

# DRAWING SHAPES A-Z NOTEBOOK

This notebook illustrates many kind of shapes drawn in  
Microsoft Small Basic programming language

Version 0.21

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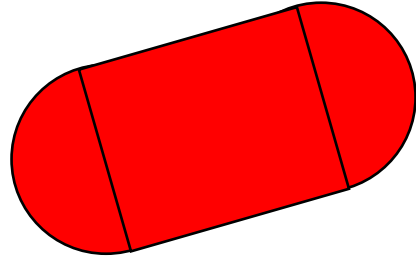
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## A. Connecting Circles

There are two cases to connect two circles. One is connecting the same size circles. The other is connecting different size circles. The sample code for the both cases is published as a program ID [JLD998](#). Mouse click on the window will toggle the shapes opacity.

### 1. Connecting the same size circles

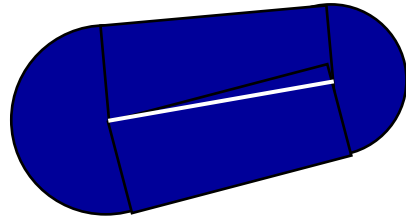
To connect the same size two circles, we need one rectangle. If the radius is  $r$  and the distance of two circles is  $d$ , the rectangle height is  $2r$  and the width is  $d$ .



### 2. Connecting different size circles

To connect different size two circles, we need two rectangle. If the radiuses are  $r_1$ ,  $r_2$  and the distance of two circles is  $d$  (white line), the rectangle height is  $r_1$  ( $> r_2$ ) and the width  $w$  can be calculated with following equation.

$$w^2 + (r_1 - r_2)^2 = d^2$$

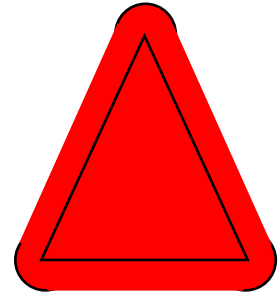


## B. Round Triangle

In this page, two shapes are illustrated. One is a round isosceles triangle. The other is a hat symbol. The sample code for the both shapes is published as a program ID [TBS366](#). Mouse click on the window will toggle the shapes opacity.

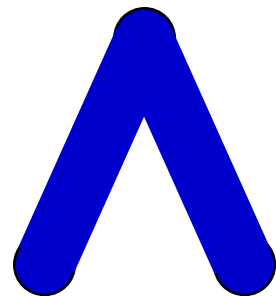
### 1. Round isosceles triangle

A round isosceles triangle is an isosceles triangle which has rounded angles. At this time, three circles are connected with three lines. And to fill the triangle, use an isosceles triangle.



### 2. Round hat

Around hat is a part of a round isosceles triangle. Three circles are connected with two lines.

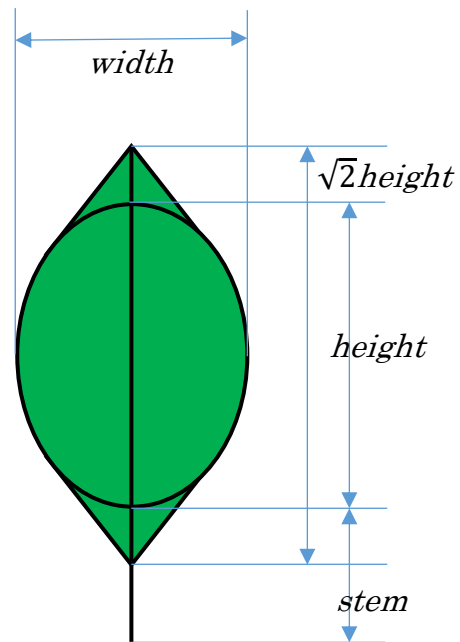


## C. Leaf

Leaf is constructed with one or two isosceles triangles, an ellipse and a line. The size parameters are width, height and stem (length). So the total height is calculated from these parameters as below.

$$\frac{1 + \sqrt{2}}{2} \text{height} + \text{stem}$$

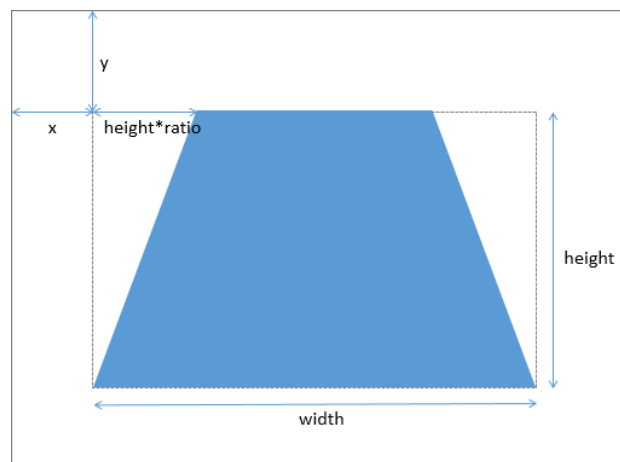
The sample program is published as a program ID [SWQ334](#). Mouse click on the window will toggle the shapes opacity.



## D. Trapezoid

An isosceles trapezoid can be constructed with two isosceles triangles and one rectangle.

As parameters,  $x$ ,  $y$ ,  $width$ ,  $height$  and  $ratio$  are used. *Ratio* is used in shapes of Microsoft Office products. And it means the x offset of the top left vertex per  $height$ . So  $ratio$  equals to or smaller than  $width / height$ .



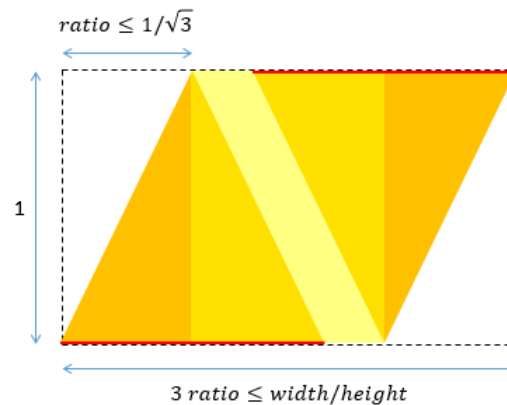
The sample program is published as [RSQ369](#). Mouse click on the window will toggle the shapes opacity. This program can't draw the border lines correctly yet.

## E. Parallelogram

A parallelogram can also be constructed with two isosceles triangles and a rectangle. But it's more difficult to draw it than a trapezoid. There are four cases for parallelogram. The sample program is published as a program ID [QWF833](#). Mouse click on the window will toggle the shapes opacity. This program can't draw the border lines correctly yet.

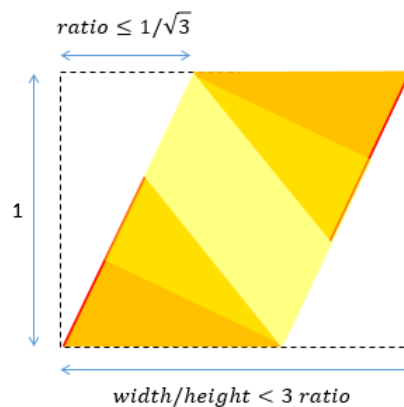
### 1. Case 1

The first case is that *ratio* equals to or is smaller than  $1/\sqrt{3}$  and *width/height* equals or is larger than  $3 \text{ ratio}$ . This is the easiest case like a trapezoid. Only the difference is that one triangle is flipped vertically. In this case and the next case, bottom lines of isosceles triangles are involved in top or bottom lines in the parallelogram.



### 2. Case 2

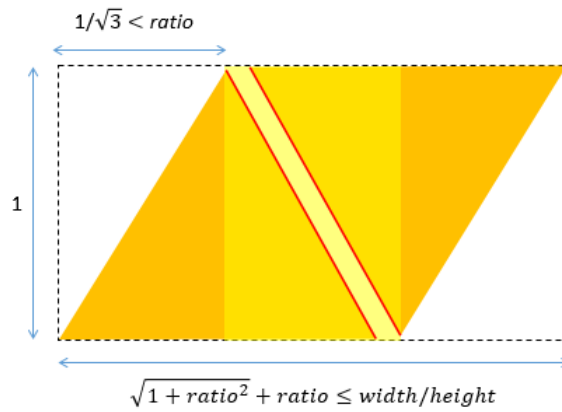
The second case is that *ratio* also equals to or is smaller than  $1/\sqrt{3}$  but *width/height* is smaller than  $3 \text{ ratio}$ .





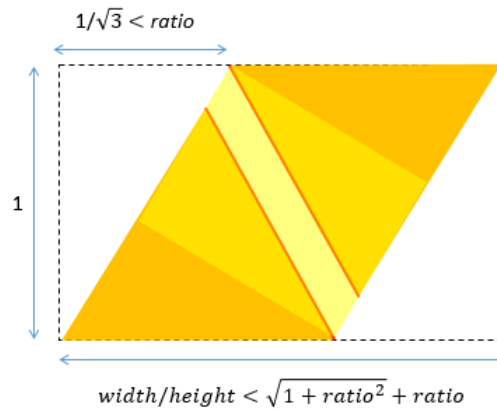
### 3. Case 3

The third case is that  $ratio$  is larger  $1/\sqrt{3}$  and  $width/height$  equals to or is larger than  $\sqrt{1 + ratio^2} + ratio$ .  $\sqrt{1 + ratio^2}$  means the side length of a triangle. In this case and the next case, two bases of the triangles are placed like face to face.



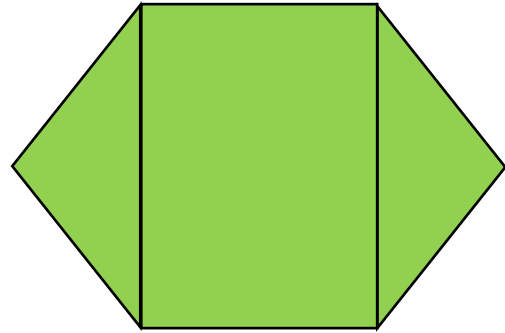
### 4. Case 4

The third case is that  $ratio$  is larger  $1/\sqrt{3}$  and  $width/height$  is smaller than  $\sqrt{1 + ratio^2} + ratio$ .



## F. Hexagon

A hexagon can also be constructed with two isosceles triangles and a rectangle. This kind of hexagon can be constructed with two isosceles trapezoid, and the same shape with the hexagon in Microsoft Office.



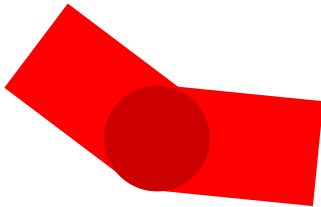
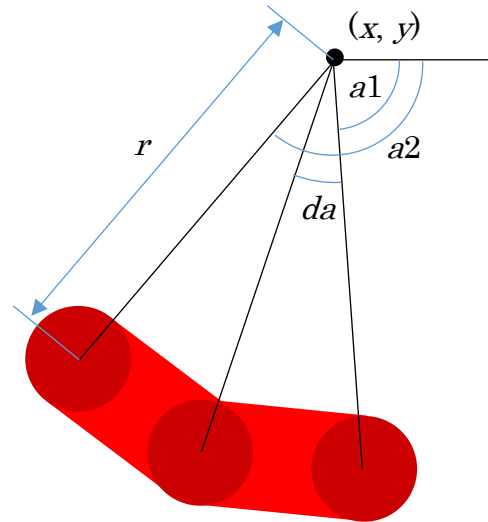
Hexagon sample program is uploaded as [BBS523](#).

## G. Arc

An arc is a kind of connected circles. This time circles are connected with lines.

Main parameters for an arc are center position  $(x, y)$ , radius  $r$ , start angle  $a1$ , end angle  $a2$ , and delta angle  $da$ .

Pen color  $pc$  and pen width  $pw$  will be used the arc color and width.



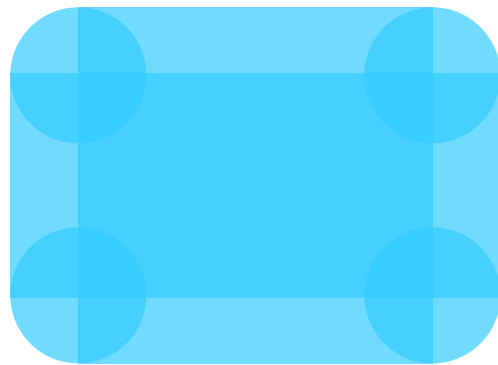
And one more parameter cap type  $ct$  determines the ends shape. “Round” is for round and otherwise for flat. The left picture shows the flat cap type.

Sample program is published as [HGP466](#).

## H. Round Rectangle

A round rectangle can be constructed with four circles and two rectangles. Parameters for a round rectangle is almost the same with a rectangle. The only one extra parameter is the border radius  $br$ .

This version of the sample [RHR763](#) can also add the border. The border will be constructed with four lines and four arcs.



## I. Bamboo Shoot

A bamboo shoot can be constructed with piled trapezoids and a triangle on that. You can calculate the radius  $r$  of the arc from the bamboo shoot height  $h$  and width  $w$  with following equation.

$$r = \frac{w}{4} + \frac{h^2}{w}$$

Following bamboo shot has 4 tiers. A bamboo shoot sample program is published as [JQF080](#). The number of tiers  $n$  can be given in the sample program.

