# CABRI® 3D


Innovative Math Tools

## USER MANUAL

# TABLE OF CONTENTS

CHAPTER 1

# INTRODUCTION

Welcome to Cabri 3D's world of spatial and solid geometry!

Cabri technology was born in the research labs of France Centre National de la Recherche Scientifique (CNRS) and Joseph Fourier University in Grenoble, the project began in 1985, when Jean-Marie Laborde, the guiding spirit behind Cabri, set out to make two-dimensional geometry easier to learn and more enjoyable to teach.

Using computers to construct geometrical figures opens up a world of new possibilities compared to the classic methods of construction using pencil, paper, ruler and compass. Around the world, more than 15 million people are using Cabri Geometry II and Cabri Geometry II Plus on computers and Texas Instruments graphing calculators.

Today, Cabri 3D brings the Cabri philosophy to the world of 3D!

Using Cabri 3D, you will quickly learn to construct, view and manipulate all sorts of objects in three dimensions: lines, planes, cones, spheres, polyhedra… You can build dynamic constructions, from the simplest to the most complex, and you can freely manipulate, change and redefine objects as needed. With Cabri 3D, you will discover a remarkable tool to help you study and solve geometry problems.

The whole CABRILOG team wishes you many exciting hours of construction, exploration and discovery, thanks to Cabri 3D.

**Note:** To get the latest news about our products and for the most recent updates of Cabri 3D, including updated versions of this guide, visit our website at *www.cabri.com*. The site also provides links to dozens of web pages and books about geometry and Cabri.


**Cabri 3D User Manual:**
**Authors:** Sophie and Pierre René de Cotret
**Latest update:** June, 30th 2005
**New versions:** *www.cabri.com*
**Mistakes:** *support@cabri.com*
**Graphic design, page layout & second readings:** Cabrilog

## 1.1 INSTALLING AND ACTIVATING THE PROGRAM

### 1.1.1 System requirements

**Supported operating systems:**

- **PC:** Windows 98, Me, NT 4, 2000, XP
- **Macintosh:** Mac OS X, version 10.3 or higher

**Recommended configuration for PC:**

800 MHz or greater CPU, NVIDIA GeForce 2 or ATI Radeon 7000 video card or newer

### 1.1.2 Installation

**Using the CD-ROM from the box version:**

- **PC:** Insert the CD-ROM and follow the instructions. If autostart is deactivated, launch the **setup.exe** program on the CD-ROM manually.

- **Macintosh:** Copy the Cabri 3D program icon to the Applications folder.

The first time you launch the program you will be asked to enter your user information and the product key (the CD key is shown inside the CD-ROM case).

**Using the download version:**

The program will run in demonstration mode for 15 minutes, with the Copy and Save commands disabled. To activate the program permanently, you must purchase a license from Cabri website (*www.cabri.com*) or from your local distributor. You will be emailed a "license.cg3" that you must open with Cabri 3D to activate.

### 1.1.3 Updates

To check if you are using the most recent version of Cabri 3D, choose the Updates… command from the program's Help menu, then follow the instructions to obtain any needed update.

Cabri 3D is easy to understand and easy to use, but you will learn the program much more quickly and easily if you take the time to work carefully through the next two chapters.

Chapter **[2] BASIC PRINCIPLES**, is an accelerated introduction to using Cabri 3D, and not just a list of functions and commands. Work through the various procedures in order and you will quickly grasp how the program works, while producing your first Cabri 3D constructions.

Chapter **[3] CABRI 3D TOOLS**, is also designed to be studied step by step, to help you learn Cabri 3D as easily and quickly as possible.

The remaining chapters of the User Guide describe Cabri 3D various complementary and advanced functions.

CHAPTER 2

# BASIC PRINCIPLES

## CREATING YOUR FIRST CABRI 3D DOCUMENT 2.1

Double-click on Cabri 3D icon. The program will automatically create a single-page document containing a **work area**, that is a white area with a gray base plane in the center.

## YOUR FIRST 3D CONSTRUCTION 2.2

First you will construct two three-dimensional objects. This will illustrate a number of Cabri 3D functions.

**Constructing a sphere**
A toolbar at the top of the Cabri 3D document window provides a series of toolboxes. Click and hold the Surfaces toolbox (fourth button from the left) and choose Sphere from the dropdown menu.

The mouse pointer changes into a pencil.

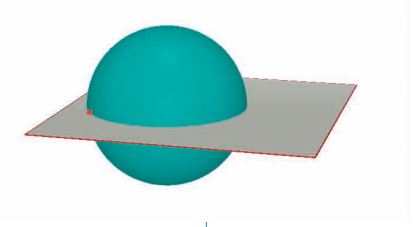
Click once about 1 cm to the left of the base plane's center point, then click again about 2 cm to the left of the first point.

You have constructed a sphere!

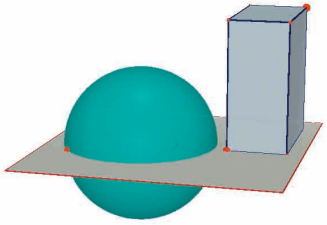
To modify the sphere, choose the Manipulation tool (the first button in the toolbar).

To change the size of the sphere, use the mouse to click and drag either the first or second point that you constructed.

To move the sphere, select it and drag it to a new position using the mouse.



**Constructing a polyhedron**
Click and hold the Polyhedron toolbox (the next to last button in the toolbar) and choose the XYZ Box from the dropdown menu.



Click on the gray base plane just to the right of the sphere.

Next, move the mouse about 2 cm to the right and 1 cm upwards. Hold down the `Shift` key and move the mouse about 5 cm upwards, then click. You have constructed an XYZ Box.

To modify the XYZ Box, choose the Manipulation tool and follow the same procedures you used with the sphere (see the previous section).

This first document – automatically named **Document1** – can be saved under the name of your choice by choosing File-Save As… After this, choosing File-Save will save all modifications applied to the construction under the same name.

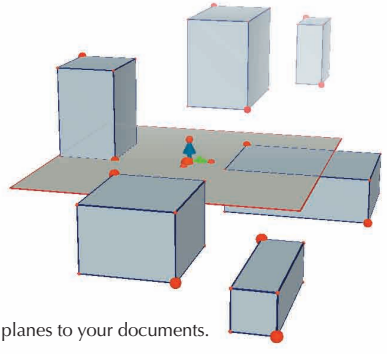
## 2.3 CREATING A NEW DOCUMENT

To build a new set of constructions you should create a new document. Choose File-New. The program will create a new document with a work area displaying a natural perspective.

To add pages or work areas to a document, or to choose from a wider selection of perspectives, see Chapter **[5] ADVANCED FUNCTIONS**.

## 2.4 THE CONCEPT OF PLANES

To really understand how Cabri 3D works, you need to grasp the concept of planes. In this section, each object you construct in Cabri 3D is placed on a plane, known as the **base plane**.



Create a new document.

The gray surface in the center is known as the **Visible Part** (VP) of the base plane. All constructions that you will build in this section, either on the VP or outside it, are necessarily placed on this base plane*.

*Later you will see that you can add other planes to your documents.

To see how this works, start by constructing an XYZ Box on the VP.

Next, construct two new boxes outside the VP, in the upper part of the work area.

Now construct a box in the lower part of the work area.

As you can see, the upper boxes are lighter and the lower boxes are darker, which contributes to the perspective effect.

All these boxes are placed on the same plane, either on the VP, or on an invisible extension of this VP, which is known as the **Non-Visible Part** (NVP).

## GLASS BALL: CHANGING VIEW ANGLE

2.5

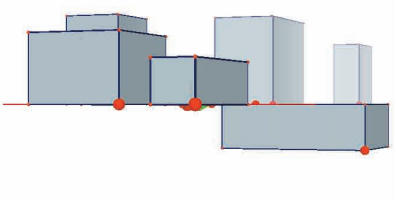
You can view your construction from various angles, as if you were moving a camera around your construction. To change the view angle of the scene, encompassed in a glass ball, put the mouse pointer anywhere in the work area, hold down the right mouse button, and move the mouse. Begin by moving the mouse up and down.

By changing the view angle, you can see that all the boxes you constructed earlier really are on the same plane, whether above or below it.

Now move the mouse left and right, instead of up and down: as you can see, this changes the angle horizontally.

(To change the view angle on a **Macintosh** with a single-button mouse, first hold down either the ⌘ or the `Ctrl` key, then click and drag with the mouse.)

Change the view angle often while you work. It will give you a clearer view of your work and a better grasp of the program capabilities. If you are building a complex construction, changing the angle may make it easier to add new objects.



# CABRI 3D TOOLS

This chapter describes each of the Cabri 3D tools. Consult it whenever you want to know what a particular Cabri 3D tool does and how to use it.

Like Chapter 4, however, this chapter can be read in order, since each new example is based on the functions and operations presented earlier.

To speed up your learning of Cabri 3D, we recommend working through this chapter in sequence, trying out each Cabri 3D tool as it is presented.

**Terms and abbreviations used in the tables**
**Base plane**: the plane provided by default when you open the program or create a new document.
**VP** – the visible part (of a plane): the colored portion of a plane.
**NVP** – the non-visible part (of a plane): the invisible extension of the visible part of a plane.

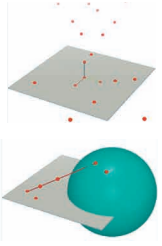
**Tool help:** Cabri 3D provides interactive help for every tool. To activate it, choose Window-Tool Help.

## MANIPULATION 3.1

- Lets you select objects.
- Lets you move points or objects, and as a consequence, all objects depending on them.

## POINTS 3.2

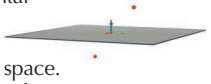
Point on a plane, or on any other object, or in space.



- Point on the VP of a plane:
  The Point tool being active, move the mouse pointer over an empty zone of the **VP** of a plane. Animated dots now cover the **VP** of this plane. Once the tool tip says a new point (on plane), a left-button click will create a new point. This point can be moved anywhere in the plane, especially in its **NVP**. However, it is not possible to move it outside of the plane.

- Point on an object:
  The Point tool being active, move the mouse pointer over an existing object (line, ray, segment, vector, circle, conic, triangle, sector, half-plane, plane, cylinder, cone, sphere). In the case of a line or curve, it will start to blink. In the case of a surface, animated dots will appear on it. In both cases, the tool tip says a new point (on …), recalling the type of the object. A left-button click will create a new point on the object. This point can be moved anywhere on the object, and is constrained to remain on this object.

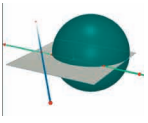
- Free point in space:
  Any point not created in a plane, or on an object is a free point in space. The Point tool being active, move the mouse pointer in an empty area of the view. The tool tip becomes a new point (in space), and a local gray grid appears, giving an idea of the horizontal (*XY*) and vertical (*Z*) position of the point. Hold down the `Shift` key to move the point vertically (*Z*) instead of horizontally (*XY*). This point can be moved anywhere in space. After the `Shift` key is held down, one can construct only a free point in space, even if the mouse pointer is subsequently moved over an object. The `Esc` key will revert to the usual selection state.
  To move a free point in space vertically, it is necessary to hold down the `Shift` key.



- Intersection point (implicit):
  Move the mouse pointer near an intersection point between two objects. A left-button click will create all intersection points between the two objects, as would have done the intersection point tool.

**Intersection point**

Construct the intersection point(s) between two objects. Select the two objects to intersect (curve/curve or curve/surface). Some combinations are not implemented yet, for example conic/conic. Implicit constructions (see above) are also enabled by this tool.



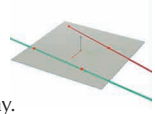
## 3.3 CURVES

**Line**

Construct a line with the following options:

- Line by two points:
  Create the line containing two points. Select the two points.

- Line intersection between two planes (implicit):
  Move the mouse pointer near the intersection between two planes. A left-button click will create the intersection line.

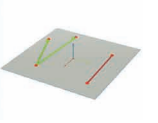


**Ray**

Construct a ray by two points. The first point is the origin of the ray.

**Segment**

Construct a segment by two points.



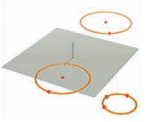
**Vector**

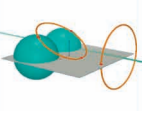
Construct a vector by two points. The first point is the origin of the vector.

**Circle**

Construct a circle, with the following options:

- Circle by two points in a plane:
  Construct a circle in a plane, defined by its center and a point of the circle. Select first the supporting plane, then the center point (in the plane), and the circle point (in the plane). If created on-the-fly in the plane, the points can then be moved on the NVP of the plane using the Manipulation tool.
- Circle by three points:
  Construct a circle containing three points. The circle is in the plane defined by the three points, and contains the points. The first point cannot be created on-the-fly in a plane (because the previous construction will accept the plane as input).
- Circle by its axis and a point:
  Construct a circle having a given line (segment, ray, vector) as axis, and containing a point (not on the axis). The circle is in the plane perpendicular to the axis and containing the point. Its center is the intersection of the axis and the plane.
- Circle by center and radius:
  Construct a circle in a plane with its radius defined by the length of a segment or a vector. Select the supporting plane and a point in this plane to define the center. Then, select a segment or vector to define the radius. This last object does not need to be on the plane.
- Intersection circle (implicit):
  Construct the intersection between a plane and a sphere, or two spheres. Move the mouse pointer near the intersection of the two objects, then left-click to create the circle.

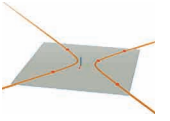




**Conic**

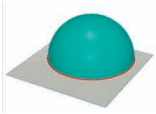
Construct a conic (ellipse, parabola, hyperbola), with the following options:

- Conic by five coplanar points:
  Construct a conic containing five coplanar points. Select the five points.
- Conic by five coplanar lines:
  Construct a conic tangent to five coplanar lines. Select the five lines.
- Intersection conic (implicit):
  Construct the intersection between a plane and a cone/cylinder. Move the mouse pointer near the intersection of the two objects, then left-click to create the conic.



### Intersection curve

Construct the intersection curve between two objects: plane/plane, plane/sphere, sphere/sphere, plane/cone, plane/cylinder. Implicit constructions (see above for line, circle, conic) are also enabled by this tool.

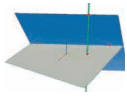


## 3.4 SURFACES

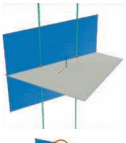
### Plane

Construct a plane, with the following options:

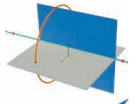
- Plane by three points:
  Construct the plane containing three points.
  Select the three points.



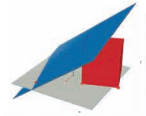
- Plane by two coplanar lines:
  Construct the plane containing two intersecting lines.
  Select the two lines.



- Plane by a line/ray/segment/vector and a point:
  Construct a plane containing a line/ray/segment/vector, and a point outside of it. Select the two elements.

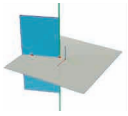


- Implicit plane constructions:
  Move the mouse pointer over a triangle or polygon.
  A left-click will construct the plane containing the object (supporting plane).



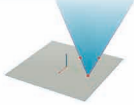
### Half-plane

Construct a half-plane limited by a line/ray/segment/vector, and containing a point outside of it. Select the two elements. The result is the portion of the plane limited by the line/ray/segment/vector, and containing the point.



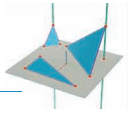
### Sector

Construct a sector: the portion of a plane limited by two rays sharing the same origin. The sector is constructed by three points. The first point is the origin, and the other points define the two rays.



### Triangle

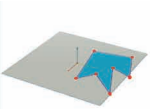
Construct a triangle by three points. Select the three points.



### Polygon

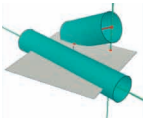
Construct a polygon defined by three or more coplanar points . Select the points. To end the selection, either select a point already selected as vertex, or press the `Enter` key. If three points are selected, the Polygon tool is equivalent to the Triangle

tool. Cabri 3D detects the cases where the result is a regular polygon, and allows further constructions accepting regular polygons.



**Cylinder**

Construct a cylinder, with the following options:

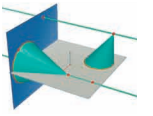


- Cylinder by axis and point:
  Construct a cylinder defined by its axis and a point. Select a line/ray/segment/vector and a point outside of it. In the case of a segment/vector, the cylinder is limited to the portion projecting orthogonally on the segment/vector; otherwise, the cylinder is infinite.

- Cylinder product of a circle/ellipse and a line/ray/segment/vector:
  Construct a cylinder product of a circle/ellipse and a line/ray/segment/vector. The result is a cylinder containing the circle/ellipse, and whose generators are parallel to the other object. If this object is a vector, the cylinder is limited by the circle/ellipse, and its image by the translation defined by the vector.

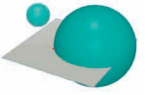
**Cone**

Construct a cone by a circle/ellipse and a point. Select the two objects.



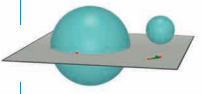
**Sphere**

Construct a sphere, with the following options:



- Sphere by center and point:
  Construct a sphere from its center and a point. Select the two points.

- Sphere by center and radius:
  Construct a sphere from its center and the length of a segment/vector. Select the two objects.



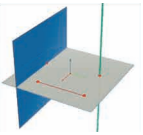
## RELATIVE CONSTRUCTIONS 3.5

**Perpendicular**

- Line perpendicular to a plane/polygon by a point:
  Construct the line perpendicular to the input plane or polygon, and containing a point.

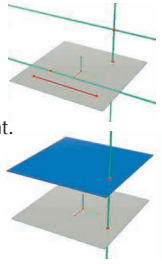
- Plane perpendicular to a line/ray/segment/vector by a point:
  Construct the plane perpendicular to a direction, and containing a point.

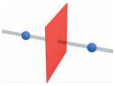
- Line perpendicular to a line/ray/segment/vector by a point:
  `Ctrl` key down on Windows (`Alt` key down on MacOS) construct the line perpendicular to a direction, and containing a point outside of it. The resulting line is in the plane determined by the two input objects.



**Parallel**

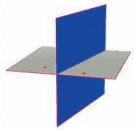
- Line parallel to a line/ray/segment/vector by a point:
  Construct the line parallel to a direction, and containing a point.
- Plane parallel to a plane/polygon by a point:
  Construct the plane parallel to a plane/polygon, and containing a point.

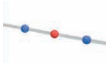




**Perpendicular bisector**

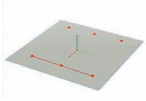
Construct the perpendicular bisector plane of a segment/vector, or two points. This is the plane perpendicular to the direction defined by the inputs, and containing the middle point of the segment/vector/two points.

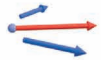




**Midpoint**

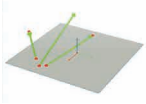
Construct the middle point of a segment/vector, or two points.





**Vector sum**

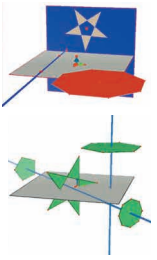
Construct the sum of two vectors. Select the two vectors to sum, and the origin point of the result.



## 3.6 REGULAR POLYGON/STAR

All these tools construct a regular polygon or regular star polygon, with the following options, similar to the circle constructions:


- Regular polygon/star by center and point in a plane:
  Select a plane, then a point in this plane (the center) and another point in the plane, defining one vertex of the polygon. If this last point is constructed on-the-fly as a free point on the plane, any vertex of the polygon/star can be freely manipulated rotate/scale up/scale down the object.
- Regular polygon/star by axis and point:
  Select a line/ray/segment/vector defining the axis of the polygon, then a point, defining one vertex of the polygon.



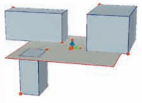
## 3.7 POLYHEDRA

**Tetrahedron**

Construct a tetrahedron defined by four points. The points are the vertices of the tetrahedron.

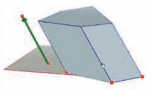
**XYZ Box**

Construct a parallelepiped with edges parallel to the *X*, *Y*, *Z* axes and defined by two points. The two points define one of the three diagonals of the box.



### Prism

Construct a prism defined by a convex polygon and a vector. The result is the convex polyhedron defined by the polygon and its image by the translation defined by the vector.

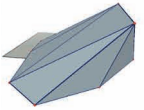


### Pyramid

Construct a pyramid defined by a convex polygon and a point. The result is the convex polyhedron defined by the polygon and the point.

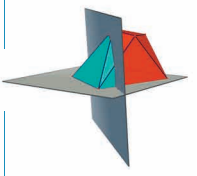
### Polyhedron

Construct a convex polyhedron defined by points, segments or polygons. The result is the smallest (by inclusion) convex polyhedron containing all the selected objects.



### Cut polyhedron

Cut a polyhedron by a plane. Select a polyhedron and cut a plane. The tool constructs a new polyhedron, restriction of the input polyhedron by the plane. The initial polyhedron is automatically hidden by the tool. Maintain the `Ctrl` key down to select the other side of the plane (on MacOS, maintain `Alt` key down).

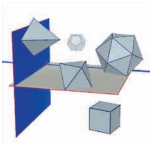


## REGULAR POLYHEDRA 3.8

### Reguliar polyhedron

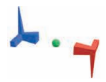
All these tools construct a regular (Platonic) convex polyhedron, with the following options:

- Regular polyhedron with a face on a plane:
  The interface is similar to the construction of a regular polygon on a plane. Instead of constructing a polygon, we construct a polyhedron with the face "glued" to the plane. Hold `Ctrl` key (`Alt` key on MacOS) down to select the other side of the plane.
- Regular polyhedron glued on a polygon:
  Construct a polyhedron "glued" on a face compatible with the faces of the selected tool (i.e. triangles for tetrahedron/ octahedron/icosahedron, square for cube, pentagon for dodecahedron). Hold `Ctrl` key (`Alt` key on MacOS) down to select the other side of the polygon.



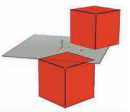
## TRANSFORMATIONS 3.9

The construction tools now expect the elements defining the transformation, and the object to transform at the end. This paradigm differs from Cabri Geometry II and the previous versions of Cabri 3D. However, if an object is selected during the construction and cannot be accepted as transformation element, then it is taken as the object to transform.



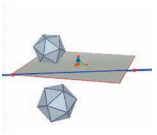
**Central symmetry**

Apply the central symmetry. The element is a point: the center of the symmetry.



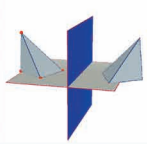
**Half-turn**

Apply a half-turn (180 degree rotation around an axis). The element is a line/ray/segment/vector defining the axis of the half-turn.



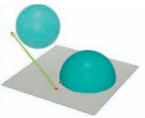
**Reflection**

Apply a reflection (orthogonal symmetry with respect to a plane). The element is a plane/polygon defining the plane of the symmetry.



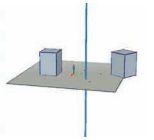
**Translation**

Apply a translation. The element is a vector, or a pair of points defining implicitly the vector.



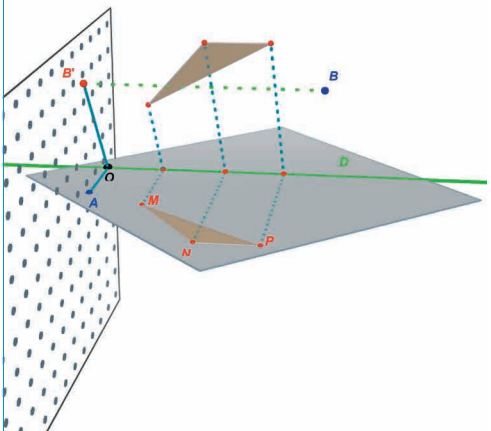
**Rotation**

Apply a rotation. The elements are a line/ray/segment/vector defining the axis of the rotation, and two points outside of the axis defining the angle. The rotation maps the half-plane by the axis and the first point to the half-plane by the axis and the second point.



In this example, we construct the image of triangle *MNP* by selecting line *D* and points *A* and *B*.
The angle of the rotation is the angle between the two half-planes:
- the half-plane with border *D* containing point *A*,
- the half-plane with border *D* containing point *B*.

This angle is also equal to $(\overrightarrow{OA},\overrightarrow{OB'})$.



## KEYBOARD-CONTROLLED SHORTCUTS AND FUNCTIONS 3.10

| Function | PC | Macintosh |
|---|---|---|
| Selecting more than one object using the Manipulaion tool | Hold down the Ctrl key and select all required objects | Hold down the Shift key and select all required objects |
| Delete selected objects | Press Delete | Press Delete |
| Stop construction of an unfinished object (e.g., stop constructing a triangle after creating 2 of its 3 points) | Press esc | Press esc |
| Cancel the selected tool and choose the Manipulation tool | Press esc | Press esc |
| Deselect a selected object | Press Ctrl+clic | Press Shift+clic |
| Construct a point or an object above or below the base plane | Hold down the Shift key, move the point vertically, then click | Hold down the Shift key, move the point vertically, then click |
| Move vertically an existing point or object constructed above or below the base plane | Hold down the Shift key, then move the object vertically | Hold down the Shift key, then move the object vertically |
| Move vertically, in increments of 5 mm, an existing point or object constructed above or below the base plane | Hold down the Ctrl+Shift keys, then move the object vertically | Hold down the Option+Shift keys, then move the object vertically |
| Move horizontally, in increments of 5 mm, an existing point or object constructed above or below the base plane | Hold down the Ctrl key, then move the object horizontally | Hold down the Option key, then move the object horizontally |

## A USEFUL TECHNIQUE FOR MANIPULATING OBJECTS 3.11

You can move existing points or objects without switching to the Manipulation tool. For example, even with the Tetrahedron or some other tool selected, you can move a sphere or change the orientation of a line, etc. Simply select a point or an object, hold down the mouse button and move the selected object.

# COMPLEMENTARY FUNCTIONS

## CREATING TEXT LABELS FOR OBJECTS 4.1

Cabri 3D lets you associate text labels with the various objects in your constructions. These labels can serve as notes to yourself or simply as a means of naming the various objects.

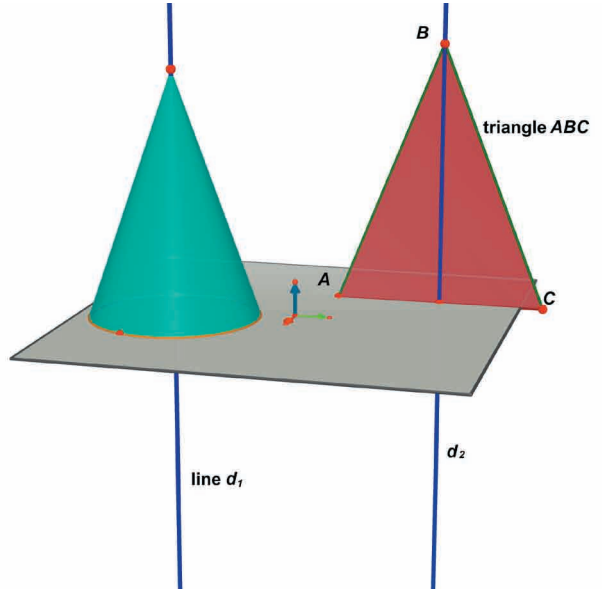
To create a label, select an object (point, sphere, line, plane, etc.) with the Manipulation tool, then enter the desired text.

Note that if you enter a number immediately following a letter, it will automatically be displayed as an index (e.g., line $d_1$).

To move a label, simply select it with the Manipulation tool and move it.

To change the label text, simply **double-click** in the text area.

Use the contextual menu to change the label font or other attribute, see Chapter **[4] COMPLEMENTARY FUNCTIONS**.



## 4.2 CREATING INDEPENDENT TEXT AREAS

Cabri 3D lets you create independent text areas that can be used for notes, legends, etc.

To create an independent text area, choose Document-Add Text Area.

To change the size of the text box, first click the border to show the resize handles. Then drag one or more of these handles to resize the text box as desired.

To enter text, click outside the text box to hide the resize handles, then click in the box to type.

To move the text box, again click the border to show the resize handles. Next click inside the box and move it using the cross pointer that appears.

Use the contextual menu to change the text font or other attributes, chapter **[4] COMPLEMENTARY FUNCTIONS**.

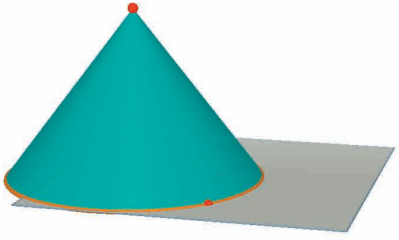


Figure # 24 - Cone - date of realisation, etc.

## 4.3 THE MASK/SHOW COMMAND

This command lets you hide existing objects and show them again as required.

To hide an object, select it using the Manipulation tool, then choose Edit-Mask/Show to hide it. To select several items, hold down the `Ctrl` key (`Shift` on Macintosh).

To show an hidden object, you must first display all hidden objects to choose it. Make sure the Active View window is open (Window-Active View), then click the "Show Masked Objects" check box. Outlines of all hidden objects will appear.

Select the hidden object you want to show, then choose Edit-Mask/Show to show it. Repeat this for all the hidden objects you want to show, or select several objects simultaneously using the `Ctrl` key (`Shift` on Macintosh).

Please note that the outline display of masked objects only applies to the currently selected work area ("view"). To learn more about creating multiple work areas, see Chapter **[5] ADVANCED FUNCTIONS**.

## AUTO ROTATE 4.4

Cabri 3D lets you watch your construction rotate on its axis. Make sure the Active View window is open (Window-Active View), then use the **Auto Rotate** slider to start rotation and control its direction and speed.

You can also start rotation using the glass ball function. Hold down the right mouse button (`Ctrl`-left button on Macintosh) to activate the view angle control, (see Chapter **[2] BASIC PRINCIPLES**). Next change the view angle with a quick movement of the mouse left or right. Rotation will start. To stop the rotation, click on the right mouse button again.

## MODIFYING OBJECTS GRAPHIC ATTRIBUTES 4.5

Cabri 3D lets you change the appearance of planes and objects.

**Changing the graphic attributes of existing objects**
You can easily see the possible results of changing the graphic attributes of existing objects.

To do this, make sure the Styles window is open (Window-Styles). Next, use the Manipulation tool to select an object. The objects attributes will be listed in the Styles window, and you can change them and see the results immediately.

To change the color of an object, click the color box to the left to display the color palette.

You can also change objects attributes using the contextual menu, see Chapter **[4] COMPLEMENTARY FUNCTIONS**.

**Changing default attributes**
You can also change the default graphic attributes Cabri 3D uses when creating new objects. To change the defaults, choose Edit-Preferences-Default Visible Styles (on Macintosh, choose Cabri 3D-Preferences, then Default Visible Styles). You can change the defaults for all families of objects (points, lines, planes, etc.).

To change the color of an object, click on the color box to the left to display the color palette.

Changes to the default attributes will not affect already existing objects. They will be applied to all new objects.

**Viewing the hidden parts of objects**
When you change an object attributes you can choose to select the "Render Object Hidden Parts" check box.

If this option is NOT selected, objects in the selected family will be hidden if any objects appear in front of them. If this option IS selected, objects will be visible through any objects in front of them.

**Graphic attributes of the hidden parts of objects**
You can change the graphic attributes of the hidden parts of objects. For example, the portion of a line that is hidden by a sphere could be dotted, appear in a different color, etc.

To change the default attributes of hidden parts of objects, on PC choose Edit-Preferences-Hidden Styles (on Macintosh, choose Cabri 3D-Preferences, Hidden Styles).

## 4.6 CONTEXTUAL MENUS

Cabri 3D provides various contextual menus. To access them, move the mouse pointer into any of the following environments, then click **briefly** with the right mouse button.

On a Macintosh with a single-button mouse, first hold down either the ⌘ or `Ctrl` key, then click **briefly**.

| **Environment** | **Examples of functions provided by the contextual menu** |
|---|---|
| Object | - Change graphic attributes<br>- Some Edit menu commands |
| Text label | - Text color and font<br>- Some Edit menu commands |
| Independent text box | - Text box background color<br>- Some Edit menu commands |
| Text selected in an independent text box | - Text color and font, alignment, etc.<br>- Some Edit menu commands |
| Blank portion of a work area | - Background color<br>- Auto rotate<br>- Some Edit menu commands |
| Page | - Document menu commands (Add Page, etc.)<br>- Some Edit menu commands |

CHAPTER 5

# ADVANCED FUNCTIONS

## THE CONCEPT OF WORK AREAS 5.1

A Cabri 3D document can include a number of pages and work areas (or "views"). No matter how many pages or work areas you create in a document, they all contain the same group of constructions. The purpose of multiple pages or views is precisely to let you see your group of constructions from various perspectives.

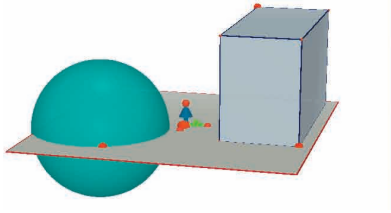
## CREATING NEW WORK AREAS 5.2

To understand how work areas operate, open a new document by choosing File-New. Construct an XYZ box and a sphere.

**To create a new work area** with a different perspective choose Document-New View…-Dimetric k=1/2.

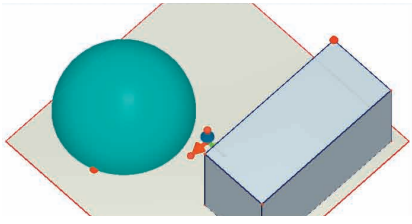
In this new work area you are looking at your construction from above.

**To enlarge or reduce a work area**, choose the Manipulation tool. Click the border of the work area to show the resize handles, then drag one or more of these handles to resize the work area as desired.



**To move a work area**, first click its border to show the resize handles, then click inside the work area and drag to move it.

**To delete a work area**, first click its border to show the resize handles, then press the Delete key to remove it.



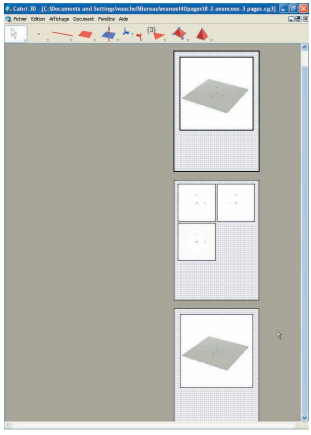
**Simultaneous updating of work areas**
Select the Manipulation tool and change the size of the sphere or the box. As you can see, your changes are immediately visible in the bottom work area. Do the same thing again, but this time in the bottom work area. Once again, your changes are visible in the top work area as well.

If you make a change in any work area, it will always be immediately visible in all other work areas, as well as in any new work areas or pages you add to a document.

## 5.3 CREATING NEW PAGES WITHIN A DOCUMENT

Every Cabri 3D document can contain multiple pages. As well, as we saw in the previous section, every page can contain several work areas.

**New page with pre-selected perspectives**
To add a page to your document, choose Document-New Page… Cabri 3D will present several choices. You can choose from a number of pre-selected perspectives for your page, as well as several paper sizes (US letter, A4, etc.). As an example, choose Technical Drawing US Layout.



Note that each new page is placed immediately following the active page.

To remove a page, click anywhere in the page to select it, then choose Edit-Delete Page.

**New page with a greater choice of perspectives**
Choose Document-New Page… then select a blank page (e.g., Empty US Letter Portrait). Click in the new page to select it, then choose Document-New View… You can now choose a view from among all the perspectives provided by Cabri 3D.

## CREATING A NEW DOCUMENT WITH A CHOICE OF PERSPECTIVES

5.4

To choose a perspective when creating a new document, choose File-New From Template… You can now select one of the standard pre-selected perspectives. For a wider choice, create a blank page and select a new view with a specific perspective, as explained in the previous section.

## CHANGING THE DEFAULT PERSPECTIVE AND PAPER FORMAT FOR NEW DOCUMENTS

5.5

By default, Cabri 3D chooses the natural perspective. To change the default perspective or paper format, choose Edit-Preferences (on Macintosh, choose Cabri 3D-Preferences), then use the Template menu to choose the format desired. In North America, for example, you might choose US Letter paper, either blank or with a specific perspective.

## DISPLAY OPTIONS

5.6

The Display menu lets you change the display scale from 1:4 (reduction) to 4:1 (enlargement).

As well, the Adjust to page command fits the whole page in the current window while the Adjust to view command fits the selected view to the current window.

The Vertical Layout, Horizontal Layout and Two Pages Layout commands let you change the arrangement of pages. These commands are only available if a document has two or more pages.

**Exporting an image**
To export a Cabri 3D image to another program you must first copy the image to the Clipboard in bitmap format.

First click in a work area to activate it, then choose Edit-Copy Selected View As Bitmap and choose the desired image resolution from the sub-menu. (Note that creating a high-resolution image may take 30 seconds or more.) Paste the resulting image into the program of your choice (word processor, presentation software, etc.).

**Exporting a dynamic image to a PC**
For Windows, Cabri 3D provides an ActiveX control that enables you to include Cabri 3D documents as dynamic (editable) images in other programs such as Microsoft Word or Internet Explorer.

In a Microsoft Office document, choose Insert-Object…-Cabri 3D. Then, using the contextual menu, choose Object Cabri3ActiveDoc-Import… and select the file to display.

Cabri 3D also provides a plug-in for Netscape-compatible browsers (Mozilla, FireFox, etc.) that enables you to view Cabri 3D dynamic images. Note that Cabri 3D (either the demo or the full version) must be installed on the computer being used to view the document.

In a web page, insert the following HTML code:
**<embed src="document-name.cg3" width="500" height="600"></embed>**, where the **src** parameter is the name of the file to be displayed (including the relative path to the page) and **width** and **height** are its dimensions in pixels.

**Exporting a dynamic image to a Macintosh**
Cabri 3D provides a plug-in for Netscape-compatible browsers (Mozilla, FireFox, etc.) that enables you to view Cabri 3D dynamic images.

Insertion of a dynamic construction on the Macintosh.
A plug-in for Netscape-class browsers (Mozilla, FireFox, etc.) allows the visualization of dynamic figures (i.e. that can be manipulated). The installer for this plug-in is available for download on *www.cabri.com*. For boxed versions, the plug-in is on the CD-ROM in the "**Cabri3D Internet plug-in**" directory. Double-click on the "**Install Cabri 3D plug-in**" and follow the instructions.

In a web page, insert the following HTML code:
**<embed src="document-name.cg3" width="500" height="600"></embed>**, where the src parameter is the name of the file to be displayed (including the relative path to the page) and **width** and **height** are its dimensions in pixels.