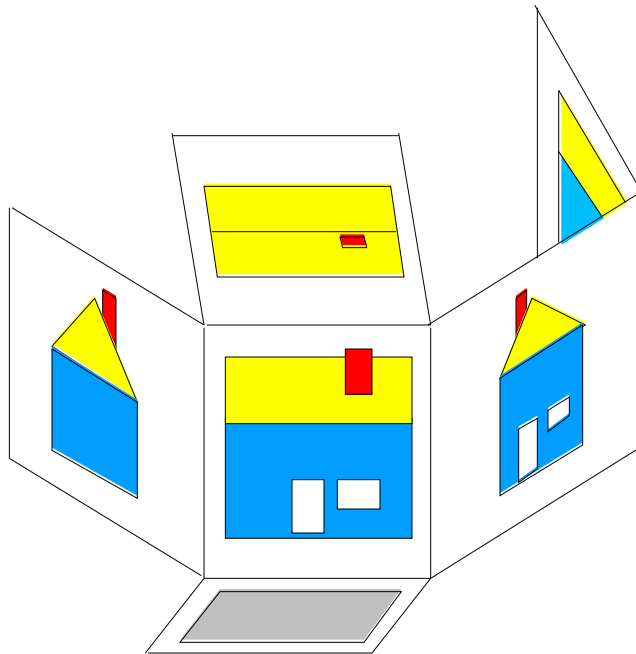


# TECHNICAL DRAWINGS



April 2005

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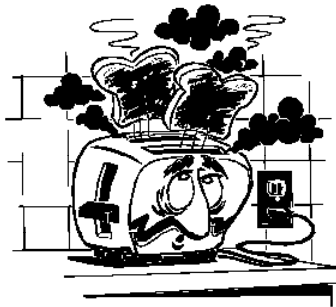
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# Technical Drawings

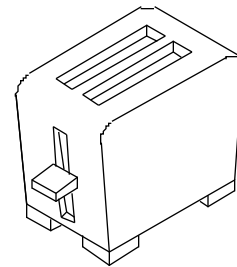
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**BACKGROUND:** Technical drawings are graphic and technical communication tools. Early humans felt a need to represent the world (hunting scenes) to their peers. The appearance of technology gradually led humans to develop another use for drawing. It became a way to convey technical thought (Archimedes, Leonardo da Vinci).

The industrial revolution gave rise to graphic and communication tools, which facilitated the exchange of technical information between individuals. An international organization codified some of these graphic tools so that everyone could understand them.

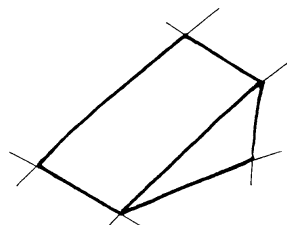


Artistic drawings convey an idea, feeling, mood or situation.

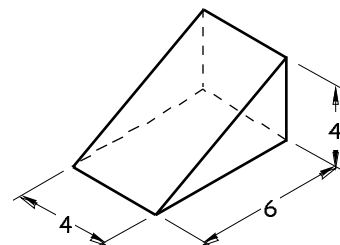


Technical drawings represent the exact shape, dimensions and composition of an object with a view to its fabrication.

There are two types of drawings. The first is a drawing done without instruments, known as a sketch. The second is a drawing done with instruments, known as a final drawing.



Sketch



Final drawing

Technical drawings are the common language of those who work in technology. Engineers, architects, designers, technologists, technicians and specialized workers use them to communicate with each other.

This universal language varies little from one country to another. Unlike spoken languages, it ensures unequivocal understanding of the definition and construction of technical objects. This means that two engineers who do not speak the same language can understand most of a technical drawing, with the exception of annotations written in a specific language.

There are many types of technical drawings, including:

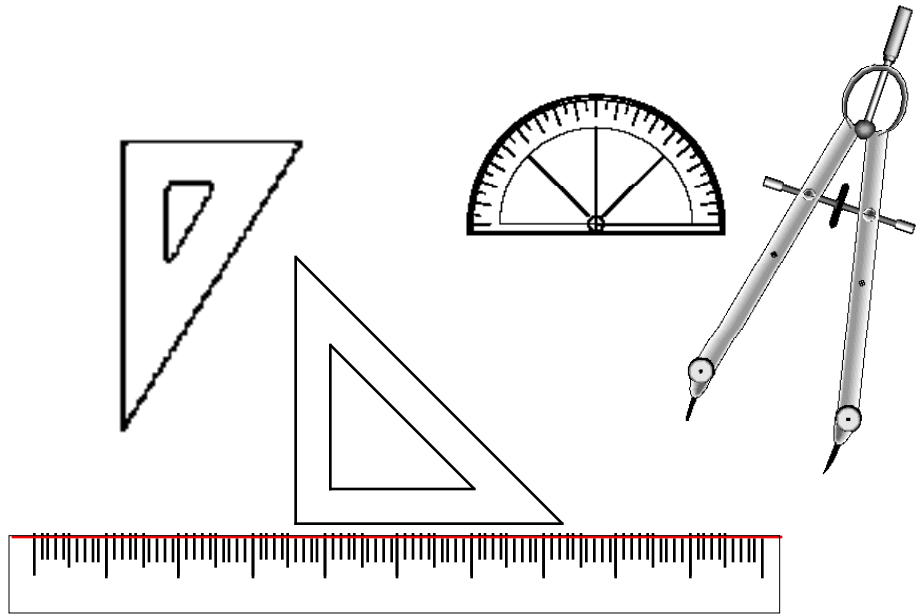
- 3D drawings (isometric, perspective)
- Exploded-view 3D drawings
- Complete working drawings
- Detail drawings (2D orthogonal projections)
- Diagrams are another form of technical drawing with looser, less universal standards.

Technical drawing is an essential tool for young people learning about technology. They need to learn the basics through the tasks assigned to them.

## DRAWING TECHNIQUES

### Instrument drawing

- Pencil
- Eraser
- Protractor
- 30° to 60° square
- 45° square
- Compass
- Pad



### Freehand drawing: sketch

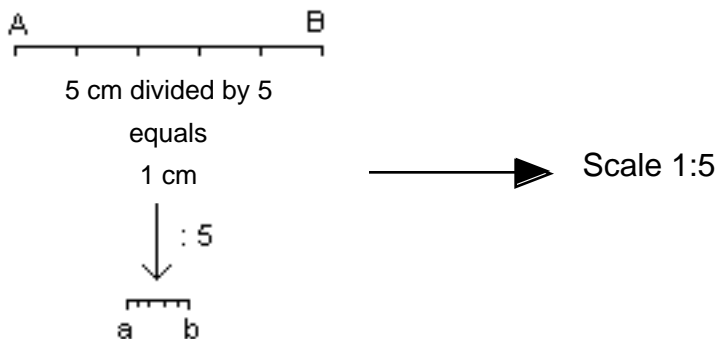
- Pencils
- Grid paper
- Eraser

### Computer drawing

## SCALES

Scale is a geometric concept used mainly to represent an object that is too big or bulky to be drawn to size on a sheet of paper.

Drawing to scale means copying an object proportionally. For example, the 5-cm broken straight line AB below has been reduced by 5 using a reduction constant of  $1/5$ .

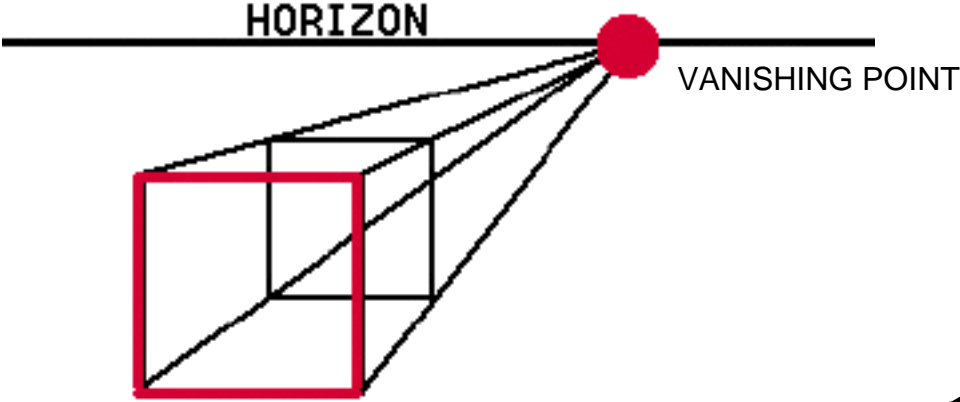


Other practical examples include maps, whose scale is  $1/10\ 000$  and read so that one centimetre on the map equals 10 000 cm or 100 m of distance.

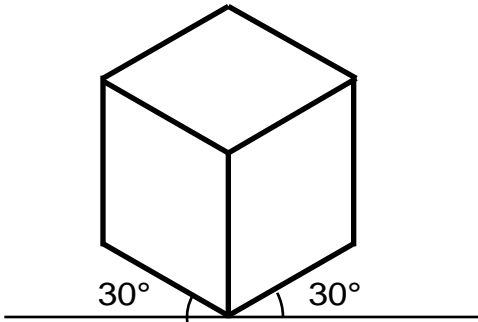
Reduction factor:  
1:2 1:5 1:10 1:20

Enlargement factor:  
2:1 5:1 10:1

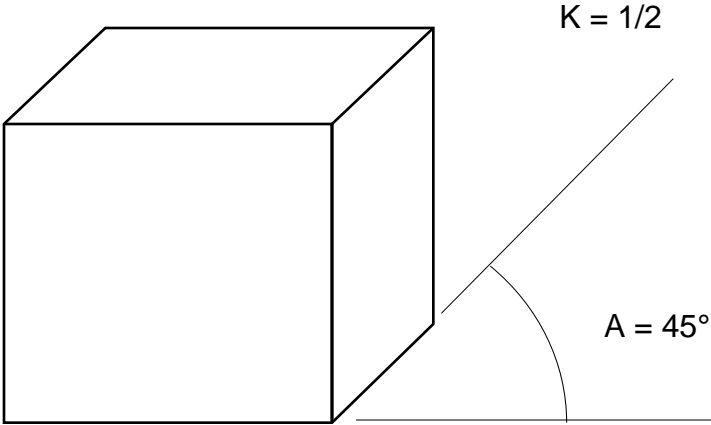
MOST COMMON PERSPECTIVES



Conic projection

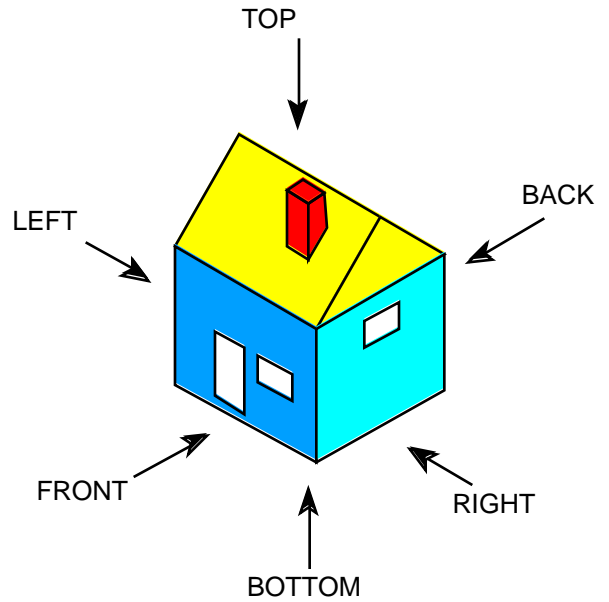
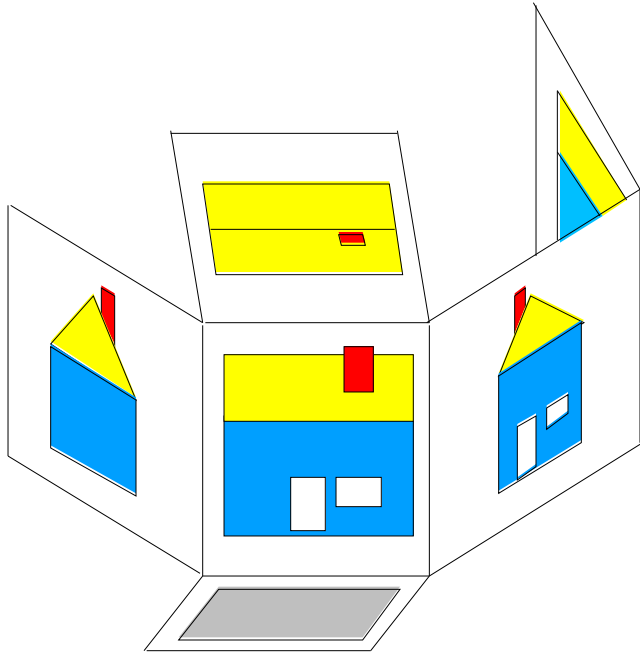


Isometric projection



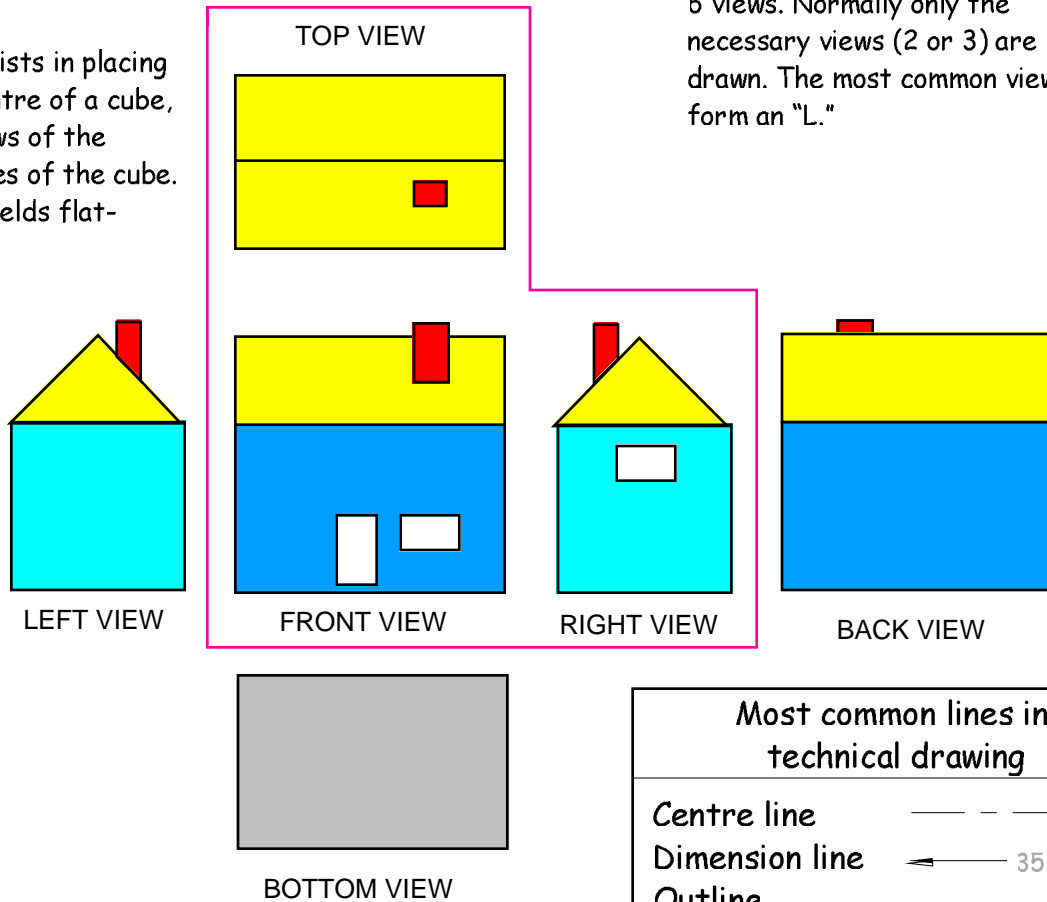
Cavalier perspective of a cube

# ORTHOGONAL PROJECTION



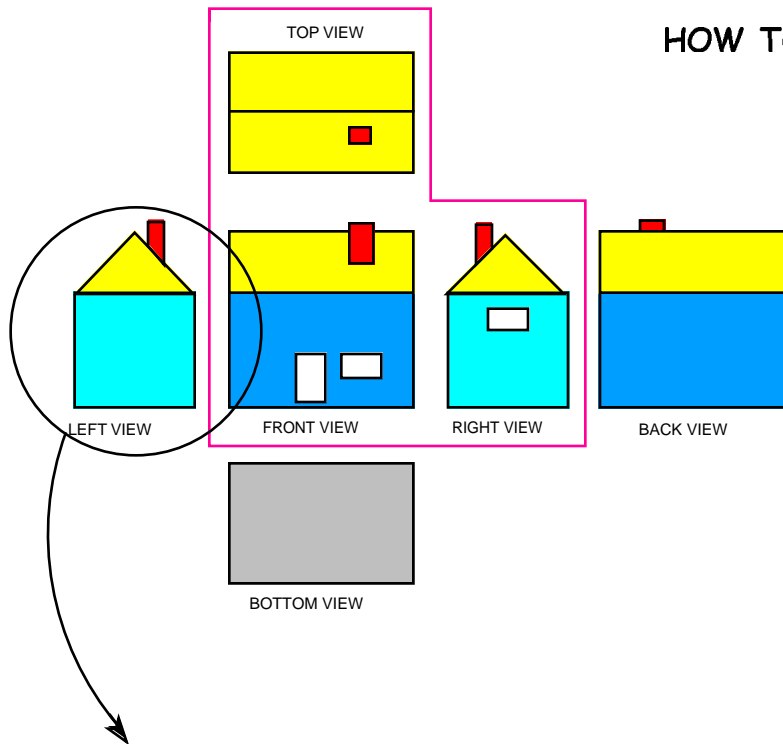
This technique consists in placing an object in the centre of a cube, then projecting views of the object onto the sides of the cube. Opening the cube yields flat-surface views.

All objects can be depicted with 6 views. Normally only the necessary views (2 or 3) are drawn. The most common views form an "L."



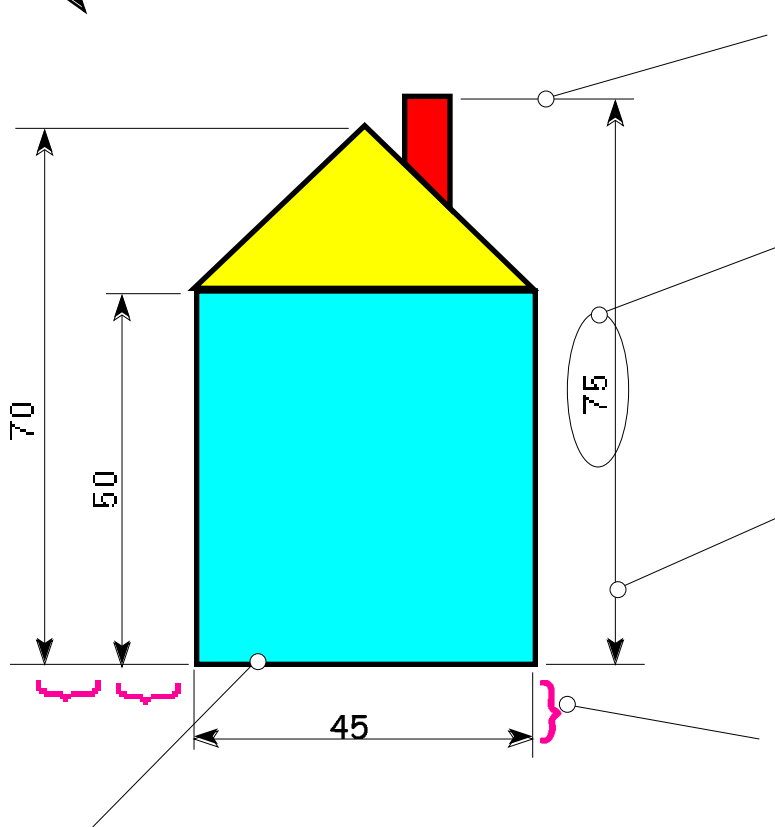
Most common lines in technical drawing	
Centre line	— · — · — · — · — · — · — · — ·
Dimension line	← 35 →
Outline	—————
Dashed line	- - - - -
Extension line	← 35 →

## HOW TO ADD MEASUREMENTS TO A DRAWING



### DIMENSIONING

Dimensioning a drawing means adding the dimensions needed to produce the object shown. Measurements must be added according to set rules.



This is an **extension line**.

This is a **measurement or dimension**.

This line with two arrows is a **dimension line**.

The space between the drawing lines and the dimension lines must **always be the same, around 10 mm**.

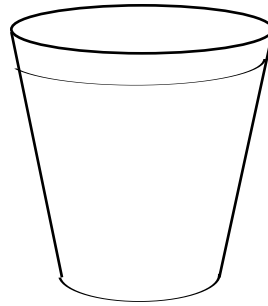
Outlines are always **thick**.

Dimension lines are always **thin**.

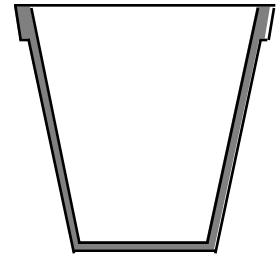


## CROSS-SECTIONS

Cross-sections make complex drawings easier to understand. They are virtual and show a part's interior.

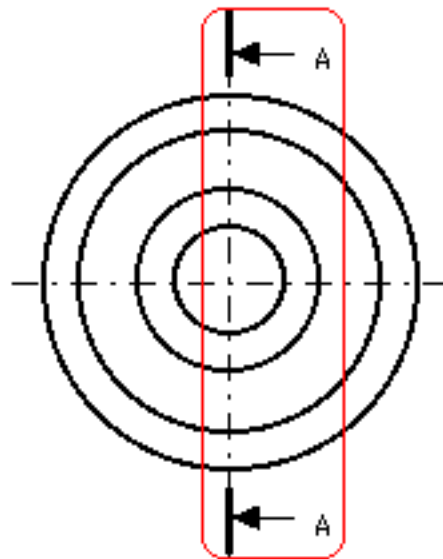
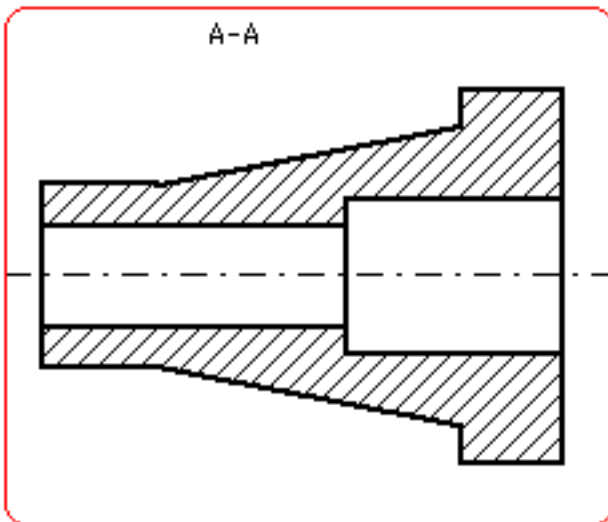


Exterior view



Cross-section view

One-dimensional cross-section



Revolved and removed sections

