

# **CONSTRUCTION Hand Tools**

**INFORMATION FOR QUESTIONS 1 - 12**

**CLOCKMAKERS**

### **Introduction**

There are hundreds of specialized woodworking and carpentry tools available. This module describes only the most common tools used in the carpentry trade. Power tools may have largely replaced many hand tools in today's construction industry, but hand tools still play an important part in the construction process. Every power tool has its origin as a hand tool, so fundamental knowledge of basic hand tools enables you to correctly choose the tool to produce the greatest amount of high-quality work with the least amount of effort.

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## Objective One

*When you have completed this objective, you will be able to:*

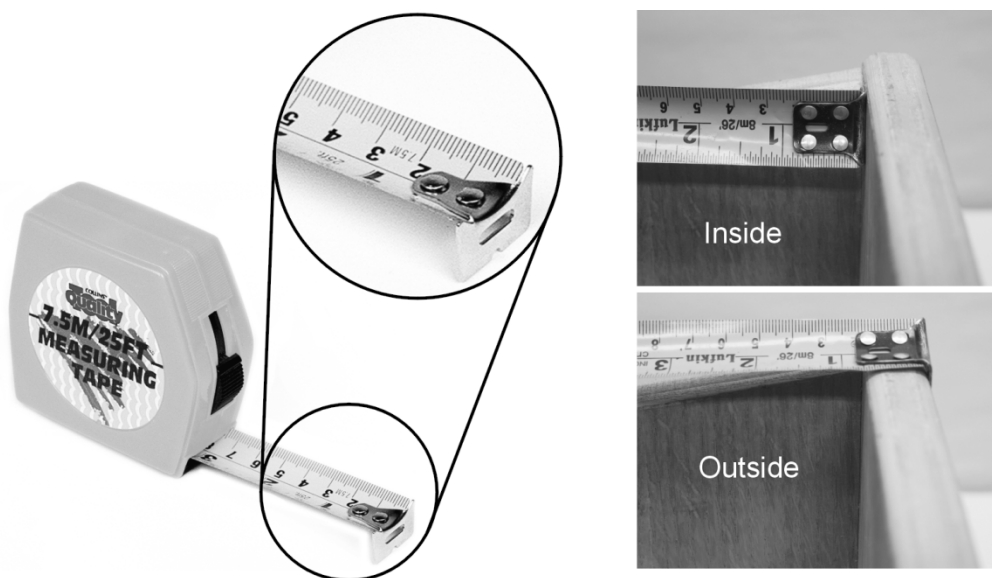
Describe the use of measuring, marking, laying-out, aligning and squaring tools.

### Measuring Tools

#### ***Flexible Tape Rules (Tape Measures)***

*Flexible tape rules* (Figure 1) are manufactured in a wide variety of lengths and widths. The 5 metre (16') to 7.5 metre (25') lengths are the most popular. The slightly convex cross-section allows the rule to remain rigid as it is pulled from the case. This is useful for taking measurements in hard-to-reach places. The wider the blade the farther it can be extended while remaining rigid outside the case. Another advantage is that the flexible rule can be bent to measure irregular shapes.

The hook end moves, but this is not a sign of poor manufacturing. It moves an amount exactly equal to the hook end thickness to allow for inside or outside measurements. The length of the tape's case can be used when taking inside measurements.



**Figure 1 - Flexible tape rule.**

Three different styles of tapes are shown in Figure 2 through Figure 4.

### Imperial Tape Rules

Imperial tapes are marked on one edge in increments of feet and inches and on the other edge in inches only, with standard on-centre spacings highlighted by black triangles, black diamonds and/or highlighted numbers. The typical increment is  $\frac{1}{16}$  inch.

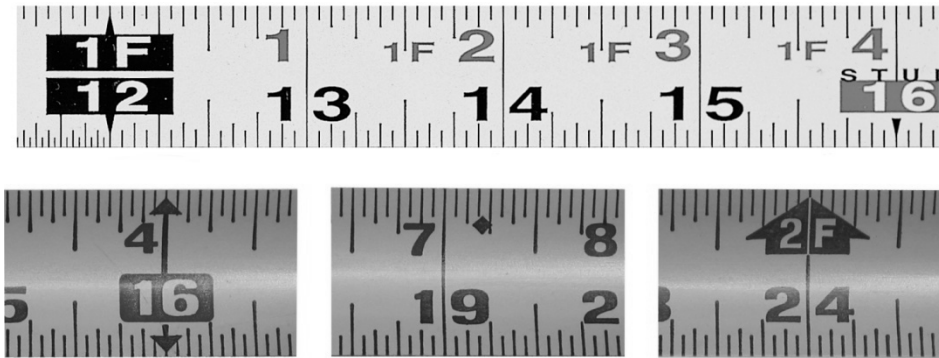


Figure 2 - Imperial tape.

### Metric Tape Rules

Metric tapes (Figure 3) are graduated in millimetres and numbered in consecutive centimetres to each metre and repeated. Metric on-centre spacings are indicated by small triangles or diamonds.

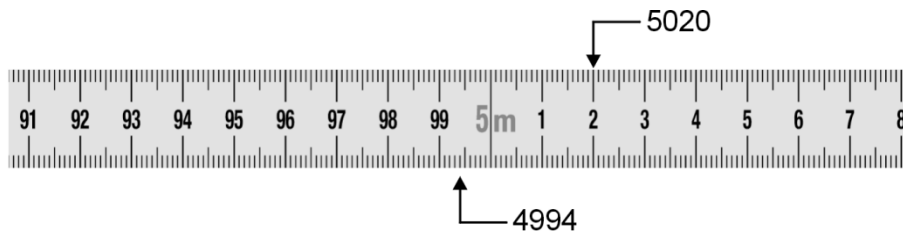


Figure 3 - Metric tape.

### Combined Tape Rules

Combined or dual tapes are a combination of both metric and imperial tapes (Figure 4).

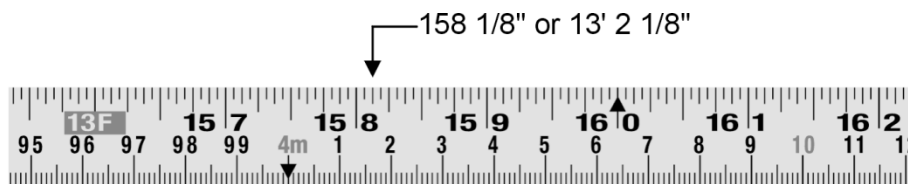


Figure 4 - Combined or dual tape.

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### **Figure 5 - Steel tapes.**

Metric tapes are graduated in millimetres and numbered in consecutive centimetres to each metre.

Imperial tapes are marked in increments of feet and inches. The normal increment for these long tapes is  $\frac{1}{8}$  inch.

Since these long tapes are commonly used in site layout, dirt and moisture are common problems. Run the tape through your fingers or a rag as the tape is retrieved to avoid clogging the internal reel mechanism. Spray lubricants may be used to coat the tape to ensure smooth operation and protect it from rusting.

## **Marking and Lay-Out Tools**

### ***Pencils***

Good quality pencils are available in many degrees of hardness, ranging from soft to hard (Figure 6). HB, F or 2H are used for general carpentry work. The *carpenter's pencil* (soft, medium and hard lead) is used for rough layout and marking.



**Figure 6 - Drafting pencils and the carpenter's pencil.**

### ***Scratch Awls***

*Scratch awls* have a hardened round steel blade tapered to a sharp point and fitted with a wooden or plastic handle. It is used to accurately mark hole centre location to guide the point of some bits when drilling and to scribe lines on wood, plastic, laminates and metal (Figure 7).



**Figure 7 - Scratch awl.**

### ***Centre Punches***

The *centre punch* is a tempered steel tool with a hardened point. When the punch is struck with a hammer the point leaves an indent that prevents the bit from wandering when drilling in metal (Figure 8).

Another useful punch is the *self-centring punch*. It is a hollow tube containing a spring loaded drive pin. If it is held vertical and rotated slightly as it is positioned in a countersunk screw hole, such as a door hinge, when struck with a hammer the sharpened drive pin will locate the exact centre of the screw hole.

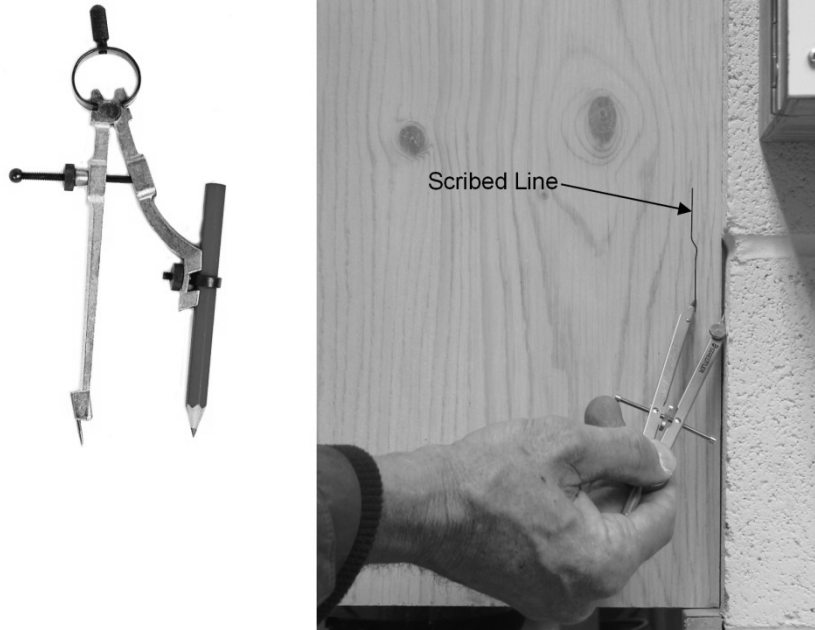


**Figure 8 - Centre punch and self-centring punch.**

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## Compasses

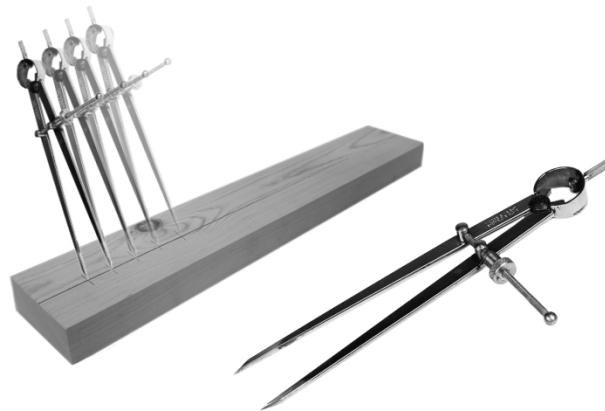
A *compass* consists of a pair of pivoting steel legs, with a sharp point on one leg and a pencil on the other. It is used to draw circles and arcs, and can be used as a scribe to copy the profile of an irregular surface onto the material you are cutting (Figure 9).



**Figure 9 - Compass.**

## Dividers

*Dividers* are similar to compasses, except that they are often larger and both legs have a sharp point. They are used to transfer dimensions from a drawing and to accurately step off a given number of equal segments (Figure 10).



**Figure 10 - Dividers.**

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## Aligning and Squaring Tools

### Try Squares

The *try square* has a steel or aluminum blade that is 150 mm (6") to 300 mm (12") in length (Figure 13). The head may be made from metal, plastic or wood. Try squares are typically used to check cut edges for square. This procedure is called *trying* the edge. They are also used to check the setup of the fence or table for square on various machines.

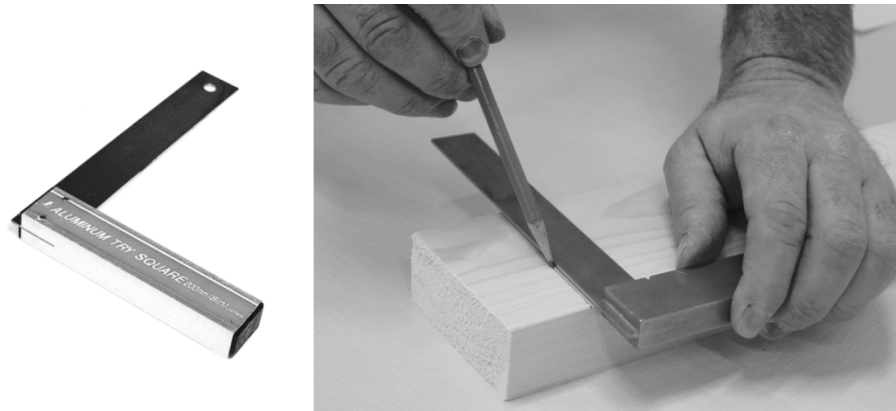


Figure 13 - Try square.

### Combination Squares

The *combination square* has an adjustable, graduated steel ruler blade with a head set at 45° and 90° (Figure 14). In addition, it may have a small level vial and a small scratch awl stored in the base of the head. It is used to *try* an edge, layout square and 45 degree lines and by locking the blade, it can be used to scribe parallel lines.

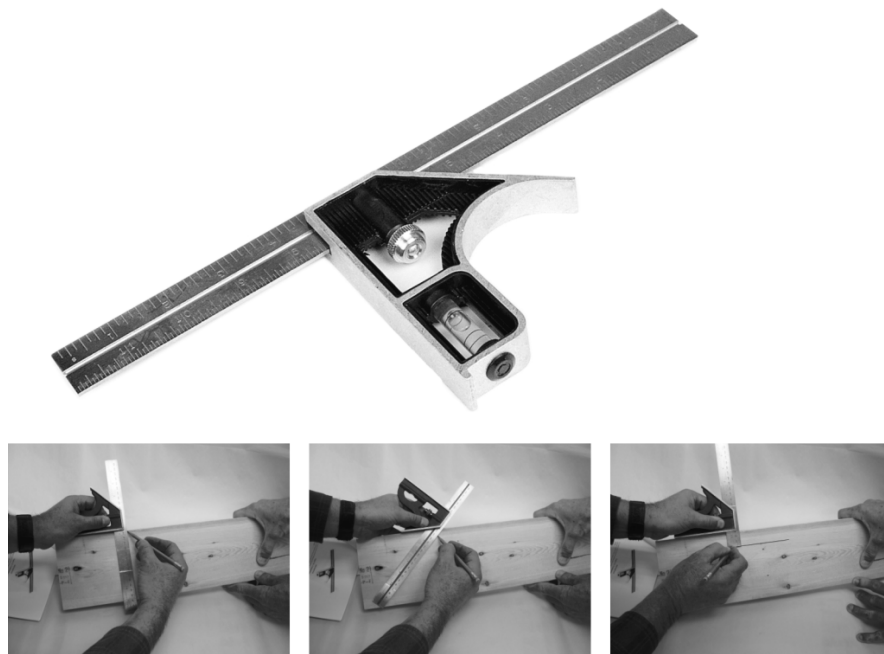


Figure 14 - Combination square.



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## Framing Squares

*Framing squares* are manufactured from steel, aluminum and other alloys. They have two arms (the *body* and the *tongue*) set at 90° to each other (Figure 15). The body on the standard framing square is 600 mm (24") long and 50 mm (2") wide. The tongue is typically 400 mm (16") long and 38 mm (1½") wide. Most framing squares will have rafter tables and scales embossed on them. Framing squares are used in a variety of framing and layout operations, but are particularly useful in stair and rafter layout.

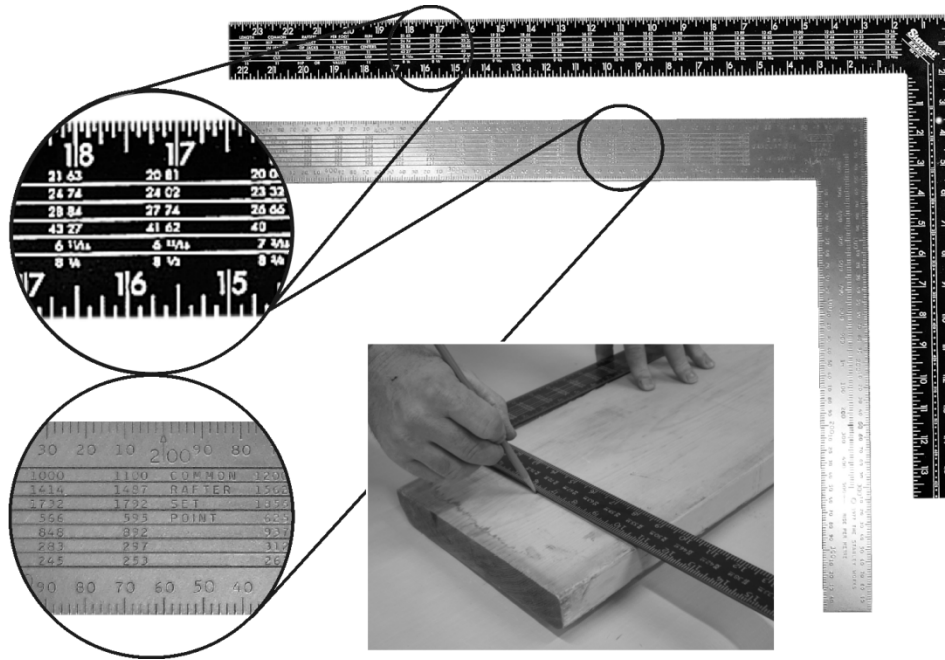


Figure 15 - Framing square.

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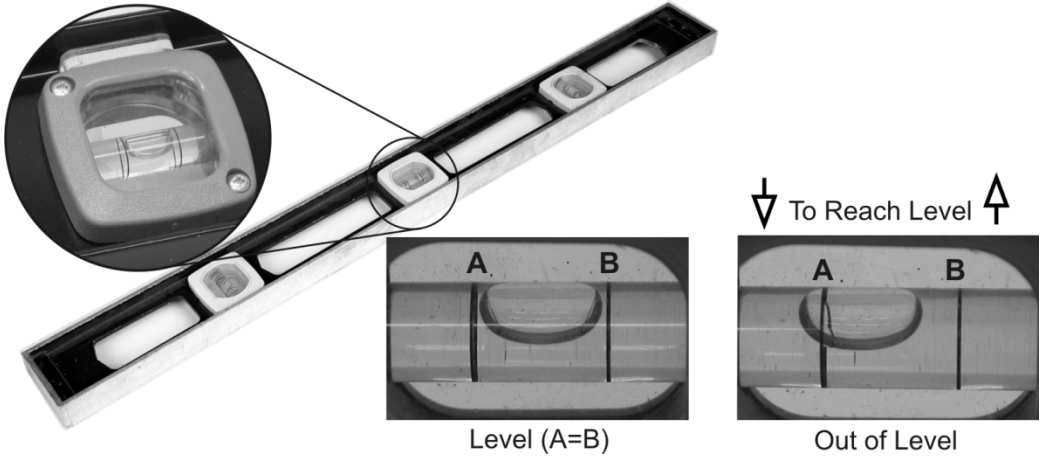
## ***Sliding T Bevel***

This *sliding T bevel* has a hardwood or metal body with an adjustable metal blade, which can be set at any angle from 0° to 180° (Figure 18). It is particularly useful for transferring angles.



**Hand Levels (Spirit Level)**

A *hand level* is a long rectangular frame typically 600 mm (2') to 1800 mm (6') long. It is usually made from metal or hardwood. Standard models have three built-in vials filled with coloured alcohol that encloses an air bubble (Figure 20). When a member is level or plumb, the air bubble in the vial of alcohol centres itself between two lines embossed on the vial's surface. The centre bubble is used for horizontal alignment (level). The two outside bubbles are used for vertical alignment (plumb).



**Figure 20 - Hand level.**

## Chisels

### Wood Chisels

Every carpenter needs at least a couple of *wood chisels*. The two most commonly used are the *firmer* and the *bevel edge*. The metal blades are available in various widths and are usually connected to a wooden or impact-resistant plastic handle (Figure 36).

#### NOTE

Wooden-handled chisels should be struck with a wooden *mallet* (a short-handled wooden hammer).



Figure 36 - Socket and tang connections for wood chisels.

### Firmer Chisels

The *firmer chisel* has a flat cross-section and parallel sides (Figure 37). The strong blade makes it useful for rough carpentry.



Figure 37 - Firmer chisel.

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## Bevel Edge Chisels

The *bevel edge chisel* has a tapered cross-section and parallel sides. It is thinner in cross-section than the firmer chisel and is generally used for finer, more delicate paring work. The bevel edge allows it to accurately cut into corners. The bevel edge *butt chisel* has a wide, short blade and is designed to cut the recess required for butt hinge gains (Figure 38).

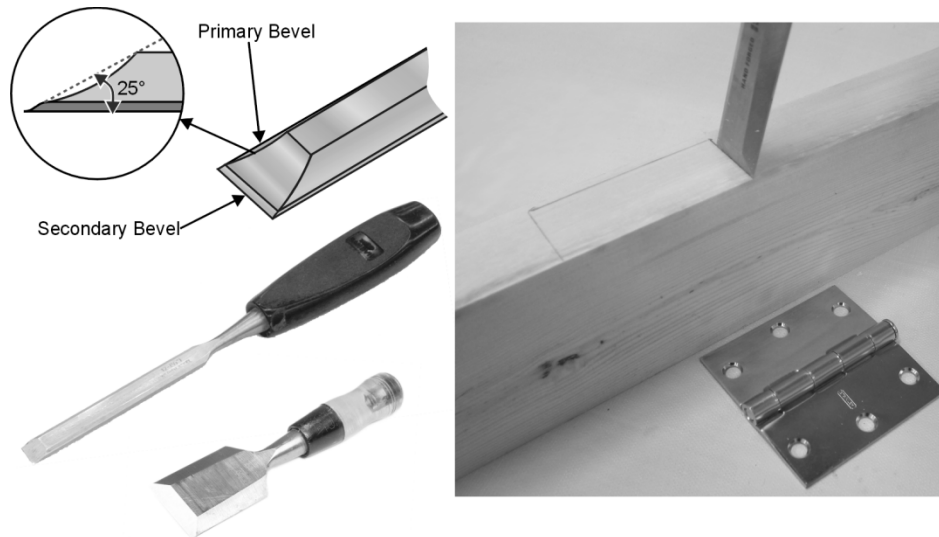


Figure 38 - Bevel edge chisel and a butt chisel.

## Cold Chisels

The *cold chisel* is made from strong forged steel. It is designed to cut non-tempered metal or to chip hard materials such as stone and concrete. It is usually used with a small sledge or club hammer (Figure 39).



Figure 39 - Cold chisel.

DANGER
To prevent injury, always use proper eye protection when chipping concrete or stone.

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## Utility Knives

The *utility knife* has a razor-sharp replaceable blade. Various styles of blades are available for general cutting or for specific materials like asphalt shingles and flooring. Better quality utility knives have retractable blades, and some models have snap-off blades that come in a dispenser. The blade dispenser is also used to snap off the old cutting edge, which is deposited into a chamber for safe disposal (Figure 40)



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## **Back Saws**

Another crosscut saw used for fine accurate cutting is the *back saw*. It is available in various lengths, with the longer lengths being used in manufactured mitre box assemblies. The blade typically has a stiffened back, to prevent the blade from bending, and 12 or more points per inch (Figure 46).



**Figure 46 - Back saw.**

**Figure 48 - Compass and keyhole saws.**

***Hacksaws***

The *hacksaw* has a U-shaped, adjustable frame and is primarily used to cut metal (Figure 49). The replaceable hacksaw blades are made from high-grade hardened and tempered steel. Blades are available for cutting various materials and obviously the blade must be harder than the material being cut, so choose the proper blade for the job.



**Figure 49 - Hacksaw.**



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### ***Metal Snips (Aviation Snips)***

Metal snips are available in three styles and are coded by the colour of the handles (Figure 50). Yellow-handled snips are general-purpose snips used for straight cuts. Green- and red-handled snips have serrated cutting edges and are designed for cutting curves. Red-handled snips are designed to cut curves in a counter-clockwise direction and green-handled snips are designed to cut in a clockwise direction.

