

## Review of engineering graphics

Drawing instruments are used to prepare drawings easily and accurately. The accuracy of the drawings depends largely on the quality of instruments. With instruments of good quality, desirable accuracy can be attained with ease. It is, therefore, essential to procure instruments of as superior quality as possible. Below is the list of minimum drawing instruments and other drawing materials which every student must possess:

1 . Drawing board

2. T-square

3. Set-squares -  $45^\circ$  and  $30^\circ$ -  $60^\circ$

4. Drawing instrument box, containing: (i) Large-size compass with inter-changeable pencil and pen legs (ii) Lengthening bar (iii) Small bow compass (iv) Large-size divider (v) Small bow divider (vi) Small bow ink-pen (vii) Inking pen

5. Scales 6. Protractor 7. French curves 8. Drawing papers

9. Drawing pencils 10. Sand-paper block 11. Eraser (Rubber)

12. Drawing pins, clips or adhesive tapes 13. Duster 14. Drafting machine 15. Roll-n-draw.

### Drawing sheet

Series	Paper size(mm×mm)
A <sub>0</sub>	841 × 1189
A <sub>1</sub>	594 × 841
A <sub>2</sub>	420 × 594
A <sub>3</sub>	297 × 420
A <sub>4</sub>	210 × 297
A <sub>5</sub>	148 × 210
A <sub>6</sub>	105 × 148
A <sub>7</sub>	74 × 105
A <sub>8</sub>	52 × 74

## Grading of Pencils

H to 9H – Hard




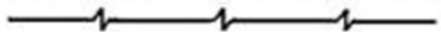



F, HB, - medium

B to 7B – soft

**Line -**

0.13 mm; 0.25 mm ; 0.35 mm ;0.5 mm; 0.7 mm; 1.0 mm; 1.4 mm ; 2.0 mm

## Basic Line Types

Illustration	Application
<b>Thick</b> 	<b>Outlines, visible edges, surface boundaries of objects, margin lines</b>
<b>Continuous thin</b> 	<b>Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines</b>
<b>Continuous thin wavy</b> 	<b>Short break lines or irregular boundary lines – drawn freehand</b>
<b>Continuous thin with zig-zag</b> 	<b>Long break lines</b>
<b>Short dashes, gap 1, length 3 mm</b> 	<b>Invisible or interior surfaces</b>
<b>Short dashes</b> 	<b>Center lines, locus lines</b> <b>Alternate long and short dashes in a proportion of 6:1,</b>
<b>Long chain thick at end and thin elsewhere</b> 	<b>Cutting plane lines</b>

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- *visible* – are continuous lines used to depict edges directly visible from a particular angle.
- *hidden* – are short-dashed lines that may be used to represent edges that are not directly visible.

- *center* – are alternately long- and short-dashed lines that may be used to represent the axes of circular features.
- *cutting plane* – are thin, medium-dashed lines, or thick alternately long- and double short-dashed that may be used to define sections for section views.
- *section* – are thin lines in a pattern (pattern determined by the material being "cut" or "sectioned") used to indicate surfaces in section views resulting from "cutting". Section lines are commonly referred to as "cross-hatching".
- *phantom* – (not shown) are alternately long- and double short-dashed thin lines used to represent a feature or component that is not part of the specified part or assembly. E.g. billet ends that may be used for testing, or the machined product that is the focus of a tooling drawing.

Lines can also be classified by a letter classification in which each line is given a letter.

- **Type A** lines show the outline of the feature of an object. They are the thickest lines on a drawing and done with a pencil softer than HB.
- **Type B** lines are dimension lines and are used for dimensioning, projecting, extending, or leaders. A harder pencil should be used, such as a 2H pencil.
- **Type C** lines are used for breaks when the whole object is not shown. These are freehand drawn and only for short breaks. 2H pencil
- **Type D** lines are similar to Type C, except these are zigzagged and only for longer breaks. 2H pencil
- **Type E** lines indicate hidden outlines of internal features of an object. These are dotted lines. 2H pencil
- **Type F** lines are Type E lines, except these are used for drawings in electro technology. 2H pencil
- **Type G** lines are used for center lines. These are dotted lines, but a long line of 10–20 mm, then a 1 mm gap, then a small line of 2 mm. 2H pencil
- **Type H** lines are the same as type G, except that every second long line is thicker. These indicate the cutting plane of an object. 2H pencil
- **Type K** lines indicate the alternate positions of an object and the line taken by that object. These are drawn with a long line of 10–20 mm, then a small gap, then a small line of 2 mm, then a gap, then another small line. 2H pencil.

**Projection** – A Projection is defined as an image or drawing of an object made on a plane.

## Classification of projection:-

(1) Multi-view projection: - A multi-view drawing is a means of representing a three-dimensional object in two dimensions.(actual shape).

- (i) First angle projection
- (ii) Second angle projection
- (iii) Third angle projection
- (iv) Fourth angle projection

