TangramTikz [en]

Tangrams, with Ti*k*Z,

with solution and/or color.

Version 0.1.5 - 25/02/2023

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https://github.com/cpierquet/TangramTikz

► Some commands to display existing Tangrams.

► Create tangram, with postionning manually the pieces.

► Idea(s) from https://tex.stackexchange.com/questions/407449/typesetting-tangram-figures-in-latex
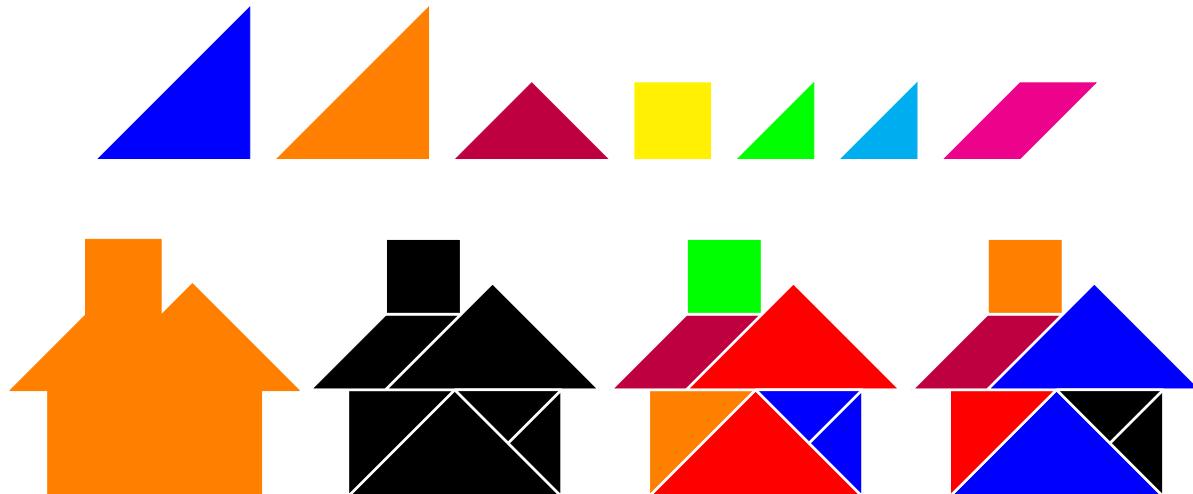
LATEX

pdfLATEX

LuaLATEX

Ti*k*Z

TEXLive

MiKTEX

Contents

Part I
Introduction

1 The package TangramTikz

1.1 Source

Some of the ideas are coming from https://tex.stackexchange.com/questions/407449/typesetting-tangram-figures-in-latex, specially from Andrew Stacey.

The package has been *built* around the ideas from Andrew Stacey.

1.2 Loading of the package, used packages

The package TangramTikz loads into the preamble by :

```latex
\usepackage{TangramTikz}
```

It's fully copatible with usuals compilations, such as latex, pdflatex, lualatex or xelatex.

It loads the packages and libraries :

- tikz awith libraries ⟨**calc**⟩ ans ⟨**shapes.geometric**⟩ ;
- xstring, xparse, simplekv and listofitems.

1.3 The package itself

The idea is to, thanks to TikZ, propose commands to display a Tangram Puzzle :

- with *full* pieces ;
- by puzzle with *border* pieces ;
- by puzzle with *border colored* pieces.

```latex
%independant command to display a Tangram
\TangramTikz[keys]<options tikz>{tangram_name}
```

There's also an environment and a special command to build the puzzle, by positionning the pieces.

```latex
%environment, with keys, and positionning the pieces
\begin{EnvTangramTikz}[keys]<options tikz>
    %positionning the pieces
    \PieceTangram[keys]<options pic>(offsetH,offsetV){TangBigTri}
    \PieceTangram[keys]<options pic>(offsetH,offsetH){TangBigTri}
    \PieceTangram[keys]<options pic>(offsetH,offsetH){TangMedTri}
    \PieceTangram[keys]<options pic>(offsetH,offsetH){TangSmalTri}
    \PieceTangram[keys]<options pic>(offsetH,offsetH){TangSmalTri}
    \PieceTangram[keys]<options pic>(offsetH,offsetH){TangSqua}
    \PieceTangram[keys]<options pic>(offsetH,offsetH){TangPara}
    %\filldraw[black] (0,0) circle[radius=4pt] ; %help for positionning
\end{EnvTangramTikz}
```

Part II
Usage of the package

2 Manually

2.1 The pieces of the Tangram

A Tangram is composed by 7 pieces :

- 2 big triangles ; 1 medium triangle ; 2 small triangles ;

- 1 square ;

- 1 parallelogram.

Each piece of the Tangram is defined in TikZ, by an independent pic..

A figure to show the 5 pieces :

- with the name of the pic ;

- with the initial *orientation* ;

- with thier initial *origin* ;

- with their common *dimensions* (given in *unit*).
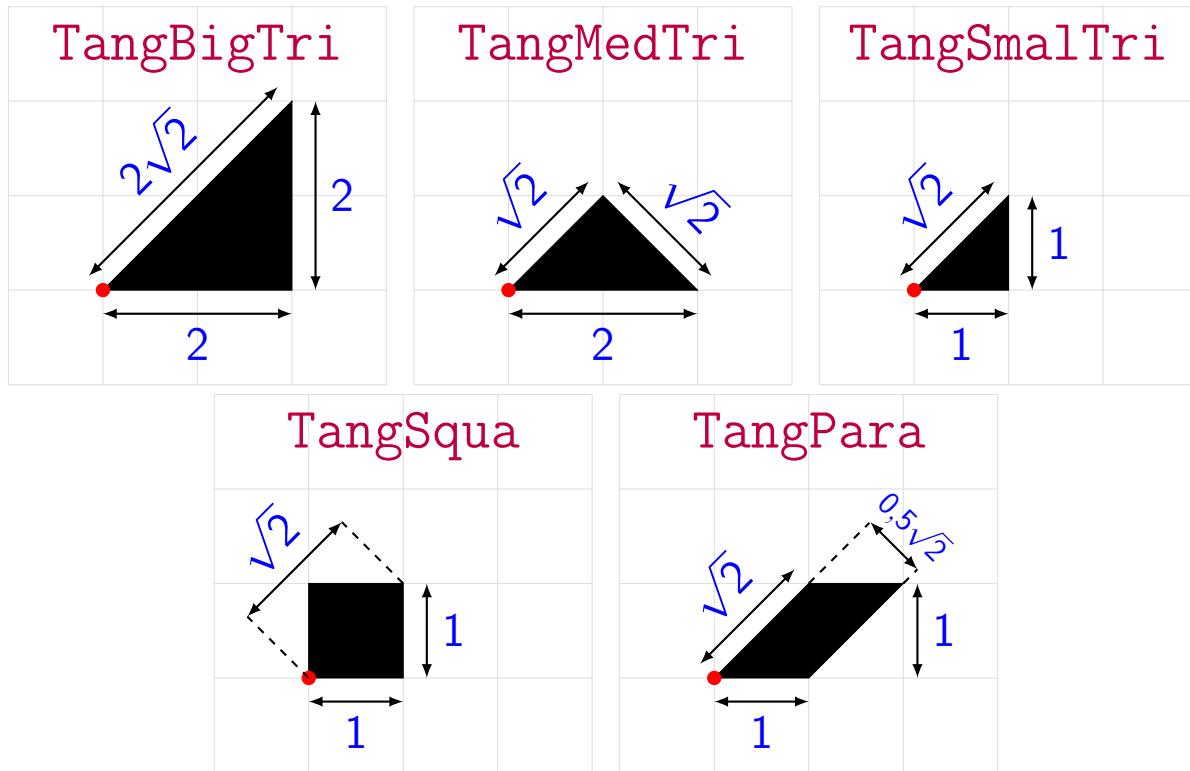
Each *piece* can :

- rotated, thanks to TikZ' option rotate=... ;

- fliped vertically or horizontally, thanks to TikZ' option xscale=-1 and yscale=-1 ;

- moved, by placing it at point (x,y).

Each piece comes with a TikZ' style :

- TangPuzz : piece of Tangram, *full*, with a color (**⟨black⟩** by default) ;

- TangSol : piece of tangram, *with white border*, with a color (**⟨black⟩** by default).

2.2 Positionning of the pieces

A first method is to use `pic` syntax in TikZ :

```
%environment or tikz command
\pic[style,rotate=...,xscale=...,yscale=...] at (x,y) {piece_name} ;
```

The package TangramTikz proposes a specific command to place the pieces :

```
%environment or tikz command
\PieceTangram[style={color}]<xscale=...,yscale=...,rotate=...>(x,y){piece_name}
```

A Tangram is built form the 7 pieces, by :

- *putting* pieces at origin ;

- *rotating/fliping* for the correct orientation ;

- *translating* for the correct position.

```
%Correction colored version, initial size
\begin{EnvTangramTikz}
    \PieceTangram[TangSol={green}]({0},{0}){TangSqua}
    \PieceTangram[TangSol={red}]({-1.5},{1}){TangBigTri}
    \PieceTangram[TangSol={red}]<rotate=-90>({0.5},{3}){TangBigTri}
    \PieceTangram[TangSol={purple}]<xscale=-1,rotate=0>({2.5},{2}){TangPara}
    \PieceTangram[TangSol={blue}]({-1.5},{2}){TangSmalTri}
    \PieceTangram[TangSol={blue}]<xscale=-1,rotate=90>({-0.5},{2}){TangSmalTri}
    \PieceTangram[TangSol={orange}]({-0.5},{3}){TangMedTri}
    \filldraw[black] (0,0) circle[radius=2pt] ; %help
\end{EnvTangramTikz}
%Normal version, initial size
\begin{EnvTangramTikz}
    \PieceTangram[TangPuzz]({0},{0}){TangSqua}
    \PieceTangram[TangPuzz]({-1.5},{1}){TangBigTri}
    \PieceTangram[TangPuzz]<rotate=-90>({0.5},{3}){TangBigTri}
    \PieceTangram[TangPuzz]<xscale=-1,rotate=0>({2.5},{2}){TangPara}
    \PieceTangram[TangPuzz]({-1.5},{2}){TangSmalTri}
    \PieceTangram[TangPuzz]<xscale=-1,rotate=90>({-0.5},{2}){TangSmalTri}
    \PieceTangram[TangPuzz]({-0.5},{3}){TangMedTri}
\end{EnvTangramTikz}
```
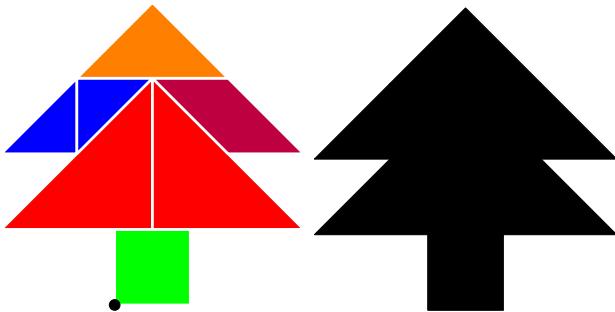
3 Automatic Method

3.1 Command

Some predefined tangrams are present in the package TangramTikz, and thre's an independent command to "call" them :

```
%independent command to display a Tangram                    Code LaTeX
\TangramTikz[keys]<options tikz>{tangram_name}
```
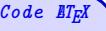
```
%independent command to display Cat/Boat/Kangaroo, with options by default    Code LaTeX
\TangramTikz{Cat}~~\TangramTikz{Boat}~~\TangramTikz{Kangaroo}
```
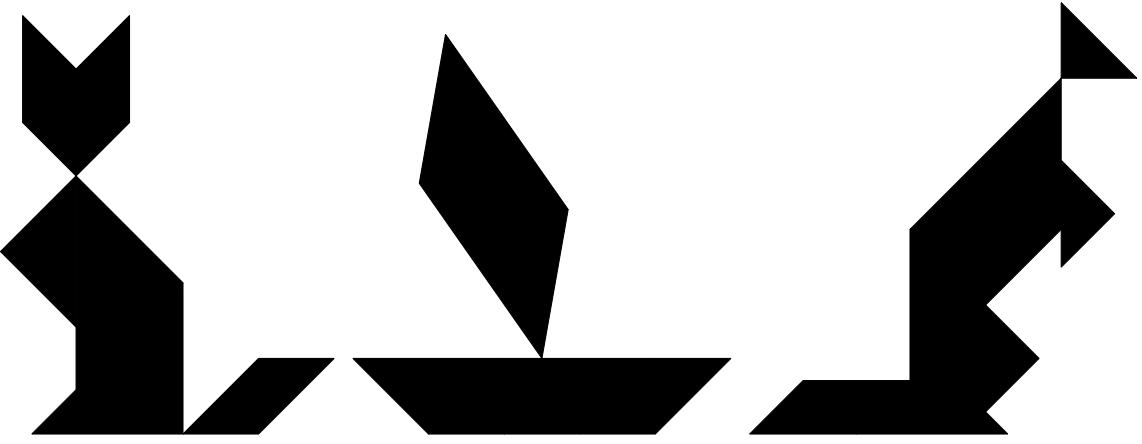
3.2 Keys, options and arguments

The first argument, *optional* and between [...], give the keys :

- the boolean ⟨**Puzzle**⟩ to display *uni*-color pieces, without border ;   default : ⟨**true**⟩

- the boolean ⟨**Correction**⟩ to display *uni*-color pieces, with border ;   default : ⟨**false**⟩

- ⟨**Color**⟩ to configure the *uni*-color with the above bololeans ;   default : ⟨**black**⟩

- the boolean ⟨**ColorCorrection**⟩ to display colored pieces with border ;   default : ⟨**false**⟩

- ⟨**ColorList**⟩ which are the colors of the pieces (BT,MT,ST,SQUA,PARA) ;

  default : ⟨**red,orange,blue,green,purple**⟩

- ⟨**Sep**⟩, the width of the border in ⟨**Correction**⟩ mode.   default : ⟨**1pt**⟩

The second argument, *optional* ans between <...>, give options to the TikZ environnement, for example :

- unit(s) change, scale change ;

- rotation, vertical alignment ;

- etc

The third argument, *mandatory* and between {...} is the name of the predefined tangram (list below).

3.3 List of predefined tangrams

- Square
- Pinguin
- Boat
- Home
- FirTree
- Cat
- Swan
- Pyramid

- Duck
- Rocket
- Candle
- Shirt
- Fish
- Sailboat
- Kangaroo
- Dog

- Plane
- Rabbit
- Rooster
- Jogger
- Dancer
- Camel
- Flamingo
- Heart

- Giraffe
- Horse
- Goat
- Lions
- Factory
- Angel
- Tower
- Ufo

- Chicken
- Turtle
- Crab
- Snail

```
\TangramTikz{Rocket}~~
\TangramTikz[Color=red]{Rocket}~~
\TangramTikz[Correction]{Rocket}~~
\TangramTikz[Correction,Color=lightgray]{Rocket}~~
\TangramTikz[ColorCorrection,ColorList={orange,blue,yellow,green,pink},Sep=1mm]{Rocket}

\TangramTikz<scale=1.5,rotate=30>{Rocket}~~
\TangramTikz<scale=0.75,rotate=-90>{Rocket}
```
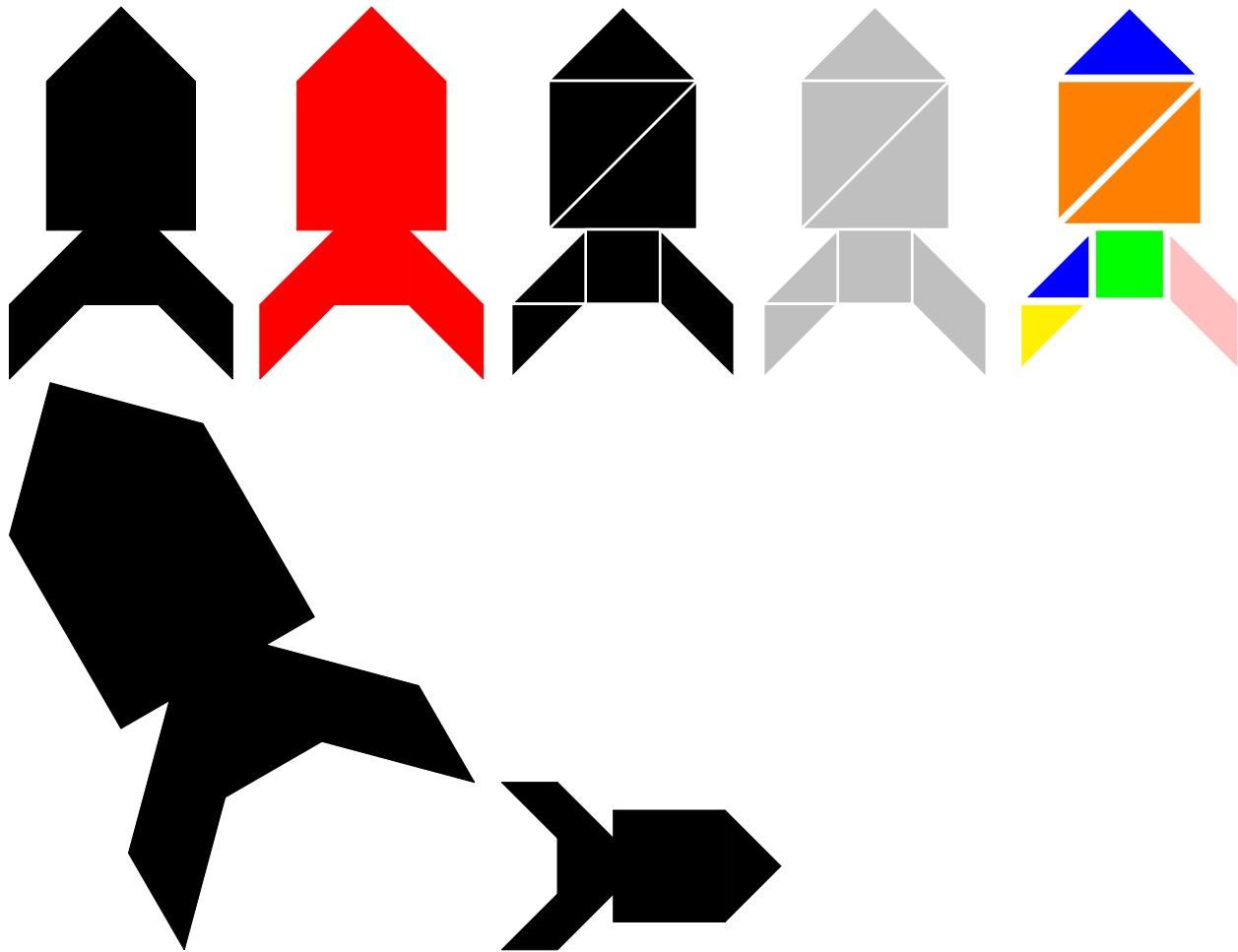
Part III
Gallery of Tangrams

```
\TangramTikz{Square}
\TangramTikz[Correction]{Square}
\TangramTikz[ColorCorrection]{Square}
```

```
\TangramTikz{Pinguin}
\TangramTikz[Correction]{Pinguin}
\TangramTikz[ColorCorrection]{Pinguin}
```

```
\TangramTikz{Boat}
\TangramTikz[Correction]{Boat}
\TangramTikz[ColorCorrection]{Boat}
```
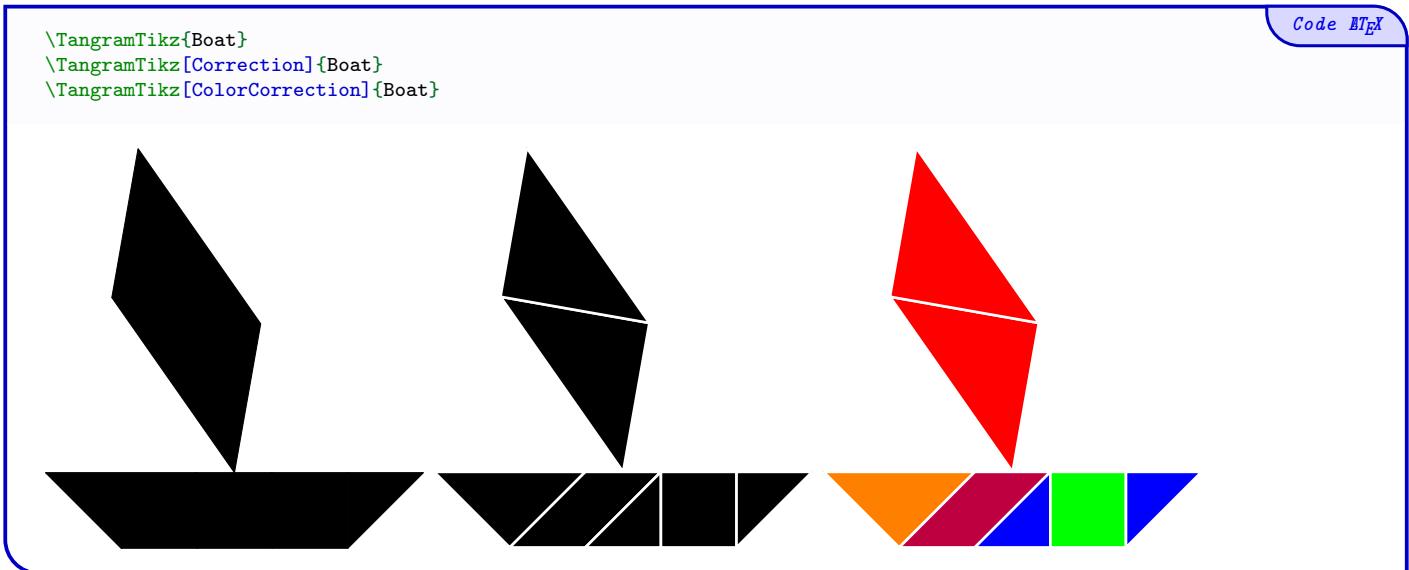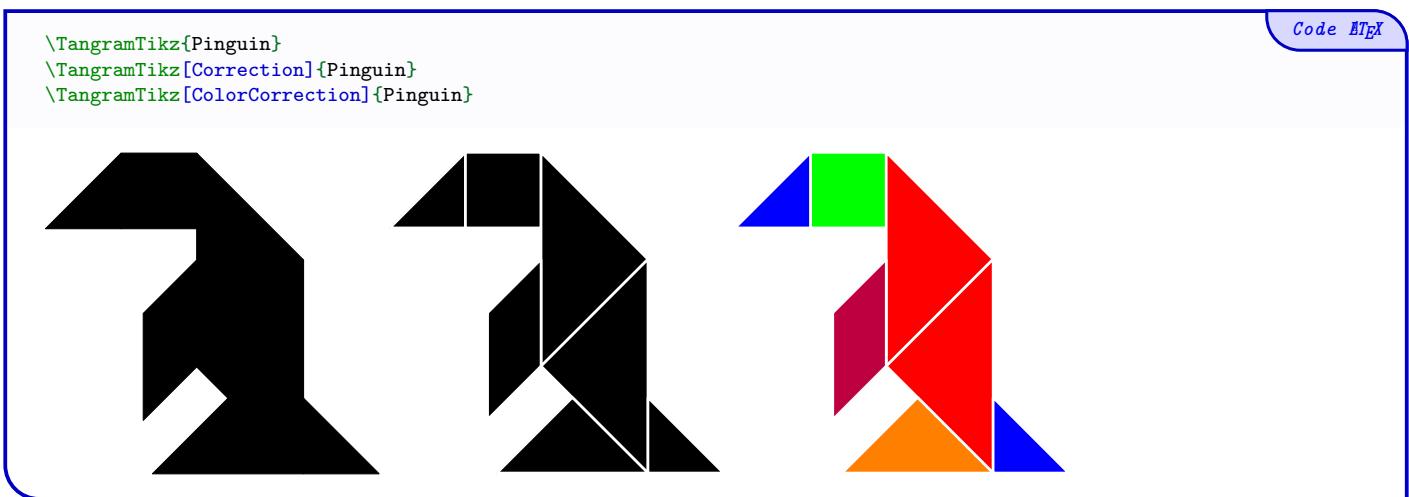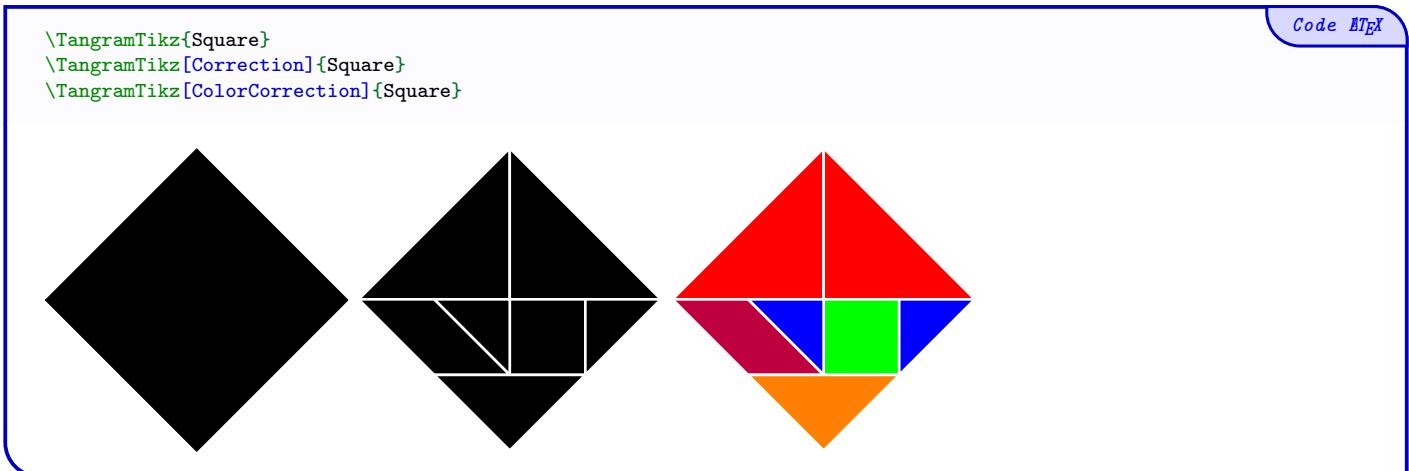
```
\TangramTikz{Home}
\TangramTikz[Correction]{Home}
\TangramTikz[ColorCorrection]{Home}
```
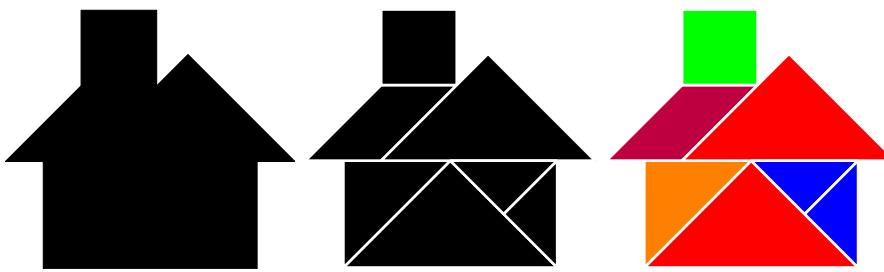
```
\TangramTikz{FirTree}
\TangramTikz[Correction]{FirTree}
\TangramTikz[ColorCorrection]{FirTree}
```
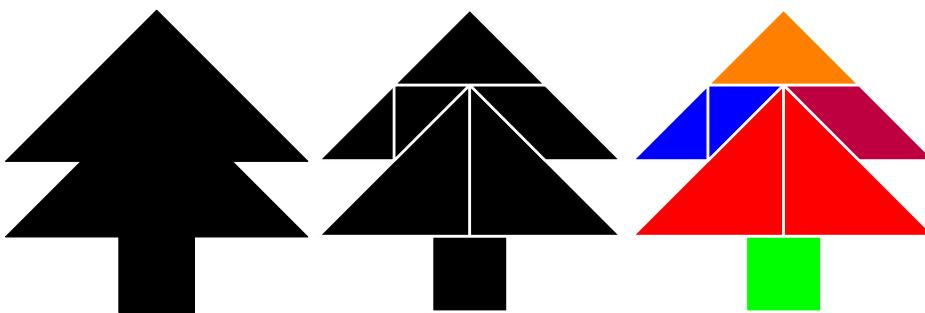
```
\TangramTikz{Cat}
\TangramTikz[Correction]{Cat}
\TangramTikz[ColorCorrection]{Cat}
```
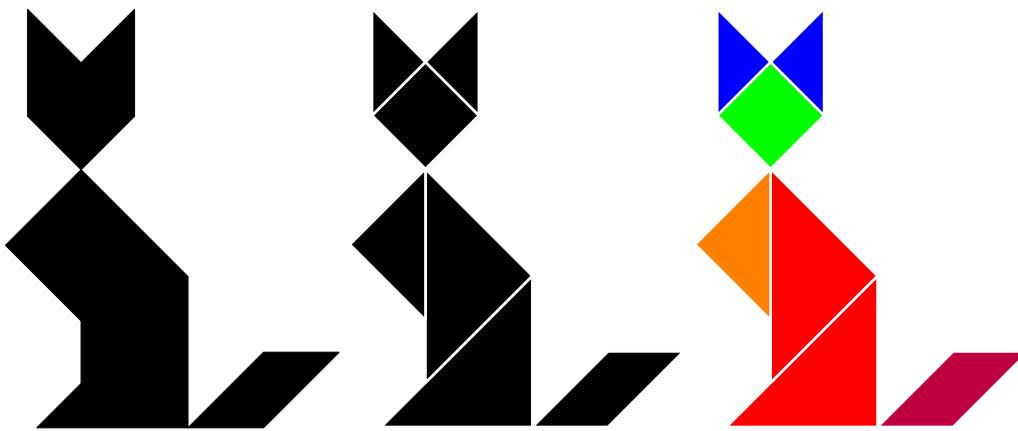
```
\TangramTikz{Swan}
\TangramTikz[Correction]{Swan}
\TangramTikz[ColorCorrection]{Swan}
```
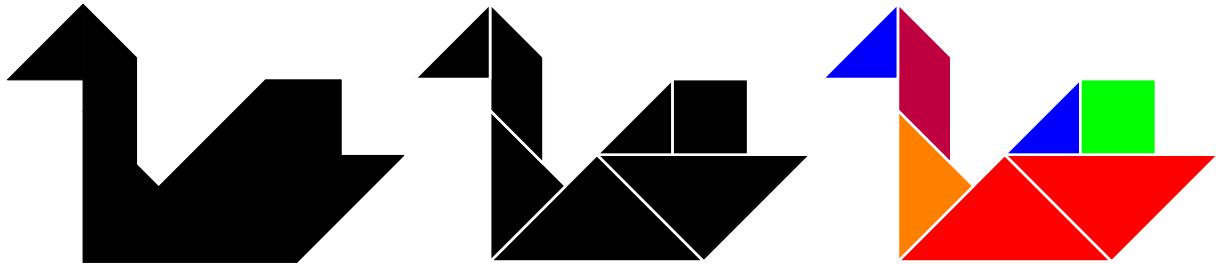
```
\TangramTikz{Pyramid}
\TangramTikz[Correction]{Pyramid}
\TangramTikz[ColorCorrection]{Pyramid}
```
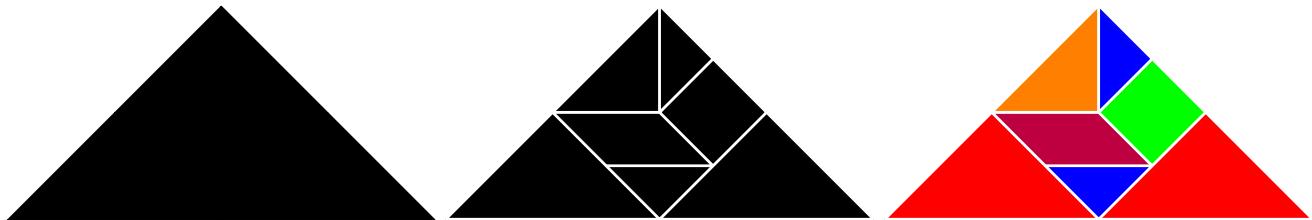
```
\TangramTikz{Duck}
\TangramTikz[Correction]{Duck}
\TangramTikz[ColorCorrection]{Duck}
```
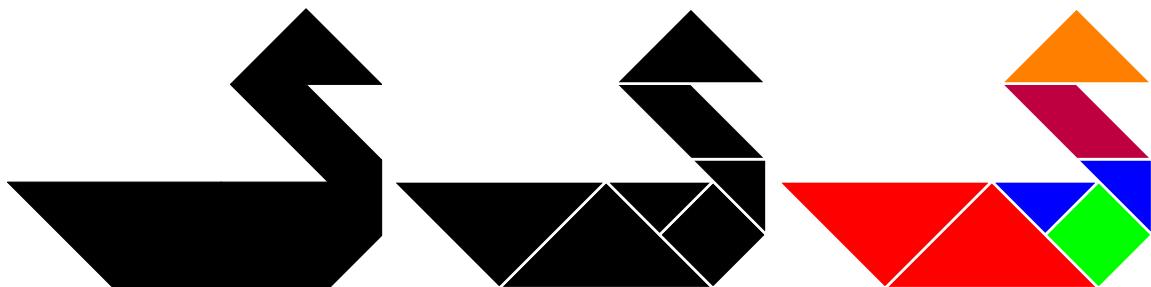
```
\TangramTikz{Rocket}
\TangramTikz[Correction]{Rocket}
\TangramTikz[ColorCorrection]{Rocket}
```
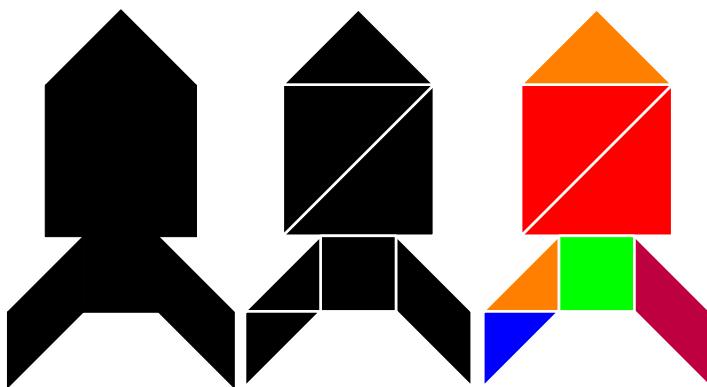
```
\TangramTikz{Candle}
\TangramTikz[Correction]{Candle}
\TangramTikz[ColorCorrection]{Candle}
```
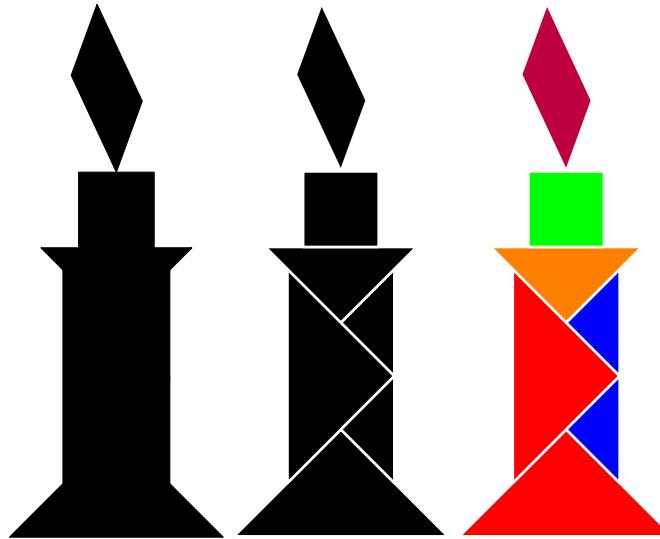
```
\TangramTikz{Shirt}
\TangramTikz[Correction]{Shirt}
\TangramTikz[ColorCorrection]{Shirt}
```
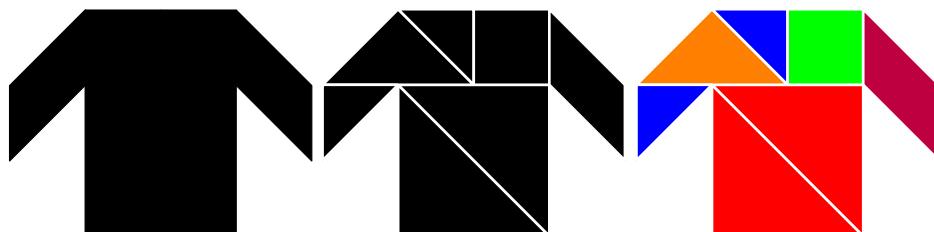
```
\TangramTikz{Fish}
\TangramTikz[Correction]{Fish}
\TangramTikz[ColorCorrection]{Fish}
```
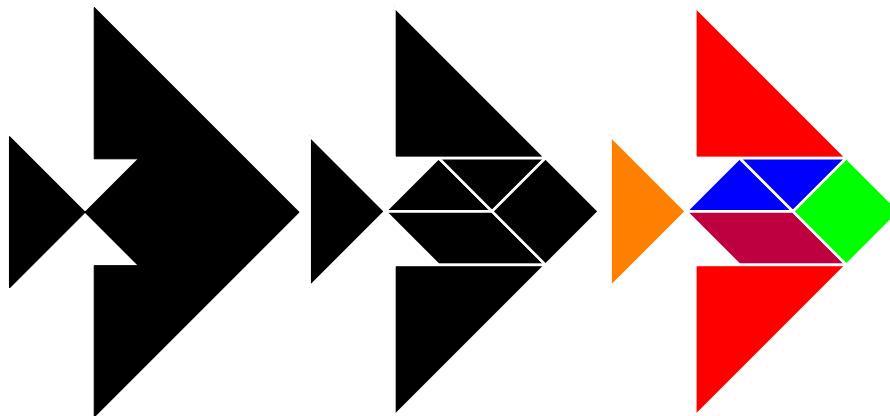
```
\TangramTikz{Sailboat}
\TangramTikz[Correction]{Sailboat}
\TangramTikz[ColorCorrection]{Sailboat}
```
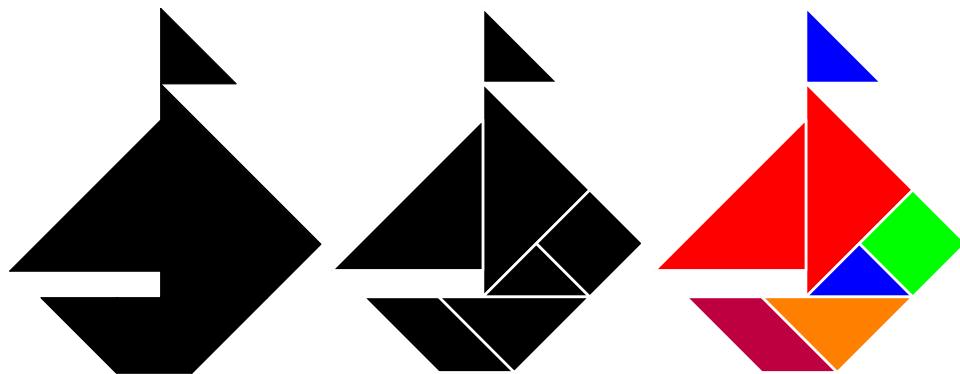
```
\TangramTikz{Kangaroo}
\TangramTikz[Correction]{Kangaroo}
\TangramTikz[ColorCorrection]{Kangaroo}
```
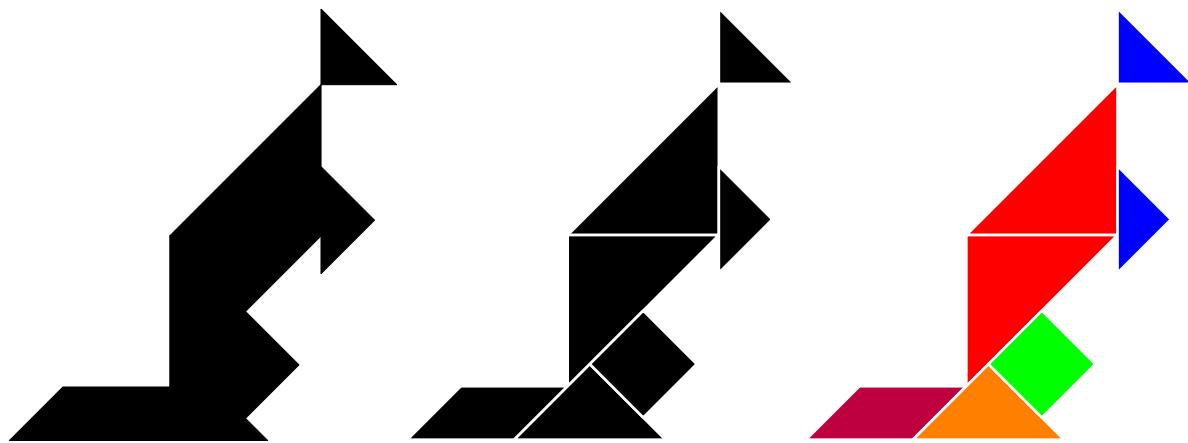
```
\TangramTikz{Dog}
\TangramTikz[Correction]{Dog}
\TangramTikz[ColorCorrection]{Dog}
```
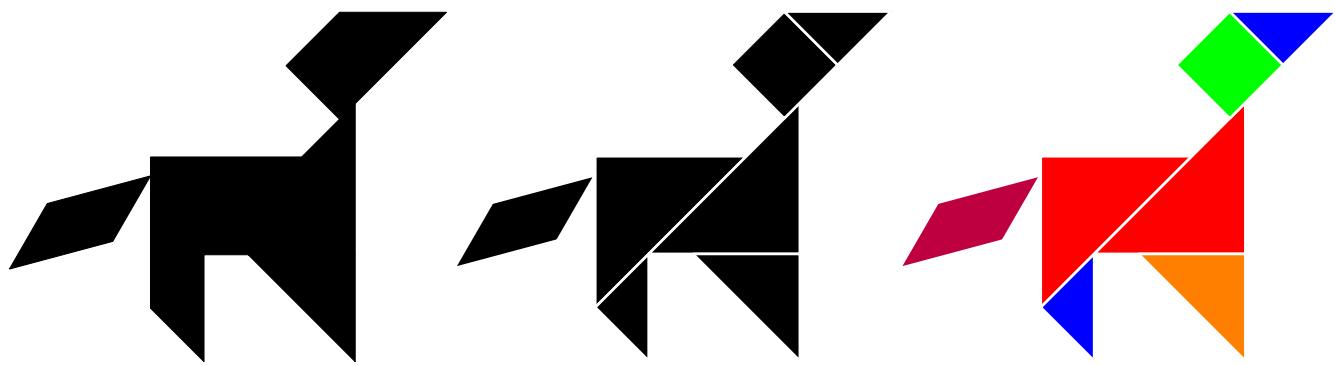
```
\TangramTikz{Plane}
\TangramTikz[Correction]{Plane}
\TangramTikz[ColorCorrection]{Plane}
```
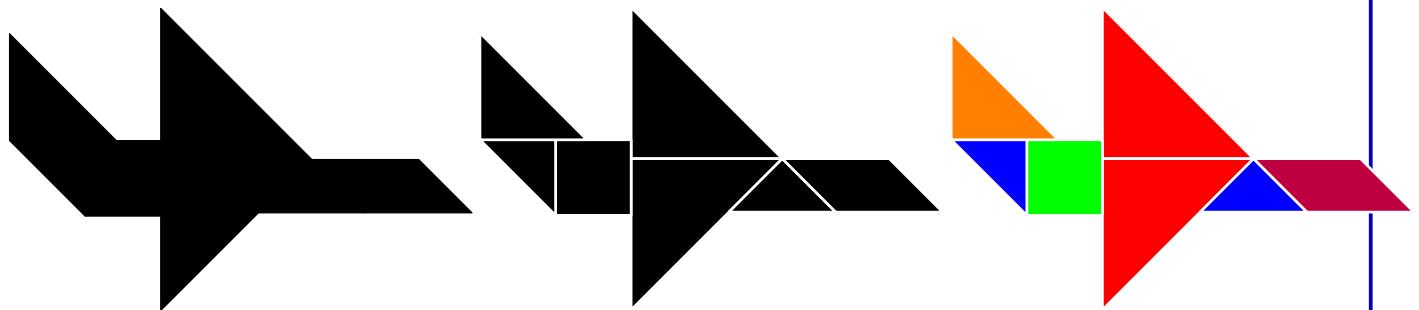
```
\TangramTikz{Rabbit}
\TangramTikz[Correction]{Rabbit}
\TangramTikz[ColorCorrection]{Rabbit}
```
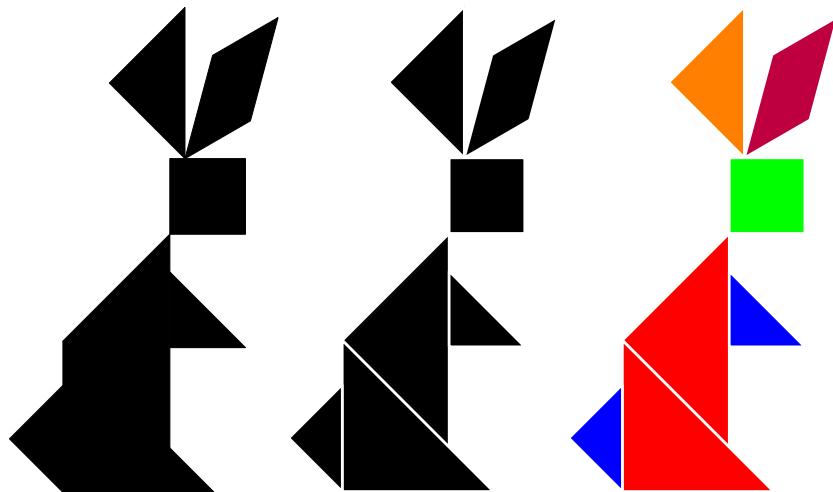
```
\TangramTikz{Rooster}
\TangramTikz[Correction]{Rooster}
\TangramTikz[ColorCorrection]{Rooster}
```
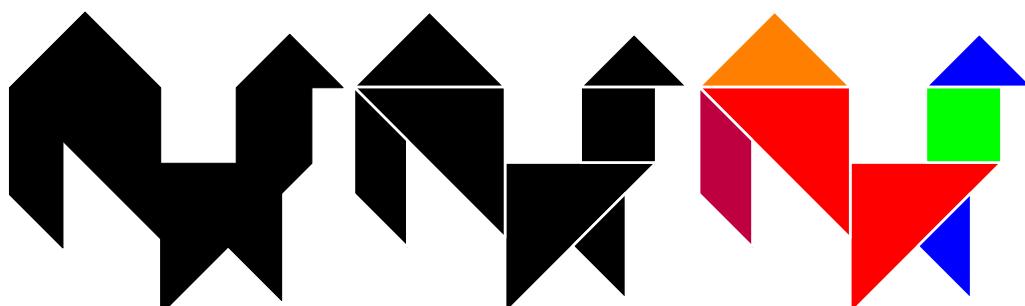
```
\TangramTikz{Jogger}
\TangramTikz[Correction]{Jogger}
\TangramTikz[ColorCorrection]{Jogger}
```
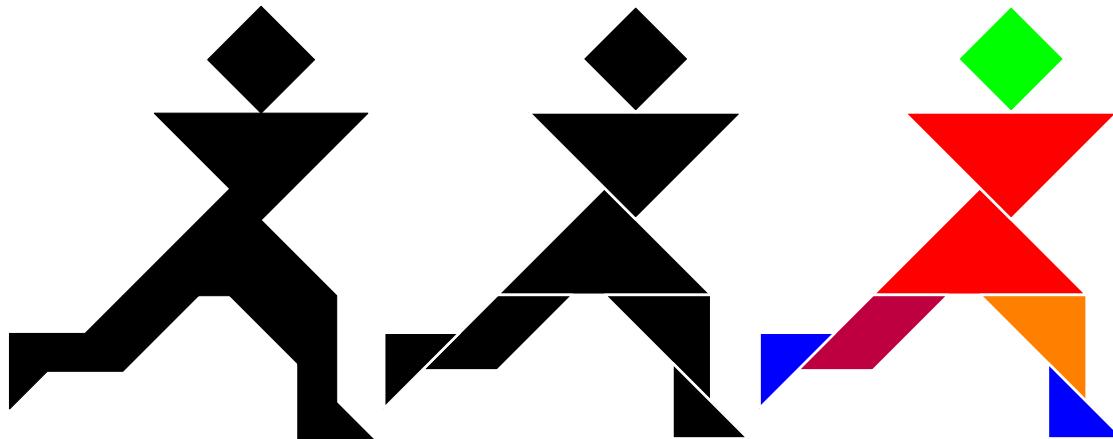
```
\TangramTikz{Dancer}
\TangramTikz[Correction]{Dancer}
\TangramTikz[ColorCorrection]{Dancer}
```
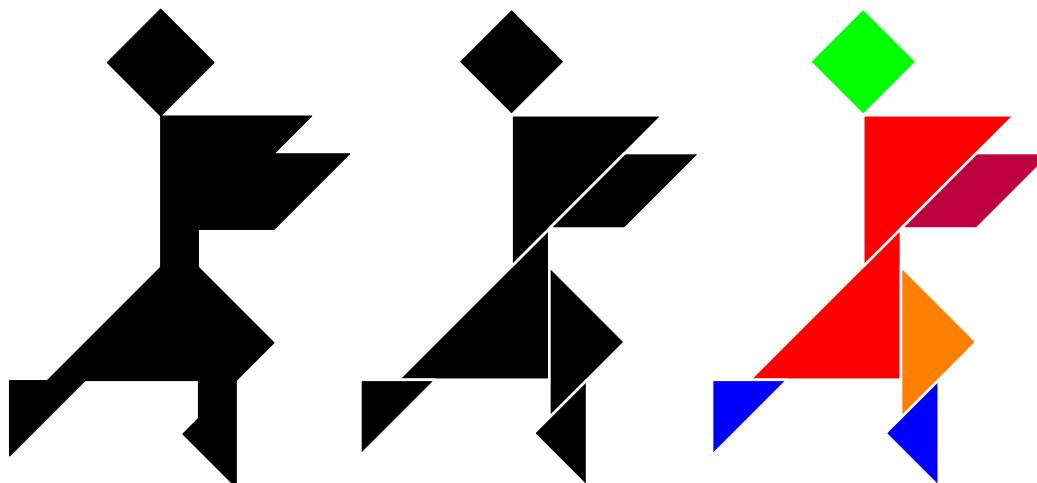
```
\TangramTikz{Camel}
\TangramTikz[Correction]{Camel}
\TangramTikz[ColorCorrection]{Camel}
```
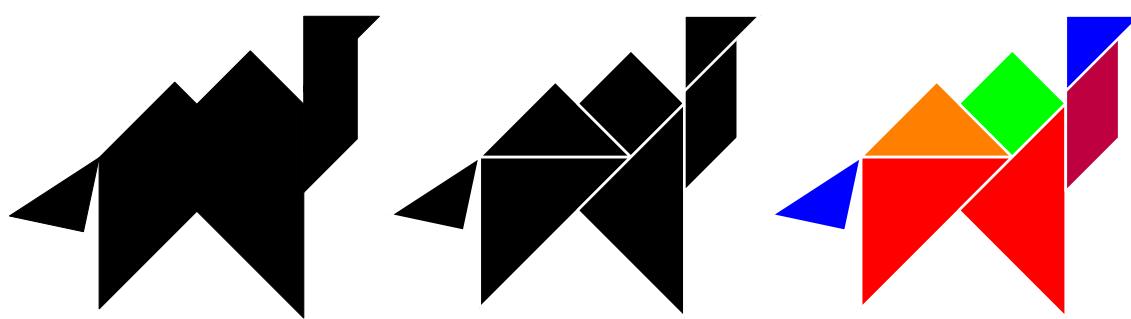
```
\TangramTikz{Flamingo}
\TangramTikz[Correction]{Flamingo}
\TangramTikz[ColorCorrection]{Flamingo}
```
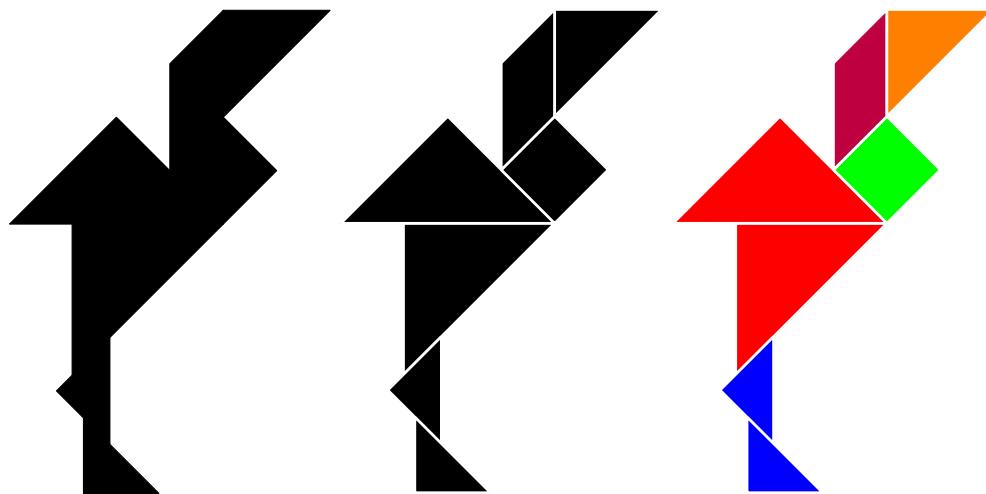
```
\TangramTikz{Heart}
\TangramTikz[Correction]{Heart}
\TangramTikz[ColorCorrection]{Heart}
```
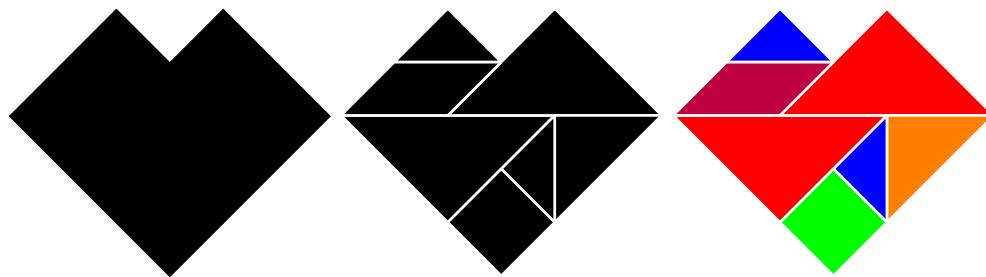
```
\TangramTikz{Giraffe}
\TangramTikz[Correction]{Giraffe}
\TangramTikz[ColorCorrection]{Giraffe}
```
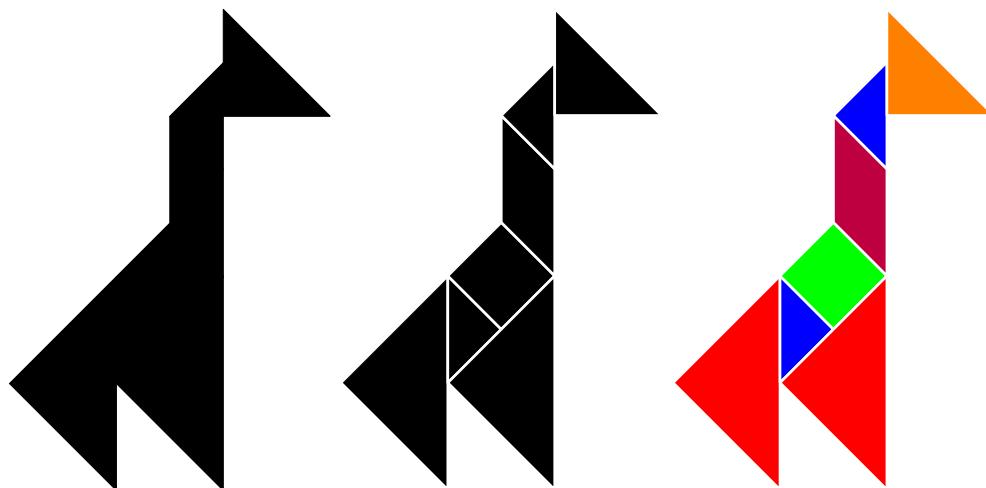
```
\TangramTikz{Horse}
\TangramTikz[Correction]{Horse}
\TangramTikz[ColorCorrection]{Horse}
```
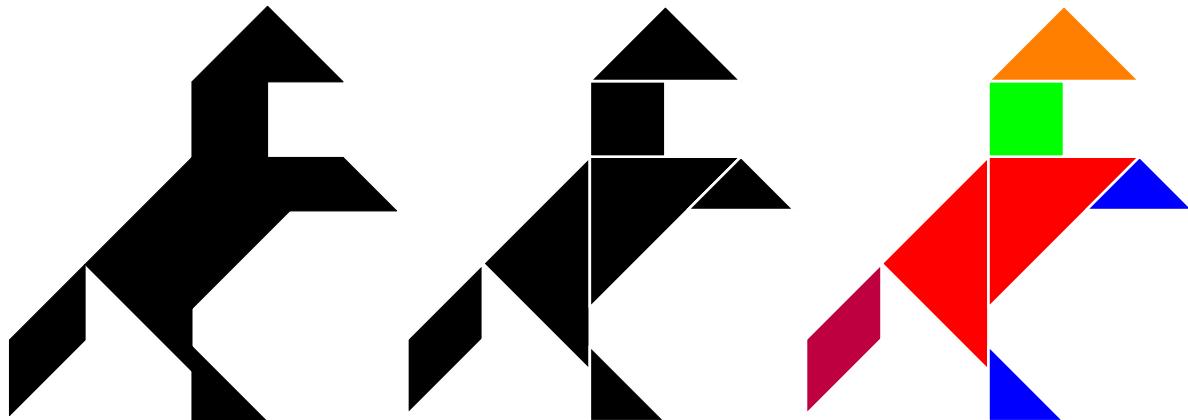
```
\TangramTikz{Goat}
\TangramTikz[Correction]{Goat}
\TangramTikz[ColorCorrection]{Goat}
```
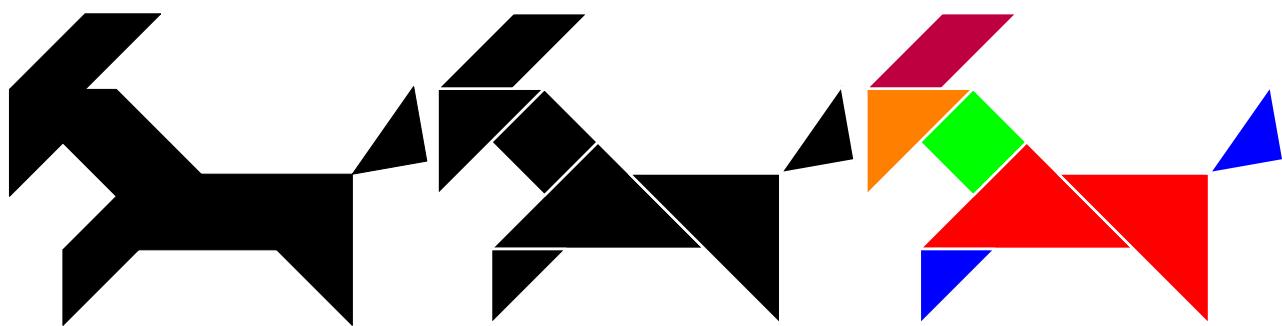
```
\TangramTikz{Lions}
\TangramTikz[Correction]{Lions}
\TangramTikz[ColorCorrection]{Lions}
```
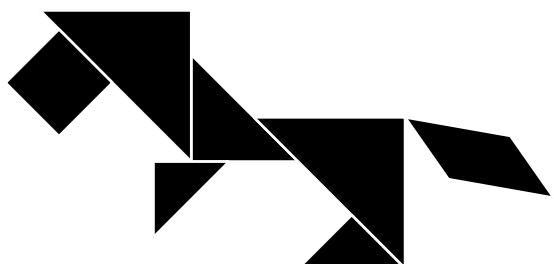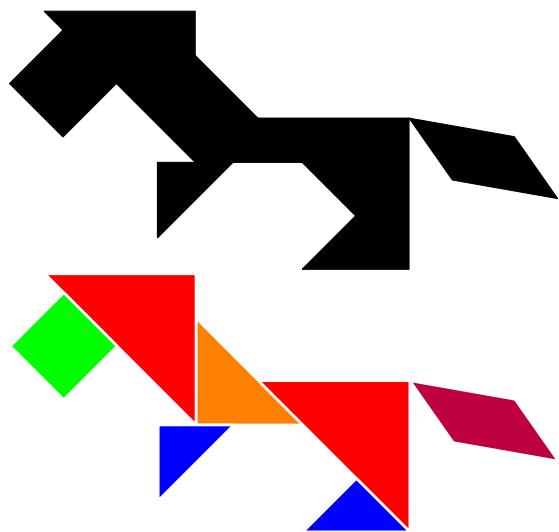
```
\TangramTikz{Factory}
\TangramTikz[Correction]{Factory}
\TangramTikz[ColorCorrection]{Factory}
```
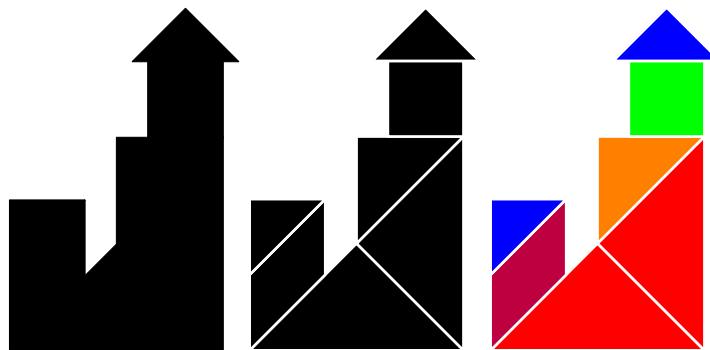
```
\TangramTikz{Angel}
\TangramTikz[Correction]{Angel}
\TangramTikz[ColorCorrection]{Angel}
```
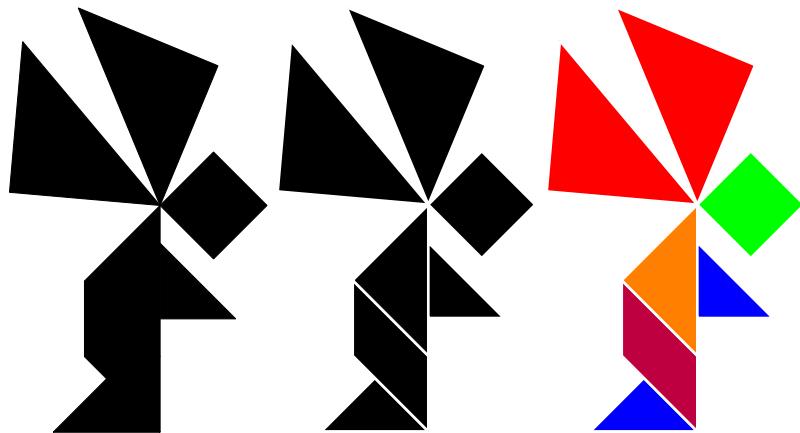
```
\TangramTikz{Tower}
\TangramTikz[Correction]{Tower}
\TangramTikz[ColorCorrection]{Tower}
```
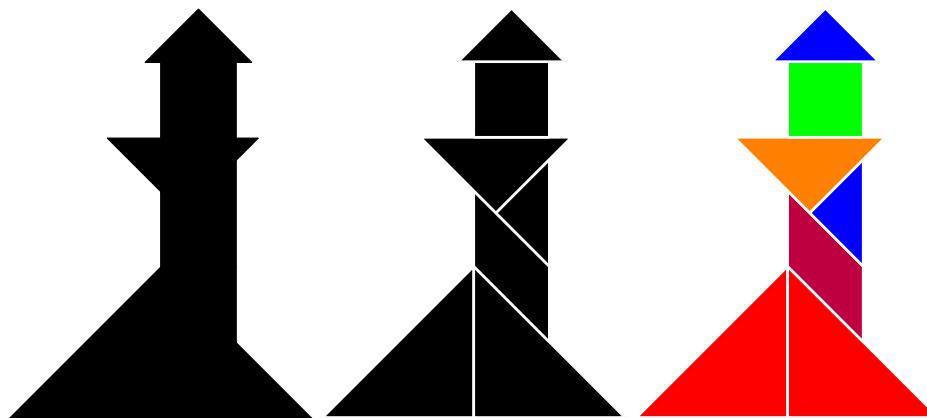
```
\TangramTikz{Ufo}
\TangramTikz[Correction]{Ufo}
\TangramTikz[ColorCorrection]{Ufo}
```
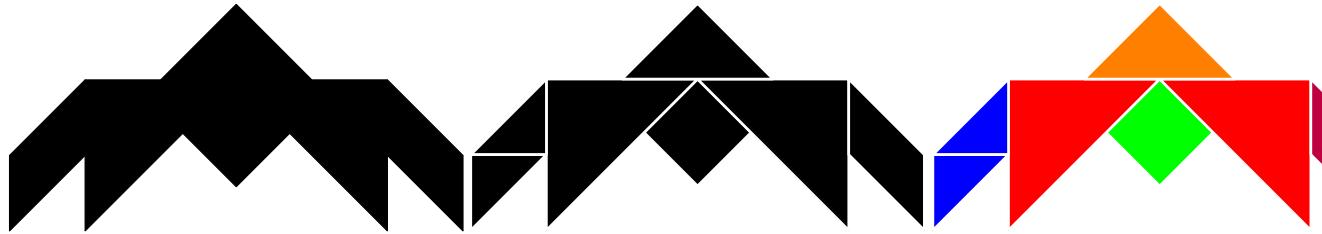
```
\TangramTikz{Chicken}
\TangramTikz[Correction]{Chicken}
\TangramTikz[ColorCorrection]{Chicken}
```
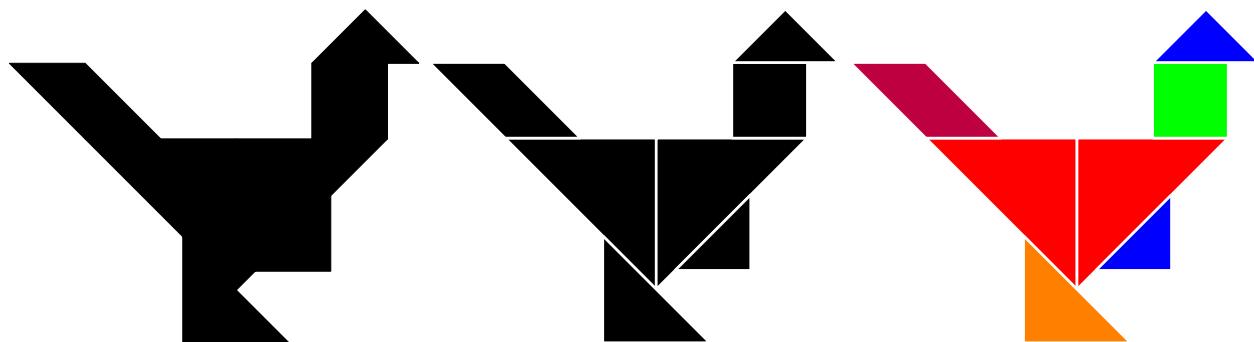
```
\TangramTikz{Turtle}
\TangramTikz[Correction]{Turtle}
\TangramTikz[ColorCorrection]{Turtle}
```
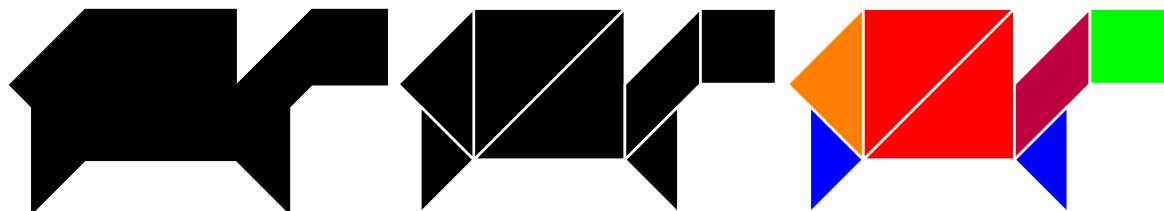
```
\TangramTikz{Crab}
\TangramTikz[Correction]{Crab}
\TangramTikz[ColorCorrection]{Crab}
```
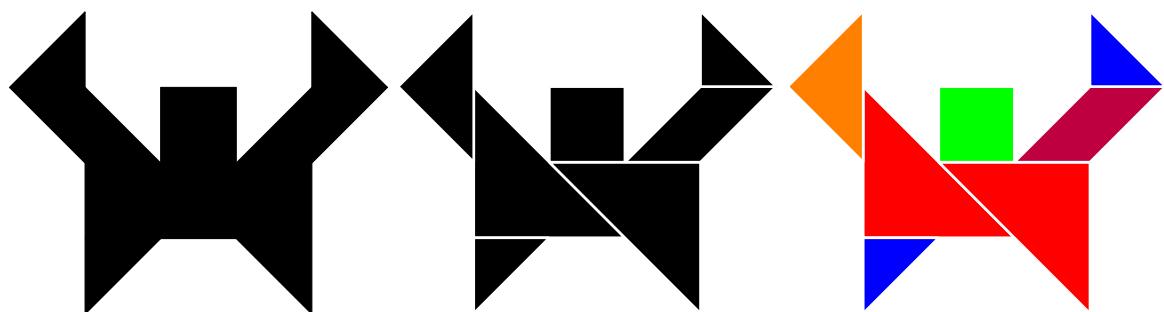
```
\TangramTikz{Snail}
\TangramTikz[Correction]{Snail}
\TangramTikz[ColorCorrection]{Snail}
```
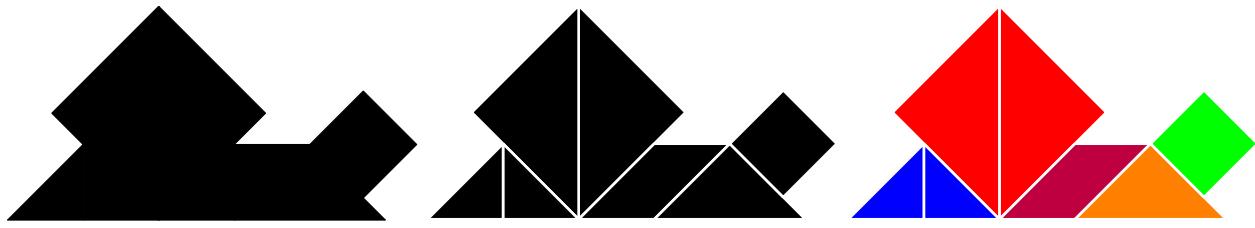
Part IV
History

v0.1.5 :   New models
v0.1.4 :   New models
v0.1.3 :   New models
v0.1.2 :   New models
v0.1.1 :   New models
v0.1.0 :   Initial version