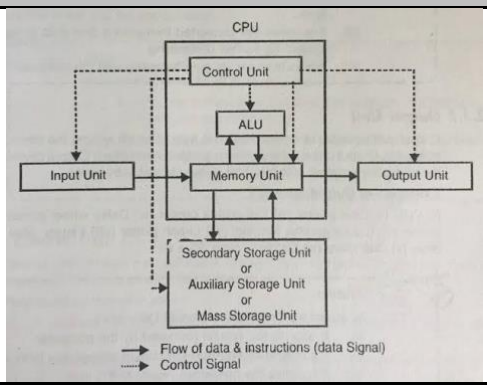
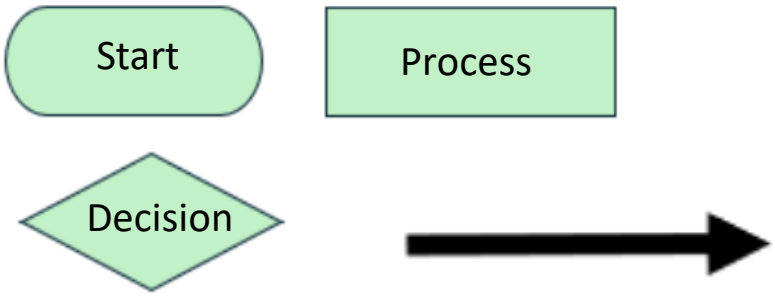
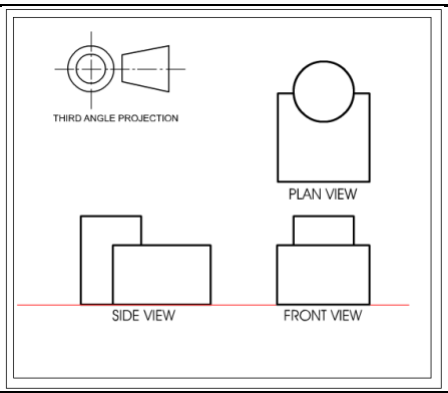
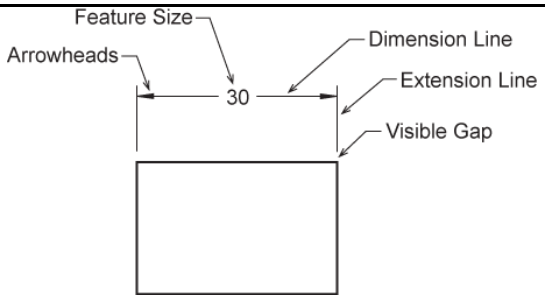
Engineering	Communicating Design Outcomes	Year 10

Design Communication		
1	Isometric Drawing	**Isometric drawings** are a type of 3D representation of an object on a 2D surface, where all three axes (length, width, and height) are equally foreshortened.
2	Oblique Drawing	**Oblique drawing** is a simple type of 2D technical drawing used to represent 3D objects.
3	Orthographic Drawing	**An orthographic drawing,** also known as an orthographic projection, is a way to represent a 3D object in 2D by using multiple views.
4	Exploded View Drawing	**An exploded view drawing** is a technical illustration that shows the relationship and order of assembly of components within a product or system. Also known as an **assembly drawing.**
5	Free hand sketching	**Freehand sketching** is the art of drawing without relying on tools like rulers or stencils, using only your hand, pencil, and paper. Also known as a **concept sketch.**
6	Working Drawing	**Working drawings** are detailed, scaled technical drawings used in construction and manufacturing to guide the building or production process.
Diagram		
7	Block Diagram	 Diagram that shows in schematic form the general arrangement of the parts or components of a complex system or process, such as an industrial apparatus or electron circuit.
8	Flow chart Symbols	
9	3rd Angle Orthographic orientation	
Keywords Vocabulary		
10	Title Block	

<table>
<tr><td></td><td></td><td colspan="2">Figure 2 Title block in compact form
<table>
<tr><td>Responsible dept.
ABC 2</td><td>Technical reference
Patricia Johnson</td><td>Document type
Sub-assembly drawing</td><td colspan="4">Document status
Released</td></tr>
<tr><td rowspan="2">Legal owner</td><td>Created by
Jane Smith</td><td rowspan="2">Title, Supplementary title
Apparatus plate
Complete with brackets</td><td colspan="4">AB123 456-7</td></tr>
<tr><td>Approved by:
David Brown</td><td>Rev.
A</td><td>Date of issue
2002-05-14</td><td>Lang.
en</td><td>Sheet
1/5</td></tr>
<tr><td colspan="7">180</td></tr>
</table>
Figure 3 Title block with person name fields on additional line
<table>
<tr><td>Responsible dept.
ABC 2</td><td>Technical reference
Patricia Johnson</td><td>Created by
Jane Smith</td><td>Approved by:
David Brown</td><td colspan="3"></td></tr>
<tr><td colspan="2" rowspan="3">Legal owner</td><td colspan="2">Document type
Sub-assembly drawing</td><td colspan="3">Document status
Released</td></tr>
<tr><td colspan="2" rowspan="2">Title, Supplementary title
Apparatus plate
Complete with brackets</td><td colspan="3">AB123 456-7</td></tr>
<tr><td>Rev.
A</td><td>Date of issue
2002-05-14</td><td>Lang.
en</td><td>Sheet
1/5</td></tr>
<tr><td colspan="7">180</td></tr>
</table></td></tr>
<tr><td>11</td><td>Dimensions</td><td colspan="2"> 
</td></tr>
<tr><td>12</td><td><u>CAD- Computer aided Design</u></td><td>Advantages
Competitively priced packages.
Drawings can be produced an amended quickly.
Most cad programs have online training to upskill.
Range of programs that are available internationally. Files can be shared easily.
CAD produces designs that can be rendered and viewed from a 360 degree.</td><td>Limitations
Requires high processing capacity so IT needs to be high quality- expensive.
Initial training in complex programs is necessary.
Can be time consuming to produce initial designs.
Computers using the software are susceptible to software changes.</td></tr>
</table>

Year 10

Communicating Design Outcomes

Engineering

Working drawings

BRITISH STANDARD BS 8888:2011

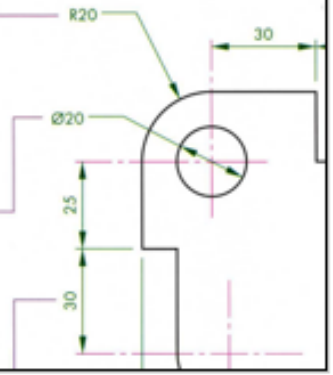
Table 3 Basic types

No.	Representation	Description
01		continuous line
02		dashed line
03		dashed spaced line
04		long-dashed dotted line
05		long-dashed double-dotted line
06		long-dashed triplicate-dotted line
07		dotted line
08		long-dashed short-dashed line
09		long-dashed double short-dashed line
10		dashed dotted line
11		double-dashed dotted line
12		dashed double-dotted line
13		double-dashed double-dotted line
14		dashed triplicate-dotted line
15		double-dashed triplicate-dotted line

Dimensioning standard practice

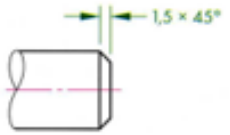
Radii
Always show the radius on arcs, curves and rounded corners. The letter symbol **R** is always shown in front of the figure. Radii should be dimensioned by a line that passes through or inline with the centre of the arc. The dimension line should have only one arrowhead, which should touch the arc.

Diameters
Where a complete circle is shown in a drawing, the diameter is shown by placing the symbol Ø in front of the figure. The radius should never be used to dimension a complete circle. When holes or circles are dimensioned, the diameter is shown as well as the location of the centre.



Chamfers

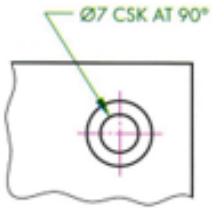
Chamfers at 45° should be dimensioned as shown. Chamfers at an angle other than 45° should dimension the angle separately.



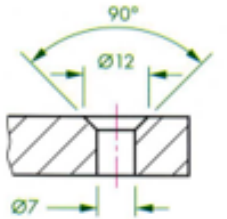
45° chamfer

Countersinks

Two examples of dimensioning countersunk holes are shown. The diameters of the countersink and the hole and the angle of the countersink should be given.



Plan view of countersink



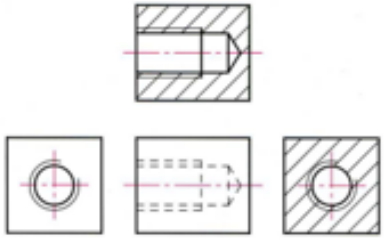
Sectional view of countersink

Screw threads

Figures A, B and C show the main conventions and details of how orthographic and sectional views of threaded parts are drawn. These conventions are used irrespective of thread type. However, if the thread type and size needs to be given, this is usually done in note form.

Figure D shows details of the thread run-out and how assembled threaded parts are drawn. Note how the hatching is affected when screw threads are assembled. Cross-hatching lines stop at the screw, but continue to the inside line when a screw is not present.

A External screw threads



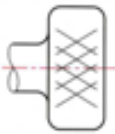
B Internal threads (blind hole)

C Internal threads (through hole)

Knurling

Knurling is represented by showing only part of the surface it is applied to. For diamond knurling the lines should be drawn at 30° to the centre line.

Straight knurling



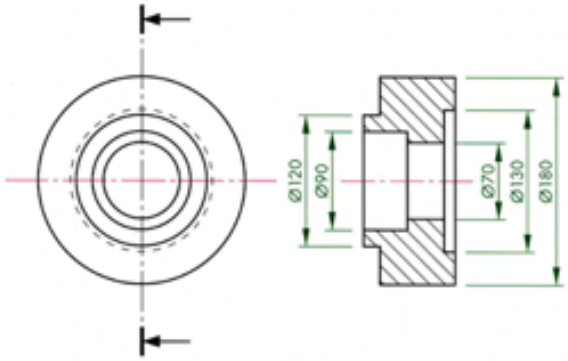
Diamond knurling

Tolerances

Engineering tolerance is **the allowed variation in measurements deriving from the base measurement**. Tolerances can apply to many different units. For example a component may have a dimension of 10 mm with a tolerance of ± 0.2mm this means that the finished dimension can be 0.2mm smaller (9.8mm) or 0.2mm bigger 10.2mm or any measurement that falls within that range.

Sectional Views

Dimensions of diameters should be placed on the view providing the greatest clarity:



Sectional views are used on engineering drawing to show a 'cut away' cross-section of an object so that the internal features can be detailed.