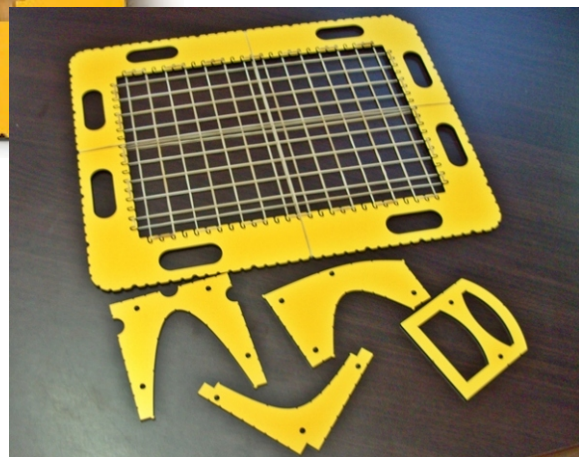
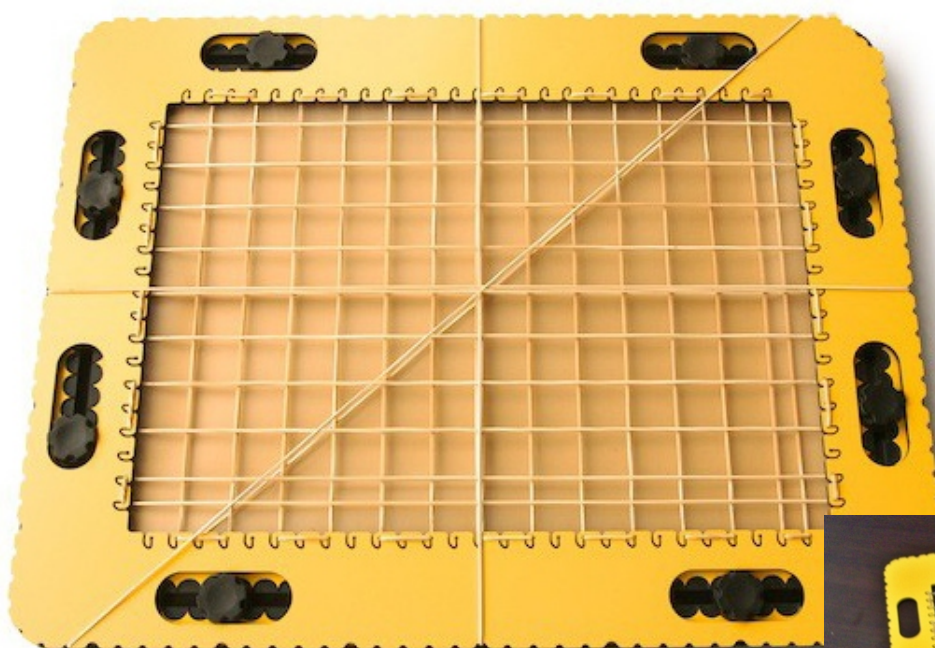


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HW-76810  
GraphGrid

## GraphGrid



## Manual

## GraphGrid

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### Clever accessories to increase the potential of the TactiPad drawing board

The GraphGrid is one of the smart accessories for the TactiPad drawing board. Besides drawing freehand this accessory allows you to draw rows, columns, squares or a coordinate system in two or three dimensions. Rubber bands fixed inside and around the GraphGrid allow you to place flexible 'graph paper' and 'coordinate systems' on the TactiPad. When making creative drawings, playing games or doing school assignments, this allows you to work easily with cross-connections in tables, differences between fore- and background or spatial proportions.

The trigonometry tool is intended to draw sine, cosine and tangent waves and indicating their values.

### Details of the GraphGrid

The GraphGrid is a framework that is placed on the TactiPad like a picture frame. Rubber bands, placed inside and around this framework from left to right and from top to bottom, form the axes and lines of the graph paper.

Along the inner edge, small "hooks" are placed at a regular interval of 1 centimeter. Along the outer edge of the GraphGrid, indentations are made with a spacing of 1 centimeter as well. Slightly wider indications mark 5 centimeter intervals. The locations of the hooks and indentations both exactly match with the centimeter scale along the edges of the TactiPad. This way the measurements of the drawing board become tangible on the entire drawing surface. The frame overlaps the drawing surface along the edges by one centimeter.

Because of the A4 dimensions of the drawing surface (21.0 by 29.7 cm), the centimeter scale is not symmetrical along the TactiPad. Therefore the starting point for horizontal and vertical distances is at the upper left corner of the drawing board, when it is in landscape orientation with the hinge facing backwards. To position the GraphGrid in its correct position, place it with the flat corner in the upper right corner on the TactiPad.

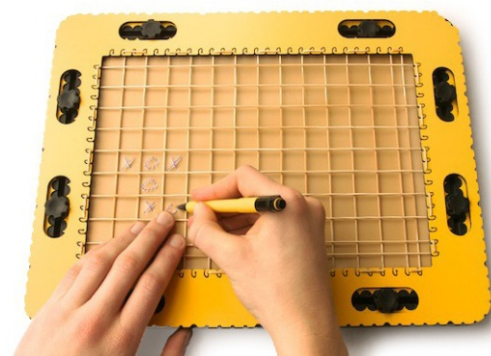
The eight holes in the GraphGrid fit around the knobs on the TactiPad. For this, you place the knobs at five centimeters from the corners of the drawing surface.

### Low and high rubber bands - Using differences in height

The framework of the GraphGrid has a thickness of four millimeters. Therefore there is a well distinguishable difference in height between the bands that run along the outer or the inner part of the frame. The lower rubber bands that are attached to the hooks run alongside the inner part of the GraphGrid and can lay flat on the drawing surface. The higher rubber bands are placed in the indents along the outer edge. The rubber bands can be placed horizontally and vertically or at an angle at any position, with a minimum distance of 1 centimeter.

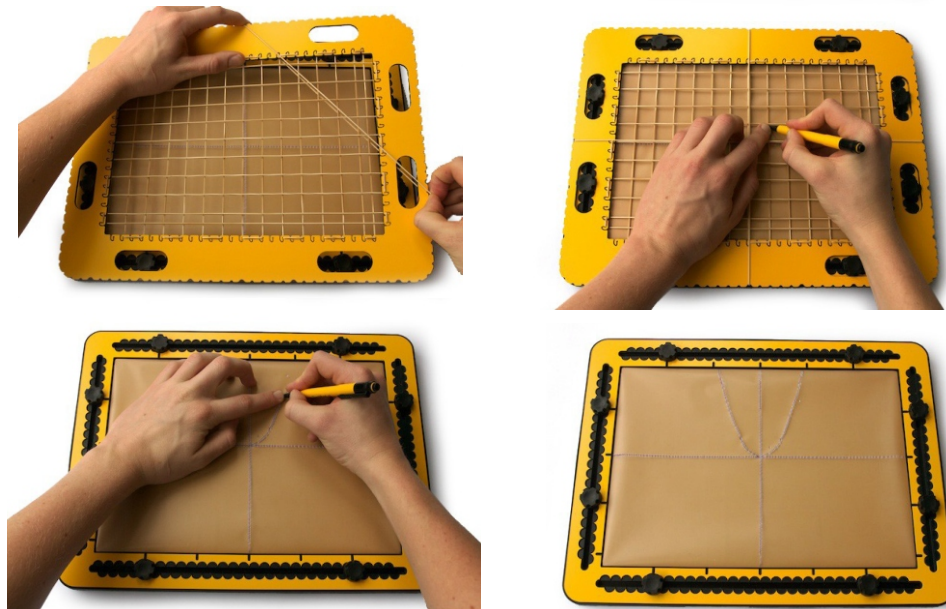
### Basic usage of the GraphGrid

In many different drawings, a regular grid of cells, columns and rows can provide useful guidance. For example, you can make beautiful creative drawings with repeating patterns in the cells. Many puzzles and games are played on a game board made up of squares, such as battleships and tic-tac-toe. In games like Yahtzee you can keep your own score by tallying in the squares. The higher rubber bands that are placed around the frame can be used to distinguish different parts of the game board or the scorecard.



## GraphGrid

In school there are many applications where the graph paper of the GraphGrid is useful. Using the cells can help with learning to count or to learn the tables of multiplication. In secondary school, the GraphGrid is ideal to use in mathematics to draw graphs or make bar charts to present statistical information.



### Graphs - Drawings based on coordinates

The easiest way to draw a graph is to draw the x- and y-axis first using the ruler and measurements on the TactiPad, and then place the GraphGrid on the drawing board. You can use the higher rubber bands as axes by letting them coincide with the axes drawn on the paper.

You can then easily count and draw the x and y values of the graph along the flexible grid lines.

Because the grid lines are flexible, the graph values can be drawn exactly at the intersections.

Once you have drawn all the coordinates of the graph, you can remove the GraphGrid and create the graph by connecting the points. If you want to create multiple graphs in the same coordinate system, it is recommended to finish one graph before starting with the next to avoid confusion between the two sets of points.

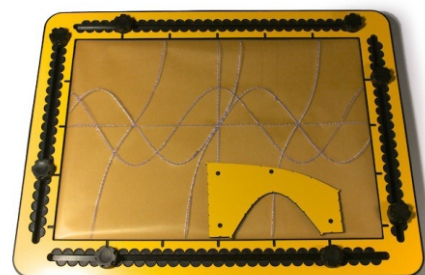
### Sine, cosine and tangent - Basic functions with the trigonometry tool

The trigonometry tool supplied with the GraphGrid is used to draw basic trigonometric functions.

The tool includes two curves: a half period of a sine wave and (almost) a quarter period of a tangent. The scale of both curves is the same. A distance of 4 centimeters along the X-axis corresponds with 90 degrees. When the sine and the tangent functions have a value of 1, the distance along the Y-axis in the drawing is 4 centimeters. These dimensions provide sufficient 'tactile space'.

Because the templates for the sine and tangent are only a part of a whole period of these functions, it is necessary to draw these segments multiple times in order to draw one or more whole periods of the graph.

The trigonometry tool has small indents and hooks as pen-stops. If you run along or against these pen-stops with the tip of your pen, you know the exact position on the tool. Along the straight sides of the tool, pen-stops are provided every centimeter. On the curves of the sine and tangent, the pen-stops indicate the 30, 45, 60 and 90 degree positions.





## GraphGrid

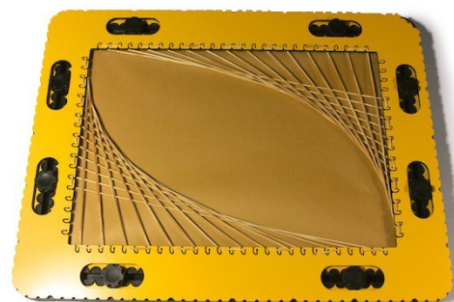
At both ends of the two curves you will find small hooks as pen-stops. These can be used to flip the tool around a pin or the tip of the pen to draw the next part of the graph without interrupted lines. Using the small, well-marked holes in three of its corners, the trigonometry tool can be fixated on the rubber layer of the TactiPad with small pins.

### Coordinate systems and 3D shapes - Using diagonal rubber bands

The main application for the GraphGrid is often a regular rectangular grid, but there are other applications in which the rubber bands can be placed diagonally, in addition to the regular horizontal and vertical lines. By combining rubber bands at different angles, you can create beautiful patterns with different angles and shapes that you can use as the basis for drawing.

You can also use a diagonally placed rubber band to turn a regular x/y coordinate system into a three-dimensional one by adding a third axis which passes through the intersection of the other two axes (the origin) at an angle between 30 and 45 degrees. This way you can create a coordinate system that you can use to create drawings of three-dimensional bodies.

You can use the rubber bands to construct the outlines of these 3D bodies as well, such as a cube or pyramid. Again, you can distinguish between different (visible or invisible) line segments with higher and lower lines. The indentations around the outside of the GraphGrid continue around all four corners to allow you to position the rubber bands at any position and angle. This way you can learn to draw line and plane intersections in geometry classes.



### (Re)placing the grid lines and axes

The hooks and indents are positioned every centimeter along the frame, so the minimum cell dimensions are one by one centimeter. To form a larger grid, you can also place the rubber bands two or more centimeters apart by alternately skipping one or more hooks. Additional rubber bands for more grid lines and axes are supplied with the GraphGrid. These are standard, thin rubber bands with a length of 12 to 15 centimeter.

To keep the rubber bands in place, the hooks have such a shape that the rubber bands will not come loose if they are positioned properly in the frame. (Re)placing a rubber band is easiest if you hold the rubber band with two hands, keeping it perpendicular to the frame so you can slide it through the slot to the end of the hook. First of all, you span the rubber band in two opposing hooks, so that it forms a double line between two sides of the GraphGrid. You then take the upper of these two lines and slide it into the next two hooks to form the second grid line.

The higher rubber bands are stretched around the outside of the GraphGrid and fall naturally into the indents. It is possible that the desired position of one of these rubber bands coincides with the position of one of the knobs. Therefore, the holes in the GraphGrid around the knobs are extra-long so you can slide the knobs aside for the desired placement of the rubber band.

