Auto Multiple Choice

User manual

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Chapter 1. Usage - Graphical interface

Here we describe an example of how the graphical interface works, from designing the MCQ to editing the students' grades.

1.1. Creating a new project and subject

Let's open the graphic interface. This can be done ordinarily by selecting **Applications › Education › Auto Multiple Choice** in the general menu of Gnome (or its equivalent in KDE or other), but the command `auto-multiple-choice` can be used directly.

In the title bar of the main AMC window, the icons have the following meanings:

- for **Open**
- for **New project**
- for **save**
- for **Preferences**
- for **Menu**.

Let's now create a new project, thanks to **New project** (icon). A window opens and allows us to see existing project names (if any) and choose a name for our new project (made with simple characters; « test » will be OK for our short test), which we write in the field *Project name*. Then we push the **New project** button.

Now we must choose a AMC-TXT or LaTeX file as a source for the multiple-choice. Several possibilities are shown:

- **model**: this choice allows to choose from models shipped with AMC an exam to customize later.
- **file**: this choice allows to choose a LaTeX file already prepared for this exam. Somebody may have prepared the exam for you, or you can have prepared the exam outside AMC, using your favorite LaTeX editor.
- **empty**: using this choice, an empty LaTeX file will be created. You have to edit it to compose the exam from zero.
- **archive**: use this choice if you have a zip or tgz archive containing the exam definition (LaTeX source file, along with image files, parameters file for example). This archive can be made by an external software. It can also be a backup of one of your AMC projects.

For our test, let us choose **model**. The next window presents the models: choose for example Simple example from *[EN] Documentation* group. Now we can edit it to modify the shape of the document or the questions, thanks to the **Edit source file** button which launches the default editor.

1.2. Preparing the subject

Preparing a project is done in two steps. First we must make the reference documents from the

source file. This can be done by clicking the **Update documents** or Alt+U. The following documents are produced:

- The *question*. This file can be printed to distribute its pages to students (see below).
- The *solution*. We can check that the chosen responses there are the good ones. It is also made to be distributed to students.

When produced, those documents can be viewed (and possibly printed) from the corresponding buttons.

Now we can begin the last step of the preparation: analyzing the layout. It can be launched with the button Layout detection. This analysis detects, in every page of the subject, the exact position of every element which must be analyzed in the students' copies.

To check whether the layouts have been correctly detected, we can use the button Check layouts. A short insight allows to check that red checkboxes are correctly located over the boxes of the subject.

1.3. Mailing examan to student (with or without password)

Emailing exam sheets is possible.

- You must prepare nominative sheets (see the **Nominative sheets** sections for LaTeX or AMC-TXT source files).
- Select printing to files: set **Preferences › Main › Printing › Printing method** > to **to files**.
- Select extracting method: set **Preferences › Main › Printing › Extracting method** to **qpdf** (usually a good choice) or **sejda-console** (to be installed) when you build PDF forms.

If option `pdfform` is used, select **sejda-console** and install it:

```
cd
wget
https://github.com/torakiki/sejda/releases/download/v3.2.85/sejda-
console-3.2.85-bin.zip
unzip sejda-console-3.2.85-bin.zip
sudo ln -s ~/sejda-console-3.2.85/bin/sejda-console /usr/local/bin
```

- Print the files.

AMC allow to protect all the files with your owner password and each file with a user password.

The studenys list should include a column with the passwords.

```
# STUDENTS / 1ST YEAR
surname,name,id,email,password
```

```
Bienvenüe,Alexis,001,paamc@passoire.fr,123456
Boulix,Jojo,002,jojo.boulix@rien.xx,789test01
Noël,Père,003,pere.noel@pole-nord.xx,clavierbepo
```

- Click on **List...** and select the csv file.

  Primary key from this list: the name of the column, in the list of students, with the students' numbers (see List of the students).

- Send the exams (see also Sending emails).

1.4. Printing and exam

Two alternative workflows can be considered:

- For the most robust, create as many exam sheets as necessary for all your students, with different sheets numbers, and print them all. Each page can be identified by its numbers and boxes at the top, so that you can scan several times the same completed answer sheet page carefree.
- Secondly, you can print a few subjects (or only one if you want), and photocopy them to get one subject for all students. Questions shuffling will be less efficient, and if you give several times a scan of the same page, AMC won't be able to know about it and will create an unwanted duplicate.

To use this second workflow using photocopies, it is necessary to take care that digitized pages of the same student are in sequence. If not, you won't be able to continue with AMC! Indeed, it would be impossible for AMC to make the link between two pages from the same student.

When the preparation is over, we can print the subject, and distribute it to the students... In simple cases, we can directly print from the viewer (after clicking the line Subject in the list of work documents). When it is better to print the copies separately (for example if copies contain multiple pages and when the printer allows to staple them together), we shall rather use the button Print copies after calculating the layout.

1.5. Test

Let the students pass the exam.

When the subject is printed and distributed, we may no more modify the *working documents* because they must remain identical to distributed copies.

It is preferable that students use a black or blue pen or B pencil.

Depending on the situation, you can ask the students to *tick* or *fill* the boxes.

Tick the boxes

If you ask the students to tick the correct boxes, they can correct a ticked box ereasing their mark with a eraser or white-out fluid. However, *they must not try to draw the boxes back*. Trying to do so, they could draw lines inside the boxes, that could then be considered as ticked boxes.

You can also let the students correct ticked boxes filling them completely. If you choose this option, you have to set the upper darkness threshold (from Preferences menu, Project tab) to some value less than 1 (but not too low). If the darkness ratio of a box is between the darkness threshold and the upper darkness threshold, the box is considered as been ticked. If the darkness ratio is greater than the upper darkness ratio, the box is considered as not ticked.

Fill the boxes

When the letters (or numbers) referencing the answers are drawn inside the boxes, you must tell the students to fill the correct boxes, as AMC can't make the difference between a box with a letter and ticked box.

The students can correct a ticked box erasing their mark with a rubber or white-out fluid, but they don't have any other solution to correct a ticked box. You must set the upper darkness threshold to 1.

1.6. Reading the copies

Now we shall describe the input from students' copies, which can be done automatically and/or manually.

Let's move to the Data capture tab of the graphical interface.

Automated input

For automatic recognition of the checked boxes in the students' pages, they must be previously digitalized. I use a copier/scanner which does it automatically (all the pages in a bundle without interaction with me), with the following settings: 300 dpi, OCR mode (for the characters' recognition, black and white without grayscale - but the scanner does not process any character recognition), each scan delivered as a single TIFF file per page.

To analyze the scans, we must have them in one or several image files (TIFF, JPG, PNG, etc.). Vector graphics formats (PDF, PS or EPS) are also suitable: scans will then be converted into PNG by AMC before analysis.

When giving scans for automated data capture the first time, you will have tell AMC which method you used: either different papers printed, or photocopied papers (see Printing and exam).

Then we select this set of scan files in the dialog opened by the button Automated of the section Data capture after examination, then we validate with the OK button. AMC begins with Optical Mark Recognition to detect the position of the four circle corner marks on the scans, position the

boxes, and detects the amount of black pixels in each box.

Some answer sheets were photocopied

With this mode, there is four options depending the way you digitized the sheets. :

- `Strict` : if there are only pages from AMC subject.
- `Ignore unrecognized` : if you want to ignore pages that are not recognized.
- `Increasing` : if the pages are always scanned in increasing order.
- `One student per file` : if each scan file contains scans for only one student.

With this mode, it is *impossible* to replace a scan.

The result of the analysis of each page is indicated in the lists of the section Diagnosis:

- The value `update` displays the date the page was last modified. Hided by default. Click on the button columns to show it.
- The value *MSD* (mean square deviation) is an indication of the good framing of the marks (the four black dots surrounding each copy). When it is too great, the framing must be checked (right click on the page's line then choose page to view the scanned page and the boxes as they were detected).
- The value *sensitivity* is an indicator of proximity of the filling of the boxes with the threshold. If it is too great (from 8 to its max value 10), we must check whether the boxes recognized as checked are the good ones (a right click on the page's line the choose zoom to view the set of boxes in the copy, verify whether the detection worked correctly, and correct it if needed drag-and-dropping the boxes images).
- The value *scan files* displays the name of the handled page. Hided by default. Click on the button columns to show it.

Manual input

If we cannot use easily the scanner, or if, for a few copies, the automated input did not work as expected, we can manage the input manually. To do so, let's open the right window thanks to the button Manual of the section Input of the copies after exam. In that window, we can input the boxes which have been checked ourselves (by clicking them) on the wanted pages.

Every manual input will overwrite results eventually coming from a previous or posterior automated input for the same page.

Viewing empty or inavlid questions

By clicking on the page numbers, AMC wrap the boxes answers with a colored square :

- cyan for empty answers,
- yellow for invalid answers.

You may change this colors in the menu tab: **Preferences › Display › Scan**.

Select a specific question

This option make it possible to manually mark on-screen a specific question. This save your having to search on each page the question if they are shuffled.

Mark an open question on-screen

- open the manual input tab and select "scan" as background,
- select the question to mark (drop-down menu above the list of pages) .

The open question's check-boxes are on the top of the window, and when you click next you move forward to the following student, always for the same question.

All questions can be checked like this.

Check on-screen pages with invalid or empty questions

- The marking must be ended before use (see Process section Correction),
- open the manual input tab and select "scan" as background,
- choose if you want to navigate through all pages, through pages with invalid answers (inv), or through pages with invalid or empty answers (i & e).

1.7. Correction

In the Marking tab of the graphic interface, the part Marking allows us to deduce the scores of the students from the inputs, but also to read the codes written by the students (see Code acquisition).

Process

The computation of the scores is launched with the button Mark, but we must previously make the following choice:

- If we check the box Update marking scale, the scoring strategy will be first extracted from the LaTeX source file. This allows to try many strategies at the end of the correction process. This action also updates which answers are specified as correct or as wrong. Hence, potential mistakes in the answers can be easily fixed after the exam. The method to specify the strategy in the LaTeX file will be explained in the section Scale (a default scoring strategy is used when no indication is given).

When we click the button Mark, the correction is made (this can take some time if we also asked for the reading of the scale).

Scale

The scale used for marking is defined in the source file. See Scoring.

AMC includes a tool to check your scale: **Menu › Help › Test scoring…**

From scoring strategy to students marks

Here is how students' marks are computed: for every student,

1. The scoring strategy is applied for each question in turn, to get the *questions scores*.
2. All questions (except indicative ones) scores are added to get the student *total score*.
3. If a positive *maximal mark* is given as a parameter (in the **Project** tab of the **Preferences** window), the total score of the student is divided by the *maximum total score* (which is the total score for a perfect copy), and multiplied by the difference (*maximal mark* - *minimal mark*), then added to the *minimal mark* to get the student's *mark*. This way, if the student answered perfectly to all questions, his mark will be the maximum mark, and a student with null score will get the *minimal mark*. If you set the *maximal mark* to 100 and the *minimal mark* to 0, the student's mark can be seen as a percentage of good answers.
4. This mark is rounded using the following settings from **Preferences › Project › Global mark rules**:
    - Grain: set it to 1 if you need an integer value, set it to 0.25 if you need to round up to a quarter, etc. Set it to 0 if you want to cancel rounding.
    - Rounding type: lower, normal, greater

Correct the scoring errors

You may, even after the test, change the scoring. However, you must not *never* update the document. It is better to open the file with a text editor to make changes and save it.

You may :

- turn correct answer into wrong answers.
- turn wrong answer into correct answers.
- Modify the scoring scale for one or several question or the default scoring.

You can not :

- Turn a simple question into a multiple choices question.
- Turn a multiple choices question into a simple question.
- Add questions, answers.
- Remove questions, answers.
- Modify the order of the questions and/or answers.

If you want to cancel a question use this strategy `\scoring{b=0,m=0,e=0,v=0}` or this one `\QuestionIndicative`.

1.8. Identification of the students

This stage is not mandatory. It deals with associating each copy with a student. The name of the

student is not read in an automated fashion, but two reasonable possibilities are proposed:

1. It is possible to ask students to identify themselves on their copy with their student number, which will be written by checking one box per digit. A LaTeX command is designed to use this method on the copy (see the part Code acquisition). After the exam, copies will be identified automatically taking into account a list matching the students' numbers and their names.
2. With no input of the students' numbers, or in the case when the automated identification has not succeeded perfectly (for example when a student made a wrong input), the graphical interface allows an assisted manual association.

Let's first move to the Marking tab of the graphical interface.

List of the students

We must previously supply a list of students. This list can obviously be used for many multiple-choices tests. This list is a CSV file with optional comments lines at the beginning with prefix ``#', as in the following example:

```
# STUDENTS / 1ST YEAR
surname:name:id:email
Bienvenüe:Alexis:001:paamc@passoire.fr
Boulix:Jojo:002:jojo.boulix@rien.xx
Noël:Père:003:pere.noel@pole-nord.xx
```

The first lines of the file which begin with the character `#' are comments. The first of the other lines contains (separated by the character \':') the column titles. Then, with one line per student, we write the corresponding information. There must be at least one column named `name` or `surname`.

One can replace the separator \':' by a comma, a semicolon or a tabulation. However the same separator must be used everywhere in the file which contains the list of students. The used separator is detected by taking the character (out of the four possible characters) which appears most frequently in the first line which is not a comment.

Any CSV file should be suitable.

Type carefully the CSV file to send the same test to multiple recipients.

- A semi-colon or colon or tabulation to separate the headers and a comma to separate the email adresses.
- A comma to separate the headers and email adresses between inverted comma/quotation marks.

```
name,forenama,email
Boulix,Jojo,"jojo@boulix.fr,parents@boulix.com"
```

The prepared list of students will then be selected with the button Set file in the Students identification section. We must also choose one of the columns as a unique key which will identify the students (generally, one chooses the column containing the student's number). Last, to prepare an automated association, we must choose the name of the relevant code used in the LaTeX command `\AMCcode` or `\AMCcodeGrid` (if used).

Association

Automated association

Without barcode

To make an automated association, at least one command `AMCcode` is required (see Code acquisition) in the LaTeX source file, as well as a list of students with a column containing a reference (generally a number of student) which will be identical to the input given in the boxes produced by the command `AMCcodeGrid`.

To perform an automated association complete the two drop-down menus on the Notation tab:

- Primary key from this list: the name of the column, in the list of students, with the students' numbers (see List of the students).
- Code name for automatic association: : the selected identifier thanks to the LaTeX command `\AMCcodeGrid` (see Code acquisition).
- Check the name filed type: set **Preferences › Project › Name field type** to *Image*
- When we push the button Automatic in the part Students identification, matching of the codes given by the students begins. We can watch or improve the result later with a (partial) manual association.

With a barcode

The barcode must be sticked in the space created by `\namefield`.

AMC does not create bar code, it is your responsibility to do so with external software.

To perform an automated association complete the two drop-down menus on the Notation tab:

- Primary key from this list: the name of the column, in the list of students, with the students' numbers (see List of the students).
- Code name for automatic association: : _namefield
- Check the name filed type: set **Preferences › Project › Name field type** to **Barcode** or **Barcode tail**.
- Decode name fields: **Menu › Project › Decode name fields**.
- When we push the button **Automatic** in the part *Students identification*, matching of the codes given by the students begins. We can watch or improve the result later with a (partial) manual association.

Manual association

To open the window allowing recognition of the students' names, let's click on Manual button in the Students identification section. This window is made of an upper part which presents in sequence images of the names written by the students, a lower part containing a button for each student from the list we supplied, and a right part allowing to browse easily the copies to be identified. Let's click the button matching the name written in the upper part for each presented page (by default, only the copies not or badly identified are presented - this can be changed by checking the box associated). When every page is read, a blue background appears instead of the names, and we just need to click the Save button to end with association.

1.9. Exporting the scores list

At this stage, we can get the list of scores under various formats (currently CSV and OpenOffice), with the button Export. This export will be followed by the opening of the produced file by the appropriate software (if available).

Export to ODS (OpenOffice, LibreOffice)

In the exported file, the following colors are used:

gray
: is used for *non applicable*. This may be for example scores for absentees, or scores corresponding to a question that was not shown to the corresponding student.

yellow
: is used for questions that has not been answered by the student.

red
: is used for questions with an *invalid* answer: the student ticked several boxes in a simple question, or he ticked some boxes *and* the box *None of these answers are correct*.

purple
: used for indicative questions.

green
: used for total score of questions in the same group (score or percentage). See Identifier and Groups of questions

1.10. Annotation

When we push the button **Annotate papers**, copies annotation will begin: on every scan, the following annotations will be made (these are the default annotations, they can be configured):

- The boxes wrongly checked by the student will be circled in red;
- the non-checked boxes which should have been are checked in red;
- the checked boxes which had to be checked are checked in blue;

- for each question, obtained and maximal scores are indicated;
- the global score of the copy is indicated on the first page of the copy.

The text written on the first page of the copies can be configured (**Preferences › Annotation › Header** for a default value, or **Preferences › Project › Papers annotation › Header text** for the current project). Substitutions will be made within the provided text (please have a look at From scoring strategy to students marks for some details on the meaning of those values):

`%S`
: is replaced by the student's *total score*.

`%M`
: is replaced by the *maximum total score*.

`%s`
: is replaced by the student's *mark*.

`%m`
: is replaced by the *maximum mark*.

`%(ID)`
: is replaced by the student's name.

`%(N)`
: is replaced by the student number (sheet).

`%(COL)`
: is replaced by the value of column <COL> in the students list for the current student.

This operation is made for each page, giving as a result PDF annotated papers. The name of the PDF file which will contain the corrected copy of a student is based on the template indicated in the field File name model. In that template, every substring as « (<col>) » is replaced by the contents of the column named `col` in the file containing the list of students (see section List of the students). If we let this field empty, a default value is built up based on the student's name and student number.

Marks' position

You may choose marks' positions with the menu **Preferences › Project › Marks position**:

- (none)
- In the margin.
- In the both margins
- Beside the boxes.
- Where defined in the source (see Define the marks' display area).

1.11. Sending emails

AMC offers to email students, whether to send them their topic (see Mailing examan to student (with or without password)), or to send them their annotated copy after the exam (see Annotation).

For this to be possible, you need to have correctly configured your e-mail provider in **Preferences › E-mail › Sending emails**, the simplest being to use the `SMTP` method.

As of May 30, 2022, Google no longer supports the use of third-party applications or devices that only ask you for your username and password to log in to your Google Account.

- Activate two-step validation.
- Create a password https://devanswers.co/create-application-specific-password-gmail/.
- Replace your password with the new one.

Chapter 2. AMC-TXT syntax

For users who are not ready to learn LaTeX (if not already familiar with this language), AMC includes a filter to process simple plain text files in a particular format, named AMC-TXT. This section is devoted to detail the syntax of AMC-TXT files. If you prefer use LaTeX to gain a fine-control over your questionnaires, skip to next section.

Let us begin with a simple example:

```
# AMC-TXT source file
Title: My first AMC questionnaire

Presentation: Please answer the following questions
the best you can.

* What is the capital city of Cameroon?
+ Yaounde
- Douala
- Kribi

** From the following numbers, which are positive?
- -2
+ 2
+ 10
```

The file that contains your questionnaire must be a plain text file, UTF-8 encoded. This is the default encoding of several text editors, like `gedit`. Don't use a text editor that can format your text with bold, images, and so on, like OpenOffice/LibreOffice, or equivalent: these save your text with a lot of other data, and AMC won't be able to read it.

The default font that will be used is libertine, an open source font that contains characters for a lot of languages. You have to install this font or choose another one (see options below). If you install AMC with a debian/ubuntu package, this font will be install together as a recommended package.

You already understand AMC-TXT structure: some general options first, and then questions.

2.1. Comments

You can write some comments inside your AMC-TXT source file in lines *beginning* with a `#`. These lines won't be considered by AMC.

2.2. General options

Here are the options you can use (in any order):

Lang

use it to specify a language the questionnaire is written in. At present, only DE (German), ES (Spanish), FR (French), IT (Italian), NL (Dutch), NO (Norwegian), PT (portuguese), JA (Japanese, see Japanese language) and AR (Arabic, see Arabic language) are supported. Without this option, English will be selected. You can also define the localized string used for another language (see the `L-xxx` options).

PaperSize

Sets the paper size. Possible values are `A3`, `A4`, `A5`, `A6`, `B3`, `B4`, `B5`, `B6`, `letter`, `legal`, `ANSIA`, `ANSIB`, `ANSIC`, `ANSID`, `ANSIE`.

LaTeXEngine

LaTeX engine : `xelatex -shell-escape`, for example.

Title

The exam title, written on top of the sheet.

Presentation

A text that presents the exam (length, rules...).

ShuffleQuestions

If 1 (default), questions will be shuffled so that their order is different from one sheet to the other. If 0, the questions will always show with the same order as in your file.

RandomSeed

One can modify the seed of the random number generator used to produce the shuffle, thanks to the option. If the value that is assigned (to be chosen between 1 and 4194303) is modified, then the shuffling will differ. Of course, one must not modify this value after the test sheets have been printed.

The value is saved in the xy file (as `\rngstate{1}{1527384}`). The default value is equal to 1527384.

Code

Give a positive integer value <n> to add boxes so that students will be able to code their student number on their sheets, with <n> digits.

CodeDigitsDirection

Sets the direction for code's digits boxes (either `vertical` or `horizontal`). If unset, AMC will choose the direction from the number of digits (horizontal for small number of digits, and vertical for high number of digits).

Columns

Give a positive integer value <n> to get a subject with <n> columns.

CompleteMulti

If 1 (default), for multiple questions (those for which zero, one or several answers are correct), an answer "None of these answers are correct" will be added. Without it, it should be impossible

to make a difference between "the student didn't answer for this question" and "the student thinks no answer is correct for this question". If you don't want this answer to be added, set this option to 0.

L-None

Give a string to replace *None of these answers are correct* (see previous option).

QuestionBlocks

If 1 (default), all questions will be enclosed in a invisible frame that prevents it to be split across several columns or pages. If 0, questions are allowed to be split if necessary: that can save pages at the cost of readability.

L-Question

Give a translation of *Question* in your questionnaire, if you need.

L-Name

Give a translation of *Name and surname*, a text written in the box where students are to write their identity.

L-Student

Small text that asks students to code their student numbers and write their name, when `Code` option is used.

TitleWidth

Width of the title zone, when `Code:` is not used. Default value is `.47\linewidth`.

NameFieldWidth

Width of the name field part. Usual LaTeX dimensions can be used. The default value is `5.8cm` when `Code:` is used, and `.47\linewidth` without `Code:`.

NameFieldLines

Number of lines in the name field box. Default is `2` when `Code:` is used, and `1` otherwise.

NameFieldLinespace

Line space in the name field box. Defaut value is `.5em`.

Pages

Gives a minimal number of pages for each question sheet. If a question has less pages, some white pages will be added. When using a separate answer sheet, this option can be written `q+a` (eg. `4+2`), where <q> will be the minimum number of pages for the question itself, and <q>+<a> the minimum number of pages for the whole sheet.

ManualDuplex

If 1 (this is not the default value), each subject will consist of an even number of pages, so that the user can manually print the PDF subject for all students in one go in duplex mode.

SingleSided

If 1 (this is not the default value), no blank page will be added between the question and the

separate answer sheet, even if the question has an odd number of pages. This mode can be useful when the subjects are printed single-sided, or when it is not necessary to separate question and answer sheet.

BoxColor

Color of the boxes to be filled by the students. This allows to print the boxes with some color that won't disturb too much the data capture (for example *red*, but some light gray can also be considered). The color has to be given as a valid `xcolor` color (see `xcolor` LaTeX package documentation for details), such as *red*, *magenta*, *pink*, *lightgray*, *cyan*, or in the form `#RRGGBB`, like `#FFBEC8` for some light red.

DefaultScoringS

Default scoring strategy for simple questions (questions for which one and only one answer is correct). See Scale. for details. The default value gives one point for the right answer, and zero for others.

DefaultScoringM

Default scoring strategy for multiple questions (questions for which there can be zero, one or several correct answers). See Scale for details. The default value is `haut=2`, so that a perfect answer gives 2 points, and each error (ticking a box that should not be ticked, or leaving a box that should be ticked unticked) takes one point off (keeping the score non-negative).

LaTeX

Set this option to 1 if you want to use LaTeX commands in your texts. This allows for example to insert mathematical formulas, like `$\sqrt{a+b}$`. If 0 (default), all your texts will be written unmodified.

LaTeX-Preambule

Give commands you want to be added to the LaTeX preambule (for example `\usepackage` commands).

LaTeX-BeginDocument

Give commands to be inserted at the beginning of the LaTeX `document` environment (for example macro definitions).

LaTeX-BeginCopy

Give LaTeX commands to be inserted at the beginning of the copy description.

LaTeX-EndCopy

Give LaTeX commands to be inserted at the end of the copy description.

PDF-BeginCopy

Give the name of a PDF file to be inserted at the beginning of all copies of the exam.

PDF-EndCopy

Give the name of a PDF file to be inserted at the end of all copies of the exam.

Disable

Gives a comma-separated list of features to disable. Current implemented features are `verbatim` (see Verbatim content), `images` (see Images), `embf` (see Bold, italic, typewriter, underlined), `local_latex` (see Short pieces of LaTeX code) and `latex` (see LaTeX fragments).

PackageOptions

Gives some more options to pass to the automultiplechoice LaTeX package (see Package options).

Separate answer sheet

To use separate answer sheets for your questionnaire, consider the following options:

SeparateAnswerSheet

If 1, a separate answer sheet will be added.

AnswerSheetTitle

Title of the answer sheet.

AnswerSheetPresentation

Presentation of the answer sheet. For example, remind the students that the answers are to be given on this sheet *only*.

AnswerSheetColumns

Number of columns for the answer sheet.

AutoMarks

If 1, uses `automarks` option (see Package options).

Nominative sheets

In some situations, it can be useful to prepare nominative sheets for all students, from a list of students. Let us see how this can be done.

PreAssociation

The list of the students' filename *with .csv extension*.

PreAssociationKey

Primary key from this list: the name of the column, in the list of students, with the students' numbers (see List of the students).

PreAssociationName

\forname\{} \name\{} headers in the students list for the current student

- The students list has to be a CSV list. Suppose in the following that the file students.csv, in the project directory, is UTF8 encoded and that its content is like the following:

```
name,forename,id,mail
Boulix,Jojo,001,jojo@boulix.fr
```

```
Golin,André,002,andre@golin.fr
Moniuszko,Stanisław,003,Moniuszko@Stanisław.fr
```

Do not use _ (underscore) with the student's name or forename. A compilation error will be displayed.

- `Code` must be equal to zero or omitted.

```
# AMC-TXT source file and nominative sheets.

PaperSize: A4
Lang: EN
PreAssociation: students.csv
PreAssociationKey: id
PreAssociationName: \forename{} \name{}
Title: My first AMC questionnaire

Presentation: Please answer the following questions
the best you can.

* What is the capital city of Cameroon?
+ Yaounde
- Douala
- Kribi

** From the following numbers, which are positive?
- -2
+ 2
+ 10
```

More details about correction: see the last item Nominative sheets.

2.3. Questions

Simple questions (questions for which one and only one answer is correct) begin with a `*` at the beginning of the line, and multiple questions (questions for which there can be zero, one or several correct answers) begin with a `**`. Insert then the question itself, and the choices, introduced with a `+` for correct ones and with a `-` for wrong ones.

Questions options

Some options are available for questions. They must be separated by commas and enclosed by square brackets just after the leading `*'s, as in the following example:

```
*[ordered,horiz,id=sum] How much are
one plus one?
- 0
```

```
- 1
+ 2
```

Available options for questions:

horiz

present choices horizontally, not on separated lines.

columns=<n>

make <n> columns for the choices.

ordered

don't shuffle the choices, keep the same order as in the description file.

id=<xxxx>

Give a name to the question, so as to locate the corresponding results easily in the exported spreadsheets. This name must contain only simple characters, without accents and LaTeX special characters such as _, ^, %...

See also Identifier.

`name` can also be used instead of `id` for compatibility with old versions, but you should prefer using `id`.

indicative

don't use this question score to compute the global student's score.

next

Use this option if you want the question to stay next to the previous one, even when using questions shuffling with `ShuffleQuestions` general option.

first

Use this option to place the question always at the beginning of the group (see Questions groups).

last

Use this option to place the question always at the end of the group (see Questions groups).

Scoring strategy

You can set the scoring strategy for a particular question or choice enclosing it with braces just after the leading characters (*, **, + or -) and the possible options, as in the following example. See Scale for details about the scoring strategy syntax.

```
*{b=2,m=-1} What is the capital city of France?
+ Paris
- Lille
- Marseille
- Ouagadougou
```

```
-{-2} New York

**[ordered,horiz,id=positive]{haut=1} From the following numbers, which are positive?
- -2
+ 2
+ 10
```

Open questions

You can define open question giving options (see Open questions) enclosed with < and >, as in the following example:

```
*<lines=4> Describe the moon.
-[O]{0} O
-[P]{1} P
+[V]{2} V
```

You should also consider using the following global options:

L-OpenText
: Text used to tell the student to write the answer on the separate answer sheet (if relevant).

L-OpenReserved
: Text to be written along the open questions boxes to tell the student not to consider these boxes.

2.4. Multi-line

You can always continue some text on the next lines (even if some of them are empty), provided that these following lines cannot be considered as the beginning of an option definition, of a question or of a choice. As an example, consider the following question:

```
* How much are 2
+ 2?
- 0
+ 4
- 10
```

This is a correct AMC-TXT question. However, it won't be treated as you'd like to, because here the second line is not considered as being the following of the first one, but form the first choice of the question!

A similar problem arises from the following AMC-TXT question, where ``Gershwin:' is considered as a general option definition...

```
* You all know Georges
  Gershwin: he is a composer.
```

```
  When was he born?
+ in 1898
- in 1892
- in 1902
```

This is a correct way to write it:

```
* You all know Georges Gershwin:
  he is a composer.
  When was he born?
+ in 1898
- in 1892
- in 1902
```

Note that line breaks can be inserted leaving an empty line, as:

```
Presentation: Title

Description of the exam.

** Difficult question.

How many stars in the sky?
- one
- two
- ten millions
```

2.5. Title

To get a title, enclose it between `[==` and `==]`.

2.6. Verbatim content

To get a *verbatim* block (as computer code), enclose it between `[verbatim]` and `[/verbatim]`:

```
* What does this program print?
[verbatim]
main( )
{
    printf("hello, world\n");
}
[/verbatim]

+ [| hello, world |]
- [| hello |]
```

```
- [| world |]
```

2.7. Bold, italic, typewriter, underlined

To get *bold* text, enclose it between [* and *]. To get *italic* text, enclose it between [_ and _]. To get *typewriter* text, enclose it between [| and |]. To get *underlined* text, enclose it between [/ and /].

```
* What is the [*capital city*] of [_France_]?
+ Paris
- Lille
- Marseille
```

2.8. Images

You can add images in your document using the following syntax:

```
![height=2cm]images/bird.png!
```

Here, the image `images/bird.png` that is located in the project directory will be appended with 2cm height. Options that can be used inside the square brackets are those from the `\includegraphics` LaTeX command (`width=3cm` or `keepaspectratio` for example). To get a centered image that is three quarters of the line width, use

```
!{center}[width=.75\linewidth]images/map.pdf!
```

2.9. Short pieces of LaTeX code

You can include some small parts of LaTeX code in your document, including it in double square brackets, as in:

```
Questions with a [[\multiSymbole{}]] may have zero, one or more right answers.
```

2.10. LaTeX fragments

To include a multi line LaTeX fragment, enclose it between [latex] and [/latex]:

```
* The following matrix is

[latex]
\[
\left[\begin{array}{ccccc}
1 & 0 & 0 & 0 & 1 \\
```

```
0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 1 \\
\end{array}
\right]\]
[/latex]

- diagonal
+ triangular
- symmetric
```

2.11. Questions groups

You can group some question so that they stay together even when shuffling, with the following syntax:

```
*( Questions about Martin Luther King.

* When was he born?
- in 1901
+ in 1929
- in 1968

* When did he die?
- in 1945
- in 1515
+ in 1968
- in 1999

* Where was he born?
+ Atlanta
- Memphis
- New York

*) End of questions on Martin Luther King.
```

You can specify some options on groups, like:

```
*([shuffle=false,columns=2] Questions about Martin Luther King.
```

The following options are available:

shuffle=<**xxx**>

Give <true> or <false> to tell if you want to shuffle the questions inside the group. The default value if the global one, from the `ShuffleQuestions` option.

columns=<n>

Number of columns for the group's questions.

group=<nom>

Give a name for the group (for internal matter).

numquestions=<n>

With this option, only the first <n> questions of the group will be used. If the questions are shuffled, this allows to get <n> questions chosen at random from the group.

Question with option `first` or `last` are not affected (they are always inserted). Moreover, questions stuck together with option `next` count as one single question.

needspace=<dimen>

Gives a height (dimension with unit, such as <4cm>) necessary to begin with the group. If the remaining vertical space on the current page is lower than this value, the group will begin on the next page.

2.12. Arabic language

Writing a questionnaire in Arabic is a little special. Use of course option

```
Lang: AR
```

You can also consider the following global options:

ArabicFont

This is the font used for Arabic text. Default value is *Rasheeq*, a font from the project ArabEyes (you can find it on debian/ubuntu in the ttf-arabeyes package).

To insert texts with non-Arabic characters, you must turn on `LaTeX` option and enclose these texts as a `\textLR` LaTeX command argument, as in `\textLR{xelatex command}`.

2.13. Japanese language

Japanese language questionnaires can be produced with option

```
Lang: JA
```

AMC will make some adjustments on the produced LaTeX source to allow Japanese characters to be included.

In this case, AMC will use `pTex` to process the LaTeX file made from your AMC-TXT

source file. AMC needs a *recent* version of `pTex` to work.

2.14. Including other files

You can include other files with:

```
IncludeFile: file-to-include.txt
```

Be very careful when including a single file from different projects! Suppose for example that `/home/alexis/questions-a.txt` is included from projects A and B. You already processed project A, and you are currently working on project B. You update the scoring strategy of a question in `/home/alexis/questions-a.txt`, and also add another question. If you need to update the marks in project A with this new scoring strategy, AMC will also see a new question for which no data capture has been made, and this will spoil all your marks in A...

2.15. A minimal example (a little bit more complete)

An example from french forum

```
# A minimal example (a little bit more complet)
PaperSize: A4
Lang: FR
CompleteMulti: 0 ①
ShuffleQuestions: 0 ②
LaTeX:1 ③
LaTex-Preambule:
\geometry{hmargin=2cm,headheight=2cm,headsep=.3cm,footskip=1cm,top=2.5cm,
bottom=2cm}

\usepackage{siunitx} ④
\sisetup{locale = FR,detect-all,group-minimum-digits=3,per-mode=symbol}

\usepackage[french]{babel} ⑤

LaTeX-BeginDocument: \def\multiSymbole{$\star$} ⑥

Title: Évaluation de SVT \no{}4   : Régimes et équilibres alimentaires

Presentation: Colorier en noir la case correspondante à la proposition correcte pour
chaque
 phrase.

*([shuffle=true] ⑦
 PARTIE I : Quelques connaissances du cours

**[horiz,last]Les aliments contiennent : ⑧
```

```
+ Des lipides
- Des acides
+ Des sels minéraux

**La dépense énergétique minimum de notre corps est :
+ Le métabolisme de base
- Les besoins énergétiques
- L'IMC

**[columns=2]Les aliments nous apportent de :
+ La matière
- Du diabète
+ De l'énergie

**[columns=2]Les besoins énergétiques d'une personne varient suivant :
+ Le sexe
+ Les activités physiques
- Les aliments consommés

*[columns=2]Manger équilibré signifie :
+ Equilibrer nos apports et nos dépenses
- Manger ce qui nous fait envie
- Manger plus que ce qu'on dépense

**[columns=2]Manger en excès par rapport à ses besoins peut aboutir à :
- Des carences
+ Des maladies cardio-vasculaires
- Un manque de nutriments

**[columns=2]L'IMC signifie :
- Indice de Maladies cardio-vasculaires
+ Indice de Masse Corporelle
- Indice de Matière et de Composition

*)

*(PARTIE II : Le goûter de Vanessa

**[columns=2]Dans le gouter de Vanessa, l'aliment le plus énergétique est :
- les pruneaux
+ Les biscuits
- les deux sont identiques.

**[columns=2]Par rapport aux biscuits, les pruneaux contiennent  :
+ moins de protides
- plus de glucides
+ moins de lipides

**[columns=2]Les dépenses énergétiques journalières d'une adolescente
  sont en moyenne de \qty{10000}{\kilo\joule}. ⑨
  Vanessa a consommé \qty{3200}{kJ} au petit-déjeuner, \qty{3500}{kJ} à midi et
```

```
  \qty{2400}{\kilo\joule} au diner. Elle a donc mangé équilibré :
- Faux
+ Vrai

*)
```

① The answer "None of these answers are correct" will be not added.

② Questions will not be shuffled.

③ Allow to insert LaTeX code in all texts.

④ Different usefull packages included in the preambule.

⑤ Use of LaTeX language through the babelpackage.

⑥ The multisymbole is now a star.

⑦ Those questions *will be shuffled*.

⑧ This question will be *always* at last position.

⑨ `LaTeX:1` and `LaTeX-Preambule` make possible this LaTeX code.

Chapter 3. LaTeX source file

This section describes the LaTeX commands that allows you to design your exam answer sheets from a LaTeX source file. If you chose another format for your source file, you can skip this section. The MCQ can be described as a LaTeX file using the automultiplechoice package. You can check the LaTeX file you are designing at any moment by compiling it with the `latex` command, then visualizing the resulting dvi file.

We start with a few examples giving quick illustrations of how to build LaTeX files for MCQs; the corresponding tex file are available as templates, so that one can create a new MCQ project starting with one of these templates.

3.1. A simple example

```
\documentclass[a4paper]{article}

\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}

\usepackage[box,completemulti]{automultiplechoice}
\begin{document}

\onecopy{10}{

%%% beginning of the test sheet header:

\noindent{\bf QCM  \hfill TEST}

\vspace*{.5cm}
\begin{minipage}{.4\linewidth}
\centering\large\bf Test\\ Examination on Jan., 1st, 2008\end{minipage}
\namefield{\fbox{
                \begin{minipage}{.5\linewidth}
                  Firstname and lastname:

                  \vspace*{.5cm}\namefielddots
                  \vspace*{1mm}
                \end{minipage}
        }}

\begin{center}\em
Duration : 10 minutes.

  No documents allowed. The use of electronic calculators is forbidden.


  Questions using the sign \multiSymbole{} may have
  zero, one or several correct answers.  Other questions have a single correct answer.
```

```
  Negative points may be attributed to \emph{very
    bad} answers.
\end{center}
\vspace{1ex}

%%% end of the header

\begin{question}{prez}
  Among the following persons, which one has ever been a President of the French
Republic?
  \begin{choices}
    \correctchoice{René Coty}
    \wrongchoice{Alain Prost}
    \wrongchoice{Marcel Proust}
    \wrongchoice{Claude Monet}
  \end{choices}
\end{question}

\begin{questionmult}{pref}
  Among the following cities, which ones are French prefectures?
  \begin{choices}
    \correctchoice{Poitiers}
    \wrongchoice{Sainte-Menehould}
    \correctchoice{Avignon}
  \end{choices}
\end{questionmult}

% \AMCaddpagesto{3}

}

\end{document}
```

A few extra details on this example:

- The packages inputenc and fontenc allow one to use the UTF-8 encoding. You can of course modify them depending on the encoding you want to use.
- The options used here for the automultiplechoice LaTeX package prevent questions from being split between two pages (`box`) and to automatically complete any multiple choice question by a standard answer allowing the student to mention that, in her/his opinion, none of the listed answers is correct (`completemulti`).
- The `onecopy` command produces as many (distinct) realizations of the MCQ test as desired (here 10). See Description of a copy for an alternative syntax using an environment.
- Lines that start here describe the header of the test-sheet.
- The `namefield` command specifies where students write their name or a barcode (see With a barcode). Will be completed with `\namefielddots` if you use `pdfform` option (see Package options).
- The `namefielddots` command insert a dotted line or a field to fill if the `pdfform` option is avaible (see Package options).

- The environments `question` and `choices` allow one to build a multiple choice question for which there is a single correct answer. A unique identifier for the question has to be specified (here: *prez*).
- The environments `questionmult` and `choices` allow one to build a multiple choice question that may have zero, one or several correct answers. Student are asked to check all the boxes corresponding to an answer that she/he thinks is correct, or the last box (added automatically thanks to the `completemulti` option used in the reference to the package in line 6).
- Uncomment this line to add enough blank pages to get a 3-pages copy (seeNumber of pages).
- This marks the end of the `onecopy` command (started at line 9).

3.2. An example with groups of questions and shuffling

In this example, we want the order in which questions appear in the MCQ test to be different from one realization of the test to the other, but still keeping together questions dealing with the same subject. To this end, we create two groups of questions, within which questions are shuffled at random.

```
\documentclass[a4paper]{article}

\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}

\usepackage[box,completemulti]{automultiplechoice}
\begin{document}

%%% preparation of the groups

\setdefaultgroupmode{withoutreplacement}

\element{geographie}{
  \begin{question}{Paris}
    In which continent is Paris?
    \begin{choices}
      \correctchoice{Europe}
      \wrongchoice{Africa}
      \wrongchoice{Asia}
      \wrongchoice{planet Mars}
    \end{choices}
  \end{question}
}

\element{geographie}{
  \begin{question}{Cameroon}
    Which is the capital city of Cameroon?
    \begin{choices}
      \correctchoice{Yaoundé}
```

```
      \wrongchoice{Douala}
      \wrongchoice{Abou-Dabi}
    \end{choices}
  \end{question}
}

\element{histoire}{
  \begin{question}{Marignan}
    In which year did the battle of Marignan take place?
    \begin{choiceshoriz}
      \correctchoice{1515}
      \wrongchoice{1915}
      \wrongchoice{1519}
    \end{choiceshoriz}
  \end{question}
}

\element{histoire}{
  \begin{questionmult}{Nantes}
    What can be said about the \emph{Édit de Nantes}?
    \begin{choices}
      \correctchoice{It was signed in 1598}
      \correctchoice{Il has been revoked by Louis XIV}
      \wrongchoice{It was signed by Henri II}
    \end{choices}
  \end{questionmult}
}

%%% copies

\onecopy{10}{

%%% beginning of the test sheet header:

\noindent{\bf QCM  \hfill TEST}

\vspace*{.5cm}
\begin{minipage}{.4\linewidth}
  \centering\large\bf History and geography\\ Examination on Jan. 1st, 2008
\end{minipage}
\namefield{\fbox{\begin{minipage}{.5\linewidth}
Firstname and lastname:

\vspace*{.5cm}\dotfill
\vspace*{1mm}
\end{minipage}}}

%%% end of the header

\begin{center}
  \hrule\vspace{2mm}
```

```
  \bf\Large Geography
  \vspace{1mm}\hrule
\end{center}

\insertgroup{geographie}

\begin{center}
  \hrule\vspace{2mm}
  \bf\Large History
  \vspace{2mm}\hrule
\end{center}

\insertgroup{histoire}

}

\end{document}
```

3.3. An example with a separate answer sheet

In this example, one wants the check-boxes to be put together in a separate sheet. This makes cheating more difficult, and, more importantly, it is enough to scan a single sheet per student, which makes things easier if one has to do a manual scan. In this example, the number of questions is limited: they fit into a single page, so that such a layout would not be really useful in this particular case. It is up to you to modify this example in order to use this layout with a large number of questions!

```
\documentclass[a4paper]{article}

\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}

\usepackage[box,completemulti,separateanswersheet]{automultiplechoice}
\begin{document}

\AMCrandomseed{1237893}

\def\AMCformQuestion#1{{\sc Question #1:}}

\setdefaultgroupmode{withoutreplacement}

\element{general}{
  \begin{question}{prez}
    Among the following persons, which one has ever been a President of the French
Republic?
    \begin{choices}
      \correctchoice{René Coty}
      \wrongchoice{Alain Prost}
      \wrongchoice{Marcel Proust}
```

```
      \wrongchoice{Claude Monet}
    \end{choices}
  \end{question}
}

\element{general}{
  \begin{questionmult}{pref}
    Among the following cities, which ones are French prefectures?
    \begin{choices}
      \correctchoice{Poitiers}
      \wrongchoice{Sainte-Menehould}
      \correctchoice{Avignon}
    \end{choices}
  \end{questionmult}
}

\element{general}{
  \begin{question}{nb-ue}
    How many different states were members of the European Union in Jan. 2009?
    \begin{choiceshoriz}[o]
      \wrongchoice{15}
      \wrongchoice{21}
      \wrongchoice{25}
      \correctchoice{27}
      \wrongchoice{31}
    \end{choiceshoriz}
  \end{question}
}

\onecopy{5}{

%%% beginning of the test sheet header:

\noindent{\bf QCM  \hfill TEST}

\vspace*{.5cm}
\begin{minipage}{.4\linewidth}
  \centering\large\bf Test\\ Examination on Jan. 1st, 2008
\end{minipage}

\begin{center}\em
Duration : 10 minutes.

  No documents allowed. The use of electronic calculators is forbidden.

  Questions using the sign \multiSymbole{} may have
  zero, one or several correct answers.  Other questions have a single correct answer.

  Negative points may be attributed to \emph{very
    bad} answers.
```

```
\end{center}
\vspace{1ex}

%%% end of the header

\insertgroup{general}

\AMCcleardoublepage

% \AMCaddpagesto{3}

\AMCformBegin

%%% beginning of the answer sheet header

{\large\bf Answer sheet:}
\hfill \namefield{\fbox{
    \begin{minipage}{.5\linewidth}
      Firstname and lastname:

      \vspace*{.5cm}\namefielddots
      \vspace*{1mm}
    \end{minipage}
  }}

\begin{center}
  \bf\em Answers must be given exclusively on this sheet:
  answers given on the other sheets will be ignored.
\end{center}

%%% end of the answer sheet header

\AMCform

% \AMCaddpagesto{5}

}

\end{document}
```

The following remarks should make the above example clearer :

- The `separateanswersheet` option is what allows us to do what we wanted.
- One can re-define in this manner the way the questions are identified on the answer sheet (this line is optional).
- This page break is put before the special page where the check-boxes are put together. If one does recto-verso printing, it is preferable to use `\AMCcleardoublepage` so that this page is printed apart from the others. In the case of recto printing, one can simply use `\clearpage`.
- Uncomment to get three pages for the question part of each copy, see Number of pages. (Here,

the command is commented so no effect.)

- This command marks the beginning of the answer sheet part. Its use is necessary for the appropriate treatment of the questions which appear only in that part, e.g. those generated by `\AMCcodeGrid`.
- Students should normally write their name on the answer sheet!
- The `namefielddots` command insert a dotted line or a field to fill if the `pdfform` option is avaible (see Package options).
- The LaTeX command `\AMCform` writes all the check-boxes.
- Uncomment to get five pages for the whole copy (question+answer sheet), see Number of pages.

\AMCtableform

`\AMCtableform[options]` 1.7.0 is a variant of `\AMCform` that displays the boxes as a multi-column table.

Declare `\usepackage{multicols}` in preamble.

nanswers=<num>

gives the number of answers that are labeled in the table (defaults to the maximal number of answers of the subject).

ncols=<num>

gives the number of columns to use (defaults to the largest possible number of columns).

idtext=<text>

gives a text to be inserted before each question number..

idtitle=<text>

gives a text to be used as a column title for question numbers.

headers=<bool>

tells if the headers with boxes letters are to be added at the top of the columns (defaults to true).

inside=<bool>

tells if letters are to be written inside the boxes (defaults to false)

columnsep=<dim>; columnseprul=<dim>

are passed to the `multicols` environment..

When using a separate answer sheet, letters (or digits, if one uses the option `digits`, see Package options) are written in the check-boxes. To achieve a correct detection of the checked boxes, one has to ask students to completely fill the relevant boxes (checking by simply drawing a cross would not suffice). One also has to tune the gray level threshold (defining the proportion of black dots in a box above which that box is considered to be checked) to a value of order 0.5.

3.4. Description of the LaTeX commands

Package options

To use the automultiplechoice package, one uses the line

```
\usepackage[...]{automultiplechoice}
```

where the dots are replaced by a list of options separated by commas. Here are the available options:

- lang=XX: sets the subject language to <XX>. At present, only DE (German), ES (Spanish), FR (French), IT (Italian), JA (Japanese), NL (Dutch), NO (Norwegian) and PT (Portuguese) are available. Several strings added by automultiplechoice will be translated, such as "None of these answers are correct", see option completemulti.
- pdfform: creates a pdf file to fill.
- box: puts every question in a block, so that it cannot be split by a page break.

You may occasionally cancel this option for each question with the command \AMCnobloc.

```
{\AMCnobloc%
  \begin{question}{nb-ue}
    How many different states were members of the European Union in
Jan. 2009?
    \begin{choiceshoriz}[o]
      \wrongchoice{15}
      \wrongchoice{21}
      \wrongchoice{25}
      \correctchoice{27}
      \wrongchoice{31}
    \end{choiceshoriz}
  \end{question}
}%
```

- asbox: same as box, but inside the separate answer sheet.
- completemulti: automatically adds a "None of these answers are correct" choice at the end of each multiple question. Thus, for these questions, a distinction can be made between no answer and the answer consisting in treating none of the listed answers as correct. This behavior can be forced or canceled for a particular question using one of the commands \AMCcompleteMulti or \AMCnoCompleteMulti inside the corresponding questionmult environment.
- noshuffle: stops the automatic shuffling of the answers for every question
- noshufflegroups: stops the automatic shuffling of the group for the test (see Groups of questions)
- answers: produces the corrected version of the MCQ test, not the test sheet itself.

- `indivanswers` : produces the corrected version of each MCQ test.
- `separateanswersheet`: requires that all check-boxes be put together at the end of the test sheet (usually, this option is used when one wants to have only one sheet to scan per student - see the example in An example with a separate answer sheet).
- `digits`: if one uses the `separateanswersheet` option, the `digits` option requires the question to be identified with digits rather than with letters (which corresponds to the default setting).
- `outsidebox`: when using `separateanswersheet`, this option asks to print letters (or digits) outside the boxes on the answer sheet.
- `init` : initializes the random generator from time. *This option is only for testing: don't use it for a real exam!*
- `insidebox`: when not using `separateanswersheet`, this options asks to print letters (or digits) inside the boxes to be filled by the students.
- `catalog`: use this option to make a catalog of your questions to be used to compose future exams. No need to use `\onecopy` with this layout.
- `keys=line`: allow one-line key printing in catalog mode.
- `postcorrect`: use this option if you want to give the correct answers after scans analysis, from a teacher completed answer sheet - see Post correcting for details.
- `fullgroups` : cancels the use of the optional parameter of `\insertgroup` and `\copygroup`, so that each group is always fully inserted and fully copied. (see Groups of questions)
- `storebox` :If you choose to change the boxes' shape (square by default, see Check-box presentation style) as ovals or circles, you may communicate this option to automultiplechoice to use `\storebox` rather than `\savebox` to store the design of the boxes.
- `automarks`: in `separateanswersheet` mode, use this option if you want to cancel marks printing on the subject pages. They will only be print on the answer sheet pages. To change the way pages numbers are print on the subject pages, redefine the `\AMCsubjectPageTag` command:

```
\renewcommand\AMCsubjectPageTag{%
  \fbox{\texttt{\the\AMCid@etud:\thepage}}%
}
```

Only use `automarks` option if no data are to be collected on the subjects pages, as AMC won't be able to process these pages.

- `nopage`: use this option if you don't need margins, corner circles and page identification boxes, that is if the document is not intended to be used with AMC (for example to produce exercises lists).
- `nowatermark`: remove the watermark (draft) if you compile withoutAMC. *Very hazardous*.
- `survey`: to create a machine readable questionnaire in high typographical quality https://gitlab.com/CSaalbach/surveyamc-project/-/blob/master/surveyamc_tutorial.pdf..

Description of a copy

The LaTeX source code describing the content of the test sheet has to be included in a call to the command `\onecopy`, the first argument being the number of distinct realizations to be produced, and the second argument being the code used to generate a realization.

```
\onecopy{50}{ ... }
```

An alternative syntax is available, using the `examcopy` environment, where the number of realizations is an option (default is 5).

```
\begin{examcopy}[50]
...
\end{examcopy}
```

To use examcopy, you need the environ package to be installed.

To differentiate between odd and even-numbered copy, use `\exemplairepair` command.

The command `\AMCStudentNumber` get the copy number.

Questions and answers

Do not nest a question inside a another environment question or tabularx otherwise exporting the notes will be incomplete (see Exporting the scores list).

Simple questions

For simple questions (a single correct answer), one uses the following model:

```
\begin{question}{identifier}
  Here is the question...
  \begin{choices}
    \correctchoice{The correct answer}
    \wrongchoice{A wrong answer}
    \wrongchoice{Another wrong answer}
  \end{choices}
\end{question}
```

Multiple questions

Multiple questions (those for which no, one, or several answers can be correct) use the `questionmult` environment instead of `question`.

Split answers

The environment `answers` can be split 1.7.0.

```
\begin{questionmult}{R.ect}
  A standard deviation is an indicator⋯
  \begin{answers}[o]
    \wrongchoice{of central tendency}
    \correctchoice{of dispersion}
  \end{answers}

  \begin{answers}[o]
    \correctchoice{sensitive to extreme values}
    \wrongchoice{not very sensitive to extreme values}
  \end{answers}

  \begin{answers}[o]
    \correctchoice{with the same unit as the values}
    \wrongchoice{with a different unit than the values}
  \end{answers}
\end{questionmult}
```

In a `questionmult` with the option `completemulti`, each environment `answers` adds the final question *None of these answers are correct*. This option should therefore be removed for the first responses. See Package options.

```
\begin{questionmult}{R.ect-b}
  A standard deviation is an indicator

  \emph{(regarding its objective)}
  {\AMCnoCompleteMulti
   \begin{answers}
     \wrongchoice{of central tendency}
     \correctchoice{of dispersion}
   \end{answers}
  }

  \emph{(regarding its sensitivity)}
  {\AMCnoCompleteMulti
   \begin{answers}
     \correctchoice{sensitive to extreme values}
     \wrongchoice{not very sensitive to extreme values}
   \end{answers}
  }

  \emph{(regarding its dimension)}
  \begin{answers}
    \correctchoice{of the same unit as the values}
    \wrongchoice{of a different unit from the values
```

```
  \end{answers}
\end{questionmult}
```

Open questions

One can sometimes require some open questions to be added to the subject. One way to do so is to reserve boxes use to the teacher for these questions. After the exam, the teacher reads the completed answer sheets and tick the boxes according to the answers written by the students for open questions. He will then scan the sheets and let AMC correct the multiple choice questions and integrate the open questions scores into the marks.

```
\begin{question}{open}
  Define \emph{inflation}.
  \AMCOpen{lines=5}{\wrongchoice[W]{w}\scoring{0}\wrongchoice[P]{p}\scoring{1
}\correctchoice[C]{c}\scoring{2}}
\end{question}
```

In this example, the teacher will get three boxes. If the first (labeled W for wrong) is ticked, the student will get 0 point. If the second (labeled P for partial) is ticked, the student will get 1 point. If the third (labeled C for correct) is ticked, the student will get 2 points.

The first argument to `\AMCOpen` is a comma separated list of options. The available options are:

lineup=<bool>

if `true`, the answering area and the scoring boxes will be on the same line. If `false` (this is default), the answering area is enclosed in a frame and placed below the scoring boxes.

lineuptext=<text>

if `lineup=true`, the text and ansewering area will be on the same line.

lines=<num>

sets the number of lines for the answer. Default value is `1`.

lineheight=<dim>

sets the height of each line. Default value is `1cm`.

dots=<bool>

if `true` (Default), each line will be realized by a line of dots.

contentcommand=<cmdname>

Use this option if you want to customize the content of the answer area. You will have to define a `\cmdname` command that has to produce the content.

hspace=<dim>

sets the space between boxes in the marking area.

backgroundcol=<color>

sets the background color of the marking area.

foregroundcol=<color>

sets the foreground color of the marking area.

scan=<bool>

if `false`, the boxes are not scanned (this can be useful if you plan to use manual data capture only to mark this question, and don't want to take into account the students drawings on the boxes). Defaults to `true`.

annotate=<bool>

if `false` (default value), the boxes from this question won't be annotated when annotating the answer sheets (only the score will be written).

question=<text>

sets a short text that helps the examiner to identify the question. This text will be written before the scoring boxes, only if a separate answer sheet is used.

The question's identifier will be displayed if you type question in the options list.

answer=<text>

sets a short text that will be written in the answering area for corrected answer sheets.

Use the command `\savebox`, *outside the* `onecopy` *command*, to display a longer text with linebreaks.

```
\newsavebox{\correcbox}
\savebox{\correcbox}{\parbox{5cm}{\color{red}{Here a linebreak\\or
\\here...}}}
```

Call out the content box:

```
\AMCOpen{lines=4,lineheight=0.15cm, answer= \usebox{\correcbox}}{the
scoring}
```

If the answer contains a comma or the equal sign, <text> must be bracketed by braces.

```
\FPeval\aRandomVariable{round(3+8*random,2)}
\FPeval\aCalculateVariable{round(\aRandomVariable*9.81,2)}

\AMCOpen{answer={m=\qty{\aRandomVariable}{\kilo\gram},%
P=\qty{\aCalculateVariable}{\newton}}}{the scoring}
```

width=<dim>

sets the width of the frame enclosing the answering area when `lineup=false`. Default value is `.95\linewidth`.

framerule=<dim>

sets the line width for the frame enclosing the answering area.

framerulecol=<color>

sets the frame color for the answering area.

boxmargin=<dim>

sets the margin around the scoring boxes.

boxframerule=<dim>

sets the line width for the frame around the scoring boxes.

boxframerulecol=<color>

sets the color of the frame around the scoring boxes.

Treserved=<texte>

a little text can be written in the marking area to tell the students not to tick these boxesà.

When using separate answer sheets, the text added to each open question can also be defined, as:

```
\def\AMCotextGoto{\par{\bf\emph{Please write the answer on the separate answer
sheet.}}}
```

You can set other default values (for the whole exam) for all these parameters using the command `\AMCopenOpts`, like

```
\AMCopenOpts{boxframerule=2pt,boxframerulecol=red}
```

if the number of boxes is significant, use this tip (`\parbox`) to force a linebreak.

```
\AMCOpen{lines=6}{
\hbox{\parbox{8.5cm}{
\wrongchoice[F]{F}\scoring{0}
\wrongchoice[1]{1}\scoring{1}
\wrongchoice[2]{2}\scoring{2}
\wrongchoice[3]{3}\scoring{3}
\wrongchoice[4]{4}\scoring{4}
\wrongchoice[5]{5}\scoring{5}
\wrongchoice[6]{6}\scoring{6}
\wrongchoice[7]{7}\scoring{7}
\wrongchoice[8]{8}\scoring{8}
```

```
\wrongchoice[9]{9}\scoring{9}
\correctchoice[10]{10}\scoring{10}
}}
  }
```

Indicative question

When the answer to the question is not supposed to be taken into account in the grading, one uses the `\QuestionIndicative` command, as in the following example:

```
\begin{question}{difficulty}\QuestionIndicative
  \scoring{auto=0,v=-1,e=-2}
  Did you find this class easy or difficult? Please answer on a scale from 0 (very
difficult) to 5
  (very easy).
  \begin{choiceshoriz}[o]
    \correctchoice{0}
    \correctchoice{1}
    \correctchoice{2}
    \correctchoice{3}
    \correctchoice{4}
    \correctchoice{5}
  \end{choiceshoriz}
\end{question}
```

Identifier

Use a different identifier for every question. An identifier can be made of digits, letters, and simple characters (but do not use e.g. underscores, braces or brackets, that have a special meaning in LaTeX files). Don't end your question identifier with an integer enclosed in square brackets, as this syntax is reserved to codes input.

The style of the identifier may be as `group.identifier` or `group:identifier` (see Language package) to get the total of a one group of questions when exporting notes (see Exporting the scores list).

Question numbers

See also Questions presentation style...

Reset the numeration

One can modify the number of the next question with the `\AMCnumero command`. At the beginning of each realization of the test, a call to

```
\AMCnumero{1}
```

is done, but this command can be used at any place.

display section N°.question N°

```
\makeatletter
\def\AMCbeginQuestion#1#2{\par\noindent{\bf \the\c@section.#1} #2\hspace*{1em}}
\makeatother
%use with amsmath package
\numberwithin{AMCquestionaff}{section}
```

Do not display the number

When you want to hide the number for a particular question and do not want to increase the question number, use `\AMCquestionNumberfalse` command as in the following example:

```
{
  \AMCquestionNumberfalse
  \def\AMCbeginQuestion##1##2{}
  \begin{question}
    ...
  \end{question}
}
```

With a command in preamble.

```
\makeatletter
\def\Iswitch{\def\AMCbeginQuestion##1##2{\ifAMC@catalog\textbf{##1}\fi}
\AMCquestionNumberfalse}
\makeatother
```

Do not forget to type inside brackets to limit the effect:

```
{\Iswitch
 \begin{question}{Number}
   Choose the greater.
   \begin{choiceshoriz}[o]
     \wrongchoice{200}\wrongchoice{2}\wrongchoice{20}\wrongchoice{200}\correctchoice
{600}
   \end{choiceshoriz}
 \end{question}
}
```

In this example, the question number will not be displayed through the command `\AMCquestionNumberfalse`.

Questions counter

The internal counter is `AMCquestionaff`. To display the total number of pages at the beginning, it is necessary declare the totcount package. Here an example:

```
documentclass[a4paper]{article}

\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}

\usepackage[english,box,completemulti]{automultiplechoice}
\usepackage{totcount}
\regtotcounter{AMCquestionaff}
\begin{document}

\onecopy{10}{

There is \total{AMCquestionaff} questions.



\noindent{\bf QCM  \hfill TEST}

\vspace*{.5cm}
\begin{minipage}{.4\linewidth}
\centering\large\bf Test\end{minipage}
\champnom{\fbox{
                \begin{minipage}{.5\linewidth}
                  Name and surname :

                  \vspace*{.5cm}\dotfill
                  \vspace*{1mm}
                \end{minipage}
         }}



\begin{question}{prez}
    Among the following persons, which one has ever been a President of the French
Republic?
    \begin{choices}
      \correctchoice{René Coty}
      \wrongchoice{Alain Prost}
      \wrongchoice{Marcel Proust}
      \wrongchoice{Claude Monet}
    \end{choices}
  \end{question}
\end{question}

  \begin{questionmult}{pref}
    Among the following cities, which ones are French prefectures?
    \begin{choices}
      \correctchoice{Poitiers}
      \wrongchoice{Sainte-Menehould}
      \correctchoice{Avignon}
```

```
    \end{choices}
  \end{questionmult}

% \AMCaddpagesto{3}

%\theAMCquestionaff
}

\end{document}
```

Answers counter

The internal counter is `AMC@ncase`.

```
% aafter \begin{document}
\makeatletter
\def\proposition{Proposition \alph{AMC@ncase} :}
\makeatother
% ...
% for a question
\begin{question}{identifiant}
Question…

\begin{reponses}
\correctchoice{\proposition{} text…}
\wrongchoice{\proposition{} text…}
\wrongchoice{\proposition{} text…}
\end{reponses}
\end{question}
```

Putting answers on multiple columns

To put the answers on two columns, one can use the multicol package: load it in the preamble (just after the reference to the package automultiplechoice for instance) with

```
\usepackage{multicol}
```

and include the choices environment inside a multicols environment in the following manner:

```
\begin{multicols}{2}
  \begin{choices}
    \correctchoice{The correct answer}
    \wrongchoice{A wrong answer}
    \wrongchoice{Another wrong answer}
  \end{choices}
\end{multicols}
```

For even shorter answers, one can require questions to be printed following one another, using the `choiceshoriz` environment instead of `choices`.

To put answers on several columns (and thus save space), one can embed the `choices` environment in a `multicols` environment, using the LaTeX package multicol.

If, moreover, the answers do not fit into a single line, an answer might be split over several columns, which might be a little puzzling for the reader. The `\AMCBoxedAnswers` command was defined in order to prevent this phenomenon, by embedding each answer into a box. Here is an example of use:

```
\begin{question}{two columns}
  What is a bird ?
  \begin{multicols}{2}\AMCBoxedAnswers
    \begin{choices}
      \correctchoice{It is an animal with wings, laying eggs. There are birds with all
sorts of colors.}
      \wrongchoice{It is a large piece of furniture, made of wood, and used most of
the time to store
      household linen}
      \wrongchoice{It is a steam machine devised to seal cans at high speed.}
    \end{choices}
  \end{multicols}
\end{question}
```

Let us note that it is also possible to parameterize the vertical space between two answer blocks, thanks to the dimension `AMCinterBrep`:

```
\AMCinterBrep=.5ex
```

One-letter answers

Sometimes this is not necessary to write some long text to describe answers, and one letter or symbol is enough. When using a separate answer sheet, it is quite annoying to print the boxes both on the question and on the answer sheet. In such cases, use `\AMCBoxOnly` instead of the `choices` environment:

```
\begin{question}{arm}
  Which letter shows the \textit{arm} on the diagram?
  \AMCBoxOnly{ordered=true}{\wrongchoice[A]{}\correctchoice[B]{}%
    \wrongchoice[C]{}\wrongchoice[D]{}}
\end{question}
```

The first argument to `\AMCBoxOnly` is a comma separated list of options. The available options are:

help=<text>

prints some reminder text before the boxes on the separate answer sheet.

ordered=<bool>

if `true` (the default value is `false`), the answers won't be shuffled.

Delving further into the answer

Command \explain

To provide explanation for the answers of a question, one can use the `\explain` command. The explanations are optional and are only displayed in the Solution and Catalog file.

Here is a simple example:

```
\begin{question}{explanation}
  Which has the highest elevation among the following?
  \begin{choices}
      \correctchoice{Sagarmatha}
      \wrongchoice{K2}
      \wrongchoice{Mont Blanc}
      \wrongchoice{Aconcagua}
  \end{choices}
  \explain{Sagarmatha which literally means `Head of sky' is the native name of
           Mount Everest, the highest mountain in the world.}
\end{question}
```

The `explain` command must be typed inside `question` like environments only. This includes `question`, `questionmult` and `questionmultx` environments.

By default this command prints *Explanation:* before each explanations. This behavior can be changed using the `\AMCtext` command (see section Customizing some texts inserted by AMC).

If you want to change this default behavior only for some questions and not for all just use the `\AMCtext` command before the `\explain` command as in the following example:

```
\begin{question}{elevation}
  Which has the highest elevation among the following?
  \begin{choices}
      \correctchoice{Sagarmatha}
      \wrongchoice{K2}
      \wrongchoice{Mont Blanc}
      \wrongchoice{Aconcagua}
  \end{choices}
  \explain{Sagarmatha which literally means `Head of sky' is the native name of
         Mount Everest, the highest mountain in the world.}
\end{question}

\begin{question}{odd}
  Pick the odd one out.
  \begin{choices}
      \correctchoice{Kilimanjaro}
```

```
      \wrongchoice{Himalayas}
      \wrongchoice{Alps}
      \wrongchoice{Andes}
  \end{choices}
  \AMCtext{explain}{\textit{\textbf{Reason: }}}
  \explain{Kilimanjaro is a mountain while the rest are mountain ranges.}
\end{question}

\begin{questionmult}{himalaya}
  Among the following which is in the Himalayas?
  \begin{choices}
      \correctchoice{Mount Everest}
      \correctchoice{K2}
      \wrongchoice{Mont Blanc}
      \wrongchoice{Aconcagua}
  \end{choices}
  \explain{Aconcagua is located in the Andes mountain range while Mont Blanc
                is located in the Alps.}
\end{questionmult}
```

This will now print *Explanation:* before the explanations of first and third question but *Reason:* before the explanation of second question.

Command \explaincontext

The command inserts its argument only in the corrected paper and outside the question environment.

Keep the original order of the answers

To keep the original order of the answers and prevent shuffling for this specific question, one can use the `o` option of the `choices` environment, replacing line 3 by the following:

```
\begin{choices}[o]
```

Last choice

You may force AMC to let one or more answers as last choices with the command `\lastchoices`.

```
\begin{question}{color}
  Which color?
  \begin{choiceshoriz}
    \wrongchoice{red}
    \wrongchoice{blue}
    \wrongchoice{yellow}
    \lastchoices
    \correctchoice{transparent}
    \wrongchoice{can't say}
  \end{choiceshoriz}
```

```
\end{question}

\begin{questionmult}{number}
  How many?
  \begin{choiceshoriz}
    \wrongchoice{none}
    \correctchoice{one}
    \wrongchoice{two}
    \wrongchoice{three}
    \lastchoices
    \correctchoice{not so much}
    \wrongchoice{a lot}
  \end{choiceshoriz}
\end{questionmult}
```

Numerical answer (not available with AMC-TXT)

See Coding the result

Remarks

Language package

Some language packages may interfere with the identifier (french for example) if you use colon. Better use the dot.

Maximum number of responses

The maximum number of answers for a given question is limited to 199.

Define the marks' display area

You may add an additional option of marking area (see Marks' position) with the package tikz.

```
\usepackage{tikz}
```

Without the `separateanswersheet` option

Type this command after `\begin{document}` and before the command `\onecopy` :

```
\AMCsetScoreZone{width=1.5em,height=1.5ex,depth=.5ex,position=margins}
```

The variables `width`, `height`, `depth` describe the dimensions of the box marking and its location on the sheet.

The `position` value may be equal to : none, question, margin, margins.

With the separateanswersheet option

Type this command after \begin{document} and before the command \onecopy :

```
\AMCsetScoreZoneAnswerSheet{width=1.5em,height=1.5ex,depth=.5ex,position=question}
```

The variables width, height, depth describe the dimensions of the box marking and its location on the sheet.

The position value may be equal to : none, question, margin, margins.

The option margins does not work with AMC-TXT.

Don't type one of those commands *after* printing.

Groups of questions

Putting questions into groups allows one to shuffle questions inside these groups, in a different way for each realization of the test. Every group of questions must have a name formed solely with plain letters.

One can put questions in a group one by one, as in the following example.

```
\element{mygroup}{
  \begin{question}{easy}
    So, how much is one plus one?
    \begin{choiceshoriz}
      \correctchoice{two}
      \wrongchoice{zero}
      \wrongchoice{three}
    \end{choiceshoriz}
  \end{question}
}
```

The formation of the group, using the element commands, must be made only once: thus, these commands have to be used *before* the onecopy command, which repeats some actions for every realization.

Finally, the group content can be output to the test sheet using command \insertgroup, as in

```
\insertgroup{mygroup}
```

Group insertion can be controlled by the group mode, that can be set by the \setgroupmode command (called after group creation, once for all, before \onecopy):

```
\setgroupmode{mygroup}{XXX}
```

where XXX can be one of the following:

fixed
: with this mode, group's elements are taken from the beginnig at each insertion.

cyclic
: the elements will be taken from the group following the last call group's use, recycling if necessary.

withreplacement
: the same as fixed, but the group is shuffled before each use.

withoutreplacement
: like cyclic, adding some shuffling when comming back to the beginning of the group.

Note that a default group mode can be set for all groups that will be created next (a group is created at the first \element call), using the command

```
\setdefaultgroupmode{XXX}
```

Without any mode definition, the fixed mode is used.

Groups of questions can be manipulated more precisely thanks to the following commands:

- \insertgroup[n]{mygroup} (using optional parameter <n>) only inserts the <n> first elements from the group.
- \insertgroupfrom[n]{groupname}{i} does the same as \insertgroup[n]{groupname}, starting from element at index <i> (the first element has index 0).
- \cleargroup{mygroup} clears all group content.
- \copygroup{groupA}{groupB} copies all the elements from group <groupA> to the end of group <groupB>. With an optional argument <n>, only the n first elements will be copied: \copygroup[n]{groupA}{groupB}.

With these commands, you can for example make a exam taking 4 questions from group GA at random, 5 questions from group GB at random, and all the questions from group GO, shuffling all these questions, with the following code (to be used inside the argument of the command \onecopy, and supposing that the group mode of groups GA, GB and all is withoutreplacement or withreplacement):

```
\cleargroup{all}
\copygroup[4]{GA}{all}
\copygroup[5]{GB}{all}
\copygroup{GO}{all}
```

```
\insertgroup{all}
```

- `\copygroupfrom[n]{groupA}{groupB}{i}` does the same as `\copygroup[n]{groupA}{groupB}` starting from element at index <i> (the first element has index 0).

A null value is allowed, if negative all the elements are copied.

Page size, margins

The `automultiplechoice` LaTeX package uses `geometry` to set the margins and page layout. You can overwrite its settings using the `\geometry` command just before the `\begin{document}` - see the geometry package documentation for details. The values initially set by AMC are:

```
\geometry{hmargin=3cm,headheight=2cm,headsep=.3cm,footskip=1cm,top=3.5cm,bottom=2.5cm}
```

When reducing the margins to gain some space, keep in mind that:

- The four corner marks must be printed entirely (they could disappear due to the printer margins).
- The four corner marks must be entirely visible on the scans (if they are too close from the border and the paper moved a little or turned a little during scanning, this could not be the case).

It is also possible to set the paper size as an option to add to the list given as argument to the `\geometry` command. Available values include `a4paper`, `a5paper`, `a6paper`, `b4paper`, `b5paper`, `ansibpaper`, `ansicpaper`, `ansidpaper`, `letterpaper`, `executivepaper`, `legalpaper`.

For small paper sizes, it may also be interesting to change the position of the human readable sheet IDs (like `1/1/53`) in the header. This can be done using the `\AMCidsPosition` command, in the form

```
\AMCidsPosition{pos=p,width=w,height=h}
```

where <p> can be `none`, `top` or `side`, and the dimensions <w> and <h> refers to the (invisible) box containing the ID. The default values are

```
\AMCidsPosition{pos=side,width=4cm,height=3ex}
```

Let us end with an example for A5 paper sheets:

```
\geometry{a5paper,hmargin=1.6cm,top=2.5cm}
\AMCidsPosition{pos=top}
```

Do not load package `pgfpages` or any other layout applications

Check-box presentation style

The `\AMCboxStyle` (new name for the `\AMCboxDimensions` command which still compatible with the options) allows one to modify one or several dimensions of the check-boxes.

Default values are :

```
\AMCboxStyle{shape=square,size=2.5ex,down=.4ex,rule=.5pt,outsidesep=.1em,color=black}
```

- `shape` is the shape of the boxes. Use the value <square> to get squares or rectangles, and <oval> to get circles or ovals. Note that the LaTeX package tikz must be loaded for <oval> to work.
- `width` is the width of the box;
- `height` is the height of the box;
- `size` is the size (`width` and `height`) of the box;
- `rule` is the thickness of the boundary of the box;
- `down` controls by how much boxes are pushed down.
- `outsidesep` for the distance between the box and the letter when printed outside the box when the `outsidebox` option is choosen (see Package options).
- `cross=true` only displayed on the answer sheet, shows the good answer with a cross instead of filling in black the box
- `crossrule=1.5pt` only displayed on the answer sheet, is the thickness of the cross.
- `color=col` gives the color to be used to draw boxes. The color <col> must be compatible with the `xcolor` package. For example, some names such as <red> can be used. You can also define your proper color, as in

  ```
  \definecolor{mylightgreen}{rgb}{0.67,0.88,0.5}
  \AMCboxStyle{color=mylightgreen}
  ```

To obtain smaller boxes, one can e.g. use the command

```
\AMCboxStyle{size=1.7ex,down=.2ex}
```

When using `separateanswersheet` package option, you can also customize the boxes labeling. The default behavior is to use uppercase alphabetical labeling, or arabic numbering if the `digits` package option is used. To use your own labeling, one has to redefine the `\AMCchoiceLabel` command which takes as argument the name of the counter used to number the choices. For example, the following code will ask for lowercase letters to label the boxes:

```
\def\AMCchoiceLabel#1{\alph{#1}}
```

As an other example, when using arabxetex package, the following code may be useful:

```
\def\AMCchoiceLabel#1{\textLR{\Alph{#1}}}
```

One can also change the style of the boxes labels redefining the \AMCchoiceLabelFormat command, as in the following example (here we need bold labels):

```
\def\AMCchoiceLabelFormat#1{\textbf{#1}}
```

One can also change the style of the outside labels redefining the \AMCoutsideLabelFormat command, as in the following example (here we need bold labels):

```
\def\AMCoutsideLabelFormat#1{\textbf{#1}}
```

The switch used to tick or not correct answers is \AMC@correctrue. You can define a command to set it to true, just after the \begin{document}.

```
\makeatletter
\def\AMCforcecorrect{\AMC@correctrue}
\makeatother
```

and then use it for a particular question (enclose in braces to limit its effect to one question):

```
{\AMCforcecorrect\begin{questionmult}{test}\QuestionIndicative
   .....
 \end{questionmult}
}
```

You should tell AMC not to count points for this question (with a 0-point scoring, or using \QuestionIndicative).

Questions presentation style

The way each question is presented can be modified by redefining the command \AMCbeginQuestion, whose default definition is the following:

```
\def\AMCbeginQuestion#1#2{\par\noindent{\bf Question #1} #2\hspace*{1em}}
```

The first parameter transmitted to this command is the number of the question to be displayed. The second parameter contains \multiSymbole in the case of a multiple question, and is void in all other cases. The \multiSymbole command too can be modified: its goal is to distinguish multiple questions from the others. By default, it displays a club.

```
\def\multiSymbole{$\clubsuit$}
```

Choices custom

The display of answers can be modified in the same fashion, if one uses the choicescustom environment instead of choices or choiceshoriz, redefining the three following LaTeX macros:

```
\def\AMCbeginAnswer{}
\def\AMCendAnswer{}
\def\AMCanswer#1#2{#1 #2}
```

Example 1

The check boxes can be used to penalize students who delay their copy, for example (8 points less for a small delay and 20 points less for an exaggerated delay). It will be enough to include at the desired place (for example in the header, something like this):

```
\fcolorbox{black}{gray}{\insertDelay}
```

the command \insertDelay is defined outside from \onecopy :

```
\def\insertDelay{ %
{\def\AMCbeginQuestion##1##2{}\AMCnobloc%
 \begin{questionmult}{00delay}
 \AMCnoCompleteMulti\AMCdontAnnotate%
 \def\AMCbeginAnswer{}\def\AMCendAnswer{}%
Holded~\begin{choicescustom}[o]\wrongchoice{R1~}\scoring{b=0,m=-8}\wrongchoice{R2
}\scoringb=0,m=-20}\end{choicescustom}%
 \end{questionmult}}%
}
```

- the command \def\AMCbeginQuestion##1##2{} (combined with the use of the reponsesperso environment) allows AMC to write not "Question XX".
- \def\AMCbeginAnswer{}\def\AMCendAnswer{} also refine the result.
- \AMCnoCompleteMulti allows to tell AMC not to add the answer "none of these answers is correct" despite the use of questionmult.
- \AMCdontAnnotate ask AMC not to annotate these boxes there.

Inside the commande \onecopy, double the #.

```
\def\AMCanswer##1##2{##1  ##2}
\def\AMCbeginQuestion##1##2{}
```

Use in mathematics

```
\begin{questionmult}{formula}\scoring{mz=2}\AMCnoCompleteMulti
How is the identity function defined?
  \begin{choicescustom}[o]
    \[f(x)=\correctchoice[$y$]{}\wrongchoice{[$x$]{}\correctchoice[$+$]
{}\correctchoice[$x^2$]{}\]
  \end{choicescustom}
\end{questionmult}
```

Spaces

Let us note that it is also possible to parameterize the dimensions (here are the default values):

```
\AMCinterIrep=0pt
\AMCinterBrep=.5ex
\AMCinterIquest=0pt
\AMCinterBquest=3ex
\AMCpostNquest=1.5ex
\AMCpostOquest=7mm
\setlength{\AMChorizAnswerSep}{3em plus 4em}
\setlength{\AMChorizBoxSep}{1em}
```

These dimensions are the vertical spaces between questions (`quest`) or answers (`rep`), in boxed mode (`B`, with `\AMCBoxedAnswers` or `box` package option) or standard mode (`I`) and the space left after a numeric and open question. The two last lengths are used in environment: `choicescustom`

Layout

Margins

Margins were chosen so that the document prints correctly on most printers. If your printer reduces, you can use the command `geometry` from laTex package geometry. For example, In order to narrow the top margin's copies, we can use `\geometry{top=3cm}` instead the default value 3.5cm, just before `\begin{document}`.

Number of pages

AMC automatically handles the number of pages for each subject. You can choose to fix a identical number of pages for each subject with the command `\AMCaddpagesto{integer}` to be called at a place you need to reach this number of pages (usually at the end of the copy description or between the question and the answer sheet).

Separate answer sheet presentation style

It is also possible to modify the layout of the separate answer sheet produced with the `separateanswersheet` option (see An example with a separate answer sheet).

1. If one only wants to modify the horizontal spacing between two check-boxes or the vertical spacing between two questions, one just has to redefine the following dimensions:

```
\AMCformHSpace=.3em
\AMCformVSpace=1.2ex
```

2. For a deeper modification of the display settings, one can also redefine the commands that are used at the beginning of each question and for each answer:

```
\def\AMCformBeforeQuestion{\vspace{\AMCformVSpace}\par}
\def\AMCformQuestion#1{\textbf{Question #1:}}
\def\AMCformAnswer#1{\hspace{\AMCformHSpace} #1}
```

   These definitions have to be inserted just after `\begin{document}` in the LaTeX file.

3. You can force AMC not to respect the arrangement of the questions and to store the open questions in order to restore them together. This can be useful when you use package multicols, the answers to open questions needing more space when hand written.

   The command `\AMCformFilter{!\AMCifcategory{open}}` displays all questions except the open questions then the command `\AMCformFilter{\AMCifcategory{open}}` displays only the open questions. Both commands must be used *together*.

```
%On two columns, the answers boxes are displayed
%except the open questions.
\begin{multicols}{2}
\AMCformFilter{!\AMCifcategory{open}}
\end{multicols}

%All the open questions are displayed.
\AMCformFilter{\AMCifcategory{open}}
```

The ascending numbering is always respected.

Code acquisition

Code acquisition can be easily performed thanks to the LaTeX command

```
\AMCcodeGridInt[options]{key}{n}
```

for instance to allow each student to enter her/his student number by herself/himself on the answer sheet. The two arguments of this command are a code/question key (identifier), and the number <n> of digits to be used by the code. One can e.g. use the following header

```
{\setlength{\parindent}{0pt}\hspace*{\fill}\AMCcodeGridInt{etu}{8}\hspace*{\fill}
```

```
\begin{minipage}[b]{6.5cm}
$\longleftarrow{}$\hspace{0pt plus 1cm} please encode your student number below,
and write your first and last names below.

\vspace{3ex}

\hfill\namefield{\fbox{
    \begin{minipage}{.9\linewidth}
      Firstname and lastname:

      \vspace*{.5cm}\dotfill

      \vspace*{.5cm}\dotfill
      \vspace*{1mm}
    \end{minipage}
  }}\hfill\vspace{5ex}\end{minipage}\hspace*{\fill}

}
```

If the `separateanswersheet` option is used, the `\AMCcodeGridInt` command has to be placed after the `\AMCformBegin` command.

Note that the codes rendering can be adapted modifying the lengths `\AMCcodeHspace`, `\AMCcodeVspace` representing the horizontal and vertical amount of space between boxes. Default values are set with the following commands:

```
\AMCcodeHspace=.5em
\AMCcodeVspace=.5em
```

The command `\AMCcodeGrid[options]{key}{description}` can be used to handle more complex codes, as codes including letters. Here, <description> is a coma-separated list of character pools to offer. As an example, a client code formed with a lettre from A to E followed by three digits can be handled with `\AMCcodeGrid{client}{ABCDE,0123456789,0123456789,0123456789}`.

The two commands \AMCcodeGrid and \AMCcodeGridInt accept the following options (coma-separated into the optional <options> argument):

vertical=<bool>

where <bool> is `true` or `false`, to indicate the direction to be used (the default value is `true`);

v

is an alias for `vertical=true`;

h

is an alias for `vertical=false`;

top

allows to get top-aligned columns in vertical direction.

multi *not recommanded*

copy the code acquisition grid to each page.

Only workes with photocopied subjects (see Photocopied subject) and with option `separateanswersheet` (see Package options.)

Using this option requires to change the original code for the position of the four corner marks.

The code below allows this and should be placed before or after`\begin{document}`.

```
\makeatletter

\def\IDbox{%
    \begin{minipage}{10cm}
        \noindent\AMCzone[id]{identification\thepage}{}
            \fbox{%
                \begin{minipage}{\linewidth}
                    \noindent Darken the boxes corresponding to your student ID:
\\[1.2ex]
                    \AMCcodeGrid[h,multi]{id}{ABCDEFGHJKLM,0123456789}
                \end{minipage}%
            }%
        }%
    \end{minipage}
}
\fancypagestyle{AMCpageFull}{%
    \fancyhf{}%
    \fancyhead[L]{\AMC@LR{\he@dbas{\leavevmode\m@rque{positionHG}}}}%
    \fancyhead[R]{\AMC@LR{\he@dbas{\leavevmode\m@rque{positionHD}}}}%
    \fancyfoot[L]{\AMC@LR{\leavevmode\m@rque{positionBG}}}%
    \fancyfoot[R]{\AMC@LR{\leavevmode\m@rque{positionBD}}}%
    \fancyhead[C]{
        \AMCIDBoxesABC\vspace{4mm}
        \ifAMC@zoneformulaire\IDbox\fi
    }%
    \fancyhfoffset[EOLR]{5mm}%
    \fancyfoot[C]{\AMC@note}%
    \renewcommand{\headrulewidth}{0pt}%
    \renewcommand{\footrulewidth}{0pt}%
}
\makeatother
```

- This LaTeX command frame the code acquisition grid students'.
- This area will be anonymized (see Copy anonymity (LaTeX only)) but it is optional.
- Code modifies the usual of AMC's performance. The lengths may need to be adjust with your margins.

Choice of shuffling parameters

One can modify the seed of the random number generator used to produce the shuffle, thanks to the following command (to be used just at the beginning of the document, and in any case outside the `onecopy` command):

```
\AMCrandomseed{1527384}
```

If the value that is assigned (to be chosen between 1 and 4194303) is modified, then the shuffling will differ. Of course, one must not modify this value after the test sheets have been printed.

The value is recorded in the xy file (as `\rngstate{1}{1515}`). The default value is 1515.

Using sectioning and separate answer sheet

For sectioning to be also visible in the separate answer sheet (if any), use `\AMCsection` and `\AMCsubsection` instead of `\section` and `\subsection` (`\AMCsection*` and `\AMCsubsection*` are also defined, for unnumbered sectionning)

Using references inside the test sheets

Using LaTeX commands `\label`, `\ref` and `\pageref` within questions or answers is problematic since they will be called with the same arguments for every realization of the test, which will alter the numbering of references. To solve this problem, one should use instead the commands `\AMClabel`, `\AMCref` and `\AMCpageref`: they add the realization number to their argument before transmitting it to `\label`, `\ref` and `\pageref`.

One also has to reset counters to zero at the beginning of each realization. For instance, if one wants to include references to pictures that are put together in a separate page, one might write something like

```
\element{animals}{
  \begin{figure}[p]
    \centering
    \includegraphics[width=.6\linewidth]{tiger}
    \caption{An animal}
    \AMClabel{tiger}
  \end{figure}

  \begin{question}{tiger}
    Which is the animal on figure~\AMCref{tiger} page~\AMCpageref{tiger}?
    \begin{choices}
      \correctchoice{A tiger}
      \wrongchoice{A giraffe}
      \wrongchoice{An elephant}
      \wrongchoice{A cat}
    \end{choices}
```

```
  \end{question}
}
```

and it is then important to add, just after the command \onecopy the line

```
\setcounter{figure}{0}
```

so that the numbering of figures starts at 1 for every realization. Without that last command, the numbering of figures would go on from one realization to the next one, which is clearly not desirable.

Using the package cleveref

This package sort in an ascending order the questions' numbers, the questions' pages or the labels' pages (the documentation http://mirrors.ctan.org/macros/latex/contrib/cleveref/cleveref.pdf).

This package must be loaded *after* the package automultiplechoice.

To use this package, a new command was created: \AMCstudentlabel.

```
\cref{\AMCstudentlabel{led},\AMCstudentlabel{lamp},\AMCstudentlabel{motor}}
```

led, *lamp*, *motor* are the created labels to reference the questions with the command \AMClabel\{}.

Customizing some texts inserted by AMC

Use \AMCtext for the following customizations:

- \AMCtext{none}{sentence} replaces « None of these answers are correct. » (the English default text) with the given <sentence> when using option completemulti.
- \AMCtext{corrected}{title} replaces « Corrected » (the English default text) with the given <title> on the corrected answer sheet.
- \AMCtext{catalog}{title} replaces « Catalog » (the English default text) with the given <title> on the questions catalog produced thanks to option catalog.
- \AMCtext{explain}{title} replaces « *Explanation* » (the English default text) with the given <title> before the explanations produced due to the explain command.

  The default option for this command is:

  ```
  \AMCtext{explain}{\textit{\textbf{Explanation: }}}
  ```

- You can also consider using commands like the following ones (here the second argument is set to the default English value):

```
\AMCtext{draft}{DRAFT}
\AMCtext{message}{For your examination, preferably print documents
                  compiled from auto-multiple-choice.}
```

- `\AMCsetFoot{text}` sets the footer. Use for example `\AMCsetFoot{\thepage}` to write the page number.

Binary code

AMC identifies each test and the page number of test with the binary code.

- First row : 12 boxes (default value) : maximum number of tests = 2^12-1 = 4 095.
- Second row : 6 first boxes (default value) : maximum number of pages per tests = 2^6-1 = 63.
- Second row : 6 last boxes (default value) : check code.

To raise the number of tests and/or pages per test modify the commands' default values `\AMC@NCBetud`, `\AMC@NCBpage` et `\AMC@NCBcheck`.

Load those commands below in the preambule (here with the default values).

```
\makeatletter
\def\AMC@NCBetud{12}
\def\AMC@NCBpage{6}
\def\AMC@NCBcheck{6}
\makeatother
```

To start the copy number at a value other than 1 (here 141).

```
\makeatletter
\AMCid@etudstart=141
\makeatother
```

To change the check code value (60 by default) to 59.

```
\makeatletter
\advance\AMCid@check\m@ne
\makeatother
```

3.5. Options for AMC

You can add in the source file header (the first lines that begin with a '%') some options to be passed to AMC:

`%%AMC:preprocess_command=commandname`

tells AMC to run the <commandname> command before calling LaTeX to process the source file. This command will be run inside the project directory, and the name of a source file copy will be passed as an argument. There is no problem for <commandname> to change this file content, because this is only a copy.

`%%AMC:latex_engine=engine`

tells AMC to set the LaTeX engine to use for this file, regardless to the one entered as a preference by the user.

3.6. Mathematical questions with randomized statements

Using package fp

Thanks to the LaTeX package fp, whose documentation is available at http://mirrors.ctan.org/macros/latex/contrib/fp/README, and which can be downloaded with the command

```
\usepackage{fp}
```

added before that corresponding to automultiplechoice, one can create exercises with randomized numerical data. Let us start with a simple example.

```
\begin{question}{addition}
  \FPeval\VQa{trunc(1+random*8,0)}
  \FPeval\VQb{trunc(4+random*5,0)}
  \FPeval\VQsomme{clip(VQa+VQb)}
  \FPeval\VQnonA{clip(VQa+VQb-1)}
  \FPeval\VQnonB{clip(VQa*VQb)}
  \FPeval\VQnonC{clip(VQa-VQb)}

  What is the sum of \VQa{} and \VQb{} ?
  \begin{choiceshoriz}
    \correctchoice{\VQsomme}
    \wrongchoice{\VQnonA}
    \wrongchoice{\VQnonB}
    \wrongchoice{\VQnonC}
  \end{choiceshoriz}
\end{question}
```

The `\FPeval` command is used to perform computations:

- Since `random` returns a real number in the interval [0,1], this command sets VQa to a random integer value between 1 and 8. The next line sets VQb to a random integer value between 4 and 8.
- Putting the correct answer in the variable VQsomme.

- Putting wrong answers in variables VQnonA, VQnonB and VQnonC...

Variable names beginning with VQ have been chosen so as to avoid interference with other LaTeX commands.

You can set the random seed with

```
\FPseed=integer
```

<integer> must be fixed, and not computed from date/time values.

Choosing an interval

The automultiplechoice package moreover defines a \AMCIntervals command which makes this kind of construction simpler, as illustrated in the next example:

```
\begin{question}{inf-expo-indep}
  \FPeval\VQa{trunc(2 + random * 4,0)}
  \FPeval\VQb{trunc(6 + random * 5,0)}
  \FPeval\VQr{VQa/(VQa+VQb)}

  Let $X$ and $Y$ be two independent random variables, following the exponential
distribution with
respective parameters \VQa{} and \VQb{}.
  To which interval does the probability $\mathbb{P}[X<Y]$ belong ?

  \begin{multicols}{5}
    \begin{choices}[o]
      \AMCIntervals{\VQr}{0}{1}{0.1}
    \end{choices}
  \end{multicols}
\end{question}
```

- This lines inserts ten answers corresponding to the intervals [0,0.1[[0.1,0.2[... [0.9,1[, while indicating that the correct interval is the one containing VQr. The arguments of the \AMCIntervals command are the following:
  1. The correct answer,
  2. The left point of the first interval,
  3. The right point of the last interval,
  4. The length of each interval.

Note that the interval formatting can be changed redefining the \AMCintervalFormat command, which is originally defined as

```
\def\AMCIntervalFormat#1#2{[#1,\,#2[}
```

to follow local conventions (writing [a,b) instead of [a,b[is for example a common usage).

Coding the result

The students can also be asked to code the numerical answer, using the \AMCnumericChoices command, as in the following example:

```
\begin{questionmultx}{sqrt}
  \FPeval\VQa{trunc(5+random*15,0)}
  \FPeval\VQs{VQa^0.5}
  Compute $\sqrt{\VQa}$ and round it with two digits after period.

  \AMCnumericChoices{\VQs}{digits=3,decimals=2,sign=true,
                borderwidth=0pt,backgroundcol=lightgray,approx=5}
\end{questionmultx}
```

Note the use of questionmultx environment: we need this question to be multiple as several boxes has to be ticked, but we can't say that several answers are correct, so we don't show the symbol for multiple questions.

Options

Available options that can be used in the second argument of the \AMCnumericChoices command are the following (<bool> can be true or false, and <color> must be a color known by the xcolor package):

digits=<num>

gives the number of digits to request (defaults to 3).

decimals=<num>

gives the number of digits after period to request (defaults to 0). Note that when <num> is positive, the LaTeX package fp must be loaded.

base=<num>

gives the base for digits and decimals (defaults to 10).

significant=<bool>

if true, the numbers to code are the first significant digits from the first argument of \AMCnumericChoices. For example, the right answer to \AMCnumericChoices{56945.23}{digits=2,significant=true} is 57.

exponent=<num>

switch to scientific notation mode, with <num> digits for the exponent.

nozero=<bool>

if true, the choice 0 is removed for all digits.

May be useful when using \AMCnumericChoices to enter small (<10) positive values.

sign=<bool>

requests (or not) a signed value (defaults to true).

exposign=<bool>

same for the exponent sign.

strict=<bool>

if `true`, a box has to be ticked for every digit (even null digits) and for the sign. If `false`, if some digits has no ticked box, they will be set to zero. Defaults to `false`.

ignoreblank=<bool>

if `true`, can be used (only with number base 10) to ignore digits for which no box has been ticked.

vertical=<bool>

if true, each digit is represented on one raw. If false (default), each digit is represented on one line.

expovertical=<bool>

if `true`, the mantissa is *above* the exponent. If `false` (default), the mantissa is *beside* the exponent.

reverse=<bool>

if true, place higher values of the digits on the top in `vertical` mode (defaults to true).

vhead=<bool>

if true, in `vertical` mode, a header is placed over all digits rows, made using the command `\AMCntextVHead` that is originally defined as

```
\def\AMCntextVHead#1{\emph{b#1}}
```

This default value is useful to number the binary digits.

Default value is `false`.

Tvhead=<{text}>

A comma separated list as \{km,hm,dam,m,dm,cm,mm} for header in vhead vertical mode. Needs `head` to be set (defaults to the empty list `{}`).

vheadunitindex=<num>

The index of the Ones place in the `Tvhead` list, counting from the right (defaults to zero).

The element on the right has an index value of 0.

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{%
digits=7,%
decimals=3,%
```

```
sign=false,%
hspace=0.75em,%%
vertical=true,%
vhead=true,%
vheadunitindex=0,%
Tvhead={km,hm,dam,m,dm,cm,mm}%
}
\end{questionmultx}
```

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{%
digits=7,%
decimals=3,%
sign=false,%
hspace=0.75em,%%
vertical=true,%
Tvhead={km,hm,dam,m,dm,cm,mm}%
}
\end{questionmultx}
```

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{%
digits=7,%
decimals=3,%
sign=false,%
hspace=0.75em,%%
vertical=true,%
vheadunitindex=0,%
Tvhead={km,{},{},m,{},{},mm}%
}
\end{questionmultx}
```

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{
digits=10,%
decimals=6,%
sign=false,%
vertical=true,%
vhead=true,%
vheadunitindex=0,%
Tvhead={km,{},{},m,{},{},mm,{} ,{}, $\mu$m},
}
\end{questionmultx}
```

```
%%Incorrect%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{
digits=10,%
decimals=6,%
sign=false,%
vertical=true,%
vhead=true,%
vheadunitindex=0,%
Tvhead={km,{},{},m,{},{},mm},
}
\end{questionmultx}
```

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{
digits=10,%
decimals=6,%
sign=false,%
vertical=true,%
vhead=true,%
vheadunitindex=7,%
Tvhead={km,{},{},m,{},{},mm},
}
\end{questionmultx}
```

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{
digits=10,%
decimals=6,%
sign=false,%
vertical=true,%
vhead=true,%
vheadunitindex=4,%
Tvhead={km,{},{},m,{},{},mm},
}
\end{questionmultx}
```

```
%%Correct%%
\begin{questionmultx}{div}
\AMCnumericChoices{12059/7}{
digits=10,%
decimals=6,%
sign=false,%
vertical=true,%
```

```
vhead=true,%
vheadunitindex=7,%
Tvhead={km,{},{},m,{},{},mm,{},{},$\mu$m},
}
\end{questionmultx}
```

hspace=<space>

sets the horizontal space between boxes (defaults to `.5em`).

vspace=<space>

sets the vertical space between boxes (defaults to `1ex`).

borderwidth=<space>

sets the width of the frame border around all the boxes (defaults to `1mm`).

bordercol=<color>

sets the color of the frame (defaults to `lightgray`).

backgroundcol=<color>

sets the background color (defaults to `white`).

Tsign=<text>

sets the text to print at the top of the boxes to set the sign (Can also be redefined by `\def\AMCntextSign{text}`, and defaults to be empty).

Tpoint=<text>

sets the text for the period. Can also be redefined by `\def\AMCdecimalPoint{text}`, and defaults to `\raisebox{1ex}{\bf .}`.

Texponent=<text>

sets the text that separates mantissa and exponent. Can also be redefined by `\def\AMCexponent{text}`, and defaults to `$\times10$\textasciicircum`.

scoring=<bool>

if `true`, a scoring strategy is given to AMC for this question. Defaults to `true`.

scoreexact=<num>

gives the score for an exact answer (defaults to 2).

exact=<num>

sets the maximal distance to the correct integer value (value without the decimal point) for an answer to be said *exact* and be rewarded to `scoreexact` points (defaults to 0).

scoreapprox=<num>

gives the score for an *approximative* answer (defaults to 1).

approx=<num>

sets the maximal distance to the correct integer value (value without the decimal point) for an

answer to be said *approximative* and be rewarded to `scoreapprox` points (defaults to 0).

AMC converts all numbers (decimals included) to integers (simply removing the decimal point) before subtracting them and comparing with `approx`. As an example, with `decimals=2`, if the correct answer is 3.14 and the given answer is 3.2, then the integer difference is 320-314=6, so that the student gets `scoreapprox` points only if `approx` is 6 or greater.

scorewrong=<num>

gives the score for an wrong answer (defaults to 0).

keepas=<text>

keeps the value entered by the student for future use with *alsocorrect* in another question.

All following questions must follow the lexicographic order of IDs

alsocorrect=<text>

gives another acceptable answer, that can be based on the values entered by the student in the previous questions. The formula use perl code:

```
+, -, *, /, ** (power)
```

```
\begin{question}{carre-a}
   \QuestionIndicative
   Choose any number.
   \begin{reponseshoriz}[o]
     \wronhchoice{2}\scoring{2,setglobal.Number=2}
     \wronhchoice{3}\scoring{3,setglobal.Number=3}
     \wronhchoice{4}\scoring{4,setglobal.Number=4}
     \wronhchoice{5}\scoring{5,setglobal.Number=5}
   \end{reponseshoriz}
 \end{question}

 \begin{questionmultx}{carre-b}
   \AMCdontAnnotate\bareme{MAX=2}
   What is his square?
   \AMCnumericChoices{}{digits=2,approx=1,alsocorrect=Number**2}
 \end{questionmultx}



 \begin{minipage}{.3\linewidth}
   \begin{tikzpicture}
     \draw[fill=blue!50] (0,0) ellipse (1.5 and 0.2);
     \draw (1.5,0) -- (0,5) -- (-1.5,0);
     \draw (1.6,0) -- (2,0);
     \draw (1.6,5) -- (2,5);
     \draw[<->] (1.8,0) -- (1.8,5);
```

```
      \node[right] at (1.8,2.5) {$h=5$};
      \draw (0,-0.4) -- (0,-0.8);
      \draw (1.5,-0.4) -- (1.5,-0.8);
      \draw[<->] (0,-0.6) -- (1.5,-0.6);
      \node[below] at (0.75,-0.6) {$r=1.5$};
      \draw[fill=black] (0,0) circle (0.02);
    \end{tikzpicture}
  \end{minipage}
  \begin{minipage}{.65\linewidth}
    \begin{questionmultx}{cone-a}
      What is the area of the blue disc?
      \AMCnumericChoices{pi*1.5^2}{digits=3,decimals=2,exponent=2,approx=2,sign=false,
      exposign=true,expovertical=true,keepas=Surface}
    \end{questionmultx}

    \begin{questionmultx}{cone-b}
      What is the volume of the cone?
      \AMCnumericChoices{pi*1.5^2*5/3
}{digits=3,decimals=2,exponent=2,approx=2,sign=false,
      exposign=true,expovertical=true,alsocorrect=Surface*5/3}
    \end{questionmultx}
  \end{minipage}



  \begin{questionmultx}{pipi2-a}
    What is the value of$\pi$ ?
    \AMCnumericChoices{pi}{digits=3,decimals=2,sign=false,keepas=Pi}
  \end{questionmultx}

  \begin{questionmultx}{pipi2-b}
    What is the value  $\pi^2$ ?
    \AMCnumericChoices{pi^2}{
digits=3,decimals=2,sign=false,approx=1,alsocorrect=Pi**2}
  \end{questionmultx}
```

You can set other default values (for the whole exam) for all these parameters using the command `\AMCnumericOpts`, like

```
\AMCnumericOpts{scoreexact=3,borderwidth=2pt}
```

Moreover, the text added at the end of the questions using `\AMCnumericChoices` when not in the separate answer sheet (and when a separate answer sheet is requested by the `separateanswersheet` package option) can also be set redefining the `\AMCntextGoto` command, as:

```
\def\AMCntextGoto{\par{\bf\emph{Please code the answer on
                           the separate answer sheet.}}}
```

Access to values

intX

raw value entered by student.

intV

correct raw value.

Using package pgf/tikz

This package must be declared *after* the package automultiplechoice.

LaTeX package pgf/tikz (see http://www.ctan.org/tex-archive/graphics/pgf/base) provides mathematical functions that can be loaded with

```
\usepackage{tikz}
```

First of all, you must set the random seed to be sure to get the same result each time latex is run to compile the subject:

```
\pgfmathsetseed{2056}
```

A simple computation

Here is an example with a simple computation:

```
\begin{question}{inverse}
  \pgfmathrandominteger{\x}{1}{50}

  How much is the reciprocal of $x=\x$?

  \begin{choices}
    \correctchoice{\pgfmathparse{1/\x}\pgfmathresult }
    \wrongchoice{\pgfmathparse{1/(\x +1)}\pgfmathresult}
    \wrongchoice{\pgfmathparse{cos(\x)} \pgfmathresult}
    \wrongchoice{\pgfmathparse{\x^(-0.5)}\pgfmathresult}
  \end{choices}
\end{question}
```

Here, the command `\pgfmathparse` makes the computation, and `\pgfmathresult` outputs the result.

Output formatting is also available with the command `\pgfmathprintnumber`, as in the following example (three digits after decimal point, and use of the comma as a decimal point).

```
\begin{question}{inverse3}
  \pgfmathrandominteger{\x}{1}{50}
  \pgfkeys{/pgf/number format/.cd,fixed,fixed zerofill,precision=3,use comma}
```

```
  How much is the reciprocal of $x=\pgfmathprintnumber{\x}$?

  \begin{choices}
    \correctchoice{\pgfmathparse{1/\x}\pgfmathprintnumber{\pgfmathresult}}
    \wrongchoice{\pgfmathparse{1/(\x +1)}} \pgfmathprintnumber{\pgfmathresult}}
    \wrongchoice{\pgfmathparse{cos(\x)} \pgfmathprintnumber{\pgfmathresult}}
    \wrongchoice{\pgfmathparse{\x^(-0.5)} \pgfmathprintnumber{\pgfmathresult}}
  \end{choices}
\end{question}
```

You can also use the \AMCIntervals and \AMCnumericChoices commands (see Choosing an interval and Coding the result)

Graphics

The tikz package also allows to make (random or not) graphs.

```
\begin{questionmult}{graph}
  Let us consider the three functions which graphs are plotted below:
  \pgfmathrandominteger{\a}{2}{4}
  \begin{center}
    \begin{tikzpicture}[domain=0:4]
      \draw[very thin,color=gray] (-0.1,-4.1) grid (3.9,3.9);
      \draw[->] (-0.2,0) -- (4.2,0) node[right] {$x$};
      \draw[->] (0,-4.2) -- (0,4.2) node[above] {$f(x)$};
      \draw[color=red] plot (\x,{(1+\a/4)*\x-\a}) node[right] {$f_{1} (x)$};
      \draw[color=blue] plot (\x,{\a*sin(\x r)}) node[right] {$f_{2}(x)$};
      \draw[color=orange] plot (\x,{\a*cos(\x r)}) node[right] {$f_{3}(x)$};
    \end{tikzpicture}
  \end{center}
  Then:
  \begin{choices}
    \pgfmathrandominteger{\x0}{2}{4}
    \correctchoice{$f_{2}(\x0)$=\pgfmathparse{\a*sin(\x0 r)} \pgfmathprintnumber
{\pgfmathresult}.}
    \correctchoice{$f_{3}(\x0)$=\pgfmathparse{\a*cos(\x0 r)} \pgfmathprintnumber
{\pgfmathresult}.}
    \wrongchoice{La fonction $f_{1}(x)$ est une fonction linéaire.}
  \end{choices}
\end{questionmult}
```

To make pretty graphs, package pgfplots can also be useful.

With pgfmath, precision is limited, so that a "Arithmetic overflow" error can be encountered. Packages tikz and pgfplots allows to overcome this problem, using `gnuplot` as a backend. You need to install `gnuplot` on your system, and use LaTeX option `--shell-escape`. To this purpose, go to AMC preferences window, and set the LaTeX engine for your project to “pdflatex --shell-escape” (without the quotes).

Using LuaLaTeX

LUA language can be used inside LaTeX documents thanks to the `lualatex` command. If you uses it, your document needs to be UTF-8 encoded, and you must not load the inputenc package. See http://www.luatex.org/documentation.html for some information.

LUA commands are to be given as a `\directlua` argument. The most useful LUA function is `tex.print`, which will output results back to LaTeX.

Once again, if you use random numbers, always fix the random seed to get the same results across different compilations:

```
\directlua{math.randomseed (2048)}
```

Here is a very simple sample source file:

```
\documentclass[a4paper]{article}
%\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}
\usepackage[box,completemulti]{automultiplechoice}
\begin{document}

\onecopy{10}{

%%% head

\noindent{\bf QCM  \hfill TEST}

\vspace*{.5cm}
\begin{minipage}{.4\linewidth}
  \centering\large\bf LuaLaTeX sample exam
\end{minipage}
\namefield{\fbox{\begin{minipage}{.5\linewidth}
Name :

\vspace*{.5cm}\dotfill
\vspace*{1mm}
\end{minipage}}}

%%%

\directlua{math.randomseed (2048)}
\directlua{a=math.random()}

\begin{question}{square-root}
  How much is the square root of \directlua{tex.print(a)}?

  \begin{choices}
    \correctchoice{\directlua{tex.print(math.sqrt(a))}}
```

```
    \wrongchoice{\directlua{tex.print(math.sqrt(2*a))}}
    \wrongchoice{\directlua{tex.print(math.sqrt(a*1.001))}}
  \end{choices}
\end{question}

}

\end{document}
```

Output formatting can be obtained using lua functions, or with the siunitx package.

You can also use the `\AMCIntervals` and `\AMCnumericChoices` commands (see Choosing an interval and Coding the result)

3.7. Conflicts with other packages

Packages to load after automultiplchoice

You must load the following packages *after* automultiplechoice : `fancyvrb`, `fancybox`, `pstricks`, `minted`.

To use `PSTricks`, you have to configure AMC : set **Preferences › Project › External commands › LaTeX engine** to **latex+dvipdf**.

verbatim

The verbatim environment interferes with AMC LaTeX package, so that it is impossible to use it inside `question` or `questionmult` environments.

In this section, you'll find a number of solutions for including pieces of computer code in your subject, for example.

Escaping

For very small texts, it is possible to escape all characters that have a special meaning for LaTeX. However, this can become quickly tedious.

```
\begin{question}{program}
What is the return value of the following R code?
\begin{center}
\texttt{sum(sapply(1:2\textasciicircum 2,function(x) \{ x/2 \}))}
\end{center}
\begin{choices}[o]
\wrongchoice{2.5}
\correctchoice{5}
\wrongchoice{NaN}
\end{choices}
\end{question}
```

`\UseVerb` from fancyvrb package.

You can also record some one-line verbatims with the fancyvrb package (define your verbatim outside, before `\onecopy`):

```
\SaveVerb{theRcode}'sum(sapply(1:2^2,function(x) { x/2 }))'
...
\begin{question}{program}
What is the return value of the following R code?
\begin{center}
\UseVerb{theRcode}
\end{center}
\begin{choices}[o]
\wrongchoice{2.5}
\correctchoice{5}
\wrongchoice{NaN}
\end{choices}
\end{question}
```

verbatimbox package

For larger verbatims, the verbatimbox package can help you (define your verbatim outside, before `\onecopy`):

```
\begin{myverbbox}{\Rcode}
sum(sapply(1:2^2,function(x) { x/2 }))
\end{myverbbox}
...

\begin{question}{program}
What is the return value of the following R code?
\begin{center}
\Rcode
\end{center}
\begin{choices}[o]
\wrongchoice{2.5}
\correctchoice{5}
\wrongchoice{NaN}
\end{choices}
\end{question}
```

Import external files

Reading the verbatim from a separate file often helps. As an example, for a syntax highlighted python code stored in a file named `prog.py` in the project directory, you can use the `listings` or `minted` packages.

listings package

```
\lstset{language=Python}
\lstinputlisting{prog.py}
```

minted package

Compile with `-shell-escape`.

```
 \inputminted{python}{prog.py}
```

Chapter 4. Scale

The score assigned to a copy is the sum of the scores obtained for each question. AMC can also be configured to calculate a final score, for example, on a scale from 0 to 20.

The scale used to assign a score to each question is indicated in the MCQ source file, which can be done in several places. A scale is made up of a set of values given to directives, each with a specific role. These directives are described in Directives.

4.1. Question scale

Simple question

In the case of a simple question (a single correct answer), you can indicate the score assigned to a correct answer using the `b` directive, and the score assigned to a wrong answer using the `m` directive, as in the following example, where a correct answer will be assigned a score of 2 and a wrong answer a negative score of -0.5:

AMC-TXT

```
*{b=2,m=-0.5} What is the capital city of Cameroon?
+ Yaoundé
- Douala
- Kribi
```

LaTeX

```
\begin{question}{Cameroon}\scoring{b=2,m=-0.5}
  What is the capital city of Cameroon?
  \begin{choices}
    \correctchoice{Yaoundé}
    \wrongchoice{Douala}
    \wrongchoice{Abou-Dabi}
  \end{choices}
\end{question}
```

Multiple question

For a multiple question, the question score is the sum of the scores obtained for each answer.

- For a well-processed answer, i.e. a correct answer ticked or an incorrect answer unticked, the value of the `b` directive (default 1) is used.
- For a wrongly processed answer, i.e. a correct answer that has not been ticked or a wrong answer that has been ticked, the value of `m` (default 0) is used.

Consider the following example, for which we have specified a question scale with `b=2,m=-0.5`:

AMC-TXT

```
**{b=2,m=-0.5} Which of the following words begin with the letter A?
+ Anyway
- Olive
+ Aim
- Enemy
```

LaTeX

```
\begin{questionmult}{firstletter}\scoring{b=2,m=-0.5}
  Which of the following words begin with the letter A?
  \begin{choices}
    \correctchoice{Anyway}
    \wrongchoice{Olive}
    \correctchoice{Aim}
    \wrongchoice{Enemy}
  \end{choices}
\end{question}
```

What score will the following copy achieve?

- ☑ Anyway
- ☐ Olive
- ☐ Aim
- ☑ Enemy

- The first two answers are well processed, so they are assigned a score of `b`, which equals 2.
- The last two answers are incorrectly processed, so they are assigned a score of `m`, which equals -0.5.

The score for this question is therefore 2+2-0.5-0.5=3. If all the questions had been well answered, the score would have been 2+2+2+2=8. AMC will therefore give this question a score of 3/8 for this copy.

4.2. Scale for a choice

You can also assign a value to a scale directive *for a given choice*.

Simple question

To assign a negative score (-2 in this case) to an answer considered very bad for a simple question, we use a special syntax with no directive name:

AMC-TXT

```
* What is the capital city of USA?
```

```
+ Washington, D.C.
- New York
-{-2} Ouagadougou
```

LaTeX

```
\begin{question}{USA}
  What is the capital city of USA?
  \begin{choices}
    \correctchoice{Washington, D.C.}
    \wrongchoice{New York}
    \wrongchoice{Ouagadougou}\scoring{-2}
  \end{choices}
\end{question}
```

Multiple question

The syntax without a directive name is not valid for a multiple question, but you can specify the value of a directive for a given answer, as in the following example, where the answer *Enemy* is not penalized if you don't treat it well, and the answer *Olive* is valued less than the others:

AMC-TXT

```
**{b=2,m=-0.5} Which of the following words begin with the letter A?
+ Anyway
-{b=1} Olive
+ Aim
-{m=0} Enemy
```

LaTeX

```
\begin{questionmult}{debutmot}\scoring{b=2,m=-0.5}
  Which of the following words begin with the letter A?
  \begin{choices}
    \correctchoice{Anyway}
    \wrongchoice{Olive}\scoring{b=1}
    \correctchoice{Aim}
    \wrongchoice{Enemy}\scoring{m=0}
  \end{choices}
\end{question}
```

What score will the following copy achieve?

- ☑ Anyway
- ☐ Olive
- ☐ Aim
- ☑ Enemy

The calculation becomes 2+1-0.5+0=2.5, whereas a perfect copy would have obtained 2+1+2+2=7. AMC will therefore give this question a score of 2.5/7 for this copy.

4.3. Default scale

If you wish to use the same scale for all questions, you can define a default scale `b=2,m=-0.5` for all single questions, and a default scale `b=0.5,m=-0.1` for all multiple questions as follows:

AMC-TXT

```
DefaultScoringS: b=2,m=-1
DefaultScoringM: b=0.5,m=-0.1
```

LaTeX

```
% Right after \begin{document}
\scoringDefaultS{b=2,m=-1}
\scoringDefaultM{b=0.5,m=-0.1}
```

4.4. Directives

Some directives only make sense in certain contexts. Here, 1 ? ☑ is used to indicate a directive that can be used for simple questions, both for the question and for an answer (only ? is used if it can only be used for the question, and only the box if it can only be used for a choice), and ♣ ? ☑ is used to indicate a directive that can be used for multiple questions, both for the question and for a choice.

- `e` 1 ? ♣ ?: score assigned if answers are inconsistent, i.e. if several boxes are ticked for a single question, or, for a multiple question, if the box “none of these answers is correct” is ticked at the same time as another box.
- `v` 1 ? ♣ ?: score assigned in case of non-response (no box checked).
- `d` ♣ ?: an offset, i.e. a value added to all notes that do not fall within the cases corresponding to parameters `e` and `v`.
- `p` ♣ ?: a floor score. If the calculation of the score obtained for the question results in a value lower than the floor value, the score is set to the floor value.
- `P` ♣ ?: a ceiling score. If the calculation of the score obtained for the question results in a value higher than the ceiling value, the score is reduced to the ceiling value.
- `b` 1 ? ♣ ? ☑: points to be awarded for the correct answer to a simple question, or for a well-answered choice to a multiple question.
- `m` 1 ? ♣ ? ☑: points to be awarded for a wrong answer to a single question, or for an incorrectly answered choice from multiple question.
- *Value without directive name* 1 ☑: number of points to be awarded if the student has ticked this answer (see Simple question).
- `auto` 1 ?: with this parameter, the value of answer number *i* will be *auto+i-1*. This option is

mainly used with `\QuestionIndicative` (see Indicative question for LaTeX sources or Questions options for AMC-TXT sources).

- `mz` 1 ? ♣ ?: this parameter imposes a "maximum or zero" scale. The student must tick all the right answers to get the `mz` mark. Otherwise, the mark will be zero.
- `haut` ♣ ?: by giving this parameter a value of *n*, the score awarded to a perfect answer will be *n*, and one point will be deducted for each incorrectly processed choice. `haut=n` is in fact rewritten as `d=n-N,p=0`.
- `MAX` 1 ? ♣ ?: gives the maximum value assigned to the question (for a "question graded out of 5", `MAX=5`). Enter this only if it does not correspond to the score obtained by entering all the correct answers. For example, if you enter `MAX=3` for a question with a possible score of 4 points, a student could obtain a score of 4/3 for this question (and, if he/she gives perfect answers to the other questions, he/she could possibly obtain an overall mark higher than 20/20).

Formula

More complex scales can be obtained by using a formula given by `formula` and possibly using other directives among the following:

- `formula` 1 ? ♣ ?: gives the question score directly, often via a formula involving certain variables (see Variables), without taking into account the values of `b` and `m`.

If the formula contains commas, enclose it in quotation marks, e.g. `formula="max(0,NBC-NMC)"`.

- `set.XXX` 1 ? ☑ ♣ ? ☑: gives a specific value to the variable named *XXX*, which can then be used by `formula`. In the context of an answer, the value is assigned only if the box is checked. Special case: if the *INVALID* variable is given a non-zero value in this way, the answers will be declared inconsistent and the score will be that given by the `e` parameter.
- `setglobal.XXX` 1 ? ☑ ♣ ? ☑: gives a value to the variable *XXX* for all the questions that follow it in the lexicographical order of identifiers.
- `default.XXX` 1 ? ♣ ?: gives a value to the variable *XXX* if no checked box has already given one via `set.XXX`.

You can assign to `b` and `m` the values of the variable declared with `default.XXX`:

AMC-TXT

```
**{default.CONF=1,m=-CONF,b=CONF} Question text.
...
```

LaTeX

```
\begin{questionmult}{id}\scoring{default.CONF=1,m=-CONF,b=CONF}
...
```

- `requires.XXX` 1 ? ♣ ?: Indicates an inconsistent entry (i.e. application of the score given by

the value of `e`) in the case where no value has been given to the variable *XXX* if no ticked box has already given one via `set.XXX`.

Variables

In addition to the variables defined by `set.XXX` and `setglobal.XXX`, the following variables can be used in the formula provided by `formula`:

- `N` is the number of proposed answers, excluding the answer automatically added by the *completemulti* option.
- `NB` is the number of correct answers to the question (regardless of whether the box is checked or not).
- `NBC` is the number of correct choices that have been ticked.
- `NM` is the number of wrong answers to the question (regardless of whether the box is checked or not).
- `NMC` is the number of wrong choices that have been ticked.
- `IS` is 1 if the question is simple and 0 otherwise.
- `IMULT` is 1 if the question is multiple and 0 otherwise.

Operators and functions

The following operators and functions can be used in the `formula`:

- addition `+`, subtraction `-`, multiplication `*`, division `/`, power `**`.
- test `( test ? value if true : value if false )`, where the test can use the equality `==`, difference `!=`, comparison `>`, `>=`, `<`, `<=` operators.
- `max(a,b)` and `min(a,b)` functions to calculate the maximum or minimum value.

4.5. Global instructions

A scale can also be specified outside the question, with two specific directives:

- `SUF=x` is used to give a total of points sufficient to obtain the maximum mark: if we set the maximum mark at 20, for example, a copy with a total of points of 12 using `SUF=15` will be given a mark of 12/15×20=16, whatever the total of a copy with all the correct answers.
- `allowempty=n` allows the student to leave *n* questions unanswered. Of the questions left unanswered by the student, *n* (or less if there are fewer) will be cancelled (i.e. not taken into account in calculating the total score).

For instance:

AMC-TXT

```
LaTeX-BeginDocument: \scoring{SUF=12}
```

LaTeX

```latex
% Right after \begin{document}
\scoring{SUF=12}
```

Chapter 5. Specific uses

5.1. Photocopied subject

As explained in Printing and exam, it is not always possible to photocopy one answer sheet to give to several students. However, when using a separate answer sheet and when questions and answers are not to be shuffled, you can photocopy the subject, and print all the answer sheets separately. We detail here the proper way to follow.

- Use `separateanswersheet` package option (see Package options).
- Write the subject before calling `\onecopy` command or outside `examcopy` environment.
- Use `\AMCformS` to output answer boxes in each answer sheet, inside `\onecopy`/`examcopy`.

Here is a minimal example:

```
\documentclass[a4paper]{article}
\usepackage[separateanswersheet]{automultiplechoice}
\begin{document}

\noindent{\bf Subject}

\begin{question}{sum}
  How much are one plus one?
  \begin{choices}
    \wrongchoice{1}
    \correctchoice{2}
    \wrongchoice{3}
  \end{choices}
\end{question}

\begin{question}{k2}
  How high is the K2?
  \begin{choices}
    \wrongchoice{around 8000m}
    \correctchoice{around 8600m}
    \wrongchoice{around 9000m}
  \end{choices}
\end{question}

\AMCcleardoublepage

\onecopy{5}{

\AMCformBegin

{\large\bf Answer sheet:}
\hfill \namefield{\fbox{
    \begin{minipage}{.5\linewidth}
```

```
      Name:

      \vspace*{.5cm}\dotfill
      \vspace*{1mm}
    \end{minipage}
  }}

\AMCformS

}

\end{document}
```

You will get from this LaTeX file one subject (sheet numbered 0) to print and photocopy to all students, and several answer sheets to print (one for each student).

5.2. Post correcting

Suppose you want to use a single generic answer sheet for all your exams. You simply print answer boxes on it (say 5 for each questions, and 40 questions), and give the students a subject that you wrote somewhere else. The point here is that the correct choices are not pointed out in the LaTeX file, so that AMC does not know about them. The solution is to give one answer sheet to the teacher to fill correct choices. Then, after scanning and AMC analysis, you simply have to tell AMC which is the teacher completed answer sheet.

To implement this idea, follow these rules:

- Use `postcorrect`, `insidebox` and `noshuffle` package options (see Package options).
- Only use `\wrongchoice` for all your choices (never `\correctchoice`).

Here is a minimal example:

```
\documentclass[a4paper]{article}
\usepackage{multicol}
\usepackage[insidebox,noshuffle,postcorrect]{automultiplechoice}

\begin{document}

\onecopy{5}{

\noindent
\begin{tabular}{|l|l|l|}
\hline
student number & class & subject\\
\hline
 \vspace{-0.25cm}
 & &\\
\AMCcode{StudentNum}{10}&
\AMCcode{class}{2}&
```

```
\AMCcode{subject}{3}
\\
\hline
\end{tabular}
\hfill\namefield{\fbox{
    \begin{minipage}{.25\linewidth}
      Name:

      \vspace*{.5cm}\dotfill

      \vspace*{.5cm}\dotfill
      \vspace*{1mm}
    \end{minipage}
  }}\hfill


\vspace{.5cm}
\noindent\hrulefill

\begin{multicols}{2}\columnseprule=.4pt

\begin{question}{01}
\begin{choicescustom}
\wrongchoice{}%
\wrongchoice{}%
\wrongchoice{}%
\wrongchoice{}%
\wrongchoice{}%
\end{choicescustom}
\end{question}

\begin{question}{02}
\begin{choicescustom}
\wrongchoice{}%
\wrongchoice{}%
\wrongchoice{}%
\wrongchoice{}%
\wrongchoice{}%
\end{choicescustom}
\end{question}

% continue here to get as many questions as needed...

\end{multicols}

}

\end{document}
```

You can then process the LaTeX file in AMC, print the sheets, scan them after the exam, and start

AMC automatic data capture (including the teacher sheet). When you click on Mark in the Marking tab, letting Update marking scale ticked, you will be prompted for the teacher answer sheet number. You can then continue as usual.

You can also write the letters outside the boxes: replace the `insidebox` option with `outsidebox`, and write your questions in the following way:

```
\begin{question}{01}
  \begin{choicescustom}
    \wrongchoice{A }%
    \wrongchoice{B }%
    \wrongchoice{C }%
    \wrongchoice{D }%
    \wrongchoice{E }%
  \end{choicescustom}
\end{question}
```

To use this option only for the questions answers (and not for the student number), type, just after `\begin{document}`

```
\makeatletter
\def\setoutsidebox{\AMC@outside@boxtrue}
\makeatother
```

Then, use this command locally (inside braces) in the form :

```
{\setoutsidebox\AMCform}
```

5.3. Nominative sheets

In some situations, it can be useful to prepare nominative sheets for all students, from a list of students. Let us see how this can be done.

- The students list has to be a CSV list. Suppose in the following that the file students.csv, in the project directory, is UTF8 encoded and that its content is like the following:

```
name,forename,id
Boulix,Jojo,001
Golin,André,002
Moniuszko,Stanisław,003
```

Do not use _ (underscore) with the student's name or forename. This would lead to compilation errors.

- `\onecopy{1}` must be equal to one.
- The number of papers must be equal to zero (graphical interface).
- The LaTeX source file has to load csvsimple package, with:

```
\usepackage{csvsimple}
```

- In the LaTeX source file, define the subject as a command that produce a single subject. This command will be called once for each student by `\csvreader` (suppose here that the questions has already be defined and included in a group named `general`):

```
\newcommand{\subject}{
  \onecopy{1}{

    \noindent{\bf AutoMultipleChoice  \hfill TEST}

    \vspace*{.5cm}

    \begin{center}\em
      Pre-filled test.
    \end{center}

    \hfill \namefield{\fbox{
        \begin{minipage}{.5\linewidth}
          Name:

          \Large\bf \name{} \surname{}

          \vspace*{1mm}
        \end{minipage}
      }}

    \noindent\hrulefill

    \vspace{1ex}

    \insertgroup{general}

    \AMCassociation{\id}
  %\AMCassociation[\name-\surname]{\id}
  }
}

%password protect
%\AMCstudentslistfile{liste.csv}{id}

\csvreader[head to column names]{students.csv}{}{\subject}
%\csvreader[head to column names,separator=semicolon]{liste.csv}{}{\subject}
```

The head to column names option for `\csvreader` defines commands `\name`, `\surname` and `\id` (named from the CSV headers), that can be used inside `\subject`. The `\AMCassociation` call tells AMC to associate the current sheet to student with id `\id`. **Optional argument to \AMCassociation to suggest a file name when printing to file.** To protect each file with a unique password. **Use this command if the CSV file contains only one email address per student.** Use this command if the CSV file contains multiple email addresses per student.

- After printing, scanning, data capture and marking, when associating copies with students, choose value "*pre-association*" for field "code-name for automatic association", and "*id*" for field "Primary key".

5.4. Topics

The aim is to combine a set of questions to calculate a score and obtain a level of success. These indications will be displayed on the header of the corrected copy (version 1.7.0 or above needed).

These groups will be described in a YAML file named `topics.yml`, to be placed in the AMC project directory.

AMC will require the following additional perl packages, which must be installed in your environment: `YAML::Syck`, `Hash::Merge`.

Principle

The YAML file format is very sensitive to indentation. You must then respect the number of spaces at each beginning of lines.

```
---
preferences:
  key level 1: value

topics:
  - key level 1 value
    key level 1:
      key level 2:
        key level 3: value
```

Examples

Full example

```
---
preferences:
  odscolumns: level  ①
  skip_indicatives: 0 ②
  answered_only: 1 ③
```

```
topics:
  - text: "Here are your topics levels" ④
  - id: geography
    name: Geography knowledge ⑤
    questions: ⑥
      - "geog:*" ⑦
      - Cameroon ⑧
    annotate_color: "#B22222" ⑨
    levels: ⑩
      - min: 75 ⑪
        message: Excellent ⑫
        color: "#1ab407" ⑬
        code: 4 ⑭
      - min: 50
        message: Fair
        color: "#2aea62"
        code: 3
      - min: 25
        message: Fragile
        color: "#ffad26"
        code: 2
      - message: Insufficient
        color: "#ff262c"
        code: 1
    decimals: 0 ⑮
    decimalsratio: 2 ⑯
    decimalspc: 0 ⑰
    floor: 0  ⑱
# Comment to lighten code. ⑲
  - id: history
    name: Historical knowledge
    format: "%{name} : %{score}/%{max}" ⑳
    questions:
      - "hist2*"
      - "hist1*"
    annotate_color: "#006c8c"
#
  - text: "-------review--------"
  - id: global
    questions: "*"
    value: "ratio:20:0.25"
    decimals: 2
    decimalspc: 2
    format: |
      %{name} : %{code} %{message}
      For questions %{nums:c}, your score is %{score}
      and your mark is %{value}/20
    exclude_questions:
     - bonus
     - difficultquestion
```

```
#
  - id: aggregate
    name: Aggregated value
    aggregate: xxx
    value: xxx
    questions:
      - "*"
```

① New columns (Export to ODS (OpenOffice, LibreOffice)) will be displayed for each topic. You can choose to display the value of the variable <code> .

② To include the indicative questions.

③ Does not display topics if all answers are empty.

④ A plain text.

⑤ Identifier without accented or spaced letters.

⑥ Full topic name.

⑦ Questions related to the topic.

⑧ All questions with the identifier beginnig with add2: are included (see Identifier).

⑨ Only one question with a unique identifier somme2ch is included. (see Identifier).

⑩ Color annotation related to scores.

If a question does not be a par of `id` or `annotate_color` option is not filled out, `Annotations color` use default. **Preferences › Annotation**.

⑪ Topic levels (percent).

⑫ Minimum required for this level.

⑬ Text written on the first page according the level.

⑭ Color for the level text.

⑮ <code> used for the column header while exporting to ODS. See Export to ODS (OpenOffice, LibreOffice) .

⑯ Number of decimals for `%{score}` and `%{code}`, defaults to 0.

⑰ Number of decimals for `%{ratio}`, defaults to 2.

⑱ Number of decimals for `%{value}`, defaults to 0.

⑲ Floor value. If the calculation of the score in that question yields a value below the floor value, the sore is set to the floor value.

⑳ Comments begin with the hash symbol.

Formatting.

Defaults to `format:\'"▯ %{name}: %{message} (%{value})"`

The corresponding score will be the ratio multiplied by 20 and rounded to the nearest multiple of 0.25.

Number of decimals.

To write a text with multiple lines.

See Aggregation functions.

Can take several values: `score`, `ratio`, `"ratio:a:b"`. The default behavior is to print the percentage.

Joker which selects all questions.

Variables

General topic values:

- `%{id}`: topic's id
- `%{name}`: topic's name

Relative values to student's score :

- `%{score}`: student's total score
- `%{max}`: maximum total score
- `%{ratio}`: quotient of score divided by maximum score (between 0 and 1)
- `%{value}`: likewise but in percent

Relative values to questions' topic :

- `%\{nums:s}`: list of question numbers
- `%\{nums:c}`: llist of question numbers by intervals (ex: 2-4 instead of 2,3,4)

Values derived from the level reached:

- `%{message}`
- `%{code}`
- `%{i}`: level

Aggregation functions

sumscores

we choose the sum of the scores, and in the denominator the sum of the maximum scores.

sumratio

We take the sum of the quotients between the question score and the maximum score for the question. In the denominator, we have the number of questions.

If we want the topic to be equal to the sum of the quotients, we take <value:score>, and if we want the topic to be the average of the ratios (so between 0 and 1), we take <value:ratio> or <value:ratio>. If left *empty*, the percentage is displayed.

minscore

we take the minimum of the scores, and in the denominator the minimum of the maximum scores to the questions.

If we want the topic to be equal to the min of the scores we choose <value:score>, and if we want the topic to be equal to the ratio of the two, we take <value:ratio>.

maxscore

we take the maximum of the scores, and in the denominator the maximum of the maximum scores to the questions.

If we want the topic to be equal to the max of the scores we choose <value:score>, and if we want the topic to be equal to the ratio of the two, we take <value:ratio>.

maxratio

we take the maximum value of the ratio, for each question, between the score obtained for the question and the optimal score that can be obtained for the question. With this aggregate value, <value:score> and <value:ratio> give the same thing.

minratio

we take the minimum value of the ratio, for each question, between the score obtained for the question and the optimal score that can be obtained for the question. With this aggregate value, <value:score> and <value:ratio> give the same thing.

count(a)

number of questions with score <a>.

count(a,b)

number of questions with score between <a> and <b>.

Shared levels

You can define a set of levels that will be used for several different topics, as in this example:

```
---
conf:
  standardlevels: ①
    levels:
      - min: 75
        message: Excellent
        color: "#1ab407"
      - min: 50
        message: Fair
        color: "#2aea62"
      - min: 25
        message: Fragile
        color: "#ffad26"
      - message: Insufficient
        color: "#ff262c"
    decimals: 2
    decimalsratio: 2
    decimalspc: 0
    floor: 0
```

```
topics:
  - id: geography
    name: Geography knowledge
    questions:
      - "geog:*"
      - Cameroon
    conf: standardlevels ②
  - id: history
    name: Historical knowledge
    format: "%{name} : %{score}/%{max}"
    questions:
      - "hist2:*"
      - "hist1:*"
    conf: standardlevels
```

① We define a configuration, called `standardlevels`, which can be used for several topics.

② Calling up this configuration.

Include file

Create a `levels.yml` file located in the parent directory of the project directory (therefore the directory common to all AMC projects).

`levels.yml`

```
# file levels.yml
preferences:
  odscolumns: level
#
conf:
  standardlevels:
    levels:
      - min: 75
        message: Excellent
        color: "#1ab407"
      - min: 50
        message: Fair
        color: "#2aea62"
      - min: 25
        message: Fragile
        color: "#ffad26"
      - message: Insufficient
        color: "#ff262c"
    decimals: 2
    decimalsratio: 2
    decimalspc: 2
    floor: 0
```

Project `topics.yml`

```
---
include:
  - ../levels.yml

topics:
  - id: geography
    name: Geography knowledge
    questions:
      - "geog:*"
      - Cameroon
    conf: standardlevels
  - id: history
    name: Historical knowledge
    format: "%{name} : %{score}/%{max}"
    questions:
      - "hist2:*"
      - "hist1:*"
    conf: standardlevels
```

5.5. Copy anonymity

In conventional use, this option is not recommended. It requires the use of a source file in LaTeX format, and version 1.6.0 or above.

Start anonymous mode

Select **Preferences › Features › Anonimization › Display anonymization panel**.

How to create anonymous pdf files

- Prepare your subject (Preparing the subject).
- Input students' copies (Reading the copies)
- Data capture tab , a new menu is displayed : click on Anonymize.
- Open to access anonymized pdf files.
- Manually correct some questions from these PDFs.
- Marks are passed to AMC by the csv file.

This files are uneditable; do notrerun a automatic recognition.

Useful commands with this option

- `AMCzone[id]{}`

  The command `\AMCzone[id]{LaTeX code}` is used to hide a defined area.

After anonymization, the `\namefield` zone is hidded.

- `\AMCexternalQuestion`

  The command `AMCexternalQuestion{identifier to choose}{score maximal}` allows to brand an external question that will be scored outside AMC, with a maximum score.

  When using this command, you can freely handle the question number and the question text (AMC will not do this). (AMC will not do this)

  

  It is not possible to add this command after the subject has been fully prepared.

  During anonymization, a csv file is created. This file will have to be filled in with the marks and then read by AMC to continue with the correction (see Correction).