

An exploded view is a type of drawing that shows the **intended assembly** of a product. It shows all parts of the assembly and how they fit together.

In mechanical systems usually the components closest to the centre are **assembled first**, or is the main part in which the other parts get assembled around.

Parts are usually exploded either along parallel 30 degree, vertical or horizontal lines.

P&O Ferries gives away a free toy boat to all the young children who sail on one of their ferries. The toy boat is shown below.

In the space below draw an exploded sketch of the toy boat. It has been started for you. Do not include colour.

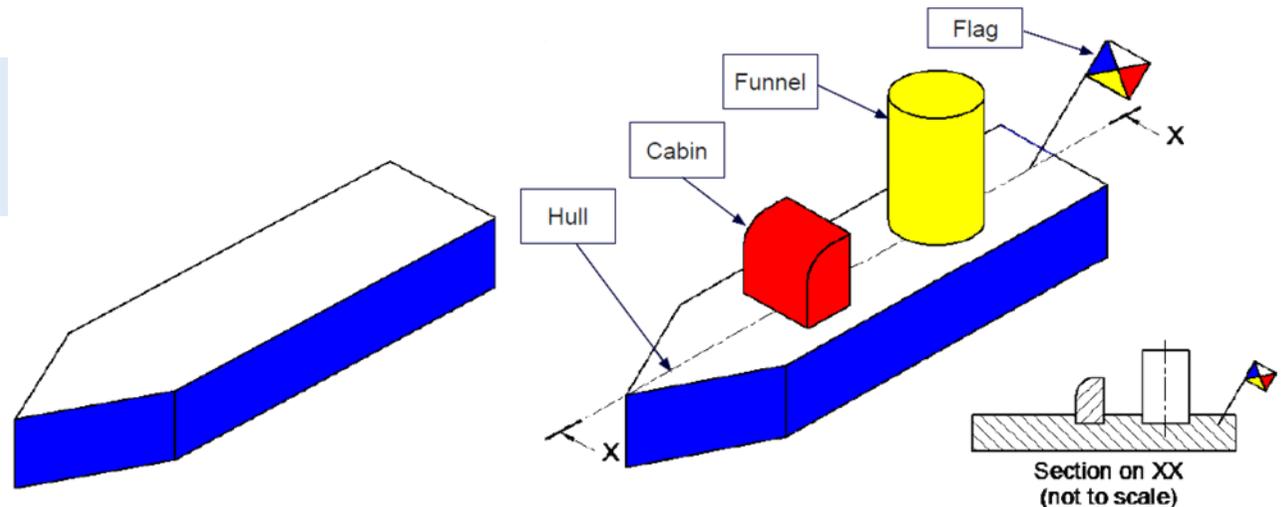
Practice Task

Complete the exploded sketch of a toy boat & then complete the worksheet.

Key Questions

What is an exploded drawing?

Why are they needed?

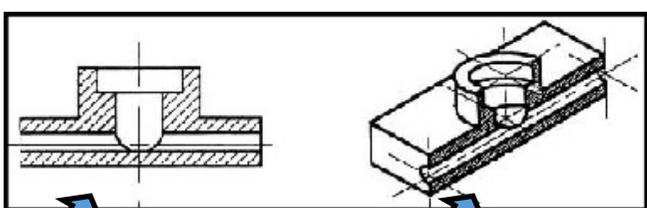
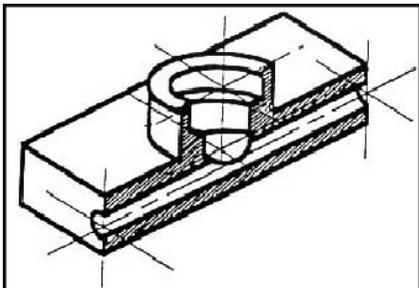
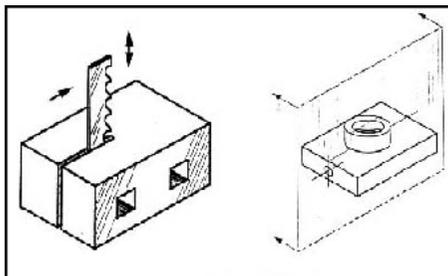
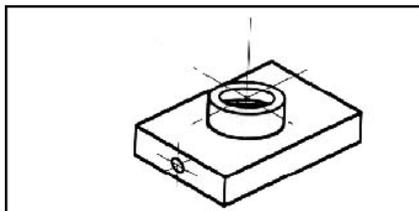
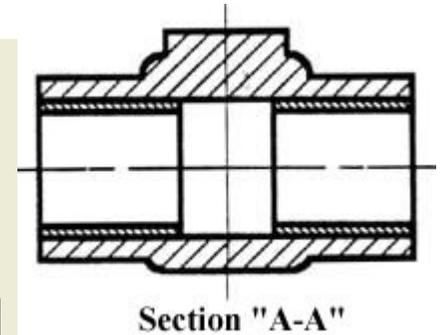
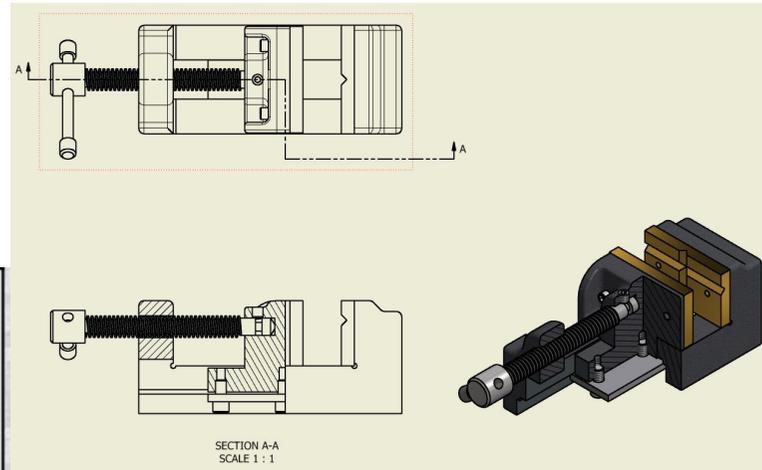
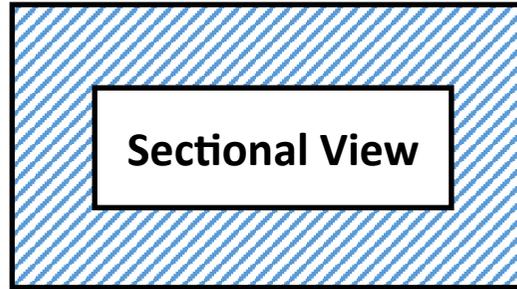


A sectional drawing is a type of drawing that shows the interior details of an object that cannot be seen from the outside.

It helps us to understand the construction of an object. If we didn't have sectional views we may view two similar objects from the outside and think that they are constructed in the same way.

A sectional view cuts an object along a plane allowing you to see the internal details.

The sectional view is applicable to objects like engine blocks, where the interior details are intricate and would be very difficult to understand through the use of "hidden" lines (hidden lines are, by convention, dotted) on an orthographic or isometric drawing.



The Section View

The cutaway view

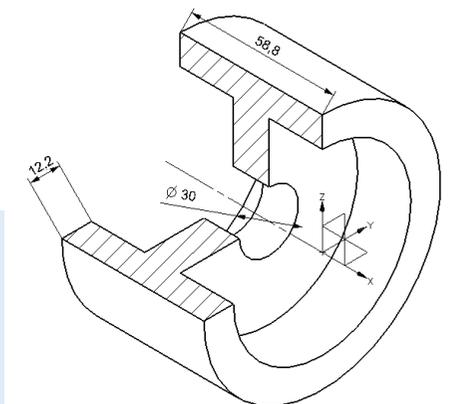
Practice Task

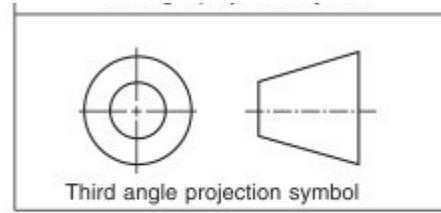
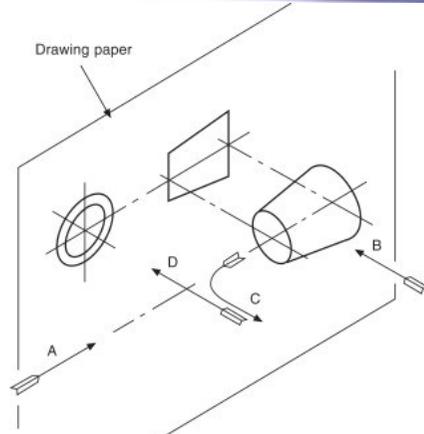
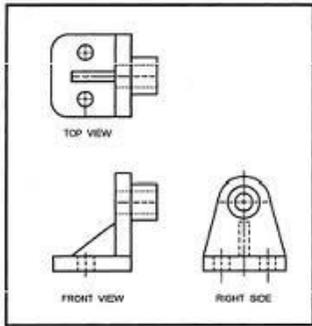
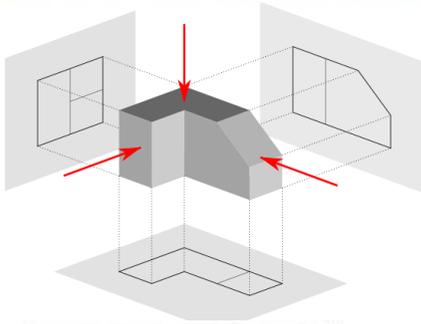
Using the cutaway drawing below, create a sectional view of the product.

Key Questions

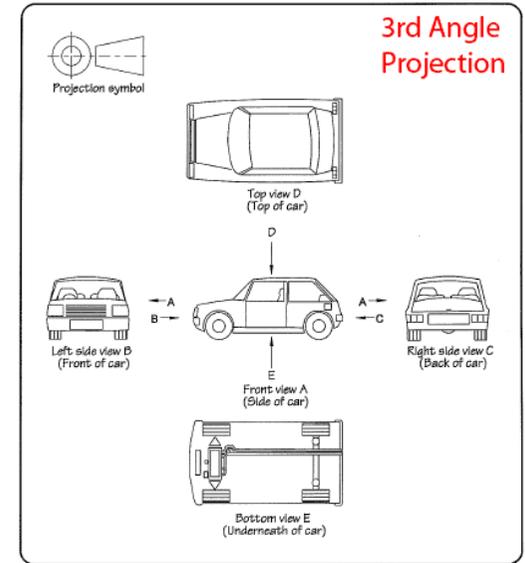
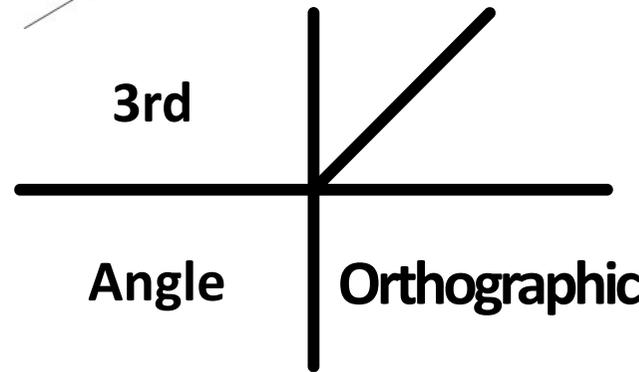
What is a sectional plane?

What convention do you use to show a solid surface on your sectional view?





Remember your drawing conventions for dimensioning and hidden detail.



Orthographic drawings are often known as working drawings or engineering drawings. It is a way of representing different views (elevations) of an object by projecting it onto a plane or surface.

You would usually show a front view, plan (top) view and side view. A 45 degree line allows the projection of the side view to the plan view.

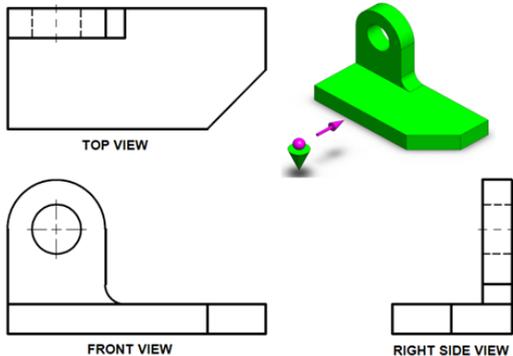
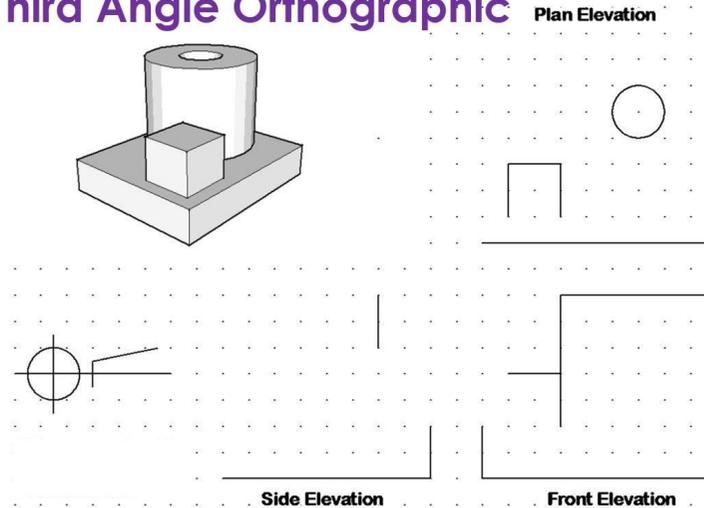


Fig: Projection of Views

www.enggwave.com

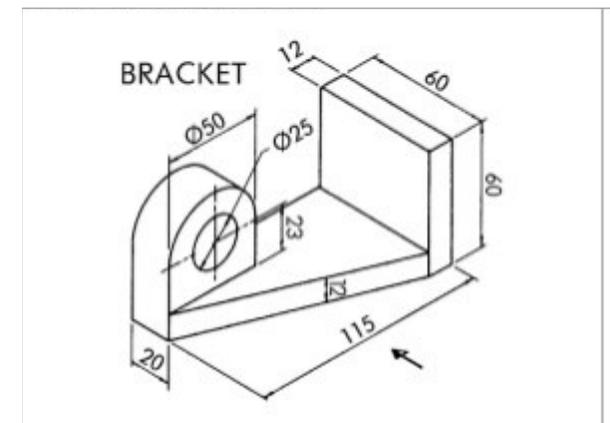
Third Angle Orthographic



Practice Tasks

Draw the 3rd angle orthographic symbol using drawing conventions.

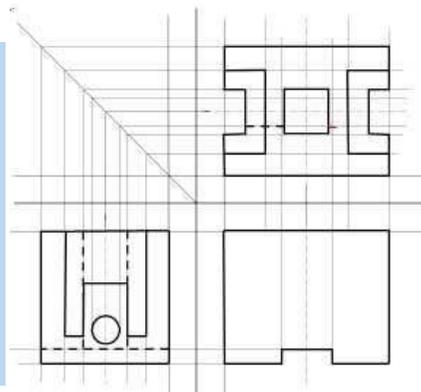
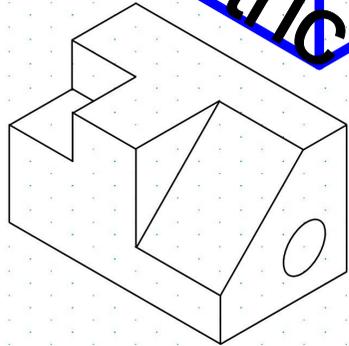
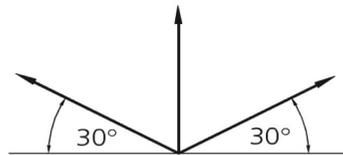
Copy and complete the example on the left
Draw the bracket below in 3rd angle orthographic



Isometric Projection

Isometric Axes

- Vertical lines remain vertical
- Horizontal lines are inclined at 30 degrees
- Used to produce realistic looking 3D views

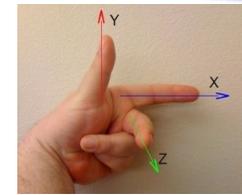
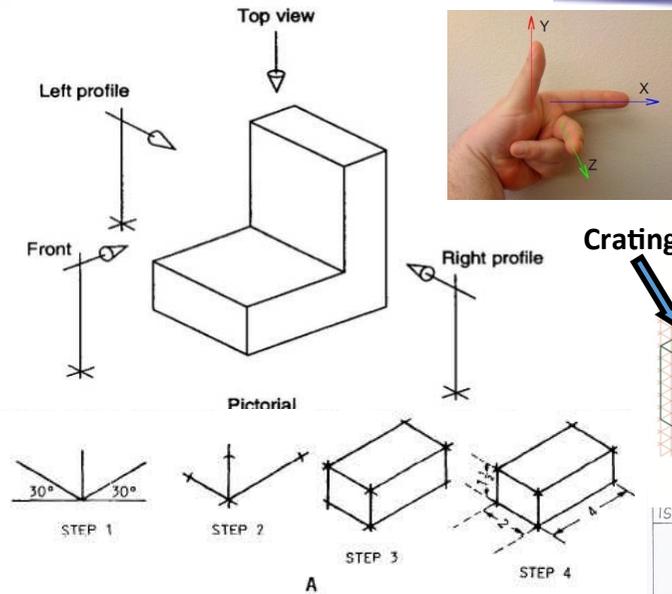
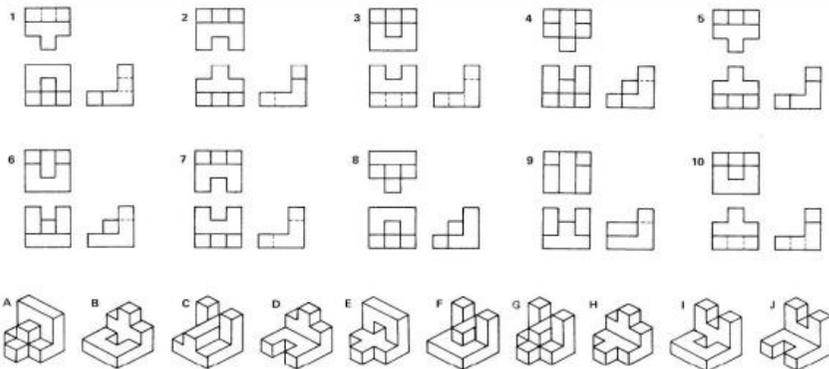


Practice Tasks

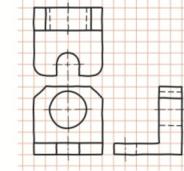
Match the Orthographic projection to the Isometric projection. (Below)

Convert the orthographic projection to an Isometric projection. (Right)

Use freehand Isometric sketching to draw products from around the home.

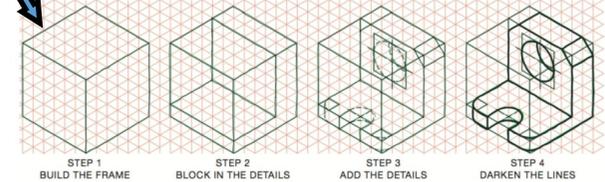


Basic steps for isometric drawing

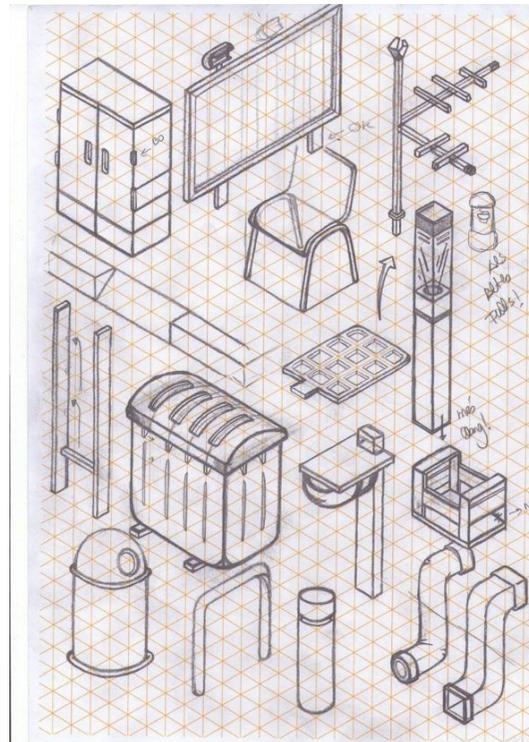
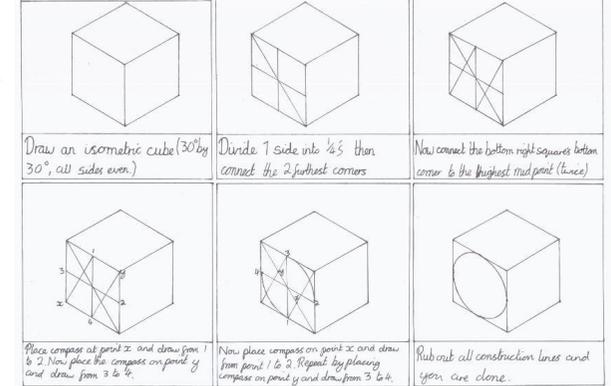


Crating

Isometric grid



ISOMETRIC CIRCLES



Isometric is a standard way of representing ideas in 3D. It is used in many different ways to provide information. These can be information about form, assembly instructions or technical details.

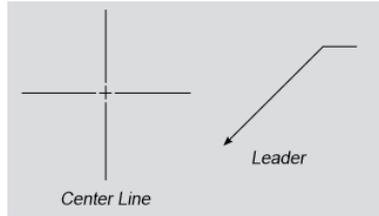
In drawings horizontal lines are always set at 30 degrees from horizontal. Isometric uses three planes using axes (X, Y & Z).

Standard Drawing Conventions

Leaders and Centre Lines

When dimensioning circles, use a leader and centre lines.

Use an R to indicate radius dimensions, and a (Ø) symbol to indicate diameter dimensions.

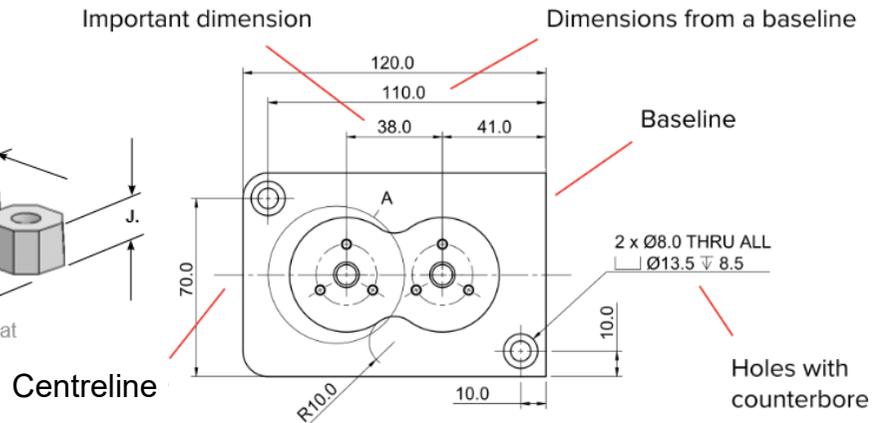
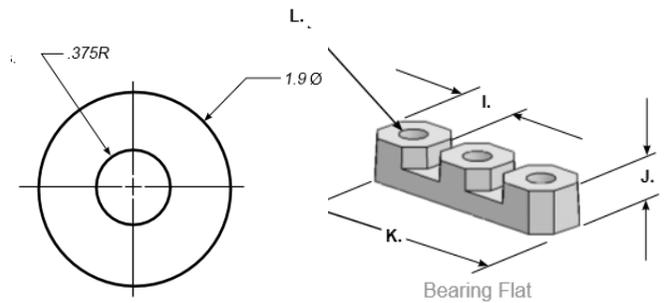
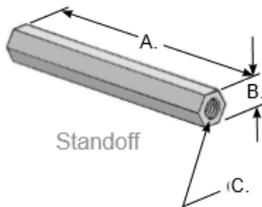
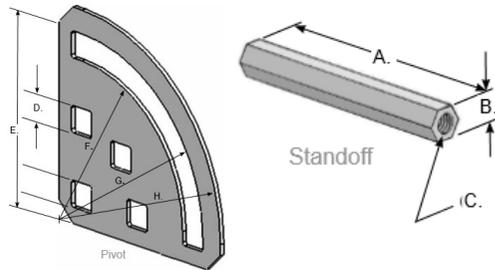
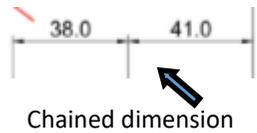


- Avoid dimensioning to hidden lines.
- Place dimensions in views where the shape and location of the object is seen best.
- Avoid placing dimensions on the object if possible.
- Select one size for ALL dimensions/text.
- No more than two dimensions may be chained.

Dimensioning Practices

Dimensions not required for manufacturing a part **should** be omitted.

Overall dimensions are placed outside the smaller dimensions. With the overall dimension given, one of the smaller distances is not dimensioned unless it is needed for reference, in which case it should be indicated by placing brackets around the value.



When constructing a drawing remember the phrase 'Light is right'.

Part Outlines	Heavy
Section Lines	Light
Hidden Lines	Medium
Centre lines	Light
Dimension and Extension Lines	Light
Cutting Plane	Heavy
Break Lines	Heavy
	Light

Key Terms

Construction lines: faint, thin lines that are easy to rub out.

Weighted lines: define the object that you are drawing making it easier to see which lines to keep and which to erase.

ISO: International standards organisation.

BSI: British standards institution.

Standardised: consistently applied across a drawing using a convention such as BSI.

Kitemark: awarded by BSI when a product meets its standards.

