



KS4 Knowledge Organiser

Subject: Engineering

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Also, please remember, you should spend 20 minutes on the following apps and websites:

- GCSE Pod
- PIXL Lit
- PIXL Maths App
- Tassomai
- BBC Bitesize
- Onmaths
- Corbett Maths
- English Instagram @greenacreenglish
- Quizlit

If you would like support with any of the apps, please email

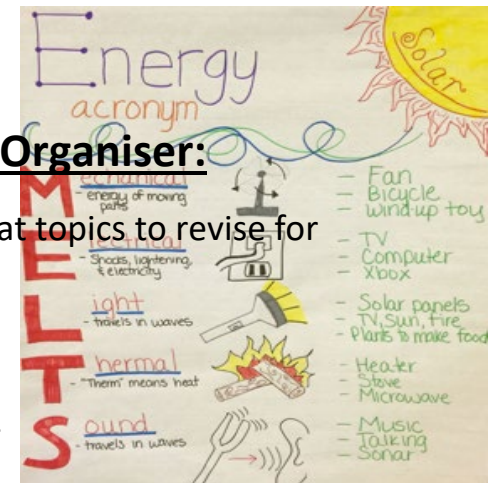
each week

- You will be expected to revise for at least 30 minutes each evening
- Ask someone to quiz you on the key information
- Remember to APPLY the information using the tasks included in each Knowledge Organiser

Revision techniques and strategies

How to use the Knowledge Organiser:

- Your teacher will direct you to what topics to revise for



- Make a plan - schedule dedicated study time into your daily schedule. Be organised with your time. Stick to your plan. Sacrifice some of your social time for study time. No pain, no gain!
- Start your revision early - start now, if you have not already done so, not days before your exam.
- Do small chunks of revision. Your brain is not capable of mass storing information in a short space of time. Digesting small chunks of information, over a longer period of time, means you are more likely to remember it

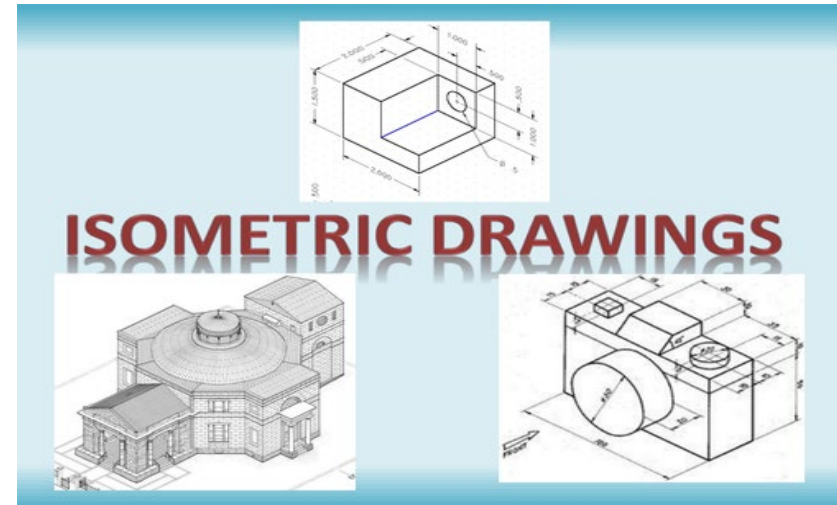
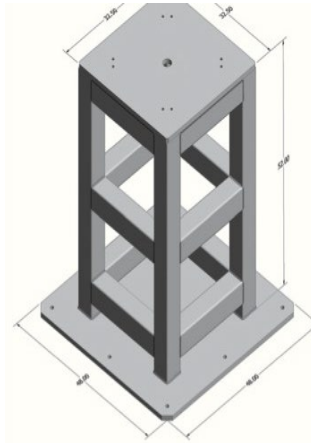
Click on the QR code below which will take you to the revision support page on our website:



Topic 1: Isometric Drawing

Isometric drawing

Isometric drawing is a British Standard method of drawing; it is recognised in many different places of work. For example, Engineers who make products will need to look at Isometric drawings produced by the designer so that they are able to make the product.



Isometric drawings are a good method of presenting your design ideas in 3D. In Engineering, you will need to show ideas for your assignments and in your exam. You have been drawing 3D design ideas for your speaker box.

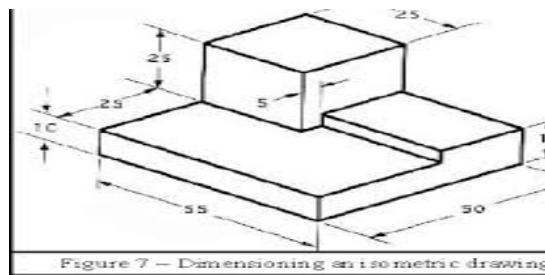


Figure 7 – Dimensioning an isometric drawing

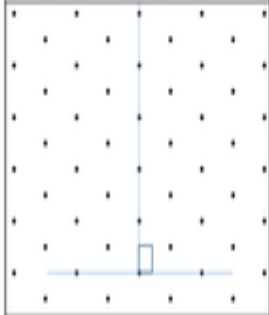
Isometric drawings allow people at work such as Engineers, Kitchen fitters, Builders, Interior designs, Carpenters and many other professions to see what the finished product / project will look like.

Isometric drawings keep all vertical lines at 90 degrees. Horizontal lines are drawn at 30 degrees to the vertical line.

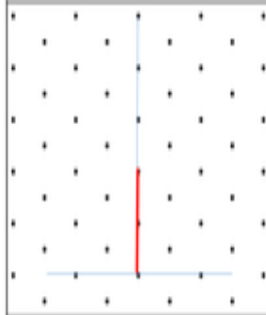
Isometric Projection

Key words: parallel right angle vertical horizontal diagonal equal isometric edge

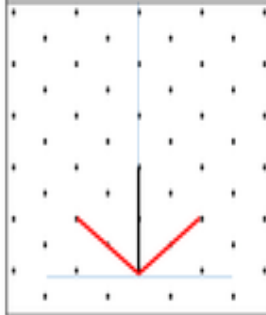
1. Draw a guide line vertical down the page centre of the page and horizontal across the page to form a right angle.



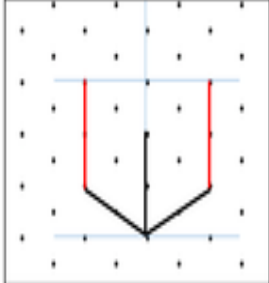
2. Draw the first vertical line of the cube on the centre guide to the length required.



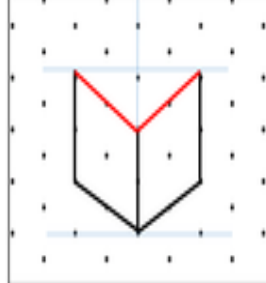
3. Add in the base lines of the cube at 30° angles to the horizontal guide line.



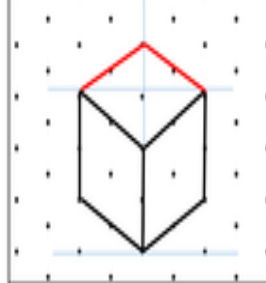
4. Create the side of the cube by drawing two vertical lines the same length as your centre line and parallel to the centre guide line.
5. Add in a new guide line across the top of the two new lines.



6. To make the top front of the cube, draw two lines parallel to the two base line at 30° by connecting the centre line to the two sides.



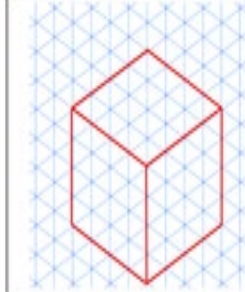
7. Add in the top back edges of the cube at 30° angles to the horizontal guide line.



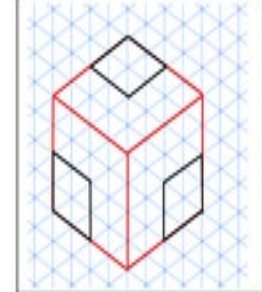
Isometric crofting

Key words: depth height width vertical horizontal diagonal equal isometric

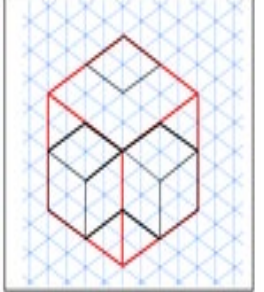
1. Draw a crate to fit the width, depth and height of the object you want to draw.



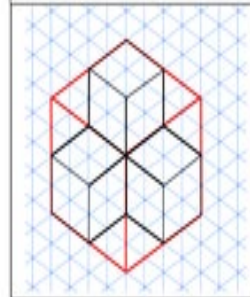
2. Draw the ends of your shape, using the grid as a guide.



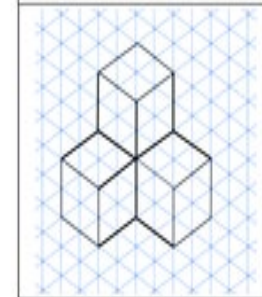
3. Add in the base lines of the cube at 30° angles.



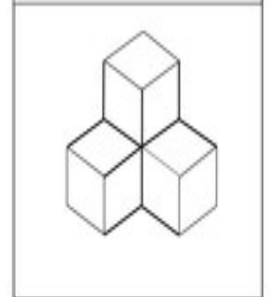
4. Create the sides of the cube by drawing the vertical lines.



5. The crate can be removed to leave the final shape.



6. Show form by rendering the shape.



Topic 2: Third Angle Orthographic Projection

Orthographic drawings are British Standard drawings (ISO, BSI) that contain all the relevant details and information needed for a part / product to be made by a third party. For example a designer will design a car engine and produce Orthographic drawings of the different parts for the Engineers in the factory to use to make the parts to the correct sizes, from the correct materials etc.

Many products are designed by Designers and Engineers in the UK. The drawings can then be sent to manufacturing companies in countries such as China who have the factories and equipment to manufacture the product.

These drawings therefore need to be very accurate with all the necessary details communicated clearly and effectively. Any errors in the drawing would lead to a product that would be faulty.

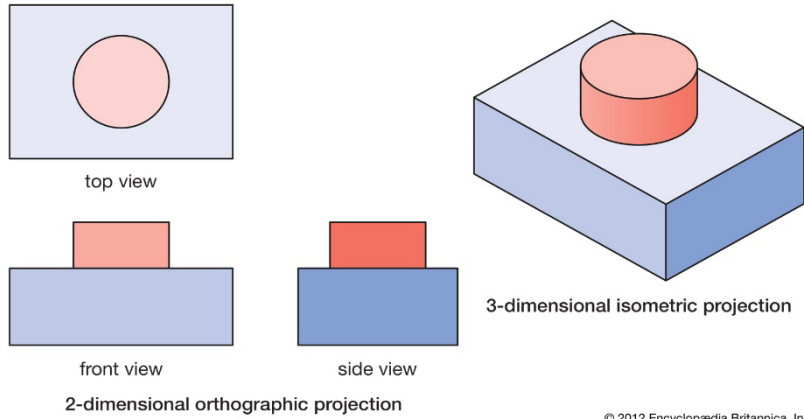
This is why orthographic drawings are standardised using the same format and symbols. Anyone should be able to read and understand the drawing as they must conform to **ISO and BSI**.

Orthographic drawings can be referred to as Technical Drawings, Working Drawings or Engineering Drawings.

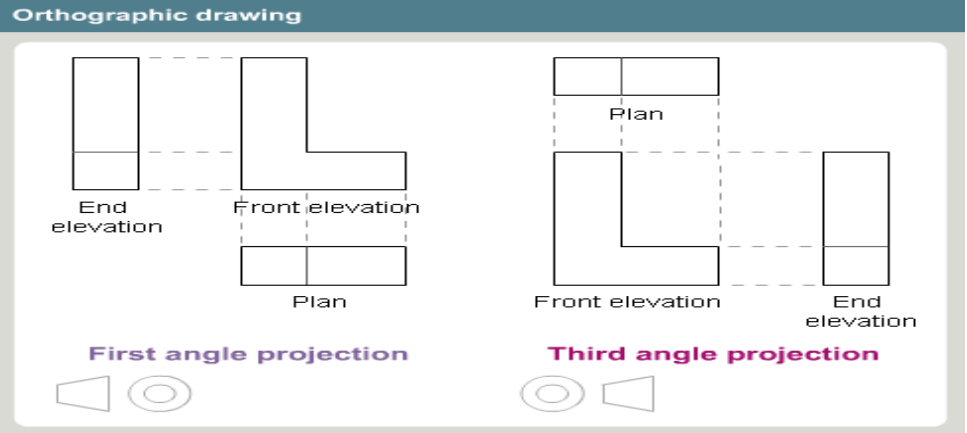
The following conventions must be shown on the drawing so that the person making the product knows what they are doing when making it. For example, all sizes and dimensions would be shown as would the material to be used.

- **Different views**
- **Dimensions**
- **Scale**
- **Materials**
- **Hidden detail**
- **Centre lines**
- **Finishes**
- **Section views**
- **Date the drawing was produced**
- **Engineers/Designers name**
- **Angle Symbol**
- **Title**
- **Parts List**
- **Manufacturing processes**

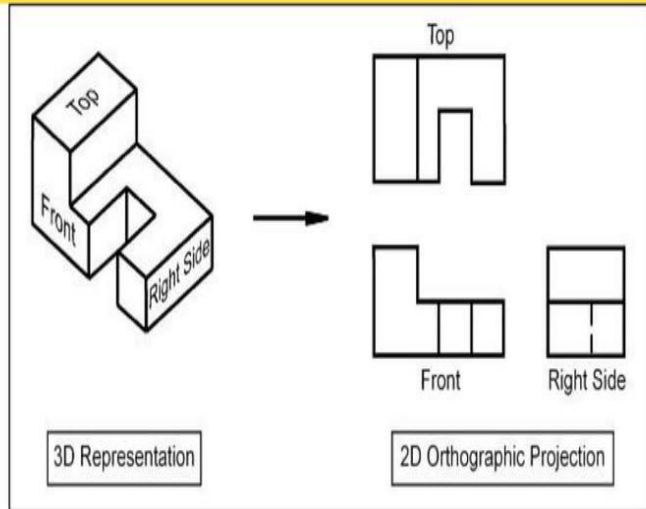
Orthographic and isometric projections of an object



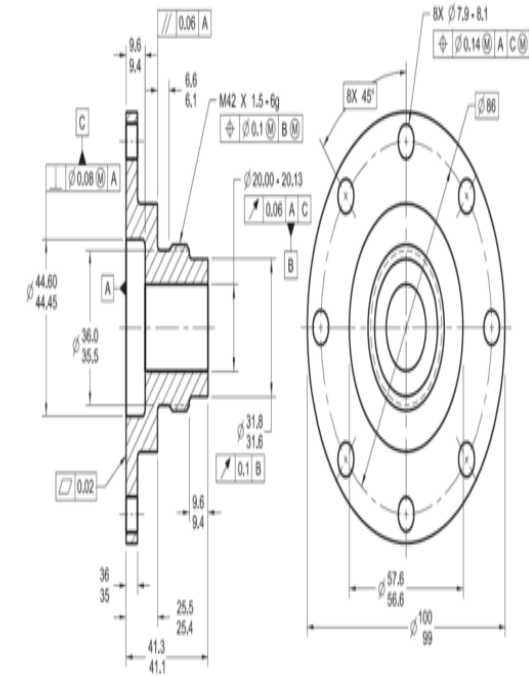
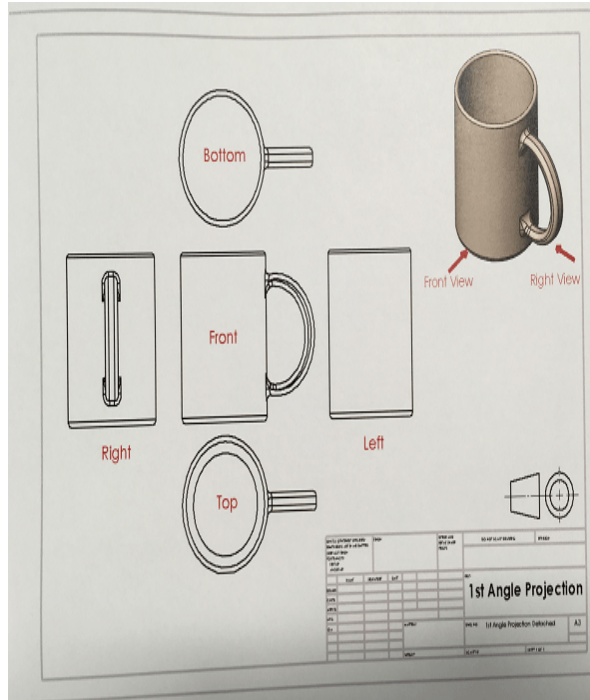
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ORTHOGRAPHIC PROJECTION.



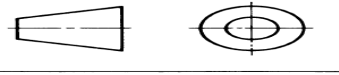
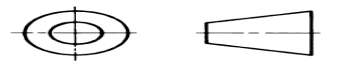
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Topic 3: Engineering Drawing Dimensions / Line type

Engineering drawings have certain standard conventions, so that any worker that is using the drawing to make something can read it.

First angle and Third angle drawing should have a symbol on the drawing to show you which of the two types of Orthographic drawing has been used in the drawing.

Projection	Symbol
First angle	
Third angle	

Dimension lines on an Orthographic drawing are very important as the person making or building the product uses the dimensions when cutting material to size or positioning features on the product they are making.

All dimensions should be kept to a minimum, so that the page is not covered in too many dimensions that will confuse the person reading it

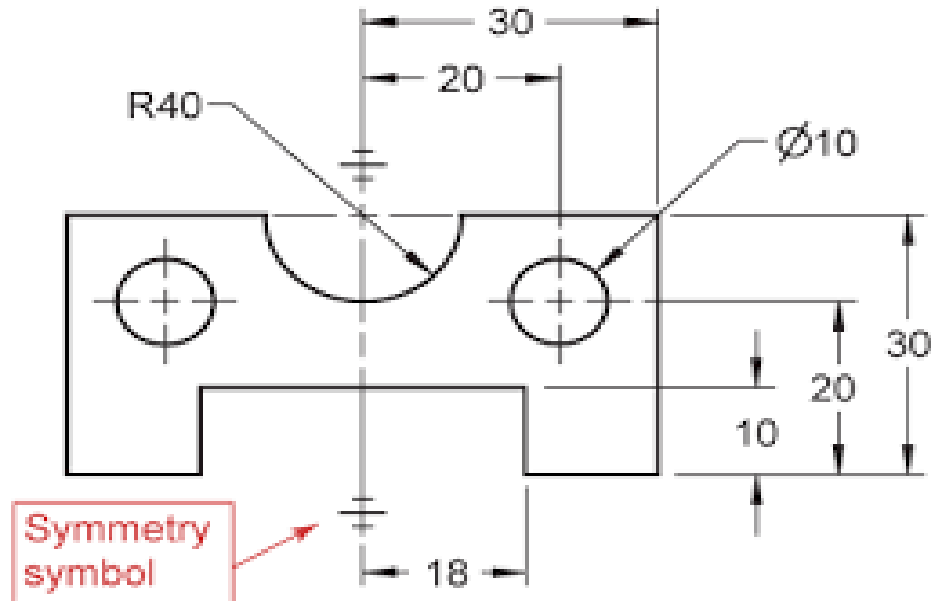
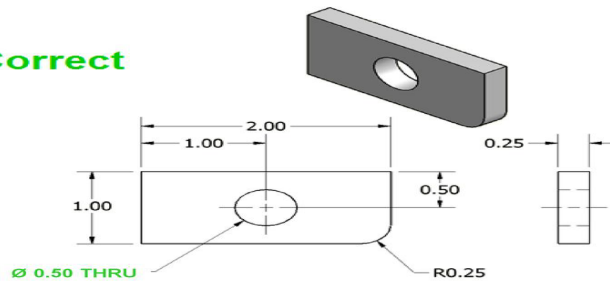
All horizontal dimensions should be show be on the left or right.

Dimension should be above or below the dimension line.

Arrowheads must be a solid block.

11. Avoid crossing dimension or extension lines with leader lines.

Correct



Different types of line used in Engineering drawings

There are many are many different types of line that are used in Engineering drawings.

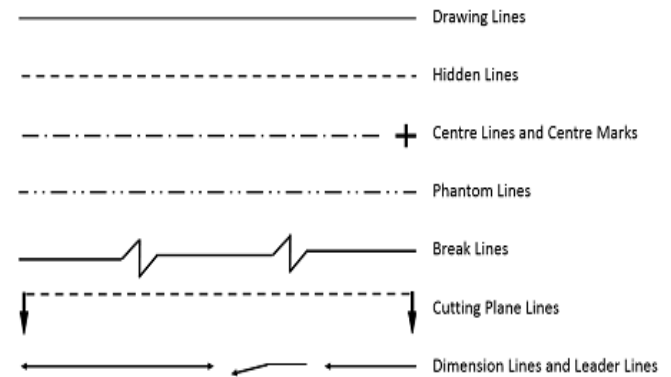
Specific lines are used to show specific things in Engineering drawings.

Due to the sheer amount and variety of lines used.

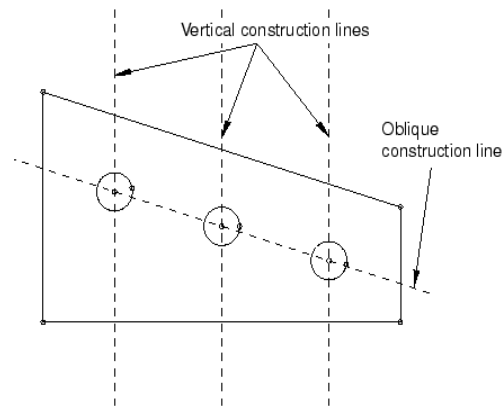
Specific lines have been created to show specific things or have a specific job.

To the right are some lines that conform to BSI 8888:2017

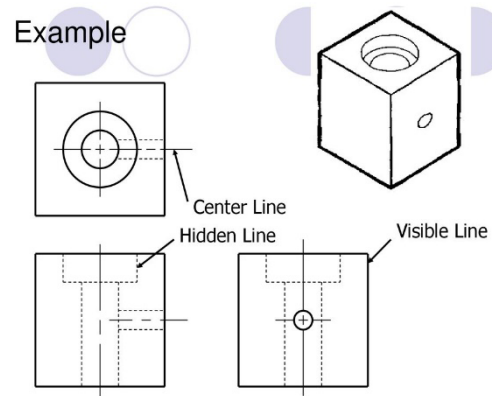
Types of Line



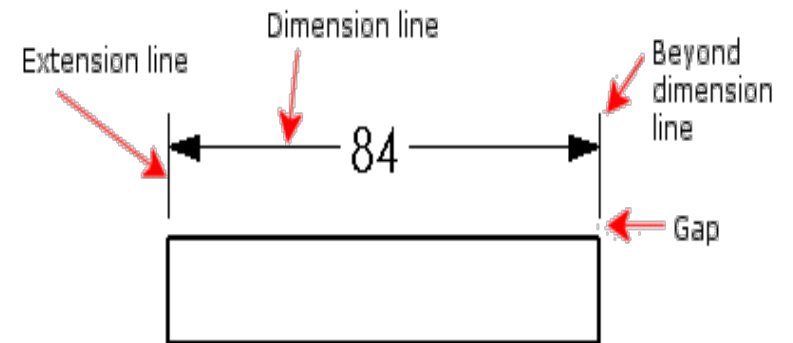
Construction Line Example



Hidden Detail Line Example



Extension Dimension lines



Vocabulary	Wider Research	Apply
<ol style="list-style-type: none"> 1. Isometric drawing 2. Three dimensional 3. British standards 4. International standards 5. Formal drawing 6. 30 degrees 7. Horizontal line 8. Vertical line 9. Isometric grid paper 10. Orthographic drawing 11. Third angle drawing 12. First angle drawing 13. Front view 14. Plan view 15. Side view 16. End view 17. 3rd angle symbol 18. 1st angle symbol 19. Dimension 20. Dimension line 21. Radius 22. Diameter 23. Engineering drawing 24. Construction line 25. Weighted line 26. Centre line 27. Hidden detail line 28. Section line 29. Extension line 	<p data-bbox="566 276 1171 339">https://www.technologystudent.com/despro_fish/graphics_iso1.html</p> <p data-bbox="566 387 1171 451">https://www.technologystudent.com/despro_fish/graphics_ortho1.html</p> <p data-bbox="566 499 1171 563">https://www.technologystudent.com/despro_fish/graphics_main2.html</p> <p data-bbox="566 611 1171 675">http://www.design-technology.info/IndProd/drawings/</p> <p data-bbox="566 722 1171 786">hop.bsigroup.com/products/technical-product-documentation-and-specification-3/standard</p> <p data-bbox="566 834 1171 898">https://www.iso.org/ics/01.100.20/x/</p>	<ol style="list-style-type: none"> 1. Draw a cube using the Isometric drawing method make sure that your horizontal lines are at 30 degrees. 2. Draw and every day product such as a television or an item of furniture using the Isometric drawing method. 3. Draw your mobile phone in 3rd Angle Orthographic Projection. 4. Drawing your phone in 1st Angle Orthographic Projection. 5. Draw the symbol for First angle projection. 6. Draw the symbol for Third angle projection. 7. Using the ISO standards add dimension lines to the drawing of your phone. 8. Draw a Centre line. On your mobile phone drawings. 9. Draw an Orthographic front view of your school bag. 10. Add hidden detail lines to show what is inside your school bag.

