

FACTFILE: GCSE

Engineering and Manufacturing

QUALITY CONTROL: UNIT 3.2.2 – USING MATERIALS, PARTS, COMPONENTS, TOOLS, EQUIPMENT AND PROCESSES



Marking out equipment

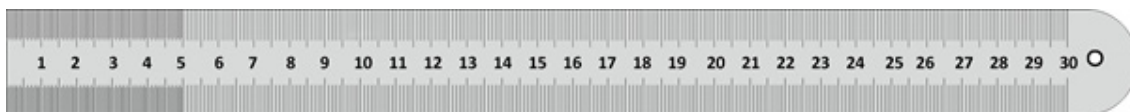
Introduction

Students should be able to:

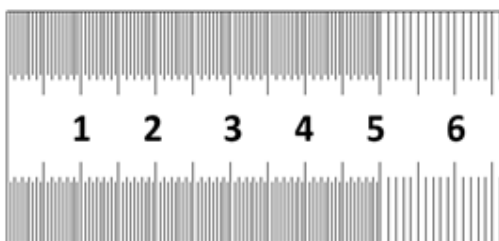
- identify, use and state the application of:
 - rules;
 - scribes;
 - pencils;
 - centre punches;
 - scribe blocks;
 - mallets;
 - odd-leg calipers;
 - spring dividers;
 - try and engineer's squares;
 - marking gauges;

Rules

The steel rule is a basic measuring tool that can be used to an accuracy of around 0.5mm when measuring and marking out.



Steel rules are generally made from stainless steel and come in a range of sizes and unit formats. Metric format is common in 150mm and 300mm lengths.



The rule shown has half millimetre graduations for the first 50mm and whole millimetres for the rest of the rule length but other configurations are available.

Before using a steel rule it is important to check the end of the rule for excessive wear that may cause errors in reading or marking with the rule.

Scribers



A scriber is made of hardened steel with a finely ground point and can be single or double ended. A scriber should be used to mark lines on the metal surface by running it against a steel rule, an engineers square or a metal template. Scribers should be kept sharp by careful grinding. Care should be taken not to mark the work piece too deeply as scribe lines can be difficult to remove during the finishing stage.

When grinding the scriber point care must be taken not to overheat the scriber as this will soften the steel and then it will become blunt very quickly. When handling a scriber the user must be aware of the danger of injury from the sharp point.

Centre punches

A centre punch has a hardened tip that is machined and ground to a conical point of 90°. It is used to produce a dent on the surface of material to start a drill hole or as the centre of a circle to be marked with a pair of dividers.



The centre punch is used by placing the point in the correct position and hitting the end of the centre punch with a hammer. A small dent is left in the component.

Odd-leg callipers

Odd-leg callipers are used to scribe a line parallel to the edge of a piece of metal. The locating leg is run along the edge and the scriber point marks the surface of the material.



The odd-leg callipers shown have a renewable scriber that can be adjusted and replaced when necessary. Odd-leg callipers are set using a steel rule, the locating leg is placed on the end of the rule and the point is moved to the correct measurement on the rule edge.

Spring dividers

Spring dividers are used to mark circles on material and for geometric development such as bisecting angles.

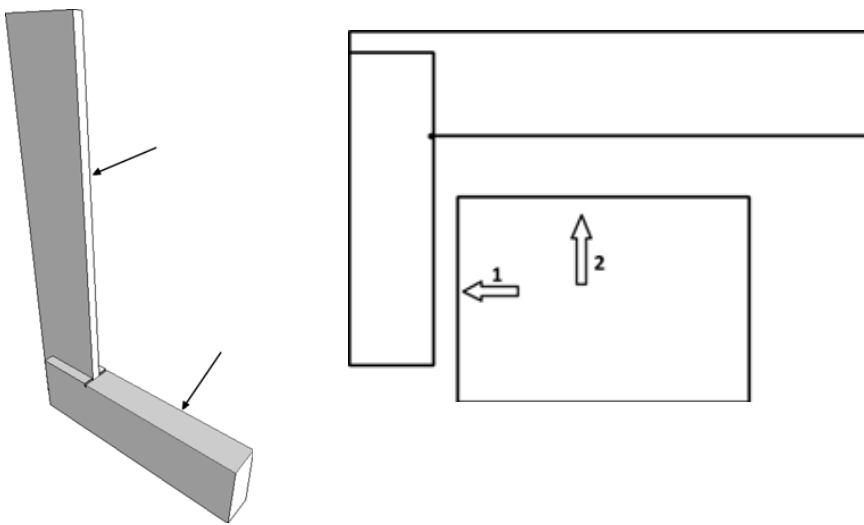


Engineer's square

The engineer's square is a precision tool used to measure and mark and check 90 degree angles. The engineer's square is made from a sturdy base and a thin blade which is pinned or welded in place. To use the engineer's square to check a piece of material a datum edge must be produced on one edge of the material. A datum edge is a flat face or straight edge from which all measurements are taken. This prevents cumulative errors being made. All other sides are developed in relation to the datum edge.

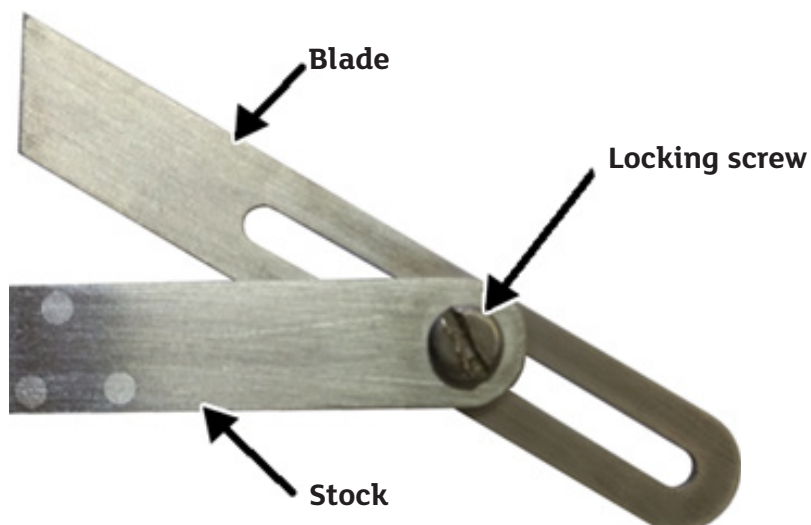
The datum edge of the material is held against the stock and slid up to the blade. The engineer's square with the material in position is then held up to a light source.

The light will show through in the low spots on the material. The 90 degree angle is achieved by filing the high spots little by little until the material fits closely to the square.



Sliding bevel

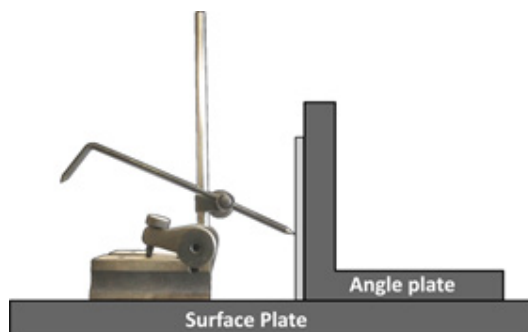
A sliding bevel is a tool which can be set to a given angle to enable a line to be scribed on a piece of metal. It can also be used to duplicate an angle or transfer angles from one place to another. They are made up of three parts - the stock, the blade and the tightening nut. The tightening nut is used to secure the blade in position.



Scribe blocks

A scribing block is used to mark lines on a work piece which is against an angle block. The scribing block can be adjusted with a high degree of accuracy and is set from a steel rule.

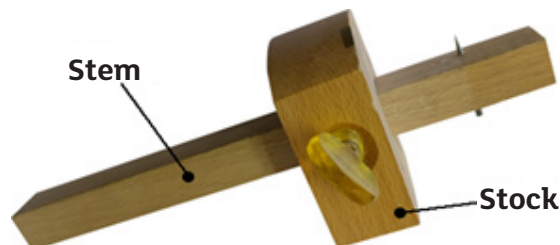
The material is marked by sliding the scribing block so that the scriber makes light contact with the surface of the material.



Scribing blocks are useful when marking multiple parts and for quickly checking key dimensions on batches of parts.

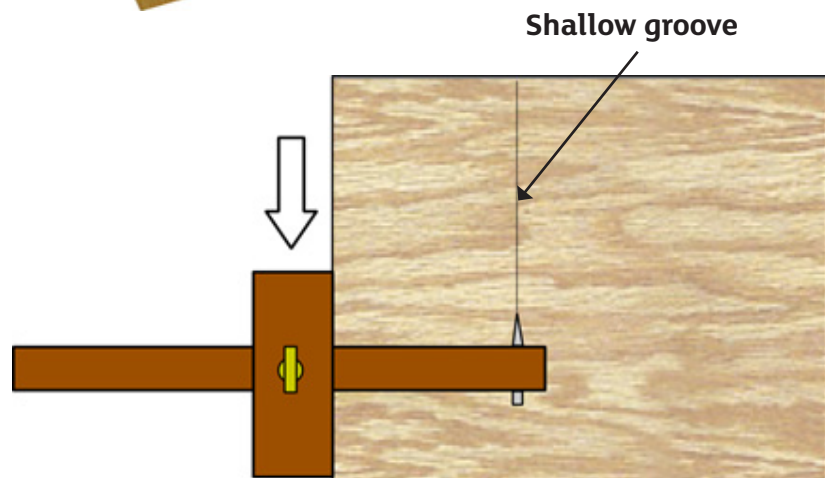
Marking gauges

A marking gauge is used to mark a line parallel to the edge of a piece of wood.



The marking gauge is made from a stem which has a pointed steel pin at one end and a stock which moves along the stem and can be locked in place with a thumb screw. The marking gauge is an extremely important tool for marking parallel lines and preparing wood for cutting joints.

The gauge is set by using a steel rule to adjust the distance between the stock and the pin. The stock is then locked using the thumbscrew. The stock is then moved along the edge of the wood while the pin makes light contact with the surface leaving a shallow groove the material surface.

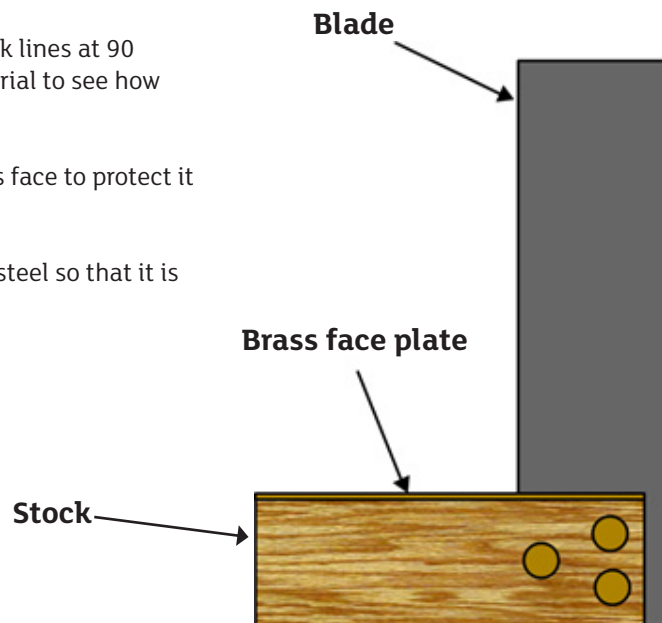


Try square

The try square is a woodworking tool used to mark lines at 90 degrees to an edge or to check the edges of material to see how square it is.







The try square has a hard wood stock with a brass face to protect it from wear.

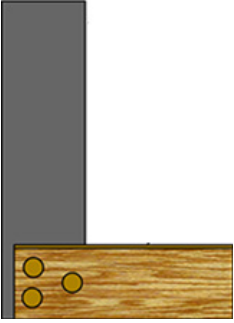


The blade is made from hardened and tempered steel so that it is hard wearing and flexible.



Revision Questions

1. Complete the table below

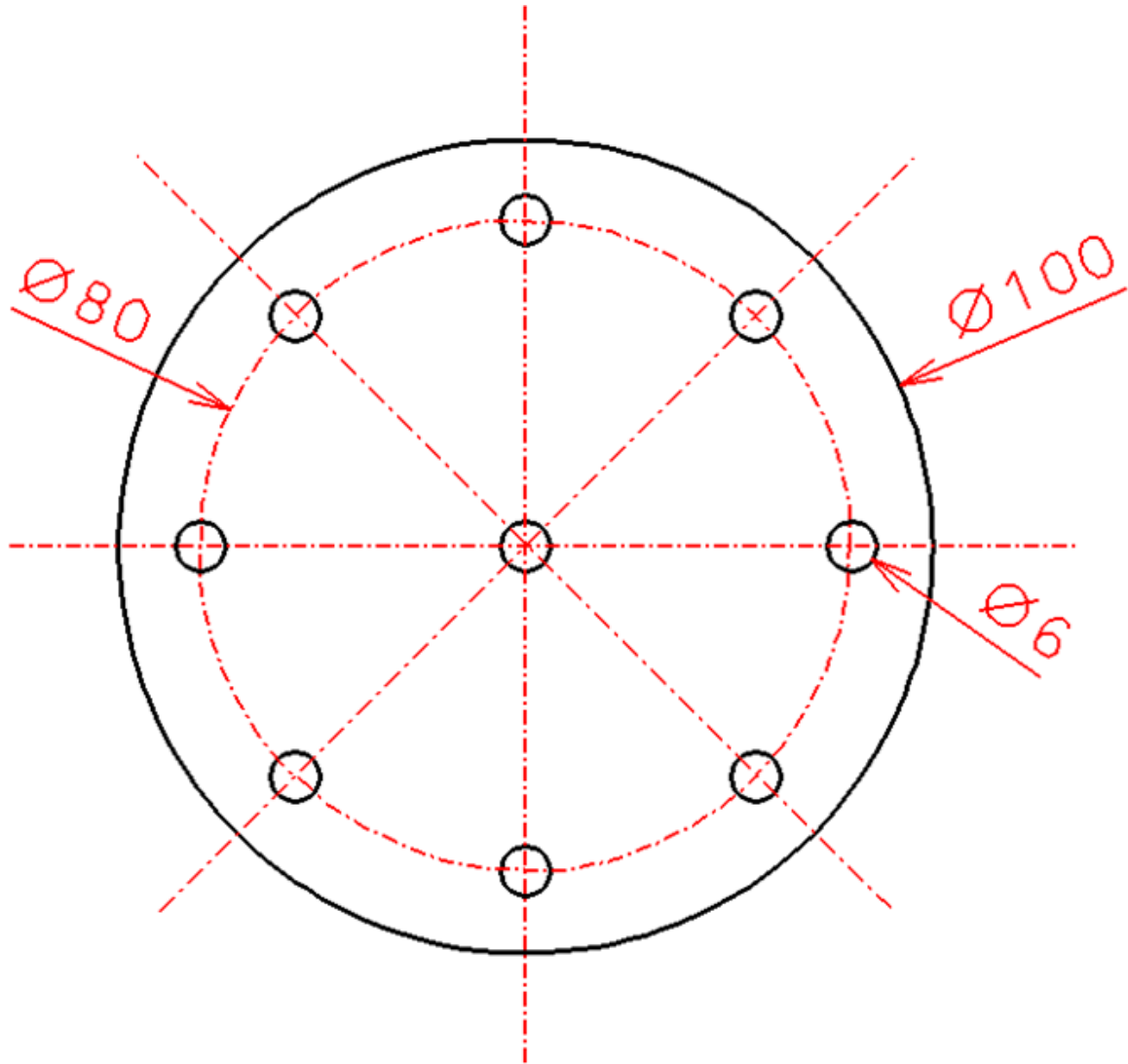
| Tool Name | Use and method of application |
|---|-------------------------------|
| Name | Use and method of application |
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| Name | Use and method of application |
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2. The component below must be made from 2mm sheet aluminium.

Explain how you would mark out the hole positions on the circumference shown.

The holes are equally spaced. In your explanation, describe the equipment and methods use to prepare the component up to the point of drilling the holes.



3. Explain what is meant by the term datum edge.

4. Name **two** pieces of marking equipment designed specifically to create lines on the workpiece that are parallel to an edge.

Additional resources

Marking out metal

<https://www.youtube.com/watch?v=V2QT2C5larE>

How to Use Marking Gauges

<https://www.youtube.com/watch?v=-fTdne8NGb0>

Prepping and marking out mild steel plate

<https://www.youtube.com/watch?v=El-II-YQ5Zc>

Angle Bisector & Perpendicular Bisector.avi

<https://www.youtube.com/watch?v=wxsr8egcq0M>

How to draw an 8 pointed star

