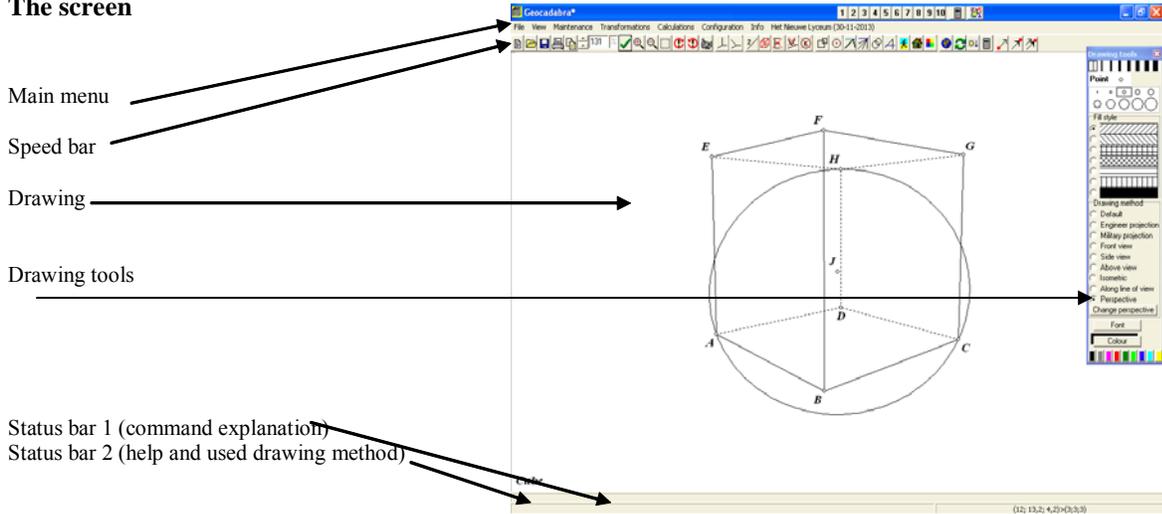


# The user interface

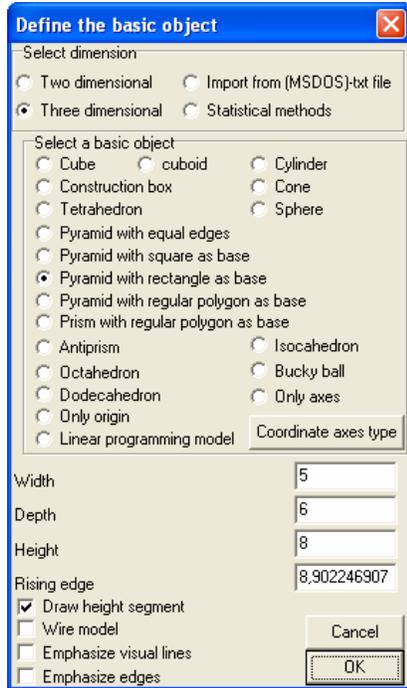
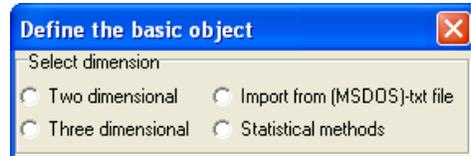
In this lesson the most important user interface items are explained to be comfortable with using the program.

## The screen

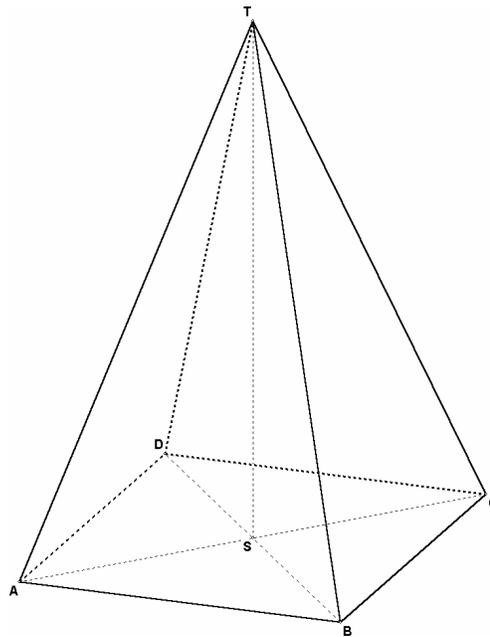


## Starting a new picture

When you start a new drawing, select *File, New*. The dialog on the right appears. Select one of the four items, for instance, a three dimensional model. The basic object options are listed.

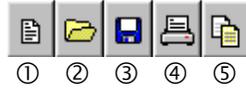


In this case one of the pyramid possibilities is defined. The measurements of the rectangle base (5 by 6) and the height (8) of the pyramid are filled in. (Note that the length of the fourth field, rising edges in this case, is automatically generated after entering the other lengths). After filling in the desired options, click the OK button, after which the object appears.



## The buttons on the speed bar

### File handling buttons



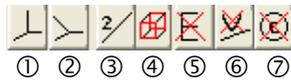
- ① Start with a new drawing
- ② Open an existing drawing
- ③ Save the current drawing
- ④ Print the drawing
- ⑤ Copy the drawing to the clipboard

### Enlargement and undo buttons



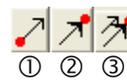
- ① Decrement/increment the enlargement factor
- ② The enlargement factor, editable
- ③ Click to fix the enlargement factor
- ④ Zoom in by a certain percentage
- ⑤ Zoom out by a certain percentage
- ⑥ Select region
- ⑦ + ⑧ Undo and redo buttons

### Toggle buttons for (textual) information in the picture



- ① Adjust orthonormal coordinate axes
- ② Define obtuse coordinate axes
- ③ Show/hide lengths toggle
- ④ Highlight/hide edges toggle
- ⑤ Show/hide names of points toggle
- ⑥ Show/hide names of lines toggle
- ⑦ show/hide names of circles toggle

### Dynamical geometry control buttons



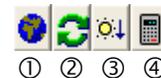
- ① Drag point
- ② Animate one point
- ③ Animate more points

### Buttons that can be used in a perspective drawing



- ① Show information of the perspective
- ② Show/hide sight and distance circles toggle
- ③ Show/hide horizon toggle
- ④ Show/hide converging lines toggle
- ⑤ Show/hide math perspective construction toggle
- ⑥ Show/hide apex of selected line(s)
- ⑦ Change camera position
- ⑧ Walk around the object
- ⑨ Configure colours of perspective help lines

### Special object commands



- ① Opaque/transparent toggle
- ② Rotate object around coordinate axis
- ③ Make segments or points (in)visible
- ④ Activate the calculator

### User definable buttons



The *maintenance* menu offers many commands. It is possible to create shortcut, user-definable buttons that couple a *maintenance* menu command to one of the user definable buttons. The coupling will be saved in a file, and automatically activated each time the program is executed. When the font style of the

number text on the button is **bold**, the button is defined. In that case the help text for the coupled command is shown when the mouse is positioned over the button.

To (re)define a user definable button, click with the *right* mouse button on that button. Its font style will change into *italic*. Now the menu command can be chosen. Instead of executing the command, it is assigned to the button. Its font style changes into **bold**.

To execute the command, simply click with the *left* mouse button on the desired button.

## The main menu

### File

In the file menu the general file handling commands can be selected, as in Windows applications.

### View

In the view menu several commands are given to change the measurements of the picture. When the mouse is positioned upon a command, a help text is shown on the status bar on the bottom of the screen.

### Maintenance

The *maintenance* menu is the main menu to manipulate and build the object. In this document no details will be explained. By exploring the application lessons the commands are demonstrated.

### Calculations

The calculations menu can be used to make several analytical calculations. They will be demonstrated in application lessons.

### Configuration

The configuration dialog can be used to define how the program should behave. Depending on the level of the users, a teacher can fine-tune several detailed switches. Details are explained in the next section.

### Info

Information provides details about the program, manual, and internet support.

Authorisation: By authorising the program, its behaviour changes from a demo into the fully functional program. The authorisation data is saved, so it should be performed only once.

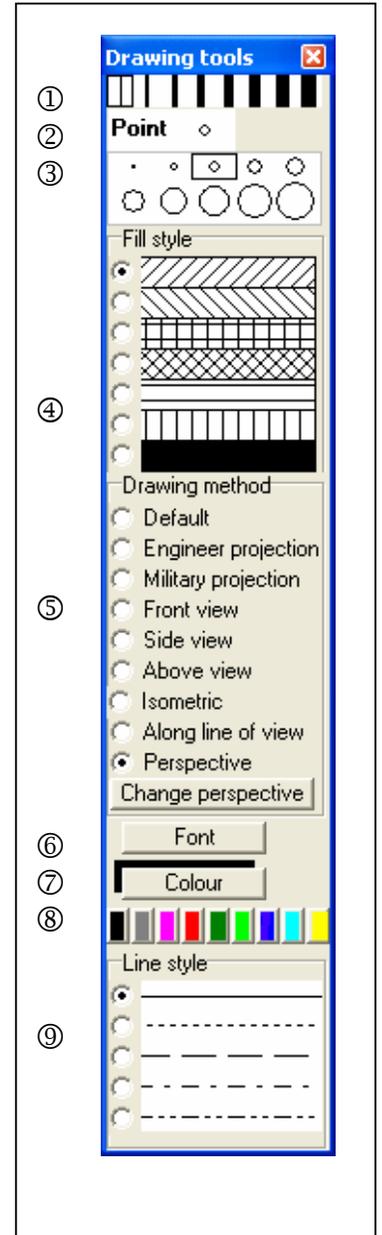
### The drawing tool bar

Several widely-used programs have a drawing tool bar, such as Paint and Word. The drawing tools of 3D Geometry are especially designed to be used in a mathematical environment.

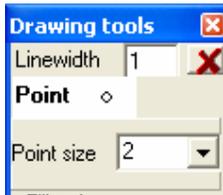
Before giving a drawing command, the desired settings in this tool bar should be selected. Each drawing command thereafter will use those settings. For instance, if you want to draw a line in red, and afterwards another line in blue:

- Select the colour red;
- Draw the first line; this results in a red line;
- Change colour to blue;
- Draw the next line; this will be a blue line.

①	The line thickness is selected here.
②	Each point is shown as a small circle, filled or not. ③ determines the size of the circle, ② determines if it should be filled, or not.
④	Determines the pattern for a filled area.
⑤	Determines the drawing method. It is a nice feature to regularly change the drawing method, to better understand a complex object.
⑥	The Font button is used to define the font of all texts in the drawing.
⑦	The Colour button is used for the following details.
⑧	The colours that are used often are listed here. It is less complicated than Colour button in ⑦.
⑨	The line style determines the appearance for the lines: solid or one of the dotted styles. Only available if “Automatic dotting” is unchecked in the Configuration window.



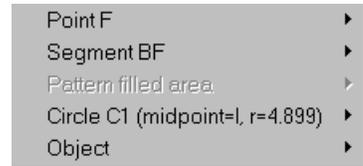
When right clicking on ① or ③ these fields change:



Now you can fill in each desired value.

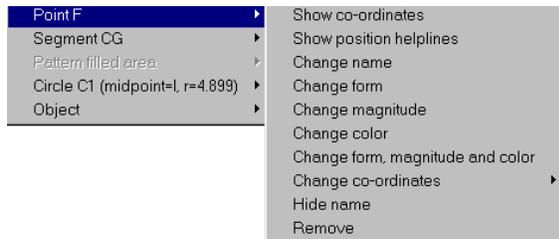
### The right mouse button

Instead of first choosing a command in the main menu and then selecting the object items to be handled by that command, you can work the other way round. Click with the right mouse button near the item that you want to manipulate. (An item can be a point, segment, line, filled area or circle). A popup menu appears. For instance (see on the right):



In this case you have clicked near point F, segment BF and circle C<sub>1</sub>.

When you want to do something with point F, point on “Point F”, and a submenu appears:

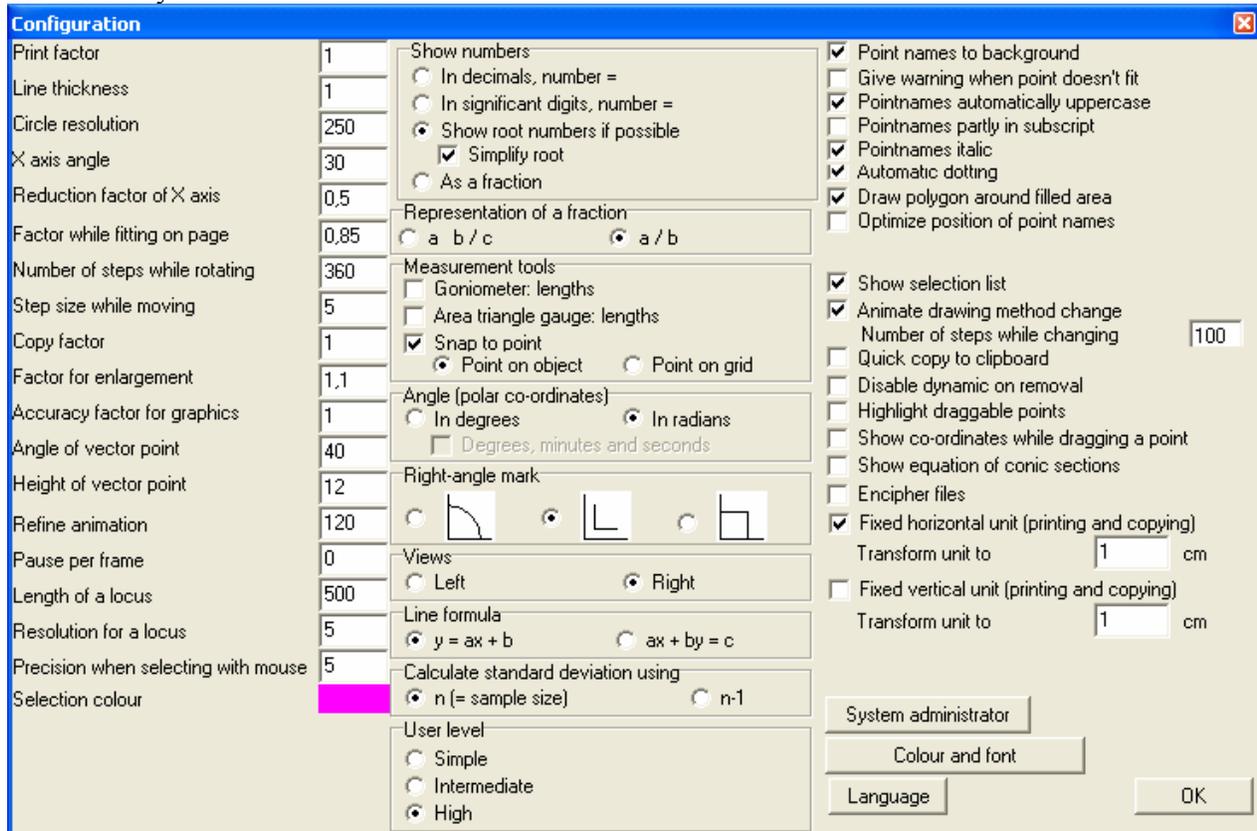


Now select the action to be performed with point F.

If you wish to handle more points the same way, the first option, using the main menu, is more convenient. It is also possible to right click on a button on the speed bar to get special menus and options. You can experiment with that. Look at the help line on the bottom after right clicking!

### The configuration dialog

Several settings can be defined by the user. After clicking the OK button, the settings are saved in a file, to be reused every time the program is executed. Each time a setting is changed, this file will be updated automatically.



**The first column (edit boxes)****Print factor**

Defines the enlargement factor of the drawing on the print

**Line thickness**

Defines the default line thickness (in pixels) in the drawing toolbar

**Circle resolution**

A circle is approximated by drawing line segments between a number of calculated circle points. Circle resolution defines how many points should be used. (A large value gives nice results on a system with high resolution. If resolution is poor however, a large value uses more calculation time, but gives a poorer result.)

**X axis angle,****Reduction factor of x axis**

In the default drawing method (on the drawings toolbar), the user can define the slope of the x-axis (default: 30°) and its reduction factor (default: 0.5).

**Factor while fitting on page**

When the Fit command (in the View menu) is executed, the program calculates how to reduce or enlarge the drawing to fit on the page. Some white space should be around the object to produce a nice result. Therefore the value should be a little less than 1. The default value is 0.85.

**Number of steps while rotating**

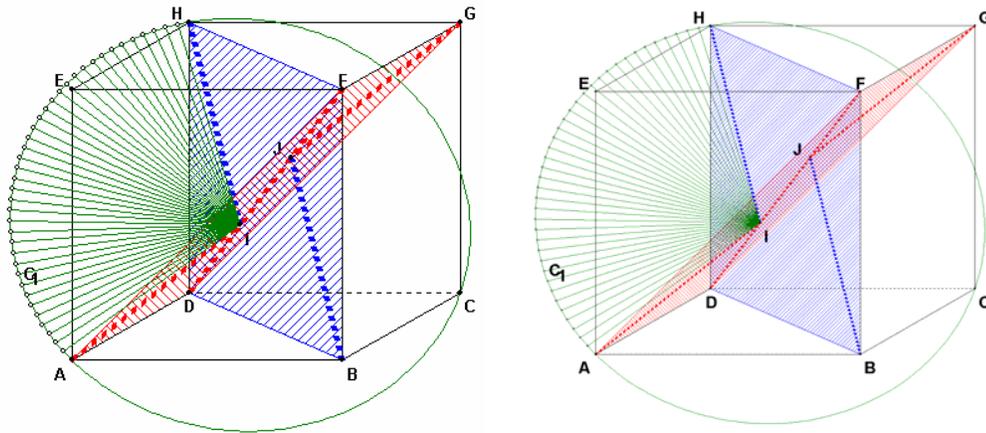
When the object is rotated once, an animation is shown. The number of pictures for one rotation is defined here. On a slow system a moderate value is advised, for instance, 50.

**Step size while moving**

The program can move a line or (intersection) plane. The number of screen pixels per step is defined here. (When using large values for the coordinates, this value should also be large.)

**Copy factor**

When copying the picture to the clipboard, the image will be a bitmap. Its quality is dependent on the screen resolution. When the copy factor is larger, the image of the screen will be enlarged (by this factor) before copying it to the clipboard. When pasting the image, its resolution will be of a better quality. Do not use very large copy factor values, because the system's resources will be exhausted. A factor up to 2 (maybe 3) will do the job. In the example below, the left figure is a copy into Word with copy factor 1. For the right figure the copy factor was 2.5, resulting in a better copy. For higher copy factors the copy action is a little bit slower.

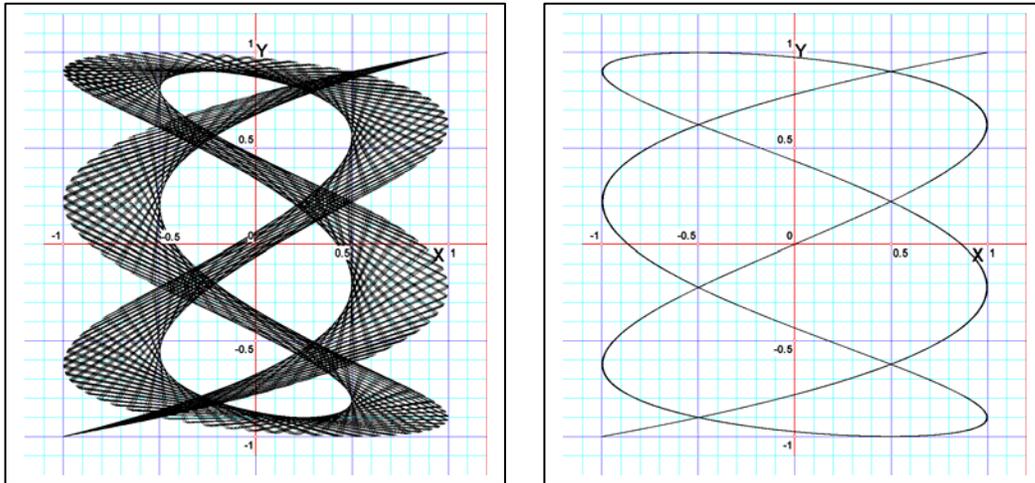
**Factor for enlargement**

When the zoom buttons are clicked, a zoom factor will be used. The factor (to zoom out) can be defined here. Default is 0.85.

## Accuracy factor for graphics

When drawing a graph of a function or curve, the accuracy is internally delimited by calculating 1000 points. This may not be sufficient. For example: the curve  $(x, y) = (\sin 7t, \sin 3t)$  on domain  $[0, 300]$ . Using maximal accuracy in the function dialog the result is the left graph.

When the accuracy factor is set to 10 in the configuration menu, the result is the right graph.



When you want to make art, please use the left variant. For a high resolution, precise graph use the right variant.

## Angle of vector point

The point of a vector is a small triangle.  
Its ending angle is defined here.

## Height of the vector point

The point of a vector is a small triangle.  
Its height is defined here.

## Refine animation

Select the number of dias to save per unit when dragging a point. A larger number gives much detail but slows down the animation. The value filled in here, will be used as default value for the animation.

## Pause per dia

The default pause (in milliseconds) between two dias can be defined here.

## Length of a locus

The arc length of the locus, when drawn, is important for parabolas and hyperbolas.

## Resolution for a focus

The number of calculated points on the locus. (The locus is approximated by drawing segments between these points.)

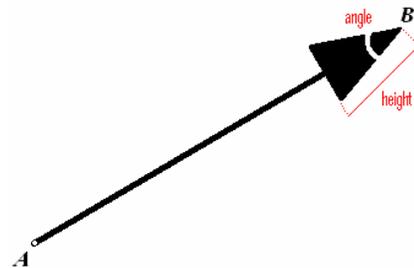
## Precision when selecting with mouse

When the mouse comes near a point, line, circle, etc., a text like “**this point A?**” appears.

The pixel distance from an object that allows this text to appear (in pixels) can be defined here.

## Selection colour

Items that are selected while defining a command will change colour temporarily. The colour for the selection is defined here.



**The middle column (radio buttons)**

## Show numbers

Selects how the program should represent numbers.

- In a certain number of decimals
- In a certain number of significant digits

value	3 significant digits	4 significant digits
12.34567	12.3	12.35
1234567	1230000	1235000
0.000123457	0.000123	0.0001235

- Show root numbers, if possible
  - If checked, the program will show exact values for lengths, using root symbols.
  - Simplify root
    - If checked, the program tries to reduce roots. For example:  $2\sqrt{5}$  rather than  $\sqrt{20}$ .
- As a fraction
  - If checked, the program will try to show the result as a fraction.

## Representation of a fraction

Show a fraction in the format a/b or b/c.

For the value 2.5 choose between the notations  $2\frac{1}{2}$  or  $\frac{5}{2}$ .

## Measurement tools

In the Calculations menu tools can be chosen to measure lengths, areas and edges. In the configuration define the values to be shown.

## Angle (polar co-ordinates)

Defines how to interpret an angle value.

## Right-angle mark

Defines how to show right angles in drawings.

## Views

Select which side view should be shown, the left or the right view.

## Line formula

Select the representation for calculated line formulae.

## Calculate standard deviation

Select how the program should calculate the standard deviation of sample data: using  $n$  or  $n - 1$ .

## User level

There are three levels. In the lowest level, the higher mathematical commands of the user interface are hidden from the user. The menus are shorter and easier to understand for the child. The teacher (or student) can select here.

**The right column (check boxes)**

## Point names to background

When the program places text into a drawing, it is surrounded by some white space. This renders some line details around the point invisible. If the text is created first and then the lines, the lines are visible, but the text could become (partly) unreadable. By (un)checking this checkbox the user can select the variant that does the best job for the current picture.

## Give warning when point doesn't fit

Often the user gives a command that results to add one or more points to an object. Occasionally a point will not fit on the screen. The user can ask the program to generate a warning in such a case. Advice: The warning is appropriate for novice users; but for an experienced user, who understands what can happen, no warning should be given. For instance: when rotating a point in

an animation and the point moves out of the screen, hundreds of warnings result when the checkbox here is checked!

#### Point names automatically uppercase

When a point name is entered it is converted automatically into uppercase.

#### Point names partly in subscript.

Assume the user gives two points the names “eye” and “S12”. If checked, the names of the points are shown as  $E_{ye}$  and  $S_{12}$ . If not checked, the names look like “eye” and “S12” on the screen.

#### Point names italic

When a point name is entered it is converted automatically into italics.

#### Automatic dotting

If checked, the program tries to draw dotted lines for invisible edges of non-transparent objects. (This works properly only with concave objects.) If not checked, the user can use the Drawing toolbar how to draw each line or segment, solid or dotted.

#### Draw polygon around filled area

Often the filled area looks nicer when a polygon is drawn around it.

#### Optimize the position of point names

If checked, the program calculates where to place the name of each point, to the optimal position to improve the overall appearance. Within animations these calculations are very time consuming, which slows the animation down. Un-checking this option beforehand makes animations run smoothly.

#### Show selection list

Sometimes many lines are present in the drawing, which makes it difficult to click on the right one when asked to select. If the Show selection list checkbox is checked, a list of available lines (or segments, circles, planes, etc) is shown by their names, so the user can choose the desired one also from this list. On the other hand, the list may partly cover the drawing. Its window can be moved, but it is sometimes desirable not to see it at all. In that case, uncheck it in the configuration (or click with the right mouse button on the list).

#### Animate drawing method change

When choosing another drawing method on the Drawing toolbar, the program changes the way it represents the object on the screen. When the checkbox is not checked, the change occurs instantaneously. When checked, the drawing changes in several small steps into the new orientation, much like changing the camera position. This takes more time but it can help novice users understand the transition to the new orientation.

#### Quick copy to clipboard

The program removes the unused white space around the drawing before copying it to clipboard. This can take some time. When you activate the checkbox, the time consuming removal of white space is skipped, and the clipboard copy is done very quickly. You may need to remove the white space in the application where you paste the copy.

#### Disable dynamic on removal

When a point, line/segment, circle, etc., is removed, all the objects that are drawn after the removed item will also be removed. By checking this box in the configuration no other items, except dependent objects, are removed.

#### Highlight draggable points

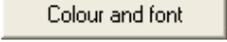
Each point is shown as a small filled or unfilled circle. If checked, the circles of all draggable points will be shown inverted (If all points are normally unfilled, the draggable points are recognised by filled circles.)

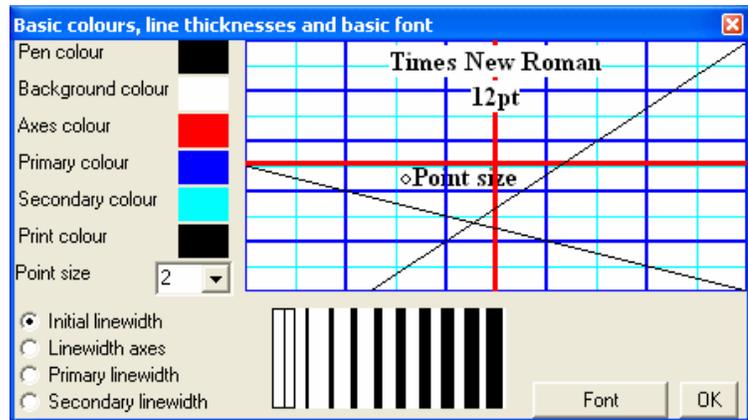
#### Show co-ordinates while dragging a point

When selecting a point, some information about the nearest point is shown. Check here to show the co-ordinates of the point (or formula of the line).

this point A??      this point A (-10.3; -6)??

## Adjustments for users with poor eyesight

Clicking the  button the user can select several settings for initial colours, point size and line thicknesses. The values that are selected here are saved and reused each time the software is executed.



## Show equation of conic sections

When 5-points on conic sections are selected, their equation appears close to them if this is checked

## Encipher files

When checked, each time a user saves a file, s/he is prompted to give a password for the file.

When the file is opened, the user is prompted to enter a password. The file can be read only if the password is correct.

## Fixed horizontal unit (printing and copying)

## Fixed vertical unit (printing and copying)

Often it is desirable that the user can determine the exact length of a segment after copying or printing the picture. For example, a 3 by 4 centimeter rectangle should be exactly these measurements in a copy in the text processor or on the printout.

By checking this, the user can also select how to convert the unit into a desired length.

When using a co-ordinate grid, the unit-fixing can be defined for the horizontal and vertical axes separately. Sometimes you only want to fix one of the two axes.

## Numerical input

When entering a real number, the user can choose between two methods:

- Use the decimal point or comma. The program converts them automatically to a decimal point.
- Enter a mathematical formula (without variables) like in a (graphical) calculator.

Most of the mathematical conventions will be recognized. For instance,  $3(7 - 4)$  gives the same result as  $3*(7 - 4)$ ; or  $\sin 5$  instead of  $\sin(5)$  – the last one is safer! Another example:  $(e^2 - 4) / (\pi + 2)$ . As in a graphical calculator spaces are ignored.

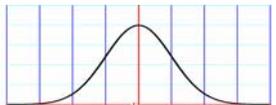
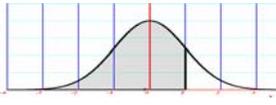
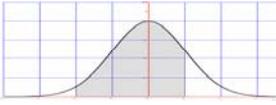
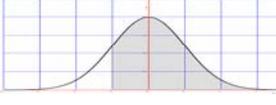
The following operations are recognized:

	meaning	example	result
+	the sum	$3 + 4$	7
-	the difference	$3 - 4$	-1
*	the product	$3 * 4$	12
/	the quotient	$3/4$	0.75
^	the power	$2^3$	8
	modulus	$ 5 - 6 $	1

The program recognises the word *pi*, which is translated into the value of  $\pi$ . And the character *e* is replaced by the *e* value of the natural logarithm.

The following functions are available: (see next page)

sin	Sine function	$\sin(1,5\pi) = -1$
cos	Cosine function	$\cos(\pi) = -1$
tan	Tangent function	$\tan(\pi/4) = 1$
exp	$\exp(3) = e^3$	$\exp(0) = 1$
log	the 10-logarithm;	$\log(100) = {}^{10}\log 100 = 2$
ln	$\ln x = {}^e \log x$	$\ln(e) = 1$
Abs	The modulus function; $\text{abs}(-3) = 3$	$\text{abs}(4 - 7) = 3$
Sqr	The square root function; $\text{sqr}(8) = \sqrt{8}$	$\text{sqr}(9) = 3$
Arcsin	The arcsine function, defined on $[-1, 1]$	$\arcsin(1) = \frac{1}{2}\pi$
Arccos	The arccosine function, defined on $[-1, 1]$	$\arccos(-1) = \pi$
Arctan	The arctangent function	$\arctan(1) = \frac{1}{4}\pi$
Sinh	The hyperbolic sine, $\frac{1}{2}(e^x - e^{-x})$	$\text{Sinh}(0) = 0$
Cosh	The hyperbolic cosine, $\frac{1}{2}(e^x + e^{-x})$	$\text{Cosh}(0) = 1$
Tanh	The hyperbolic tangent	$\text{Tanh}(0) = 0$

Int	The integer function	Int (-3.2) = -4; Int (3.2) = 3
Normal	$Normal(x) = \int_{-\infty}^x \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2} dx$	
NormPdf	$NormPdf(x; \mu; \sigma) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	
NormLft	$NormLft(x; \mu; \sigma) = \int_{-\infty}^x \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}} dt = P(X < x)$	
NormBtwn	$NormBtwn(a; b; \mu; \sigma) = \int_a^b \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}} dt = P(a < x < b)$	
NormRght	$NormRght(x; \mu; \sigma) = \int_x^{\infty} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(t-\mu)^2}{2\sigma^2}} dt$	
InvNorm	$InvNorm(x; \mu; \sigma) = y \Leftrightarrow NormLft(y; \mu; \sigma) = x$	
BinomPdf	$X = \text{bin}(n, p) \Rightarrow \text{BinomPdf}(n; p; A) = P(X = A)$	
BinomCdf	$X = \text{bin}(n, p) \Rightarrow \text{BinomCdf}(n; p; A) = P(X \leq A)$	
HypPdf	HypPdf(P; Q; n; x) = probability on <i>exactly</i> x successes for selecting n elements, without replacement, from a vase with P success elements and Q failure elements	
HypCdf	HypCdf(P; Q; n; x) = probability on <i>at most</i> x successes for selecting n elements, without replacement, from a vase with P success elements and Q failure elements	
PoissonPdf	$PoissonPdf(\lambda; x) = P(X = x) = \frac{\lambda^x}{x!} e^{-\lambda}$ = probability on <i>exactly</i> x successes in a Poisson-divided stochast X.	
PoissonCdf	$PoissonCdf(\lambda; x) = P(X \leq x)$ = probability on <i>at most</i> x successes in a Poisson-divided stochast X.	
GeometPdf	$GeometPdf(p; x) = P(X = x)$ = probability on first success after <i>exactly</i> x times	
GeometCdf	$GeometCdf(p; x) = P(X \leq x)$ = probability on first success after <i>at most</i> x times	

NegBinPdf	$\text{NegBinPdf}(p; I; k) = P(X = k) = \binom{k-1}{i-1} p^i (1-p)^{k-i}$ <p>“X=k” means: on the k-th experiment i successes appear</p>	$i \geq 1$ $k \geq i$ $p = P(\text{success})$
NegBinCdf	$\text{NegBinPdf}(p; I; k) = P(X \leq k)$ , cumulative	
Random	Random(n) gives whole random number in range 1 .. n	
Gauss	Gauss ( $\mu; \sigma$ ) gives a random number in a normal distribution with given $\mu$ and $\sigma$	
Fac	<p>Fac (n) = n! = 1*2*3*...*n if n is a whole, positive number,</p> <p>Fac (n) = n * (n-1) * (n-2) * ... * <math>\frac{1}{2} * \sqrt{\pi}</math> if <math>n + \frac{1}{2}</math> is a whole, positive number,</p>	
nPr	$nPr(n; k) = \frac{n!}{k!}$ , the number of permutations of k elements out of n.	
nCr	$nCr(n; k) = \binom{n}{k} = \frac{n!}{k!(n-k)!}$ , the number of combinations of k elements out of n.	

### Chaining functions

Functions can be chained. Assume the first function is  $y = \sin(x)$  and the second one should be its square. The second function text  $y = (\sin(x))^2$  can be entered, but also  $y = [1]^2$ .

A number between [ ]-brackets refers to the number in the function list.

It is also possible to use an argument. For instance:  $y = \sin(x - 3)$  can be defined as:  $[1(x - 2)]$ .

The expression,  $(f(x+0.001) - f(x)) / 0.001$ , is often used for the numerical approximation of a derivative. In Geocadabra, the expression  $y = ([1(x + 0.001)] - [1(x)]) / 0.001$  is equivalent.

### Ambiguities

The expression  $f(x) = \sin(x)^2$  can be interpreted in two ways:

$$f(x) = (\sin(x))^2 = (\sin x)^2 \quad \text{or} \quad f(x) = \sin((x)^2) = \sin(x^2)$$

The user can work around this problem by using extra brackets:

When  $(\sin x)^2$  is meant:  $(\sin x)^2$

When  $\sin(x^2)$  is meant:  $\sin(x^2)$

The expression “sin 2t” mathematically means  $(\sin 2)^t$ , but may be interpreted to be  $\sin(2t)$ . This is bad practice. Use brackets to express what you intend.

### Hide / show toggle for functions and curves

When functions of curves are defined, a functions toggle window is visible.

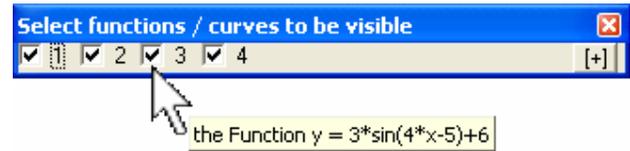
In this window the number of functions is defined. Each function that is drawn is numbered in this window. It is possible to hide one or more of these functions by unchecking its number. By rechecking the function number its graph will become visible again.

This way you can predefine, for instance, 10 functions.

By checking one after another you can make the separate graphs available.

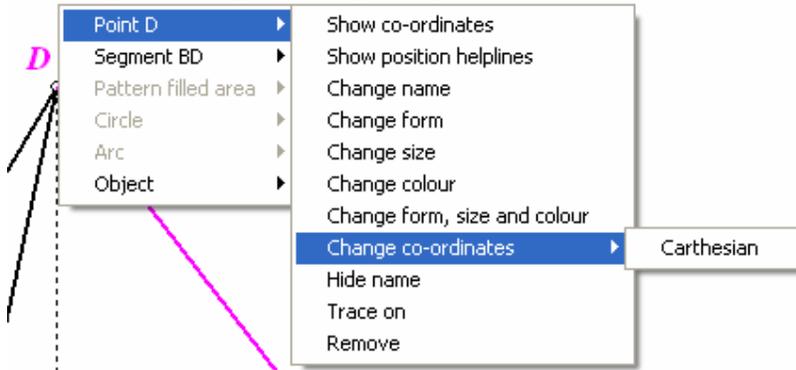
When the mouse cursor is positioned above a checkbox, the function definition is shown.

A new function can be added using the *maintenance, function* menu, but it is also possible to click the [+] button in this window.



### Using the right mouse button

When right clicking on an object a pull-down menu appears. Select what to do with the selected item.



So there are two ways to change a drawing:

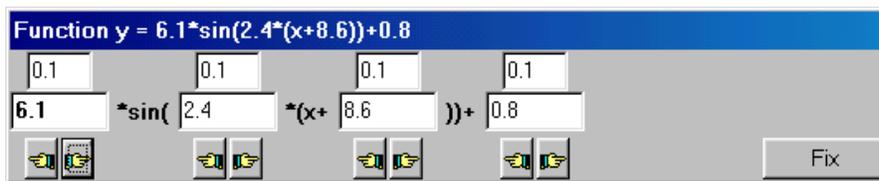
1. select a command in a menu, and then click the item;
2. right click the item, and select what to do with it in the pull-down menu.

### Manipulate function parameter

If you want to study the influence of changing the parameters in the sinusoid  $y = a \sin b(x - c) + d$  you start to define one function: (The parameters must be placed between the {} braces).

$$y = \{1\} \sin(\{2\}(x + \{3\})) + \{4\}$$

After defining the function, the graph is shown. Now select *Maintenance, Functions and curves, Animated analysis, Investigate parameter*. A dialog appears, that allows you to see how the graph of the function changes when the defined parameter is changed (slightly).



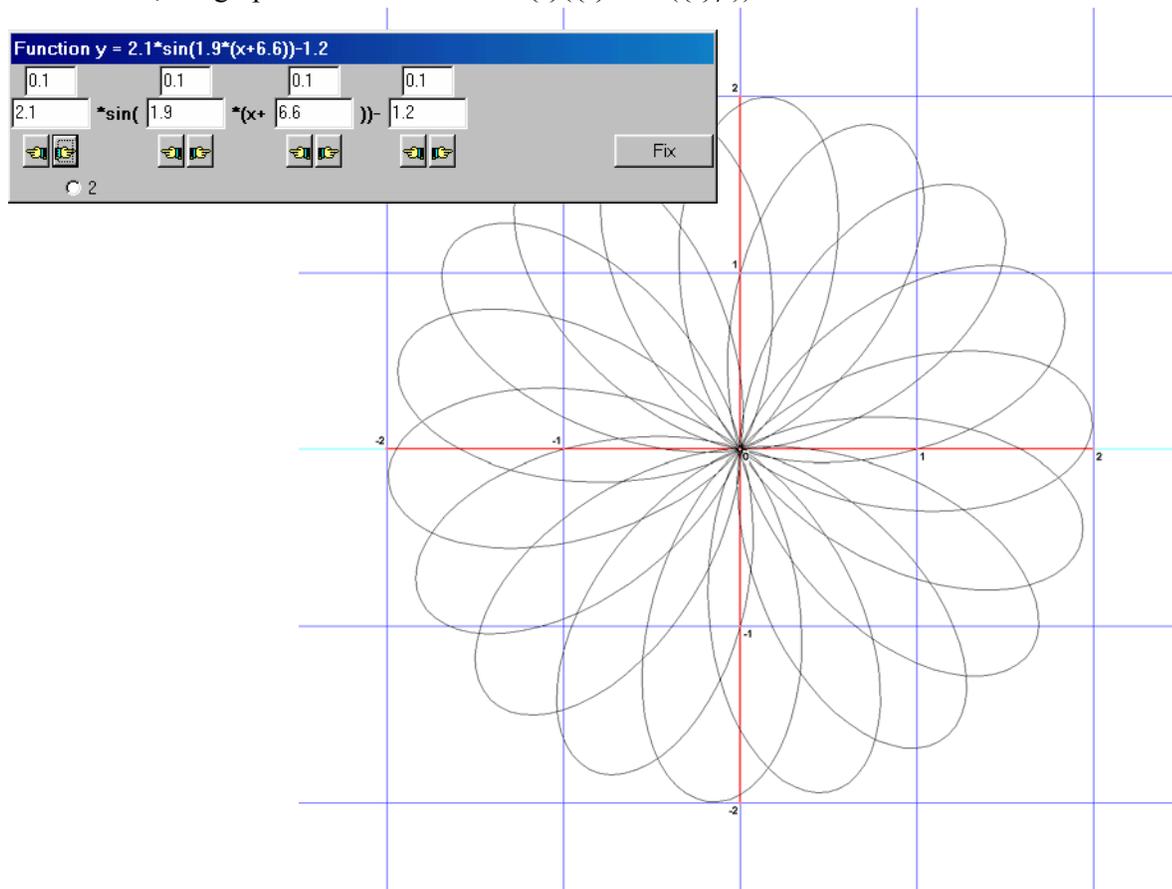
When more parameter functions are defined, this dialog shows an extra line with radio buttons.

Switch to another function by clicking the appropriate radio button. (If a function has no parameter in its definition, its radio button is light grey, and can not be selected.)

After clicking the fix button, the latest value of each parameter is kept in the function definition.



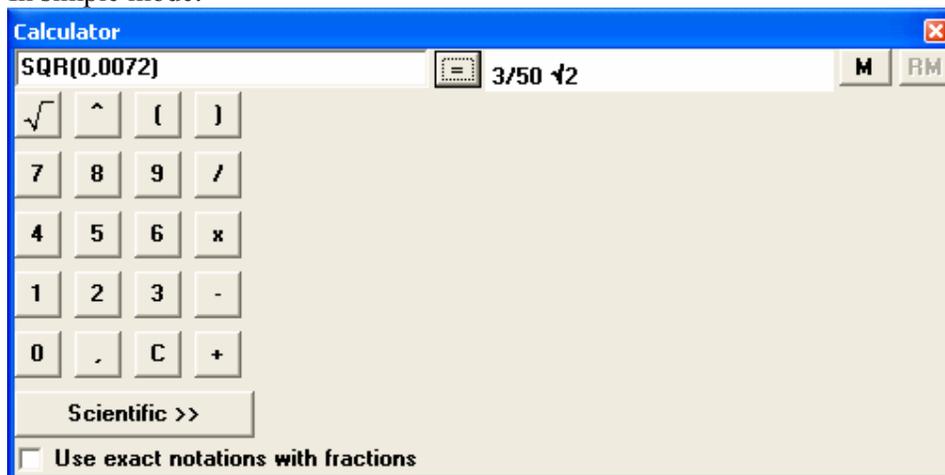
The use of parameters is only supported for functions and curves in polar coordinates. For instance, the graph of the cardioid  $r = 1(1 + \sin(1\varphi))$  can be studied.



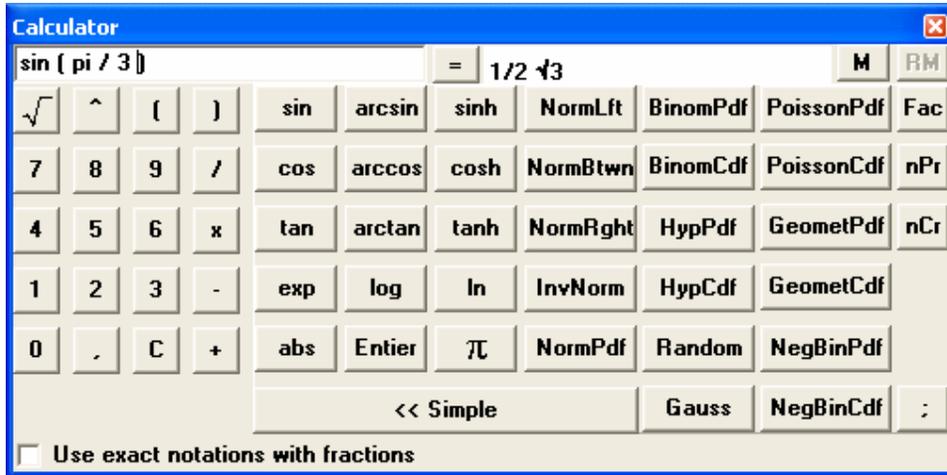
### The calculator

Clicking the button  shows the calculator.

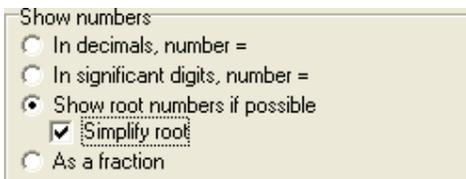
In simple mode:



In scientific mode:

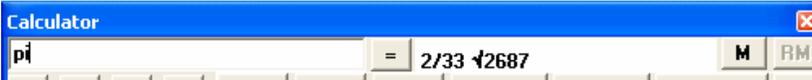


Using *sin*, *cos* and *tan*, the argument will be parsed in radians or degrees, depending on the settings in the configuration. In this case radians are chosen.



The outcome is determined by the configuration settings

There are side effects, because the calculator is accurate to 7 significant digits.



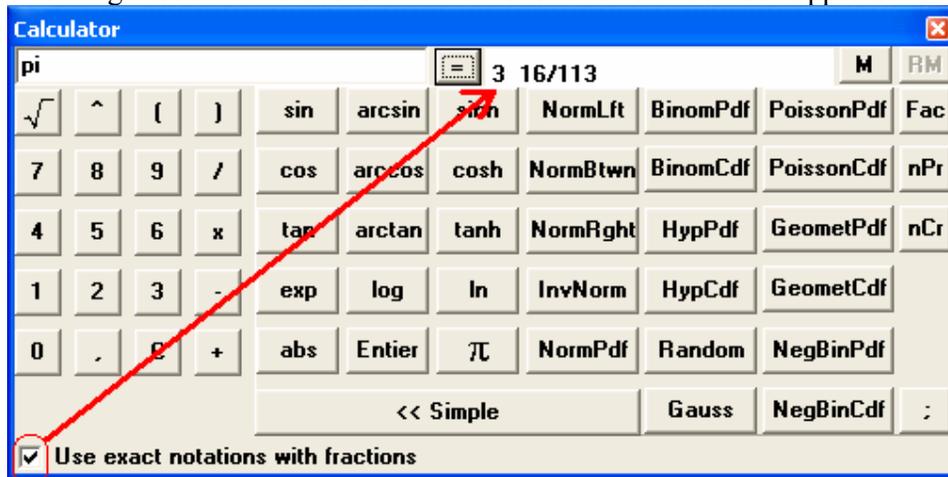
This  $\pi$  result looks strange at first sight because in the Configuration the Simplify root is selected, and

the result is correct to 7 significant digits.

$$\pi = 3,141592654\dots$$

$$\frac{2}{33}\sqrt{2687} = 3,141592772\dots$$

Checking “use exact notations with fractions” another nice result appears:



Note that  $3\frac{16}{113} = 3,141592654$

Advice: think about these side effects.

- ☞ Set the configuration option “show root numbers if possible” only when useful, for instance, when using the Pythagoras theorem.

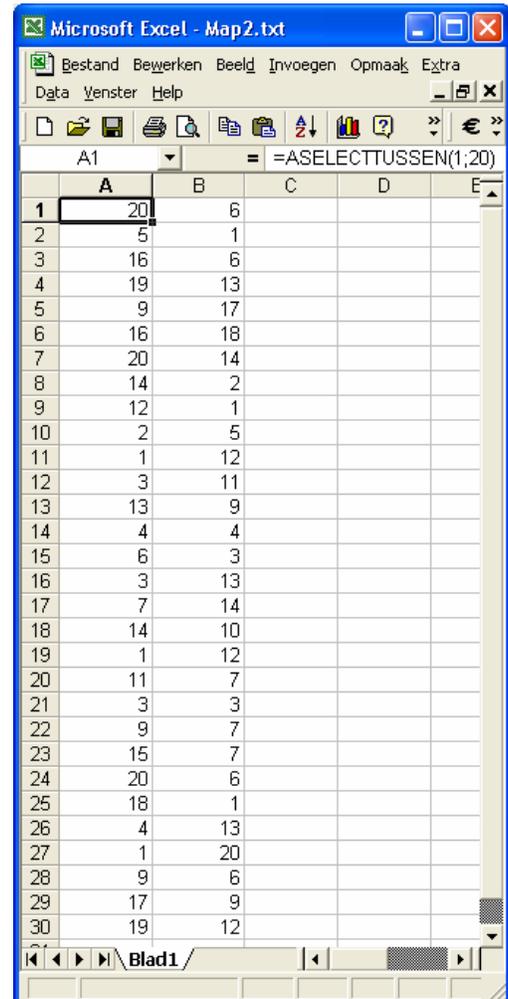
- ☞ Set the calculator option “use exact notations with fractions” only when you expect such results.
- ☞ Sometimes you want to see fractional results. For instance:



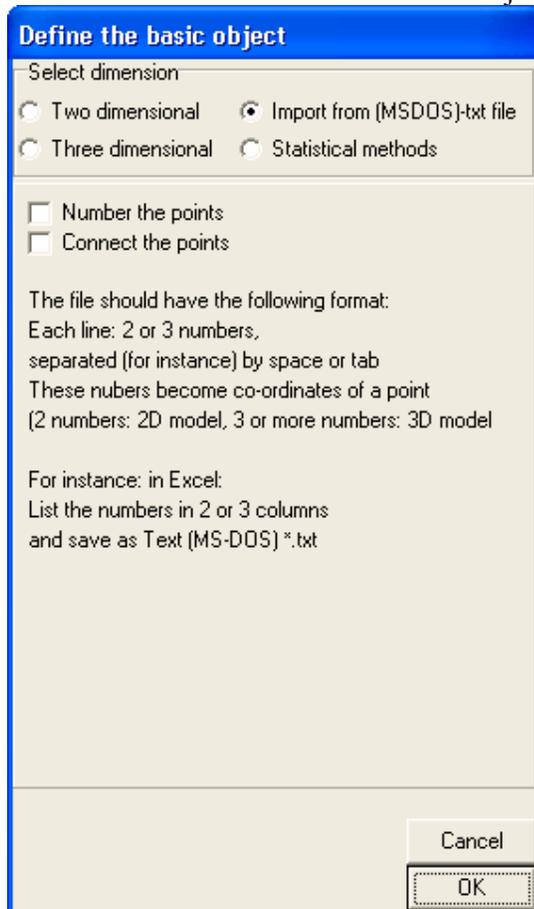
## Importing data from Excel

Assume you have the table on the right in Excel, to be used within Geocadabra to be analysed with correlation and regression.

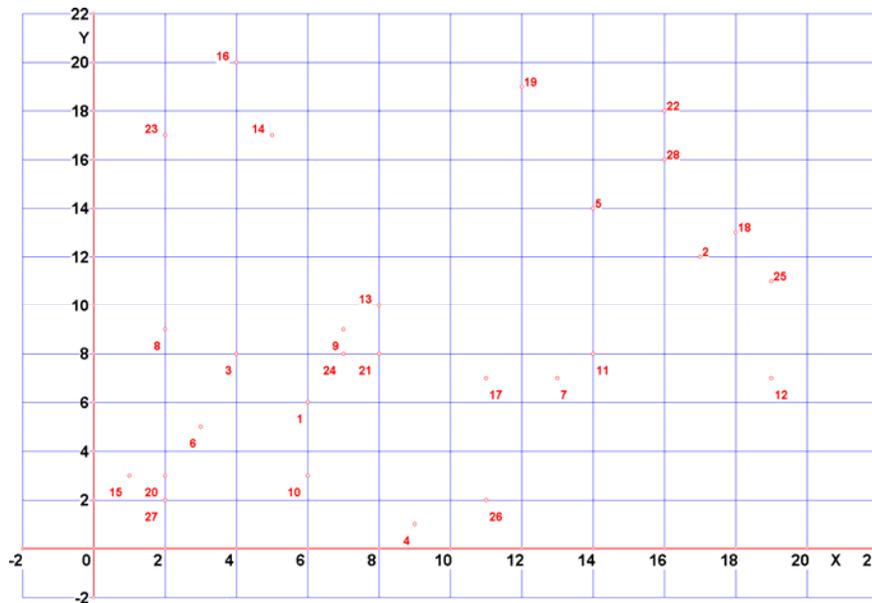
Save the data in MS-DOS text format.



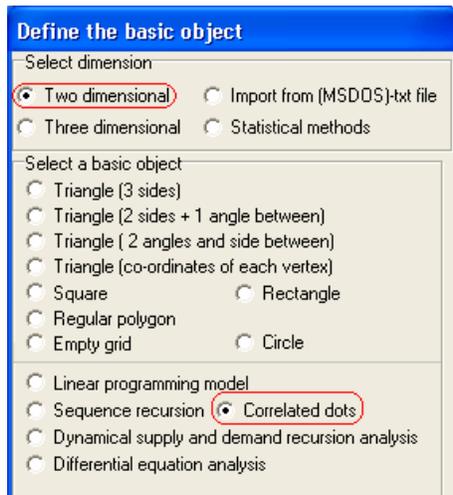
Now run Geocadabra and select a new object as follows:



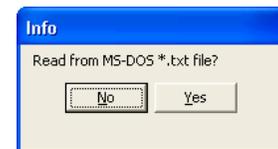
Geocadabra reads the file and translates it into a 2-dimensional model. The axis borders are automatically generated and the drawing appears:



To do a regression analysis, run Geocadabra and select a new object as follows:

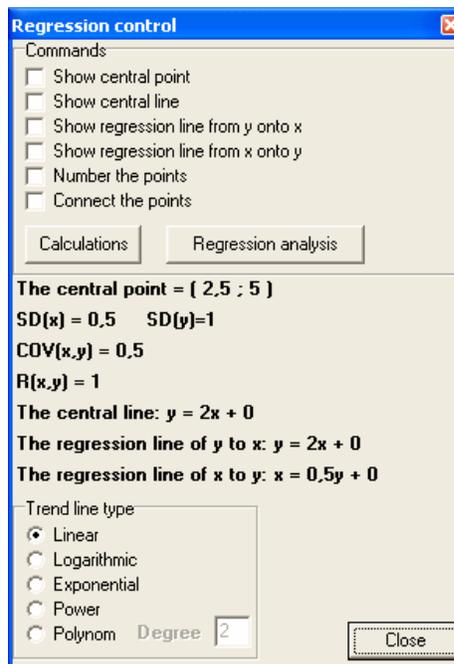


After clicking OK Geocadabra asks:

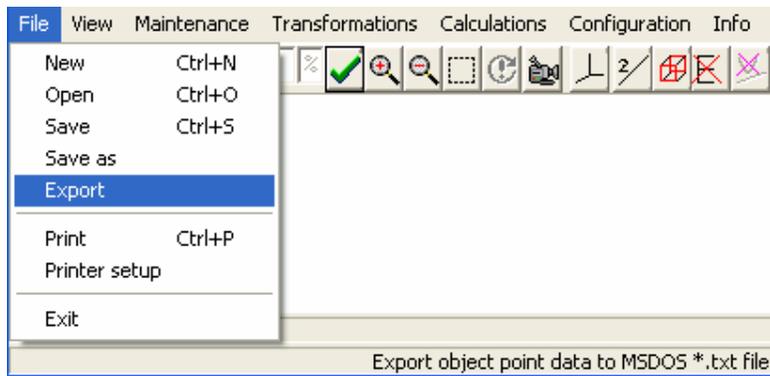


Select [Yes] and select an Excel saved file.

Now the drawing and the regression applet appears:



## Export co-ordinates



Some of the data for a geometrical object can be exported. In the current version of Geocadabra this results in a text file that contains the following data for each point:

- The three co-ordinates
- The name of the point

In the case of a standard cube the results are:

6	0	0	A
6	6	0	B
0	6	0	C
0	0	0	D
6	0	6	E
6	6	6	F
0	6	6	G
0	0	6	H

Think about how these data can be used??