Frank Lloyd Wright 1867-1959
• Mimor Sinan 1489-1588
• Giles gilbert Scott

Explore the below :
• Original and effective design ideas
• Unique and interesting architecture features
• Nationality
• Builds they have designed
• Era</td></tr>
<tr><td>Objectives</td><td colspan="3">To look at the work of others by examining in detail their work.</td></tr>
<tr><td>Outcomes</td><td colspan="3">Analysis of past and present designers / architecture</td></tr>
<tr><td>Time frame</td><td>1 hours</td><td>Assessment</td><td>Inclusion of eco-friendly design and materials</td></tr>
<tr><td>Prior learning</td><td colspan="3">Specification points, product analysis, Eco friendly homes, grand designs. Architecture</td></tr>
<tr><td>Key vocabulary</td><td colspan="3">Eco home, alternative sources of energy, impact, sustainability, user needs</td></tr>
<tr><td>Character and cultural development</td><td colspan="3">History of architecture, role in society, shapes, design, user needs</td></tr>
<tr><td>Skills Coverage</td><td colspan="3">Presentation skills, development work, SketchUp tools, CAD development</td></tr>
<tr><td>Extension / challenge</td><td colspan="3">Research Giles Gilbert scott – explore what his role was within the Liverpool cathedral and investigate how he was chosen as the architect for the Liverpool Cathedral</td><td>Homework – looking at shape of eco homes – analyse why they have been designed like that ? analyse the materials that have been used and impact on the environment</td></tr>
</table>

Lesson 4	**New and emerging technologies**		**Lesson Breakdown** • Introduce new and emerging technologies to pupils Ask pupils to look at a range of houses. Discuss materials that have been used in building the house. • What are the walls made from? • What are the windows made from? Are they large or small? • What is the roof made from? • Where are they getting light from? • Where does their rubbish go? Ask pupils to think of ways the house could be wasting energy and brainstorm their ideas. Explain that they are going to be building a model eco-house incorporating as many ways of making it eco-friendly as possible. Ask them to focus on three main areas: • Energy creation • Preventing energy waste (light and heat) • Saving water and reducing rubbish • Introduce careers in design, engineering and technology - architects – who's role is it to develop these materials or manufacture them • Discussion: Talk about the responsibility's different members design and technology to develop more sustainable means of construction. • Theory: Introduce in detailed eco design and encourage students to make notes of design ideas • Students to incorporate design elements to design ideas with reference to responsibility to engineer, designer or technologist
Objectives	To investigate new and emerging technologies environmentally friendly/ carbon footprint and the responsibility of designers, engineers and technologists		
Outcomes	Observe and examine the work of others		
Time frame	1 hours	Assessment	**Time frame**
Prior learning	Eco houses		
Key vocabulary	Modelling, prototype, shape, design, specification, environmentally friendly, carbon footprint, proposal, aesthetics.		
Character and cultural development	Careers in design and technology, designing eco houses for the future.		
Skills Coverage	Designs, sketches, product analysis, technology, research, analytical		
Extension / challenge	- Include reference to other careers in design and technology like construction - Include reference to Co2 Emissions		Homework – Pupils could investigate items inside the house which are eco-friendly e.g. white goods with A+ energy rating, furniture made from sustainable sources, fabric made from organic materials. Pupils could make a display of their eco-homes or present them in

Lesson 5	**Testing material for insulation**	**Lesson Breakdown**
Objectives	They investigate materials that are good for insulation (link with Science) and which materials are appropriate for different uses	Investigation into materials for insulation. Show pupils several different materials that could be used for insulation. Explain that they will conduct an experiment to see which one is the best at keeping heat in. Each group will require two beakers – one as a control and one to wrap insulation around. They will also require two thermometers. Pupils follow this method: 1. Wrap one beaker with insulation. 2. Measure 100 cm3 hot water into both beakers. 3. Record the temperature of both beakers. 4. Start the clock. 5. Record the temperature every 5 minutes for 30 minutes into a table. These results can be plotted into a graph. Encourage groups to test different materials, such as bubble wrap, foam, different fabrics (cotton, wool, carpet). From the class results, decide which materials were the most successful at keeping in the heat. Pupils can also investigate which materials would be appropriate for the different places that insulation is needed in the house i.e. loft insulation would not be appropriate for curtains Evaluation of results
Outcomes	learn about eco-friendly houses. They learn that physical properties of houses can affect how good they are for the environment. They investigate materials that are good for insulation (link with Science) and which materials are appropriate for different uses. They are also shown the use of solar power as a source of energy in the home. The main outcome of this unit will be the design and construction of a model eco-house.	
Time frame	1 hour	
Prior learning	Technical drawings	
Key vocabulary	designing e.g. modelling, fair test, labelling • making e.g. cutting, fixing, measuring, strengthening • knowledge and understanding e.g. structure, window, wall, roof, insulation, solar power, waste, energy, heat, double-glazing, draughts	
Character and cultural development	Environmental impact of correct home insulation	
Skills Coverage	Extension: Saving Energy (heat and light) – what are the bets ways to do this ?	Homework: resources for the modelling task – fabrics, colours, materials

Lesson 6	**Model and construction of an eco home**			Lesson Breakdown The task is for pupils to construct a model of a house, incorporating as many features as possible which will help to save energy, water and waste. In groups, pupils brainstorm ideas. It may help to refer back to the PowerPoint. Pupils then design their house, labelling all the different eco-features they plan to incorporate and what materials they will use. If possible, allow pupils to incorporate the mini solar panels and LEDs into their models. Pupils construct a the model homes. Encourage them to evaluate their work as it progresses and seek improvements to their first attempts. Floorplanner - Create 2D & 3D floorplans for real estate, office space or your home. You will work in teams to convert a box into a model eco-home. You will have a limited time. You must use a range of materials to make it as eco-friendly as possible. You will be given small solar panels to light your home. Alternative ideas : ● Introduce a range of different technical drawings ● Demonstrate orthographic drawing and plan views ● Demonstrate the use of scale ● Students to complete design idea in plan view to the correct scale ● Demonstration: Isometric design of house using isometric paper Students to complete isometric drawing with annotations or construct model using given material.
Objectives	To review and evaluate concepts			
Outcomes	Construction model of a house			
Time frame	1 hour	Assessment	Model of house and justification of choices	
Prior learning	Steps taken and evaluated			
Key vocabulary	Model, solar panels, led lighting, solar panels			
Character and cultural development	Cultural homes , industrial contexts (energy manufacturing) domestic and local contexts (health and culture)			
Skills Coverage	Prioritising Initiative, teamwork, time keeping, interior design, shaping, manipulation of materials.			
Extension / challenge	Write steps taken to complete design and complete a sketch of new concept			Homework: Write steps taken to complete design and complete a sketch of new concept

Year 9 Design Technology 2022

Rotation 1

KS3 Subject Intent: What we want the pupils to know by the end of Year 9 in product design

Students will develop knowledge regarding aerodynamics, physical and working properties of materials. Students will undertake research and testing to help evaluate ideas to generate fully functional design proposals. Students will develop practical skills when working with materials for example metals and plastics including, cutting, shaping, forming and joining. They will understand how to use creativity and imagination to solve real and relevant problems considering the needs, wants and values of others.

Design : research to identify user needs: identity and solve design problems and how to reformulate the problems given. User centre design to generate creative ideas, interactive process of designing and making.

Make: specialist tools, techniques and processes, consideration for eco building materials

Evaluate: test, evaluate refine ideas, take into account others feedback, understanding of the environment and impact on individuals and society

Technical knowledge : properties of materials and performance of materials, movement and force changes using mechanical systems – solar panels, LED lighting, insulation – eco buildings materials. New and emerging technologies. Advanced electrical and electronic systems can be powered and used in the home – heat, light, sound, movement. Electronics inputs (sensors) and control outputs - actuators as a control output.

KS3 Subject Ethos: How we reflect the Academy's core values within the Curriculum: Respect, Ambition, Resilience, Compassion The core ethos of the school is to aim to send each young person able and qualified to play their full part, and in year 8 our aim if to allow each young person to develop skills and knowledge; both in practical marking, from woodwork to food and nutrition. The students will be supported in DT with outcomes and lessons constantly adapting to suit the learners needs, in order for them to be proud with what outcomes they can achieve as they look towards the future. As a knowledge engaged curriculum, we believe that knowledge underpins and enables the application of skills; both are entwined. As a department we define the powerful knowledge our students need and help them recall it by developing their technical skills that focus on visualisation and realisation of ideas and information, with a focus on nutrition, drawing, , physical materials food - hard materials as well as knowledge and understanding of the current and emergent means of production, design and food nutrition.