Contents

1 Introduction
This is a package intended to help teachers creating mathematics books for secondary/upper secondary.

2 Usage
2.1 Options of the package
There are 4 keys that can be given as an option: exercises, activities, lesson or solutions. All these keys can have two values: true or false.

When the values are false, the corresponding part of the book will not appear in the document. If it’s true, it will appear.

For these 4 keys, the default value is true.

If you want a book that contains only the exercises (and the solutions), call the package that way:

\usepackage[lesson=false,activities=false]{fascicules}

There is another possible value for solutions: inside. In that case, the solutions appear inside the exercises part, right after the exercise. The goal is to make it easier to check, when you want to type or modify the solutions.

There is also another possible value for lesson: methods. In that case, only the methods appear inside the lesson part (actually, there is in that case a method part that replaces the lesson part). In that case, the lesson will be compiled somewhere else, as a beamer presentation.
2.2 Make the title page

\fasciculestitle
This commands replace the \LaTeX command \maketitle. It uses the well-known \LaTeX commands \title{}, \subtitle{}, \author{}, \publishers{} and \date{}.

2.3 Create a chapter

Start a new chapter with the \LaTeX command \chapter{title of the chapter}
You can have an image in the background with the following code:

\backgroundimage{paths/to/image}
\thispagestyle{chapterpage}

2.4 The table of contents

\listofmethods
In addition to the latex command \tableofcontents the package provides the command \listofmethods in order to print the list of the methods. The methods are numbered in the way 1.1, where the first number is the number of the chapter and the second the number of the method.

2.5 Organisation of the chapters

lesson
activities
exercises
solutions
These three environments start the pages for the lesson, the activities and the exercises. Each chapter can have these type of pages. The exercises are displayed in a twocolumn environment.

This environment is to display the solutions of the exercises. All the solutions of the different chapter will appear at the end of the book.

2.6 Exercises

\onecolumnexos
The exercises always appear in a twocolumn layout. If for some reason, we want to avoid it, we can use this command

\onecolumnexos{(the text in one column)}

\groupexos
This commands can appear before exercises that match the same learning goal. The title will appear clearly in the middle of the columns

\groupexos{(title)}

\exo
This environment contains the text of one exercise. The exercises are numbered starting at 1 for each new chapter. The exercise have optional argument.

- title : is the title of the exercise, if any (none by default).
- type : solution (there is a solution printed usually at the end of the book). In that case, the number of the exercise appears in another color.
- method This exercise is supposed to appear in the lesson, right after a method. The number appears also in a specific color.
\begin{exo}\ [
\text{(title,type=)}
\ldots\ (text) \ldots
\end{exo}

sol  Those environments contain the text of the answers. The solution will appear on another page and only for the teachers for the environment sol*

2.7 Activities
\activity This command starts a new activity, the activities are numbered starting at 1 for each chapter.
\objective An environment where you can write the objective of this activity (if any).

2.8 Lesson
After the lesson command, you can start writing your lesson. the lessons are divided into sections and subsections.
\method All those environments must have a title (possibly empty). A label can be given as an optional argument, so that it can be referred to in other parts of the book (e.g. in the exercises).
\begin{method}\ [(yourlabel)]\{(title)\}
\ldots\ (text) \ldots
\end{method}

remark Those are also straightforward. No argument, they just work on their own.

2.9 Graphics
Graphics are quite important in a secondary mathematics book. The following commands are here to ensure that the graphics have all the same style.
\window This command defines the window where the graphic will be drawn. The x-axes is horizontal and the y-axes is vertical.
\window\{\(X_{\text{min}}\}\{\(X_{\text{max}}\}\{\(Y_{\text{min}}\}\{\(Y_{\text{max}}\)\}

\axeH Those commands enable to draw rapidly the axes (vertical and horizontal) and to mark the first graduation. By default, the axes are labeled \(x\) and \(y\) and the graduation is put at 1. It can be changed by using the optional argument.
\axeH\{\(label\)\}
\axeV\{\(label\)\}
\tickX\{\(graduation\)\}
\tickY\{\(graduation\)\}
Finally, you can force the ratio of the rectangle window. The height/width is by default 0.66, so that the graphics looks more or less like the screen of a calculator, the ratio can be changed.

\begin{windowsratio}\langle\text{ratio}\rangle
\text{(text)}...
\end{windowsratio}

3 Implementation

\textsc{1} \texttt{\textbackslash NeedsTeXFormat\{LaTeX2e\}[1994/06/01]}
\textsc{2} \texttt{\textbackslash ProvidesPackage\{fascicules\}[2018/02/22]}
\textsc{3} \texttt{\textbackslash RequirePackage\{svgnames\}\{xcolor\} \% nice colors with nice names}
\textsc{4} \texttt{\:getclass\{scrbook\}\{}
\textsc{5} \texttt{\textbackslash RequirePackage\{noxcolor\}\{beamerarticle\}\}{}
\textsc{6} \}
\textsc{7}
\textsc{8} \texttt{\textbackslash RequirePackage\{amsthm\}}
\textsc{9} \texttt{\textbackslash RequirePackage\{keyval\}}
\textsc{10} \texttt{\textbackslash RequirePackage\{comment\}}
\textsc{11} \texttt{\textbackslash RequirePackage\{ifthen\}}
\textsc{12} \texttt{\:if\textbackslash class\{scrbook\}\{}
\textsc{13} \texttt{\textbackslash RequirePackage\{enumitem\}}
\textsc{14} \}
\textsc{15}
\textsc{16} \% ligne vide necessaire apr\'es la condition
\textsc{17}
\textsc{18} \texttt{\textbackslash RequirePackage\{multicol\}}
\textsc{19} \texttt{\textbackslash RequirePackage\{calc\} \% commande widthof}
\textsc{20} \texttt{\textbackslash RequirePackage\{tikz\}}
\textsc{21} \texttt{\textbackslash RequirePackage\{nameref\}}
\textsc{22} \texttt{\usetikzlibrary\{calc\}}
\textsc{23} \texttt{\textbackslash RequirePackage\{tcolorbox\} \% differentes box colores}
\textsc{24} \texttt{\tcbuselibrary\{theorems\}}
\textsc{25} \texttt{\textbackslash RequirePackage\{pgfplots\} \% use keyval option in the package}
\textsc{26} \texttt{\textbackslash RequirePackage\{envron\} \% new command \textbackslash NewEnviron}
\textsc{27} \texttt{\textbackslash RequirePackage\{comment\} \% include environment as a comment. The goal here is to include or}
\textsc{28} \texttt{\textbackslash RequirePackage\{tagging\} \% conditionnal compiling (used for the methods)}
\textsc{29} \texttt{\textbackslash RequirePackage\{xcomment\} \% to comment everything but some environments (used for the method}
\textsc{30} \texttt{\textbackslash RequirePackage\{hyperref\} \% references}
\textsc{31} \texttt{\textbackslash RequirePackage\{cleveref\} \% clever references}
\textsc{32}
\textsc{33} \% To be able to use the old commands and
\textsc{34}
\textsc{35} \texttt{\textbackslash DeclareOldFontCommand\{\bf\}{\texttt\{normalfont\}\texttt\{bfseries\}}\{mathbf\}}
\textsc{36} \texttt{\textbackslash DeclareOldFontCommand\{\texttt\{\}it\}{\texttt\{normalfont\}\texttt\{bfseries\}}\{mathit\}}
\textsc{37}
The colors and the name of the part of the book, in French

\newcommand{\methodscolor}{DarkOrchid}
\newcommand{\lessoncolor}{LimeGreen}
\newcommand{\exercisescolor}{SlateBlue}
\newcommand{\activitiescolor}{OrangeRed}
\newcommand{\solutionscolor}{red}
\newcommand{\notez}{}
\newlength{\fascicules@groupexoswidth}
\newcommand{\esbook@lessonname}{cours}
\newcommand{\esbook@activitiesname}{activités}
\newcommand{\esbook@activityname}{activité}
\newcommand{\esbook@exercisesname}{exercices}
\newcommand{\esbook@solutionsname}{corrigés}
\newcommand{\esbook@methodsname}{métodes}

Definition of the theorem-like environment for the lesson
\renewenvironment{theorem}[2][\]{\begin{theo}[label=#1]{#2}{}\}}{\end{theo}}
\renewenvironment{definition}[2][\]{\begin{defi}[label=#1]{#2}{}\}}{\end{defi}}
\newenvironment{objective}{\begin{obj}{}{}}{\end{obj}}
\newenvironment{property}[2][\]{\begin{prop}[label=#1]{#2}{}\}}{\end{prop}}
\newenvironment{formula}[2][\]{\begin{form}[label=#1]{#2}{}\}}{\end{form}}

The method environment vary if we are in a beamer or not. In order to get the list of methods also in beamer
\@ifclassloaded{scrbook}{
\@ifclassloaded{beamer}{}{
\newenvironment{method}[2][\]{\begin{meth}[label=#1]{#2}{}\}}{\end{meth}}
\@ifclassloaded{beamer}{
\newenvironment{method}[2][\]{\begin{meth}[label=#1]{#2}{} %

Personnalisation de la numerotation, utilise le package enumitem. La numération est le plus compacte possible, serre sur la marge, afin de laisser de la place pour le texte (notamment quand il y a deux colonnes)
\setitemize{itemsep=0pt, parsep=0pt, leftmargin=*, labelsep=1pt, noitemsep}
\setenumerate{wide, nosep, noitemsep, labelsep=0pt}
\setenumerate[1]{label=\bf{\arabic*.}\; 
\}
\setenumerate[2]{label=\bf{\alph*)\;} 
\}
\newenvironment{method}[2][\]{\begin{meth}[label=#1]{#2}{} \}{\end{meth}}
The code is specific to the book. It does not concern beamer lessons
Definition of the title

\ifclassloaded{scrbook}{
\begin{titlepage}
%=======================
\begin{center}
\hspace{0pt}\vspace{4cm}{\Large\bfseries \@author}\vspace{3cm}{\scalebox{1.5}{\Huge\bfseries \@title }}\vspace{0.8cm}{\LARGE\bfseries \@subtitle}\[10pt]
% ----------------------------------------------------------------
\vfill \@publishers\vspace{0.8cm}\@date
% ----------------------------------------------------------------
\end{center}
% ---------------
\thispagestyle{empty}
clearpage\end{titlepage}}
\makeatother

Processing the options

\pgfkeys{
/include/.is family,/include,
default/.style = {exercises = true,lesson = true,activities=true,solutions=true},
exercises/.store in=!fascicules@modeexercises,
lesson/.store in=!fascicules@modelesson,
activities/.store in=!fascicules@modeactivities,
solutions/.store in=!fascicules@modesolutions,}
\pgfkeys{/include,/include/default}
\ProcessPgfOptions{/include}
If we want to have the solutions of the exercises inside exercises pages.

\ifthenelse{\equal{\fascicules@modesolutions}{inside}}{\PassOptionsToPackage{nosolutionfiles}{answers}}{}

\RequirePackage{answers}

% activates pagestyle scrheadings
\RequirePackage[headsepline=1pt,footsepline=1pt]{scrlayer-scrpage}
\clearpairofpagestyles

\addtokomafont{pagehead}{\color{white} \bfseries} % font for the page headers
\addtokomafont{pagefoot}{\large \bfseries} % font for the page headers

\newcommand*{\headcontents}[1]{\raisebox{0pt}{\ht\strutbox}\dimexpr\headheight-\ht\strutbox\relax\}{#1}}
\newpairofpagestyles*[scrheadings]{lesson}{\ihead{\esbook@lessonname} \ohead{\leftmark} \ofoot{\thepage}}
\newpairofpagestyles*[scrheadings]{activities}{\ihead{\esbook@activitiesname} \ohead{\leftmark} \ofoot{\thepage}}
\newpairofpagestyles*[scrheadings]{exercises}{\ihead{\esbook@exercisesname} \ohead{\leftmark} \ofoot{\thepage}}
\newpairofpagestyles*[scrheadings]{solutions}{\ihead{\esbook@solutionsname} \ofoot{\thepage}}
\newpairofpagestyles*[scrheadings]{methods}{\ihead{\esbook@methodsname} \ohead{\leftmark} \ofoot{\thepage}}

Here are the definitions of the layers
\newcommand*{\headcoloredbg}[1]{\begin{tikzpicture} \fill[color=#1](0,0)rectangle({\layerwidth},{\layerheight}); \end{tikzpicture}}
\DeclareNewLayer*[background,topmargin,addheight=20pt,contents=\headcoloredbg{\lessoncolor}]{lesson.bg}
\DeclareNewLayer*[background,topmargin,addheight=20pt,contents=\headcoloredbg{\exercisescolor}]{exercises.bg}
\DeclareNewLayer*[background,topmargin,addheight=20pt,contents=\headcoloredbg{\activitiescolor}]{activities.bg}
The background image for the chapter page

The background image for the chapter page

Solutions with the package answers.

Solutions with the package answers.
Exercises are always in a two column environment, sometimes we don’t want it.

\newcommand{\onecolumnexos}[1]{\end{multicols}\thispagestyle{exercises}\#1\begin{multicols}{2}\pagestyle{exercises}\Opensolutionfile{solution}{solutions/ch\thechapter}\Opensolutionfile{soluce}{solutions/ch\thechapter_prof}\BODY\closesolutionfile{solution}\closesolutionfile{soluce}\end{multicols}}
\NewEnviron{solutions}{
\newpage
\pagestyle{solutions}
\begin{multicols}{2}
\BODY
\clearpage
\end{multicols}
}

\newenvironment{lesson}{
\setcounter{fascicles@exo}{0}
\newpage
\ifthenelse{\equal{\fascicles@modelesson}{true}}{%
\pagestyle{lesson}\{}
\ifthenelse{\equal{\fascicles@modelesson}{methods}}{
\pagestyle{methods}\{}
\Opensolutionfile{solution}\[solutions/ch\thechapter_methods]
\}{%}
\clearpage
\ifthenelse{\equal{\fascicles@modelesson}{methods}}{
\pagestyle{methods}\{}
\Closesolutionfile{solution}
\}{%}
\}
\clearpage
\ifthenelse{\equal{\fascicles@modelesson}{methods}}{
\pagestyle{methods}\{}
\}
\}
\medskip
\newcommand{\activity}[1]{\refstepcounter{fascicles@activity}
\activitytitleFormat \esbook@activityname~\thefascicles@activity. #1}
\newcommand{\groupexos}[1]{\setlength{\fascicles@groupexoswidth}{\minof{\widthof{#1}}{.4\textwidth}}
\begin{center}
\begin{minipage}{\fascicles@groupexoswidth}
\groupexosFormat
\dotfill \par
#1
\end{minipage}
\end{center}
\begin{center}
\end{minipage}
\end{center}
The parts to include or exclude, depending of the package options

364 \ifthenelse 365 {\equal{\fascicules@modeexercises}{true}} 366 {} 367 \ifthenelse 368 {\excludecomment{exercises}} 369 \ifthenelse 370 {\equal{\fascicules@modeactivities}{true}} 371 {} 372 \ifthenelse 373 {\excludecomment{activities}} 374 \ifthenelse 375 {\equal{\fascicules@modelesson}{true}} 376 {} 377 \ifthenelse 378 {\equal{\fascicules@modelesson}{false}} 379 {\excludecomment{lesson}} 380 \ifthenelse 381 {\equal{\fascicules@modelesson}{methods}} \usetag{method} % will print only the methods 382 \ifthenelse 383 {\equal{\fascicules@modesolutions}{false}} \excludecomment{solutions} 384 \ifthenelse 385 {\equal{\fascicules@modesolutions}{false}} \excludecomment{solutions} 386 \ifthenelse 387 {\equal{\fascicules@modesolutions}{false}} \excludecomment{solutions} 388 \ifthenelse 389 {\equal{\fascicules@modesolutions}{false}} \excludecomment{solutions} 390 \ifthenelse 391 \begin{exo} \pgfkeys{ 392 \fascicules/.is family,;/fascicules, 393 default/.style = {title = ,type = none}, 394 title/.estore in = \exotitle, 395 type/.estore in = \exotype, 396 } 397 \refstepcounter{fascicules@exo} 398 \end{exo} 399 400 Exercises have optional arguments. The color of the number varies if there are solutions or not in the manual. 401 \pgfkeys{ 402 /fascicules/.is family,;/fascicules, 403 default/.style = {title = ,type = none}, 404 title/.estore in = \exotitle, 405 type/.estore in = \exotype, 406 } 407 408 \newenvironment{exo}[1][] 409 \pgfkeys{/fascicules, default, #1} 410 \vspace{3mm} 411 \refstepcounter{fascicules@exo} 412
How to manage the references with the \cref package

\makeatletter
\def\cref@getref#1#2{% 
  \xdef\@lastusedlabel{#1}% 
  \expandafter\let\expandafter#2\csname r@#1@cref\endcsname% 
  \expandafter\expandafter\expandafter\def% 
  \expandafter\expandafter\expandafter#2% 
  \expandafter\expandafter\expandafter{\% 
  \expandafter\@firstoftwo#2}}\% 
\crefformat{method}{\color{\lessoncolor} M\’ethode #2#1#3 \nameref*{\@lastusedlabel} } \% 
\crefformat{section}{\color{\lessoncolor} \S #2#1#3 \nameref*{\@lastusedlabel} } \% 
\crefformat{fascicules@activity}{\color{\activitiescolor} \esbook@activityname~#2#1#3 \nameref*{\@lastusedlabel} } \%

The command listofmethods for the book
\newcommand\listofmethods{\tcblistof[\section*]{method}{Liste des M\’ethodes} } \%

Then what is specific to the beamer slides
\makeatletter
\makeatother
\@ifclassloaded{beamer}{\% class scrbook uniquement\%
\usecolortheme{rose} 
\useoutertheme[hideallsubsections,height=8pt]{sidebar} 
\setbeamertemplate{section in toc}[sections numbered] 
\setbeamercolor{structure}{fg=\lessoncolor, bg=green!10} 
\resetcounteronoverlays[tcb@cnt@meth] % reset counters for methods 
}{%
\AtBeginSection[
\begin{frame}<beamer>
\begin{centering}
This trick (found on the net) to make possible the usage of cleveref (with tcolorbox list inside option) in beamer
The commands list of methods vary if we are in a beamer

\begin{tikzpicture}[remember picture,overlay]
\node[scale=2,text opacity=0.1]
at (current page.center) \{\includegraphics{../../commons/img/crayon}\};
\end{tikzpicture}

The exercises that appear in the beamer lessons

\newcounter{beamerExo}
\resetcounteronoverlays{beamerExo}

\pgfkeys{
/fascicules/.is family,/fascicules,
default/.style = {title = ,type = none},
title/.estore in = \exotitle,
type/.estore in = \exotype,
}

\newenvironment{exo}[1][\{\pgfkeys{/fascicules, default, #1}\
\refstepcounter{beamerExo}
\tikz \node[rectangle,draw=\methodscolor!50,fill=\methodscolor!20] \{#thebeamerExo\};
\ifthenelse{\equal{\exotitle}{}}{}{{\bf \exotitle.}}
}
Commandes pour tracer des jolies courbes

\tikzstyle{general}=[line width=0.3mm, >=latex, x=1cm, y=1cm, line cap=round, line join=round]
\tikzstyle{grid}=[line width=0.3mm, color=LightBlue]
\tikzstyle{courbe} = [draw=blue, line width=1.2pt]

\newcommand{\window}[4]{\def\poslabelX{above left} \def\poslabelY{below right} \pgfmathsetmacro{\windowwidth}{7}; % la largeur par défaut d'une window \pgfmathsetmacro{\Xmin}{#1}; % \pgfmathsetmacro{\Xmax}{#2}; % \pgfmathsetmacro{\Ymin}{#3}; % \pgfmathsetmacro{\Ymax}{#4}; %}

\newenvironment{windowsratio}[1][0.66]{\begin{scope}[xscale=\windowwidth/(\Xmax-\Xmin),yscale=(\windowwidth * #1)/(\Ymax-\Ymin)]}{\end{scope}}

\newcommand{\axeH}[1][x]{\draw[->] (\Xmin,0) -- (\Xmax,0) node[\poslabelX]{#1};}
\newcommand{\axeV}[1][y]{\draw[->] (0,\Ymin) -- (0,\Ymax) node[\poslabelY]{#1};}
\newcommand{\tickX}[1][1]{\draw (#1,0) node {\scriptsize $#+$} node[above]{$+$} node[below]{$+$};}
\newcommand{\tickY}[1][1]{\draw (0,#1) node {\scriptsize $#+$} node[left]{$+$} node[right]{$+$};}