TangramTikz [en]
Tangrams, with TikZ,
with solution and/or color.
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► Some commands to display existing Tangrams.
► Create tangram, with positioning manually the pieces.
► Idea(s) from https://tex.stackexchange.com/questions/407449/typesetting-tangram-figures-in-latex

\begin{center}
\includegraphics[width=\textwidth]{tangram}
\end{center}
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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:

\usepackage{TangramTikz}

It's fully compatible with usual compilations, such as latex, pdflatex, lualatex or xelatex.
It loads the packages and libraries:

- tikz with libraries \texttt{calc} and \texttt{shapes.geometric};
- xstring, xparse, simplekv and listofitems.

1.3 The package itself
The idea is to, thanks to Ti\textit{k}Z, propose commands to display a Tangram Puzzle:

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

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

\begin{EnvTangramTikz}[\texttt{keys}][\texttt{options tikz}]{\texttt{tangram name}}
\end{EnvTangramTikz}

\begin{EnvTangramTikz}[\texttt{keys}][\texttt{options tikz}]
%positionning the pieces
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetV}){\texttt{TangBigTri}}
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetH}){\texttt{TangBigTri}}
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetH}){\texttt{TangMedTri}}
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetH}){\texttt{TangSmalTri}}
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetH}){\texttt{TangSmalTri}}
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetH}){\texttt{TangSqua}}
\PieceTangram[\texttt{keys}][\texttt{options pic}](\texttt{offsetH},\texttt{offsetH}){\texttt{TangPara}}
%\filldraw[\texttt{black}] (0,0) circle[\texttt{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 thier common dimensions (given in unit).

Each piece can:

- rotated, thanks to TikZ’ option `rotate=...`;
- flipped 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 \texttt{pic} syntax in Ti\TeX:

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

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

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

A Tangram is built from the 7 pieces, by:

- \textit{putting} pieces at origin;
- \textit{rotating/filiping} for the correct orientation;
- \textit{translating} for the correct position.

\begin{verbatim}
%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}){TangSralTri}
\PieceTangram[TangSol={blue}]<xscale=-1,rotate=90>({0.5},{2}){TangSralTri}
\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}){TangSralTri}
\PieceTangram[TangPuzz]<xscale=-1,rotate=90>({0.5},{2}){TangSralTri}
\end{EnvTangramTikz}
\end{verbatim}
3 Automatic Method

3.1 Command

Some predefined tangrams are present in the package \texttt{TangramTikz}, and there's an independent command to "call" them:

\begin{verbatim}
% independent command to display a Tangram
\texttt{TangramTikz[options tikz]{tangram_name}}
\end{verbatim}

\begin{verbatim}
% independent command to display Cat/Boat/Kangaroo, with options by default
\texttt{TangramTikz{Cat}~~\texttt{TangramTikz{Boat}~~\texttt{TangramTikz{Kangaroo}}}
\end{verbatim}

3.2 Keys, options and arguments

The first argument, \textit{optional} and between \texttt{[...]}, give the keys:

- the boolean \texttt{(Puzzle)} to display \textit{uni}-color pieces, without border; default: \texttt{(true)}
- the boolean \texttt{(Correction)} to display \textit{uni}-color pieces, with border; default: \texttt{(false)}
- \texttt{(Color)} to configure the \textit{uni}-color with the above booleans; default: \texttt{(black)}
- the boolean \texttt{(ColorCorrection)} to display colored pieces with border; default: \texttt{(false)}
- \texttt{(ColorList)} which are the colors of the pieces (BT,MT,ST,SQUA,PARA); default: \texttt{(red,orange,blue,green,purple)}
- \texttt{(Sep)}, the width of the border in \texttt{(Correction)} mode. default: \texttt{(1pt)}

The second argument, \textit{optional} ans between \texttt{<...>}, give options to the Ti\textit{k}Z environnement, for example:

- unit(s) change, scale change;
- rotation, vertical alignment;
- etc

The third argument, \textit{mandatory} and between \texttt{\{...\}} 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
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{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{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