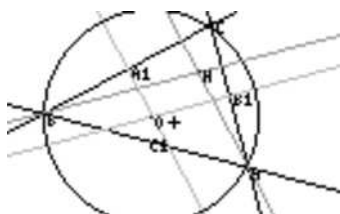
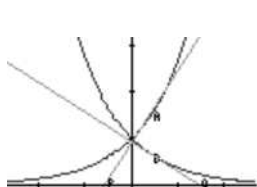


GeoHp English version 1.0

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1 Introduction, Installation



Geohp is a dynamical geometric software for HP49g+/HP50 inspired by geogebra (free software: see www.geogebra.org) or geoplan (not free).

It allows you to create geometrical figures with lines, points circles, curves... All drawn in real time.

Installation of GeoHp

For working GeoHp needs the ArmToolbox. You can download this library here:

<http://www.hpcalc.org/details.php?id=6090>

GeoHp is just a library like any other one and can be installed in any port of the calculator.

Launch of GeoHp

If you launch the program: this one looks at level 1 of the stack. He may found:

- a list corresponding to a figure created by GeoHp. This list ends with a string beginning with “GEOMHP”. This list is produced by GeoHp when you quit it. Then you can save a figure. Don't try to edit a list made by GeoHp with anything else than GeoHp: it will crash your calculator.
- Anything else (or nothing) GeoHp starts a new figure.

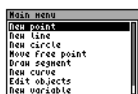
2 The use of GeoHp.

When you start GeoHp for the first time you just have a little cross in the middle of a blank screen.

Main keys are the followings:

- Arrows move the cursor.
- The key * shows/hides the orthonormal
- The key + makes a zoom in
- The key - makes a zoom out
- On quit GeoHp.
- The key TOOL shows the menu: it allows you to create points, circles, lines and curve (cartesian or parametric). But also to control a point or a variable...
- MODE show/hide displays.
- NXT go to next display.
- STO made a screenshot into the SD card.

In details the key TOOL allows the following choices:



- | | |
|-------------------|----------------------|
| • New point | • New curve |
| • New line | • Edit objects |
| • New circle | • New variable |
| • Move free point | • Control a variable |
| • Draw segment | • New display |

Here, in details, the different choices for each of the sub-menu.

2.1 New point

The sub-menu **New point** allows the following choices.

- Free point of the plane. Then you just have to enter the name of the point. Then you can use **Move free point** to move this point.
- Free point on a line. You enter the name of the point and you choose a line. The line must be created by the menu **New line**
- Free point on a circle. The same as before but you choose a circle.
- Middle of two points.
- Intersection of lines.

- Intersection line/circle. You enter the name and you choose a line and a circle. The soft also ask a name for the second point. If you press ENTER or ON there will be only one intersection point defined.
- Intersection circle/circle. Same remark for the second point.
- Point defined by its coordinates. You enter the name and then the coordinates. For each coordinate you enter a numeric value or an equation (see below)
- Symmetric by a line. Enter the name, choose a point and a line to get the symmetric of the point by the line.

Defined a coordinate by an equation. In the **Point defined by its coordinates** section you can define one coordinate by an algebraic expression. When you have to enter one coordinate just **Press the key ' (key O)**. The soft launch the equation writer of the Hp. Enter the expression that you want and press enter. For example if you enter x for the first coordinate and x^2 you will get a point on the curve $y = x^2$.

Warnings: the variables which appear in the expression must have been defined before with the menu new variable.

In the previous example you must first define a variable called x and after the point (x, x^2) .

2.2 New line

This menu allows the following choices.

- Passing by two points. You enter the name and you choose two points.
- Perpendicular to. You choose a line D and a point A to get the perpendicular to D passing by A .
- Parallel. Same as perpendicular but you get a line parallel to D and passing by A .
- Midperpendicular. You choose two points and you get the Midperpendicular.
- Defined by its equation. You enter the coefficients a, b and c of the equation of the line (equation: $ax+by+c=0$). **Important:** As for a point, the key ' (**key o**) allows you to enter an algebraic expression instead of a numeric value. For example you can define a mobile tangent to a curve.
- Symmetric by a line. You enter the name then choose a first line and second line. You get the symmetric of the first line by the second.

2.3 New circle

This menu allows the following choices.

- Center and a point. You choose the center and a point of a circle.
- Diameter. You choose two different points: that's will be the diameter of your new circle.
- Center and radius. You choose the center of the circle (point already created) and the radius. For the radius you may enter a numeric value or press ' to enter an algebric expression.
- Symetric by a line. Enter the name then choose the circle and the line.

2.4 Move free point

You choose a free point (of the plane, on a line or on a circle). The arrows allows you to move the point.

2.5 Draw segment

You have to choose two points.

2.6 New curve

First you have to choose the kind of curve: cartesian ($y=f(x)$) or parametric ($x(t),y(t)$).

- For a cartesian curve. You enter (using the equation-writer) the function of the variable X and the name of the curve.
- For a parametric curve. You enter the name of the curve and two functions $x(T)$ and $y(T)$. Finally you have to choose the minimal and maximal value of the parameter T .

Warnings: The name of the variables are very important: it is X for a cartesian curve and T for a parametric curve. You can't use other variables (so GeoHp can't deal with a familly of curves...).

2.7 Edit objects

This menu allows you to edit already created objects. You have to use the following keys:

- Up and Down arrows to move between the differents items.
- Right and Left arrows to edit another object.
- Enter for edit an item

- ON to quit the edition of objects.

For all objects this different items can be edited:

- Name. You can change the name.
- Object visible/hidden. You can make an object hidden. The object will not be drawing on the screen (it can be usefull for some constructions lines)
- Color. After press enter you have to press a key 0...9,A...F to choose a color into the 16 grey levels (0=white, F=black).

The following possibilities also exist:

- With points defined by its coodinates you can change the value or the expression of a coordinate.
- With lines defined by its equation you can change (the value or the expression) of one of the coefficients a , b or c .
- With a circle defined by its center and radius, you can change the radius in the same way.
- With a curve, you can edit the function(s). With a parametric curve you can edit the minimal and maximal value and the number of points of the curve.

Remarks: When you change a numerical value (coordinate of a point, coefficient in the equation of a line or radius of a circle) you can press the ' key to enter an expression instead of a fix value.

2.8 New variable

You defined a new variable which will be use to define a point by its coordinates (or one of the coefficients of the equation of a line).

Example: You create the variable a then a point by its coordinates with

$$x = 3 * \cos(a) \text{ and } y = 2 * \sin(a).$$

when you control a the point move on an ellipse.

To defined a new variable you have to enter:

- The name **Only one character**.
- The minimal value of the variable.
- The maximal value of the variable.
- The step (see **Control a variable**).
- The initial value of the variable

2.9 Control a variable.

You have to choose a variable (already created) and then the arrows increase or decrease the step.

2.10 New display

You can display in the bottom of the screen the coordinate of a point, the length of a segment, the area of a triangle or the angle (in degrees) of three points. You can use MODE to show/hide display and NXT to go to the next display.

3 Examples

EXAMPLES is an hp dir with three examples for geohp.

1. HYPER is the hyperbol $x \rightarrow \frac{1}{x}$ with three points $A(a, 1/a)$, $B(b, 1/b)$ and $C(c, 1/c)$ on it and H the orthocenter of ABC^x which is on the hyperbol. You can control the variables A, B or C to move the points A, B or C .
2. PAR The parabol $x \rightarrow x^2$ with the tangent at the point with abscissa T . (use “control a variable” to change the value of T).
3. TRI A triangle ABC with the EULER’s line passing by the orthocenter, the center of gravity, center of the circumcircle. Use “move free point” to move A, B or C and see all the figures moving in real time.