



SOC

<p><b>Description of Unit</b>                  This project provides pupils with the opportunity to design a desktop light using a copper pipe as an arm. They will be asked to solve the problem of how to fix the pipe at an appropriate angle using a second material (sheet metal, acrylic or wood) and curve/bend the pipe to complement the design..</p>		
<p><b>Knowledge, Understanding and Skills</b></p> <p><b>Developing pupils' Knowledge understanding and skills; Developing creative thinking and problem solving skills through:</b></p> <ul style="list-style-type: none"> <li>• <b>Design</b> – identifying problems; investigating, generating, developing, modelling and evaluating design proposals; giving consideration to form, function and safety;</li> <li>• <b>Communication</b> – use of free-hand sketching and formal drawing techniques;</li> <li>• <b>Manufacture</b>- safe use of a range of tools and processes appropriate to materials, demonstrating accuracy and quality of outcome.</li> </ul>	<p><b>Key Elements</b></p> <p><b>Personal understanding</b> – exposure to good exemplars of product designs in relation to personal lifestyle.</p> <p><b>Moral character</b> – Demonstrate cooperation and respect for others. To tolerate errors and set-backs and to learn from these experiences.</p> <p>Demonstrate tenacity to meet design challenges, using failure as a learning experience.</p> <p><b>Mutual understanding</b> – agreeing criteria to evaluate their own work and that of others</p> <p><b>Education for sustainable development</b> – encouraging pupils to trade spare cut-offs to reduce waste of materials.</p> <p><b>Personal health</b> – Abide by health and safety rules when using tools, machines and equipment.</p>	<p><b>Thinking Skills &amp; Personal Capabilities</b></p> <p><b>Thinking, Problem Solving and Decision Making</b>                  Generate a range of possible solutions. Examine options and weigh up pros and cons.</p> <p><b>Working with Others:</b>                  Working effectively in group work tasks.</p> <p><b>Self management:</b>                  Plan how to go about a task. Focus, sustain attention and persist with tasks.</p> <p><b>Manufacturing:</b>                  Selecting and using materials fit for purpose; safe use of a range of tools and processes appropriate to materials, demonstrating accuracy and quality of outcome;</p>
<p><b>Learning Outcomes</b></p> <ul style="list-style-type: none"> <li>• demonstrate practical skills in the safe use of a range of tools, machines and equipment,</li> <li>• research and manage information effectively to investigate design issues;</li> <li>• work methodically through the design processes;</li> <li>• communicate effectively in oral, visual (including graphic), written,;</li> <li>• work independently, managing evaluating and improving own learning;</li> <li>• work effectively with others;</li> <li>• demonstrate creativity and initiative when developing ideas and following them through;</li> </ul>	<p><b>Possible Links with other Areas of Learning/Subject strands:</b></p> <p><b>Maths -</b></p> <ul style="list-style-type: none"> <li>• Symmetry</li> <li>• Scale drawing</li> <li>• Measurement</li> <li>• Evaluating and appreciating their own and others' work through discussion and reflection</li> </ul>	

## Lessons

Learning Intentions Pupils are learning	Learning and teaching activities	Opportunities for Thinking Skills and Personal Capabilities / development <i>(Including Communication, Using Mathematics and Using ICT)</i>	Opportunities for assessment <i>(For and of Learning)</i>	Resources
<p><b>1. Pupils will identify aspects to be considered when solving a problem.</b></p> <p><b>2. Pupils will be able To produce quality research and information about a product/problem</b></p> <p><b>2. Pupils will be able to generate effective solutions to the problems identified in the form of 2D and 3D sketches</b></p>	<p>This task allows pupils to break the problem down by identifying aspects to be addressed, making it easier to manage/more attainable.</p> <p>Pupils will research a range of existing, similar or inspirational products with a focus on features, form, structure and materials.</p> <p>Good research is key in developing a successful outcome.</p> <p>The teacher will demonstrate how research can be used to inspire the generation of solutions to a problem. Pupils will produce a range of ideas to resolve the problems posed.</p>	<p>Select a focal point or area as to which the project is aimed at.</p> <p>Select, classify, compare and evaluate information.</p> <p>Use own and other's ideas to locate sources of information.</p> <p>Use a range of methods for collating, recording and representing information.</p> <p>Generate possible solutions, try out alternative approaches, and evaluate outcomes.</p>		<p><b>All of the activity sheets come with teacher guidance material.</b></p> <p>Activity sheet – Design Brief</p> <p>Activity sheet – Research</p> <p>Activity sheet – Design page</p>

<p><b>3. Pupils will be able accurately mark out a sheet metal design/ wooden/ acrylic and copper pipe bend in orthographic front projection.</b></p>	<p>This task allows pupils to generate their own version of the Male/Female concept. Using the front elevation template they will draw out one side of the symmetrical shape identifying waste and bend lines. Emphasis on accuracy. <i>Appropriate teacher demonstration</i></p>	<p>Make ideas real by experimenting with different designs, actions, outcomes</p> <p>See opportunities in mistakes and failures.</p>		<p>Activity sheet – Design page Sheet metal</p>
<p><b>4. The pupils will be able to use card as an effective way to model/trial an idea. (not applicable if making wooden base)</b></p>	<p>This task demonstrates how card can be used as a low cost, quick method of modelling and realising a concept. This process is to be repeated until pupils produced a highly developed outcome.</p>	<p>Generate possible solutions, try out alternative approaches, and evaluate outcomes.</p>		<p>Activity sheet – Design page Card model</p>
<p><b>5. Pupil will get the opportunity to design a system in the form of a PCB layout.</b></p>	<p>This task encourages pupils to develop their skills in system design by developing their own PCB layout. <i>Appropriate teacher demonstration</i></p>			
<p><b>6. Pupils will plan their manufacture of their product.</b></p>	<p>This task encourages pupils to develop their skills in system design and design their own PCB layout. <i>Appropriate teacher demonstration</i></p>	<p>Organise and plan how to go about a task</p>		<p>Activity sheet – Manufacture sheet, production plan.</p>

<p><b>7. Manufacture</b>  <b>Pupils should be able to:</b></p> <p><b>(a) Understand the process of manufacturing the Light.</b></p> <p><b>(b) Develop the skills required to produce a high quality product.</b></p> <p><b>(c) Understand the health and safety implications of manufacturing when in the workshop.</b></p>	<p>This task allows pupils to develop a production plan. This allows pupils to clarify the process and the steps involved. This should encouraging them to:</p> <ul style="list-style-type: none"> <li>- follow step by step instructions</li> <li>- work more independently/self reliant (less dependency on the teacher for instruction)</li> <li>- have a clearer understand the processes</li> </ul> <p>The teacher will demonstrate the correct and safe use of workshop tools and equipment.</p> <p>Pupils will manufacture their product using a range of workshop skills and techniques with a focus on accuracy and finish.</p> <p><i>Teacher explanation</i>  Theory on bending pipe metal and product examples</p>	<p>Take personal responsibility for practical work.</p> <p>Focus, sustain attention and persist with tasks</p> <p>Seek advice when necessary</p> <p>Make ideas real by experimenting with different designs, actions, outcomes</p> <p>Take personal responsibility for work with others and evaluate own contribution to the group.</p> <p>Respect the views and opinions of others.</p> <p>Learn from and value other people's ideas.</p>		<p>Theory sheet – Bending</p> <p>See teacher guidance booklet for manufacturing resource list</p>
---	---	--	--	---

**8. Pupils should be able to objectively evaluate of the outcome.**

Teacher and pupil review of the outcome, this can take place in peer groups or as a whole class group.

Followed up with teacher/pupil individual assessment.

Note: Pupils should be made aware of the respective assessment criteria at the start of the design assignment and manufacturing assignment.

**Debrief –**

- Pupils will be asked to feedback on the activity:
- What was difficult about this exercise?
- Did you find it useful in helping to clarify design thinking?