

exam-ltr — A Comprehensive LaTeX Exam Package*

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Abstract

The `exam-ltr` package provides a comprehensive framework for designing professional exams and academic assessments in $\text{\LaTeX}$. Developed specifically for educators and exam setters, it supports a wide variety of question types, including Multiple Choice, True/False, Fill in the Blank, Ordering, Matching, Essay, Short Answer, and Reading Passages.

Key features include automatic answer key generation, controlled randomization, metadata display, and flexible layout for both simple quizzes and complex examinations.

Contents

1	Introduction	2
2	Installation	2
3	Quick Start	3
4	Mode Commands	4
5	Question Environment	5
6	Question Types	6
6.1	Multiple Choice (MC)	6
6.2	True/False (TF)	7
6.3	Fill in the Blank (FillBlank)	8
6.4	Ordering	9
6.5	Matching	10
6.6	Essay	11
6.7	Short Answer (ShortAnswer)	12
6.8	Reading Passage	13
7	Complete Example	13
8	Common Mistakes	14

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9 Known Limitations	14
10 License	15
11 Implementation	15

1 Introduction

The `exam-ltr` package provides a clean and robust environment for building professional exams without manual formatting. Built with educators in mind, it allows you to focus on creating high-quality question content while the package handles layout, alignment, and answer key generation automatically.

Key features:

- **8 Dedicated Question Types:** MC, TF, FillBlank, Ordering, Matching, Essay, ShortAnswer, and Reading Passage (ReadingPassage).
- **Automated Answer Keys:** Answers are collected and displayed directly after each question in teacher mode.
- **Smart Randomization:** Shuffles options, matching columns, and ordering items in a reproducible manner.
- **Metadata Display:** Show or hide marks, difficulty levels, and question type tags.
- **Dual-Mode Output:** Switch between student version (answers hidden) and teacher version (answers shown).

2 Installation

The `exam-ltr` package is distributed through CTAN and is included in all major LaTeX distributions (TeX Live, MiKTeX, MacTeX). In most cases, no manual installation is needed; the system's package manager will handle it automatically.

If manual installation is required, use one of the following methods.

Quick Installation (Single Project)

This method is suitable for users who need the package for a single document.

1. Copy `exam-ltr.sty` into the same folder as the main `.tex` file.
2. Add `\usepackage{exam-ltr}` to the document preamble.

Permanent Installation (System-Wide)

This method installs the package into the user's local TeX tree, making it available for all future documents.

Linux / macOS

1. Create the target directory:
`mkdir -p ~/texmf/tex/latex/exam-ltr`
2. Copy the package file into this directory:
`cp exam-ltr.sty ~/texmf/tex/latex/exam-ltr/`
3. Update the LaTeX file database:
`texhash ~/texmf`

Windows

- **MiKTeX:**

1. Create the folder: `C:\texmf\tex\latex\exam-ltr`
2. Copy `exam-ltr.sty` into it.
3. Refresh the database via the MiKTeX Console (“Refresh FNDB”).

- **TeX Live::**

1. Create the folder: `C:\texlive\texmf-local\tex\latex\exam-ltr`
2. Copy `exam-ltr.sty` into it.
3. Refresh the database by running `texhash`.

Requirements

The package requires the following LaTeX packages, which are loaded automatically: `xcolor`, `tcolorbox`, `expl3`, and `xparse`.

Engine Compatibility

The package is compatible with all major LaTeX engines: pdfLaTeX, LuaLaTeX, and XeLaTeX.

3 Quick Start

This section outlines the standard workflow for creating an exam with the `exam-ltr` package.

Step 1: Load the Package and Configure Mode

Include the package in your document preamble and set the desired output mode:

```
\documentclass{article}
\usepackage{exam-ltr}

\TeacherMode    % Show answer keys
\ShowMarks      % Display marks
\ShowCorrection  % Show answer boxes
\ExamID{123}    % Fix randomization seed
```

Step 2: Structure Your Questions

Wrap every question in the `Question` environment. You must specify four arguments: $\langle Type \rangle$, $\langle Difficulty \rangle$, $\langle Marks \rangle$, and $\langle Question\ text \rangle$:

```
\begin{Question}{\langle Type \rangle}{\langle Difficulty \rangle}{\langle Marks \rangle}{\langle Question\ text \rangle}
    question content
\end{Question}
```

Step 3: Choose the Environment for Your Question

Inside the `Question` environment, select the environment that matches your question type: `MC` (Multiple Choice), `TF` (True/False), `FillBlank`, `Ordering`, `Matching`, `Essay`, `ShortAnswer`, or `ReadingPassage`.

Step 4: Compile and View Output

Compile your document with `pdflatex` (or `xelatex`/`lualatex`). The output depends on the mode set in Step 1:

- **Student Mode (default):** Answer keys are hidden.
- **Teacher Mode:** Answer keys appear when `\ShowCorrection` is also enabled.

Minimal Working Example

```
\documentclass{article}
\usepackage{exam-ltr}

\TeacherMode
\ShowCorrection

\begin{document}

\begin{Question}{MC}{Easy}{2}{Multiple Choice Quiz}
    \begin{MC}
        \MCQuestion{What is 2+2?}{2}
        \MCOption{3}
        \MCOption{4}
        \MCOption{5}
    \end{MC}
\end{Question}

\end{document}
```

4 Mode Commands

The package provides several switches that control the appearance of the final exam sheet. These switches allow you to toggle between student and teacher views, display metadata, and show answer boxes.

Student and Teacher Modes

`\StudentMode` These commands toggle between student and teacher views.

`\TeacherMode`

`\StudentMode` % Hide answer keys (default)

`\TeacherMode` % Show answer keys

The default mode is `\StudentMode`. When `\TeacherMode` is active, answer keys become visible.

Metadata Visibility

`\ShowMarks` These commands control the visibility of question metadata.

`\ShowDifficulty`

`\ShowType` `\ShowMarks` % Display marks

`\ShowDifficulty` % Display difficulty levels

`\ShowType` % Display question type

Each switch is independent; any combination may be enabled.

Correction Boxes

`\ShowCorrection` Enables the display of correction boxes for teacher use.

`\ShowCorrection`

Only takes effect when `\TeacherMode` is explicitly enabled.

Randomization Seed

`\ExamID` Sets a fixed seed for all randomization operations (shuffling MC options, ordering items, and matching pairs).

`\ExamID`{*number*}

Using the same seed guarantees identical output across compilations.

5 Question Environment

`Question` (*env.*) The `Question` environment is the primary container for all question types. It handles automatic numbering, manages metadata display (type, difficulty, marks), and integrates answer key collection in teacher mode.

Syntax

```
\begin{Question}{<Type>}{<Difficulty>}{<Marks>}{<Question Text>}{  
  question content  
}\end{Question}
```

Arguments

- $\langle Type \rangle$: Question category (MC, TF, FillBlank, Ordering, Matching, Essay, ShortAnswer, ReadingPassage).
- $\langle Difficulty \rangle$: Descriptive label (e.g., Easy, Medium, Hard).
- $\langle Marks \rangle$: Numeric score assigned to the question.
- $\langle Question\ Text \rangle$: Main prompt or instruction.

How It Works

- **Automatic Numbering:** Questions are numbered sequentially.
- **Metadata Display:** When enabled via `\ShowType`, `\ShowDifficulty`, and `\ShowMarks`, the corresponding labels are displayed alongside the question.
- **Answer Key Collection:** When `\TeacherMode` and `\ShowCorrection` are enabled, all answers are collected and displayed in a dedicated answer key box.
- **Consistent Formatting:** All question types placed inside this environment share consistent spacing and layout.

Example

```
\begin{Question}{Matching}{Easy}{3}{Match the opposite words.}
  \begin{Matching}
    \MatchPair{Tall}{Short}
    \MatchPair{Big}{Small}
    \MatchPair{High}{Low}
  \end{Matching}
\end{Question}
```

6 Question Types

6.1 Multiple Choice (MC)

`MC` (*env.*) The MC environment creates multiple-choice questions with automatically shuffled options. Multiple questions can be placed inside a single MC environment, each with its own set of options. The correct answer is stored internally and appears in the answer key in teacher mode. Options are displayed in a grid layout with a customizable number of columns.

Syntax

```
\begin{MC} [ $\langle columns \rangle$ ]
  \MCQuestion{ $\langle question\ text \rangle$ }{ $\langle correct\_index \rangle$ }
  \MCOption{ $\langle option\ 1 \rangle$ }
  \MCOption{ $\langle option\ 2 \rangle$ }
  \MCOption{ $\langle option\ 3 \rangle$ }
  ...
\end{MC}
```

How It Works

- **Column Layout (Default: 4):** The optional [*columns*] argument sets the number of columns for displaying options. Any number can be used as long as it fits the page width.
- **Correct Answer Index:** The {*correct_index*} is a single number indicating which option is correct (e.g., 2 means the second option is correct). This index is used internally to track the correct answer after shuffling.
- **Randomization:** All options inside `\MCQuestion` are shuffled based on the global exam seed set by `\ExamID`. This ensures reproducibility when a fixed seed is provided.
- **Answer Key Integration:** The correct answer is collected automatically and displayed in the answer key when `\TeacherMode` and `\ShowCorrection` are enabled.

Example

```
\begin{Question}{MC}{Easy}{1}{Basic Arithmetic}
  \begin{MC}[3]
    \MCQuestion{What is 2+2?}{2}
    \MCOption{3}
    \MCOption{4}
    \MCOption{5}
  \end{MC}
\end{Question}
```

6.2 True/False (TF)

`TF (env.)` The TF environment creates True/False questions. Multiple statements can be placed inside a single TF environment, each with its own correct answer. Two display styles are available: bracket style (default) and options style, allowing flexibility for different assessment needs.

Syntax

```
\begin{TF}[style]
  \TFQuestion{statement}{answer}
  \TFQuestion{statement}{answer}
  ...
\end{TF}
```

How It Works

- **Visual Style:** The optional [*style*] argument selects the display format:
 - **bracket (default):** Places an empty answer slot () after each statement.
 - **options:** Places “True” and “False” labels to the right of each statement.

- **Statement Input:** The `{\langle statement \rangle}` argument receives the text that students must evaluate.
- **Answer Specification:** The `{\langle answer \rangle}` argument accepts any text, which will be displayed in the answer key as provided (e.g., “True”, “False”, “T”, “F”).
- **Answer Key:** When `\TeacherMode` and `\ShowCorrection` are enabled, the correct answers are collected and displayed in the answer key.
- **Multiple Questions:** Multiple `\TFQuestion` commands can be placed sequentially within one TF environment.

Example

```
\begin{Question}{TF}{Easy}{2}{True or False}
  \begin{TF}[bracket]
    \TFQuestion{The Earth is flat.}{False}
    \TFQuestion{Water boils at 100°C.}{True}
  \end{TF}
\end{Question}
```

6.3 Fill in the Blank (FillBlank)

FillBlank (*env.*) The FillBlank environment creates fill-in-the-blank questions where students complete sentences with appropriate words. It supports single or multiple blanks per question, multiple correct answers per blank (separated by |), and an optional `\Blank` word bank to assist students during assessment.

Syntax

```
\begin{FillBlank}[\langle wordbank \rangle]
  \WordBank[\langle separator \rangle]{\langle word1, word2, ... \rangle}
  \FillQuestion{\langle text with \Blank \rangle}{\langle answer \rangle}
\end{FillBlank}
```

How It Works

- **Blank Creation:** The `\Blank` command creates an underline field where students write their answers. Its optional argument `[\langle width \rangle]` sets the line length (default: 4.25em).
- **Word Bank Activation:** The optional `[\langle wordbank \rangle]` argument controls whether a word bank is displayed. Set to `true` to show a framed list of words above the questions (default is `false`).
- **Word Bank Configuration:** The `\WordBank` command defines the vocabulary list. Words must be separated by commas. The optional `[\langle separator \rangle]` controls spacing between words (default: `\quad`).
- **Multiple Answers:** When a question has multiple blanks, separate the answers with | in the order they appear. Example: `Red|Green|Blue`.

- **Answer Key:** When `\TeacherMode` and `\ShowCorrection` are enabled, correct answers are collected and displayed in a dedicated answer key box.

Example

```
\begin{Question}{FillBlank}{Medium}{4}{Complete the sentences}
  \begin{FillBlank}[true]
    \WordBank{gravity, light, oxygen}
    \FillQuestion{Humans need \Blank to breathe.}{oxygen}
    \FillQuestion{Plants need \Blank from the sun.}{light}
  \end{FillBlank}
\end{Question}
```

6.4 Ordering

Ordering (*env.*) The Ordering environment creates sequencing questions where students must arrange items in their correct logical order. Items must be written in their proper sequence inside the environment, but are presented to students in a shuffled layout. The original order is preserved for the teacher's answer key. Options are displayed in a grid layout with a customizable number of columns.

Syntax

```
\begin{Ordering}[\langle columns \rangle]
  \OrderQuestion{\langle instruction \rangle}
  \OrderOption{\langle item 1 \rangle}
  \OrderOption{\langle item 2 \rangle}
  \OrderOption{\langle item 3 \rangle}
  ...
  \OrderAnswer[\langle width \rangle]
\end{Ordering}
```

How It Works

- **Correct Sequence:** Items must be written inside `\OrderOption` in their correct logical order. This order is preserved for the answer key.
- **Randomization:** Items are shuffled for the student based on the global exam seed (`\ExamID`), ensuring consistent randomization across compilations.
- **Column Layout (Default: 4):** The optional `[\langle columns \rangle]` argument sets the number of columns for displaying shuffled items. Any number can be used as long as it fits the page width.
- **Answer Space:** The `\OrderAnswer` command adds an optional answer space (with customizable width) where students write their final ordered sequence.
- **Answer Key:** When `\TeacherMode` and `\ShowCorrection` are enabled, the correct sequence is collected and displayed in the answer key.

Example

```
\begin{Question}{Ordering}{Medium}{3}{Arrange in correct order}
  \begin{Ordering}[3]
    \OrderQuestion{Steps of the water cycle}
    \OrderOption{Evaporation}
    \OrderOption{Condensation}
    \OrderOption{Precipitation}
    \OrderAnswer
  \end{Ordering}
\end{Question}
```

6.5 Matching

Matching (*env.*) The Matching environment creates two-column association questions. Items must be written in their correct pairs inside the environment. The left column remains fixed and numbered, while the right column is automatically shuffled for students. The original pairings are preserved for the teacher's answer key.

\MatchPair

Syntax

```
\begin{Matching}[\langle left\_ratio \rangle]
  \MatchPair{\langle left item \rangle}{\langle right item \rangle}
  \MatchPair{\langle left item \rangle}{\langle right item \rangle}
  ...
\end{Matching}
```

How It Works

- **Pair Definition:** Each pair is defined using `\MatchPair`. The order of definition determines the correct answer key. The left column is fixed and numbered, while the right column is automatically shuffled.
- **Column Width Control:** The optional `[\langle left\_ratio \rangle]` adjusts the width of the left column as a decimal fraction between 0 and 1. Default is 0.5 (equal split). This is useful when the left column contains short terms and the right column has lengthy descriptions (e.g., 0.3 for 30% width).
- **Randomization:** The right column is shuffled based on the global exam seed (`\ExamID`), ensuring consistency across compilations.
- **Answer Key:** When `\TeacherMode` and `\ShowCorrection` are enabled, the correct mappings are displayed as numbered-to-lettered pairs (e.g., (1) $\Rightarrow$ (b)).
- **Capacity:** Supports a maximum of 26 pairs per question (limited by the alphabet A-Z).

Example

```
\begin{Question}{Matching}{Medium}{4}{Match countries with capitals}
  \begin{Matching}[0.3]
    \MatchPair{France}{Paris}
  \end{Matching}
\end{Question}
```

```

\MatchPair{Germany}{Berlin}
\MatchPair{Italy}{Rome}
\end{Matching}
\end{Question}

```

6.6 Essay

Essay (*env.*) The Essay environment creates open-ended, long-form written response questions. **\EssayQuestion** It provides a writing area with either ruled lines or blank space, depending on the selected style. The instructor's answer summary is stored and displayed in the answer key in teacher mode.

Syntax

```

\begin{Essay}[\langle lines \rangle]
  \EssayQuestion[\langle line\_count \rangle]{\langle question \rangle}{\langle answer summary \rangle}
  ...
\end{Essay}

```

How It Works

- **Writing Space Style:** The optional environment argument `[\langle lines \rangle]` controls the appearance of the writing area:
 - **true:** Generates ruled notebook lines (default).
 - **false:** Provides blank white space for free-form text or diagrams.
- **Writing Space Size (Default: 4):** The optional `[\langle line\_count \rangle]` argument specifies the number of lines allocated for the student's answer.
- **Question Components:** `\EssayQuestion` command takes two mandatory arguments: the question prompt and a concise answer summary for the instructor's reference.
- **Multiple Questions:** Multiple `\EssayQuestion` commands can be placed sequentially within one Essay environment.
- **Answer Key:** When `\TeacherMode` and `\ShowCorrection` are enabled, all answer summaries are collected and displayed in a dedicated answer key box.

Example

```

\begin{Question}{Essay}{Hard}{10}{Written Response}
  \begin{Essay}[true]
    \EssayQuestion{What is cloud computing?}{Cloud computing}
    \EssayQuestion[10]{What is cybersecurity?}{Cybersecurity}
  \end{Essay}
\end{Question}

```

6.7 Short Answer (ShortAnswer)

ShortAnswer (*env.*) The ShortAnswer environment creates questions that require brief, direct responses — such as single words, short phrases, or concise statements. The answer space can be customized (0, 1, or 2 lines) to keep the exam layout clear and space-efficient. The instructor’s answer is stored and displayed in the answer key in teacher mode.

Syntax

```
\begin{ShortAnswer}[\langle lines \rangle]
  \ShortQuestion[\langle size \rangle]{\langle question \rangle}{\langle answer \rangle}
  ...
\end{ShortAnswer}
```

How It Works

- **Writing Space Style:** The optional environment argument `[\langle lines \rangle]` controls the appearance of the answer space:
 - **true:** Generates ruled notebook lines (default).
 - **false:** Provides blank white space without lines.
- **Answer Space Size:** The optional `[\langle size \rangle]` argument specifies the number of lines for the student’s answer:
 - **0:** Prints a short underline directly after the question text — ideal for single-word answers. (Always prints a line regardless of the environment style.)
 - **1:** Generates a one-line writing space below the question.
 - **2:** Generates a two-line writing space below the question.
- **Question Components:** `\ShortQuestion` command takes two mandatory arguments: the question prompt and the model answer or keyword solution.
- **Multiple Questions:** Multiple `\ShortQuestion` commands can be placed sequentially within one ShortAnswer environment.
- **Answer Key:** When `\TeacherMode` and `\ShowCorrection` are enabled, all answers are collected and displayed in a dedicated answer key box.

Example

```
\begin{Question}{ShortAnswer}{Easy}{3}{Answer briefly}
  \begin{ShortAnswer}[true]
    \ShortQuestion[0]{Diameter of Earth?}{12,742 km}
    \ShortQuestion[1]{Strongest gravity planet?}{Jupiter}
  \end{ShortAnswer}
\end{Question}
```

6.8 Reading Passage

`ReadingPassage` (*env.*) The `ReadingPassage` environment provides a container for reading comprehension texts. The passage is printed exactly as written — preserving all formatting, paragraph breaks, and inline styling — without any modification or randomization. The passage is displayed in a standalone box, and authors can place any question type after it to assess comprehension.

Syntax

```
\begin{ReadingPassage}{\langle title \rangle}
    passage text
\end{ReadingPassage}
```

How It Works

- **Passage Rendering:** The text is displayed in a framed box, exactly as entered, preserving all formatting.
- **Title:** The mandatory `{\langle title \rangle}` argument sets the centered heading above the passage. If left empty `{}`, the default title “Reading Passage” is used.
- **Content Flexibility:** The passage can include multiple paragraphs, inline text styles (bold, italic, etc.), and custom lists.
- **Question Integration:** Any question type can follow a `ReadingPassage` within the same `Question` block to assess comprehension.

Example

```
\begin{Question}{ReadingPassage}{Medium}{10}{Read and answer}
    \begin{ReadingPassage}{The Solar System}
        Our solar system has eight planets that orbit the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
    \end{ReadingPassage}
    \begin{FillBlank}
        \FillQuestion{\Blank is the smallest planet.}{Mercury}
        \FillQuestion{\Blank is the largest planet.}{Jupiter}
    \end{FillBlank}
\end{Question}
```

7 Complete Example

A fully functional sample exam file, `example.tex`, is included with the package to demonstrate its capabilities in a realistic academic context. The example file covers all question types supported by the package: `MC`, `TF`, `Ordering`, `FillBlank`, `Matching`, `ShortAnswer`, `Essay`, and `ReadingPassage`.

Usage Instructions:

1. Ensure you have the file `example.tex` in your working directory (usually found in the package documentation folder).

2. Open it in your L^AT_EX editor and compile with `pdflatex`, `xelatex`, or `lualatex`.
3. To switch between student and teacher views, uncomment or comment the `\TeacherMode` and `\ShowCorrection` commands in the preamble. This toggles the display of answer keys and correction boxes.

8 Common Mistakes

The following list addresses frequent errors encountered during exam creation. Adhering to these guidelines ensures correct compilation and output.

- **Enabling `\ShowCorrection` without `\TeacherMode`:** `\ShowCorrection` alone does not display answers. Both `\TeacherMode` and `\ShowCorrection` must be active for solutions to appear.
- **Omitting the `Question` Environment:** All question types must be wrapped inside the `Question` environment. Failing to do so prevents metadata and answer keys from appearing.
- **Using Invalid Type Identifiers:** The first argument of `Question` must be a valid identifier: `MC`, `TF`, `FillBlank`, `Ordering`, `Matching`, `Essay`, `ShortAnswer`, or `ReadingPassage`. Using non-standard identifiers (e.g., `MCQ`) will result in missing or incorrect metadata labels.
- **Missing Pipe Separator in `FillBlank`:** For questions with multiple answers, separate them with a vertical pipe `|` (e.g., `Red|Green|Blue`). Omitting this causes the package to treat multiple answers as a single string.
- **Incorrect Column Placement in `Matching`:** The `Matching` environment always shuffles the right column. Items intended for randomization must be placed in the second argument. Placing them in the first argument results in an illogical question.
- **Incorrect Input Sequence in `Ordering`:** The order in which you write the `\OrderOption` commands in your document defines the correct answer. Entering them in the wrong order will result in incorrect grading.
- **Omitting the Title in `ReadingPassage`:** The `ReadingPassage` environment requires a title argument. If no custom title is needed, use empty braces `{}`. Omitting the argument causes LaTeX to misinterpret the first character of the passage text as the title.

9 Known Limitations

The `exam-ltr` package has the following limitations in its current version.

- **Directionality:** The package is optimized for Left-to-Right (LTR) languages (e.g., English). For Right-to-Left (RTL) languages (e.g., Arabic), use the companion package `exam-rtl`.

- **Mandatory Randomization:** Option shuffling cannot be fully disabled. Even without the `\ExamID` macro, a default randomization is applied.
- **Scope of Randomization:** Randomization is limited to internal elements: choices in `MC`, items in `Ordering`, and the right-hand column in `Matching`. Shuffling the entire sequence of question blocks is not supported in this version.
- **Item Capacity:** Each question within `Ordering` and `Matching` is limited to a maximum of 26 items (tracked using Latin letters A–Z).
- **Answer Key Placement:** Answer keys are displayed individually beneath each question. A centralized answer sheet at the end of the document is not supported in this version.

10 License

This package is distributed under the LaTeX Project Public License (LPPL), version 1.3c or later.

The latest version of this license is available at: <http://www.latex-project.org/lppl.txt>

11 Implementation

This section contains the complete source code of the `exam-ltr` package. Each macro, variable, and environment is documented with its purpose and usage.

```

1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{exam-ltr}[2026/08/20 v1.0 LTR Exam Core]
3
4 \RequirePackage{xcolor}
5 \RequirePackage{tcolorbox}
6 \tcbuselibrary{skins, breakable}
7 \RequirePackage{expl3}
8 \RequirePackage{xparse}
9 \ExplSyntaxOn
10 \cs_generate_variant:Nn \tl_if_eq:nnT { VWT }
11 \cs_generate_variant:Nn \msg_warning:nnn { nnx }

\PrintNumber Converts a number to its standard representation.
12 \newcommand{\PrintNumber}[1]{\number#1}

\g__mode_teacher_bool Core boolean variables for controlling mode and metadata visibility.
\g__mode_marks_bool
\g__mode_difficulty_bool
\g__mode_type_bool
\g__mode_correction_bool
13 \bool_new:N \g__mode_teacher_bool
14 \bool_new:N \g__mode_marks_bool
15 \bool_new:N \g__mode_difficulty_bool
16 \bool_new:N \g__mode_type_bool
17 \bool_new:N \g__mode_correction_bool

\g__exam_id_int Core integer variables for exam ID, question numbering, and seed.
\g__question_number_int
\g__question_seed_int
18 \int_new:N \g__exam_id_int
19 \int_new:N \g__question_number_int
20 \int_new:N \g__question_seed_int

```

`\g__question_answer_tl` Token lists for storing question data.

```

\g__question_type_tl 21 \tl_new:N \g__question_answer_tl
\g__question_level_tl 22 \tl_new:N \g__question_type_tl
\g__question_marks_tl 23 \tl_new:N \g__question_level_tl
                      24 \tl_new:N \g__question_marks_tl

```

`\g__question_type_prop` Property list that maps question type identifiers to their display names.

```

25 \prop_new:N \g__question_type_prop
26 \prop_put:Nnn \g__question_type_prop {MC} {Multiple~Choice}
27 \prop_put:Nnn \g__question_type_prop {TF} {True/False}
28 \prop_put:Nnn \g__question_type_prop {FillBlank} {Fill~in~the~Blank}
29 \prop_put:Nnn \g__question_type_prop {Ordering} {Ordering}
30 \prop_put:Nnn \g__question_type_prop {Matching} {Matching}
31 \prop_put:Nnn \g__question_type_prop {Essay} {Essay}
32 \prop_put:Nnn \g__question_type_prop {ShortAnswer} {Short~Answer}
33 \prop_put:Nnn \g__question_type_prop {ReadingPassage} {Reading~Passage}

```

`\g__exam_letters_seq` Sequence of Latin letters (a-z) for labeling options.

```

34 \seq_new:N \g__exam_letters_seq
35 \seq_set_from_clist:Nn \g__exam_letters_seq
36 {
37   a , b , c , d , e , f , g , h , i , j , k , l , m , n , o , p , q ,
38   r , s , t , u , v , w , x , y , z
39 }

```

`\StudentMode` Set the teacher/student mode booleans.

`\TeacherMode`

```

40 \NewDocumentCommand{\StudentMode}{}
41 { \bool_gset_false:N \g__mode_teacher_bool }
42 \NewDocumentCommand{\TeacherMode}{}
43 { \bool_gset_true:N \g__mode_teacher_bool }

```

`\ShowType` Set metadata visibility booleans.

`\ShowDifficulty`

`\ShowMarks`

`\ShowCorrection`

```

44 \NewDocumentCommand{\ShowType}{}
45 { \bool_gset_true:N \g__mode_type_bool }
46 \NewDocumentCommand{\ShowDifficulty}{}
47 { \bool_gset_true:N \g__mode_difficulty_bool }
48 \NewDocumentCommand{\ShowMarks}{}
49 { \bool_gset_true:N \g__mode_marks_bool }
50 \NewDocumentCommand{\ShowCorrection}{}
51 { \bool_gset_true:N \g__mode_correction_bool }

```

`\ExamID` Sets the randomization seed. Use 0 for default system seed.

```

52 \NewDocumentCommand{\ExamID}{m}{
53   \int_gset:Nn \g__exam_id_int {#1}
54   \sys_gset_rand_seed:n {#1}
55 }

```

`\__question_build_seed` Builds a unique seed for each question based on the exam ID and question number. This ensures consistent randomization across compilations.

```

56 \cs_new_protected:Npn \__question_build_seed: {
57   \int_gset:Nn \g__question_seed_int
58   { \int_eval:n { \g__exam_id_int * 1000 + \g__question_number_int } }
59   \sys_gset_rand_seed:n { \g__question_seed_int }
60 }

```


`\__exam_print_answer_box` Prints a formatted answer key box in teacher mode.

```

61 \cs_new_protected:Npn \__exam_print_answer_box:
62 {
63   \par\smallskip
64   \begin{tcolorbox}[
65     enhanced,
66     breakable,
67     colback=white,
68     colframe=black,
69     arc=0pt,
70     outer~arc=0pt,
71     boxrule=1pt,
72     top=10pt,
73     bottom=10pt,
74     left=10pt,
75     right=10pt,
76     parbox=true,
77     fontupper=\linespread{1.2}\selectfont,
78     before~upper={\begin{flushleft}},
79     after~upper={\end{flushleft}},
80     coltitle=black,
81     fonttitle=\bfseries,
82     title={Answer~Key},
83     attach~boxed~title~to~top~left={
84       xshift=5mm,
85       yshift=-3.5mm
86     },
87     boxed~title~style={
88       colback=white,
89       colframe=white,
90       left=5pt, right=5pt
91     }
92   ]{
93     \setlength{\baselineskip}{1.2\normalbaselineskip}
94     \tl_use:N \g__question_answer_tl
95   }
96   \end{tcolorbox}
97   \par\smallskip
98 }

```

Question (*env.*) Main container for all question types. Handles numbering, metadata, and answer collection.

```

99 \dim_new:N \g__question_number_width_dim
100 \dim_new:N \g__question_metadata_width_dim
101 \dim_new:N \g__question_text_width_dim
102
103 \NewDocumentEnvironment{Question}{ m m m m }
104 {
105   \int_gincr:N \g__question_number_int
106
107   \tl_gset:Nn \g__question_type_tl   {#1}
108   \tl_gset:Nn \g__question_level_tl  {#2}
109   \tl_gset:Nn \g__question_marks_tl  {#3}
110 }

```

```

111 \tl_gclear:N \g__question_answer_tl
112
113 \__question_build_seed:
114
115 \tl_clear:N \l_tmpa_tl
116 \bool_if:nT { \g__mode_type_bool }
117 {
118   \tl_put_right:Nn \l_tmpa_tl
119   { [\prop_item:Nn \g__question_type_prop {#1}] }
120 }
121 \bool_if:nT { \g__mode_difficulty_bool }
122 { \tl_put_right:Nn \l_tmpa_tl { ~[#2] } }
123 \bool_if:nT { \g__mode_marks_bool }
124 { \tl_put_right:Nn \l_tmpa_tl { ~[#3~marks] } }
125
126 \settowidth{\g__question_metadata_width_dim}
127 { \footnotesize \l_tmpa_tl }
128
129 \settowidth{\g__question_number_width_dim}
130 { \bfseries Question~\PrintNumber{ \g__question_number_int }::~ }
131
132 \dim_set:Nn \g__question_text_width_dim
133 {
134   \linewidth
135   - \g__question_number_width_dim
136   - \g__question_metadata_width_dim
137   - 1em
138 }
139
140 \dim_compare:nNnT { \g__question_text_width_dim } < { Opt }
141 { \dim_set:Nn \g__question_text_width_dim { Opt } }
142
143 \par\medskip
144 \noindent
145 \makebox[\linewidth][l]
146 {
147   \makebox[\g__question_number_width_dim][l]
148   {\bfseries Question~\PrintNumber{\g__question_number_int}::~}
149
150   \parbox[t]{\g__question_text_width_dim}
151   { \bfseries #4 }
152
153   \hfill
154   { \footnotesize
155     \bool_if:nT { \g__mode_type_bool }
156     { [\prop_item:Nn \g__question_type_prop {#1}] }
157     \bool_if:nT { \g__mode_difficulty_bool }
158     { ~[#2] }
159     \bool_if:nT { \g__mode_marks_bool }
160     { ~[#3~marks] }
161   }
162 }
163 \par\smallskip
164 }

```

```

165 {
166   \bool_if:nT { \g__mode_teacher_bool && \g__mode_correction_bool }
167   {
168     \tl_if_empty:NF \g__question_answer_tl
169     { \__exam_print_answer_box: }
170   }
171   \par\smallskip
172 }

```

MC (*env.*) Creates multiple-choice questions with shuffled options.

```

173 \dim_new:N \l__mc_label_width_dim
174 \dim_new:N \l__mc_label_sep_dim
175 \dim_new:N \l__mc_col_sep_dim
176 \dim_new:N \l__mc_text_width_dim
177
178 \dim_set:Nn \l__mc_label_width_dim { 1.25em }
179 \dim_set:Nn \l__mc_label_sep_dim { 0.5em }
180 \dim_set:Nn \l__mc_col_sep_dim { 1.5em }
181
182 \dim_new:N \l__mc_before_first_question_dim
183 \dim_new:N \l__mc_after_question_text_dim
184 \dim_new:N \l__mc_between_questions_dim
185 \dim_new:N \l__mc_after_options_dim
186 \dim_new:N \l__mc_between_option_lines_dim
187
188 \dim_set:Nn \l__mc_before_first_question_dim { 0.2em }
189 \dim_set:Nn \l__mc_after_question_text_dim { 0.4em }
190 \dim_set:Nn \l__mc_between_questions_dim { 0.3em }
191 \dim_set:Nn \l__mc_after_options_dim { 0.3em }
192 \dim_set:Nn \l__mc_between_option_lines_dim { 0.7em }
193
194 \int_new:N \l__mc_question_counter_int
195 \int_new:N \l__mc_option_counter_int
196 \int_new:N \l__mc_columns_int
197 \int_new:N \l__mc_correct_index_int
198 \seq_new:N \l__mc_options_seq
199 \tl_new:N \l__mc_question_text_tl
200
201 \NewDocumentEnvironment{MC}{0{4}} {
202   {
203     \int_set:Nn \l__mc_columns_int {#1}
204     \int_zero:N \l__mc_question_counter_int
205     \int_zero:N \l__mc_option_counter_int
206     \par
207   }
208   {
209     \int_compare:nNnT { \l__mc_option_counter_int } > { 0 }
210     { \__mc_display_options: }
211     \par
212   }

```

\MCQuestion Defines a multiple-choice question within the MC environment.

```

213 \NewDocumentCommand{\MCQuestion}{m m }
214 {

```

```

215 \int_compare:nNnT { \l__mc_option_counter_int } > { 0 }
216 {
217   \__mc_display_options:
218   \par\vspace{\l__mc_after_options_dim}
219 }
220
221 \int_incr:N \l__mc_question_counter_int
222
223 \int_compare:nNnTF { \l__mc_question_counter_int } = { 1 }
224 { \par\vspace{\l__mc_before_first_question_dim} }
225 { \par\vspace{\l__mc_between_questions_dim} }
226
227 \par\noindent
228 \textbf{\PrintNumber{\l__mc_question_counter_int}.~#1}
229 \par\vspace{\l__mc_after_question_text_dim}
230
231 \int_set:Nn \l__mc_correct_index_int {#2}
232 \int_zero:N \l__mc_option_counter_int
233 \seq_clear:N \l__mc_options_seq
234 }

```

\MCOption Defines an option for a multiple-choice question.

```

235 \NewDocumentCommand{\MCOption}{ m }
236 {
237   \int_incr:N \l__mc_option_counter_int
238   \seq_put_right:Nn \l__mc_options_seq {#1}
239 }

```

__mc_display_options Displays the shuffled options in a grid layout.

```

240 \cs_new_protected:Npn \__mc_display_options:
241 {
242   \int_compare:nNnT { \l__mc_option_counter_int } = { 0 }
243   {
244     \msg_warning:nn { mc } { no-options }
245     \par
246     \scan_stop:
247   }
248
249   \tl_set:Nx \l_tmpa_tl
250   { \seq_item:Nn \l__mc_options_seq { \l__mc_correct_index_int } }
251
252   \seq_shuffle:N \l__mc_options_seq
253
254   \int_set:Nn \l_tmpa_int
255   { \int_mod:nn { \l__mc_option_counter_int } { \l__mc_columns_int } }
256
257   \int_compare:nNnT { \l_tmpa_int } > { 0 }
258   {
259     \int_set:Nn \l_tmpb_int { \l__mc_columns_int - \l_tmpa_int }
260     \prg_replicate:nn { \l_tmpb_int }
261     { \seq_put_right:Nn \l__mc_options_seq { \hspace{0pt} } }
262   }
263
264   \dim_set:Nn \l_tmpb_dim

```

```

265     { \int_eval:n { \l__mc_columns_int - 1 } \l__mc_col_sep_dim }
266 \dim_set:Nn \l_tmpa_dim
267   { ( \linewidth - \l_tmpb_dim ) / \l__mc_columns_int }
268
269 \dim_set:Nn \l__mc_text_width_dim
270   { \dim_eval:n
271     { \l_tmpa_dim - \l__mc_label_width_dim - \l__mc_label_sep_dim }
272   }
273
274 \dim_compare:nNnT { \l__mc_text_width_dim } < { Opt }
275   { \dim_set:Nn \l__mc_text_width_dim { Opt } }
276
277 \noindent
278 \int_step_inline:nn { \seq_count:N \l__mc_options_seq }
279   {
280     \tl_set:Nx \l_tmpb_tl {\seq_item:Nn \l__mc_options_seq {##1}}
281
282     \makebox[\l_tmpa_dim][l]
283     {
284       \makebox[\l__mc_label_width_dim][r]
285       {
286         \int_compare:nNnTF {##1} > { \l__mc_option_counter_int }
287         { \hspace{Opt} }
288         { \seq_item:Nn \g__exam_letters_seq {##1} }
289       }%
290       \hspace{\l__mc_label_sep_dim}%
291       \parbox[t]{\l__mc_text_width_dim}
292       {
293         \setlength{\baselineskip}{1.2\normalbaselineskip}
294         \raggedright
295         \l_tmpb_tl
296         \par
297       }%
298     }
299
300 \int_compare:nNnT { ##1 } < { \l__mc_option_counter_int + 1 }
301   {
302     \tl_if_eq:VVT \l_tmpb_tl \l_tmpa_tl
303     {
304       \tl_gput_right:Nx \g__question_answer_tl
305       {
306         \exp_not:N \makebox[5.25em][l]
307         {
308           (\PrintNumber{\l__mc_question_counter_int})~
309           $\Rightarrow$~
310           (\seq_item:Nn \g__exam_letters_seq {##1})
311         }%
312         \quad
313       }
314     }
315   }
316
317 \int_compare:nNnF
318   { \int_mod:nn {##1} { \l__mc_columns_int } } = { 0 }

```

```

319         { \hspace{\l__mc_col_sep_dim} }
320
321     \int_compare:nNnT
322     { \int_mod:nn {##1} { \l__mc_columns_int } } = { 0 }
323     {
324         \par\prevdepth=\dp\strutbox%
325         \vspace{\l__mc_between_option_lines_dim}
326         \noindent
327     }
328 }
329 \par
330 }

```

`\msg_new:nnnmcno-options` Warning message for MC questions without options.

```

331 \msg_new:nnn { mc } { no-options }
332 {
333     Warning: No options for question
334     \int_use:N \l__mc_question_counter_int.
335 }

```

TF (*env.*) Creates True/False questions with two display styles.

```

336 \int_new:N \l__tf_question_counter_int
337 \tl_new:N \l__tf_question_text_tl
338 \tl_new:N \l__tf_correct_answer_tl
339 \bool_new:N \l__tf_style_bool
340
341 \dim_const:Nn \l__tf_number_width_dim { 5.3mm }
342 \dim_const:Nn \l__tf_bracket_width_dim { 3em }
343 \dim_const:Nn \l__tf_option_width_dim { 8em }
344
345 \dim_new:N \l__tf_before_first_question_dim
346 \dim_new:N \l__tf_between_questions_dim
347 \dim_set:Nn \l__tf_before_first_question_dim { 0.3em }
348 \dim_set:Nn \l__tf_between_questions_dim { 0.7em }
349
350 \NewDocumentEnvironment{TF}{0}{bracket} }
351 {
352     \int_zero:N \l__tf_question_counter_int
353
354     \str_if_eq:nnTF {#1} {bracket}
355     { \bool_set_true:N \l__tf_style_bool }
356     { \bool_set_false:N \l__tf_style_bool }
357 }
358 { \vspace{0.3em} }

```

\TFQuestion Defines a True/False question.

```

359 \NewDocumentCommand{\TFQuestion}{m m }
360 {
361     \int_incr:N \l__tf_question_counter_int
362
363     \int_compare:nNnTF { \l__tf_question_counter_int } = { 1 }
364     { \par\vspace{\l__tf_before_first_question_dim} }
365     { \par\vspace{\l__tf_between_questions_dim} }
366

```

```

367 \par\noindent
368 \makebox[5.0mm][r]
369 { \PrintNumber{\l__tf_question_counter_int}\vphantom{(). }%
370 \hspace{0.7em}%
371
372 \bool_if:NTF \l__tf_style_bool
373 {
374   \parbox[t]{\dim_eval:n{\linewidth-8.0mm}}
375   {
376     \setlength{\baselineskip}{1.2\normalbaselineskip}
377     #1\unskip\nobreak\hspace{1em}%
378     \makebox[3em][c]{(\hspace{1.5em})}
379     \par
380   }
381 }
382 {
383   \parbox[t]
384   {\dim_eval:n{\linewidth-8.0mm-\l__tf_option_width_dim}}
385   {
386     \setlength{\baselineskip}{1.2\normalbaselineskip}
387     #1
388     \par
389   }%
390   \hfill
391   \makebox[\l__tf_option_width_dim][c]
392   {
393     \makebox[3em][c]{True}%
394     \hspace{1em}%
395     \makebox[3em][c]{False}
396   }
397 }
398 \par\prevdepth=\dp\strutbox%
399
400 \tl_gput_right:Nx \g__question_answer_tl
401 {
402   \exp_not:N \makebox[5.25em][l]
403   {
404     (\PrintNumber{\l__tf_question_counter_int})~
405     $\Rightarrow$~
406     #2
407   }%
408   \quad
409 }
410 }

```

FillBlank (*env.*) Creates fill-in-the-blank questions with optional word bank.

```

411 \int_new:N \l__fb_question_counter_int
412 \tl_new:N \l__fb_answer_tl
413 \bool_new:N \l__fb_wordbank_bool
414
415 \dim_const:Nn \l__fb_number_width_dim { 5.3mm }
416
417 \dim_new:N \l__fb_before_first_question_dim
418 \dim_new:N \l__fb_between_questions_dim

```

```

419 \dim_set:Nn \l__fb_before_first_question_dim { 0.5em }
420 \dim_set:Nn \l__fb_between_questions_dim { 0.8em }
421
422 \NewDocumentEnvironment{FillBlank}{0}{false} {
423   {
424     \int_zero:N \l__fb_question_counter_int
425     \tl_clear:N \l__fb_answer_tl
426     \str_if_eq:nnTF {#1} {true}
427       { \bool_set_true:N \l__fb_wordbank_bool }
428       { \bool_set_false:N \l__fb_wordbank_bool }
429   }
430   {
431     \tl_gset_eq:NN \g__question_answer_tl \l__fb_answer_tl
432     \vspace{0.35em}%
433   }

```

`\WordBank` Displays a dynamic word bank box.

```

434 \NewDocumentCommand{\WordBank}{0}{\quad} m {
435   {
436     \bool_if:NT \l__fb_wordbank_bool
437       {
438         \par\vspace{0.5em}\noindent
439
440         \tl_clear:N \l_tmpa_tl
441         \clist_set:Nn \l_tmpa_clist {#2}
442
443         \hbox_set:Nn \l_tmpa_box { \clist_use:Nn \l_tmpa_clist {#1} }
444         \dim_set:Nn \l_tmpa_dim { \box_wd:N \l_tmpa_box }
445
446         \dim_set:Nn \l_tmpb_dim { 0.9\linewidth }
447
448         \dim_compare:nNnTF { \l_tmpa_dim } > { \l_tmpb_dim }
449           { \dim_set:Nn \l_tmpa_dim { \l_tmpb_dim } }
450           { }
451
452         \dim_add:Nn \l_tmpa_dim { 10pt }
453
454         \makebox[\linewidth][c]
455         {
456           \fbox
457             {%
458               \begin{minipage}{\l_tmpa_dim}
459                 \centering
460                 \vspace{4pt}
461                 \setlength{\baselineskip}{1.2\normalbaselineskip}
462                 \clist_use:Nn \l_tmpa_clist {#1}
463                 \vspace{3pt}
464                 \end{minipage}%
465             }
466           }%
467         \par\vspace{0.3em}
468       }
469   }

```


`\Blank` Creates an underline field for student answers.

```
470 \NewDocumentCommand{\Blank}{0{4.25em}}{ }
471 { \underline{\hspace{#1}} }
```

`\FillQuestion` Defines a fill-in-the-blank question with its answer.

```
472 \NewDocumentCommand{\FillQuestion}{m m }
473 {
474   \int_incr:N \l__fb_question_counter_int
475
476   \int_compare:nNnTF { \l__fb_question_counter_int } = { 1 }
477   { \par\vspace{\l__fb_before_first_question_dim} }
478   { \par\vspace{\l__fb_between_questions_dim} }
479
480   \par\noindent
481   \makebox[5.0mm][r]
482   { \PrintNumber{\l__fb_question_counter_int}\vphantom{(}. }%
483   \hspace{0.7em}%
484
485   \parbox[t]{\dim_eval:n{\linewidth-8.0mm}}
486   {
487     \setlength{\baselineskip}{1.2\normalbaselineskip}
488     #1
489     \par
490   }
491   \par\prevdepth=\dp\strutbox%
492
493   \seq_set_split:Nnn \l_tmpa_seq { | } {#2}
494   \int_zero:N \l_tmpa_int
495
496   \seq_map_inline:Nn \l_tmpa_seq
497   {
498     \int_incr:N \l_tmpa_int
499
500     \int_compare:nNnTF { \seq_count:N \l_tmpa_seq } > { 1 }
501     {
502       \tl_put_right:Nx \l__fb_answer_tl
503       {
504         \exp_not:N
505         (\PrintNumber{\l__fb_question_counter_int} -
506          \int_use:N \l_tmpa_int)~$\Rightarrow$~##1
507         \exp_not:N \par
508         \exp_not:N \noindent
509       }
510     }
511     {
512       \tl_put_right:Nx \l__fb_answer_tl
513       {
514         \exp_not:N (\PrintNumber{\l__fb_question_counter_int})~
515         $\Rightarrow$~
516         ##1
517         \exp_not:N \par
518         \exp_not:N \noindent
519       }
520     }
521   }
```

```

521     }
522 }

```

Ordering (*env.*) Creates sequencing questions with shuffled options.

```

523 \int_new:N \l__ord_question_counter_int
524 \int_new:N \l__ord_option_counter_int
525 \int_new:N \l__ord_columns_int
526 \seq_new:N \l__ord_options_seq
527 \seq_new:N \l__ord_original_order_seq
528 \tl_new:N \l__ord_answer_tl
529
530 \bool_new:N \l__ord_answer_pending_bool
531
532 \dim_new:N \l__ord_answer_width_dim
533 \dim_set:Nn \l__ord_answer_width_dim { 1.5em }
534
535 \dim_new:N \l__ord_label_width_dim
536 \dim_new:N \l__ord_label_sep_dim
537 \dim_new:N \l__ord_col_sep_dim
538 \dim_new:N \l__ord_text_width_dim
539 \dim_set:Nn \l__ord_label_width_dim { 1.25em }
540 \dim_set:Nn \l__ord_label_sep_dim { 0.5em }
541 \dim_set:Nn \l__ord_col_sep_dim { 1.5em }
542
543 \dim_new:N \l__ord_before_first_question_dim
544 \dim_new:N \l__ord_after_question_text_dim
545 \dim_new:N \l__ord_between_questions_dim
546 \dim_new:N \l__ord_after_options_dim
547 \dim_new:N \l__ord_between_option_lines_dim
548
549 \dim_set:Nn \l__ord_before_first_question_dim { 0.2em }
550 \dim_set:Nn \l__ord_after_question_text_dim { 0.4em }
551 \dim_set:Nn \l__ord_between_questions_dim { 0.3em }
552 \dim_set:Nn \l__ord_after_options_dim { 0.3em }
553 \dim_set:Nn \l__ord_between_option_lines_dim { 0.7em }
554
555 \NewDocumentEnvironment{Ordering}{0{4} }
556 {
557   \int_set:Nn \l__ord_columns_int {#1}
558   \int_zero:N \l__ord_question_counter_int
559   \int_zero:N \l__ord_option_counter_int
560   \tl_clear:N \l__ord_answer_tl
561   \seq_clear:N \l__ord_options_seq
562   \seq_clear:N \l__ord_original_order_seq
563   \bool_set_false:N \l__ord_answer_pending_bool
564   \par
565 }
566 {
567   \int_compare:nNnT { \l__ord_option_counter_int } > { 0 }
568     { \__ord_display_options: }
569
570   \tl_gset_eq:NN \g__question_answer_tl \l__ord_answer_tl
571
572   \par

```

573 }

\OrderQuestion Defines an ordering question.

```

574 \NewDocumentCommand{\OrderQuestion}{ m }
575 {
576   \int_compare:nNnT { \l__ord_option_counter_int } > { 0 }
577   {
578     \__ord_display_options:
579     \par\vspace{\l__ord_after_options_dim}
580   }
581
582   \int_incr:N \l__ord_question_counter_int
583
584   \int_compare:nNnTF { \l__ord_question_counter_int } = { 1 }
585   { \par\vspace{\l__ord_before_first_question_dim} }
586   { \par\vspace{\l__ord_between_questions_dim} }
587
588   \par\noindent
589   \textbf{\PrintNumber{\l__ord_question_counter_int}.~#1}
590   \par\vspace{\l__ord_after_question_text_dim}
591
592   \int_zero:N \l__ord_option_counter_int
593   \seq_clear:N \l__ord_options_seq
594   \seq_clear:N \l__ord_original_order_seq
595   \bool_set_false:N \l__ord_answer_pending_bool
596 }

```

\OrderOption Defines an option for an ordering question.

```

597 \NewDocumentCommand{\OrderOption}{ m }
598 {
599   \int_incr:N \l__ord_option_counter_int
600   \seq_put_right:Nn \l__ord_options_seq {#1}
601   \seq_put_right:Nn \l__ord_original_order_seq {#1}
602 }

```

\OrderAnswer Adds an optional answer space after ordering options.

```

603 \NewDocumentCommand{\OrderAnswer}{ 0{1.5em} }
604 {
605   \bool_set_true:N \l__ord_answer_pending_bool
606   \dim_set:Nn \l__ord_answer_width_dim {#1}
607 }

```

__ord_display_options Displays shuffled ordering options and builds the answer key.

```

608 \cs_new_protected:Npn \__ord_display_options:
609 {
610   \int_compare:nNnT { \l__ord_option_counter_int } = { 0 }
611   {
612     \msg_warning:nn { ord } { no-options }
613     \par
614     \scan_stop:
615   }
616
617   \seq_shuffle:N \l__ord_options_seq
618

```

```

619 \int_set:Nn \l_tmpa_int
620   {\int_mod:nn {\l__ord_option_counter_int} {\l__ord_columns_int}}
621
622 \int_compare:nNnT { \l_tmpa_int } > { 0 }
623   {
624     \int_set:Nn \l_tmpb_int { \l__ord_columns_int - \l_tmpa_int }
625     \prg_replicate:nn { \l_tmpb_int }
626     { \seq_put_right:Nn \l__ord_options_seq { \hspace{0pt} } }
627   }
628
629 \dim_set:Nn \l_tmpb_dim
630   { \int_eval:n { \l__ord_columns_int - 1 } \l__ord_col_sep_dim }
631 \dim_set:Nn \l_tmpa_dim
632   { ( \linewidth - \l_tmpb_dim ) / \l__ord_columns_int }
633
634 \dim_set:Nn \l__ord_text_width_dim
635   { \dim_eval:n
636     {\l_tmpa_dim - \l__ord_label_width_dim - \l__ord_label_sep_dim}
637   }
638
639 \dim_compare:nNnT { \l__ord_text_width_dim } < { Opt }
640   { \dim_set:Nn \l__ord_text_width_dim { Opt } }
641
642 \noindent
643 \int_step_inline:nn { \seq_count:N \l__ord_options_seq }
644   {
645     \tl_set:Nx \l_tmpb_tl {\seq_item:Nn \l__ord_options_seq {##1}}
646
647     \makebox[\l_tmpa_dim][l]
648     {
649       \makebox[\l__ord_label_width_dim][l]
650       {
651         \int_compare:nNnTF {##1} > {\l__ord_option_counter_int}
652         { \hspace{0pt} }
653         { \seq_item:Nn \g__exam_letters_seq {##1} ) }
654       }%
655       \hspace{\l__ord_label_sep_dim}%
656       \parbox[t]{\l__ord_text_width_dim}
657       {
658         \setlength{\baselineskip}{1.2\normalbaselineskip}
659         \raggedright
660         \l_tmpb_tl
661       }
662     }
663   }
664
665 \int_compare:nNnF
666   { \int_mod:nn {##1} { \l__ord_columns_int } } = { 0 }
667   { \hspace{\l__ord_col_sep_dim} }
668
669 \int_compare:nNnT
670   { \int_mod:nn {##1} { \l__ord_columns_int } } = { 0 }
671   {
672     \par\prevdepth=\dp\strutbox%

```

```

673         \vspace{\l__ord_between_option_lines_dim}
674         \noindent
675     }
676 }
677 \par
678
679 \__ord_build_correct_order:
680
681 \bool_if:NT \l__ord_answer_pending_bool
682 {
683     \__ord_print_answer:
684     \bool_set_false:N \l__ord_answer_pending_bool
685 }
686 }

```

`\__ord_build_correct_order` Builds the correct order string for the answer key.

```

687 \cs_new_protected:Npn \__ord_build_correct_order:
688 {
689     \tl_clear:N \l_tmpa_tl
690
691     \int_step_inline:nn { \l__ord_option_counter_int }
692     {
693         \int_zero:N \l_tmpb_int
694         \tl_set:Nx \l_tmpb_tl
695             { \seq_item:Nn \l__ord_original_order_seq {##1} }
696
697         \int_step_inline:nn { \l__ord_option_counter_int }
698         {
699             \tl_set:Nx \l_tmpc_tl
700                 { \seq_item:Nn \l__ord_options_seq {####1} }
701             \tl_if_eq:NNT \l_tmpb_tl \l_tmpc_tl
702                 { \int_set:Nn \l_tmpb_int {####1} }
703         }
704
705         \tl_put_right:Nx \l_tmpa_tl
706             { \seq_item:Nn \g__exam_letters_seq { \int_use:N \l_tmpb_int } }
707
708         \int_compare:nNnF {##1} = { \l__ord_option_counter_int }
709             { \tl_put_right:Nn \l_tmpa_tl { ~,~ } }
710     }
711
712     \tl_put_right:Nx \l__ord_answer_tl
713     {
714         \exp_not:N \makebox[4em][l]
715         {
716             (\PrintNumber{\l__ord_question_counter_int})~
717             $\Rightarrow$~
718             \l_tmpa_tl
719         }%
720     }
721     \noindent
722 }
723 }

```

`\__ord_print_answer` Prints the answer space for ordering questions.

```

724 \cs_new_protected:Npn \__ord_print_answer:
725 {
726   \par
727   \noindent
728   Order:\quad
729   \int_step_inline:nn { \l__ord_option_counter_int }
730   {
731     \underline{\hspace{\l__ord_answer_width_dim}}\,
732     \int_compare:nNnT {##1} < { \l__ord_option_counter_int } { ,\ }
733   }
734   \par\vspace{0.3\baselineskip}
735 }
```

`Matching (env.)` Creates two-column matching questions with shuffled right column.

```

736 \seq_new:N \l__match_left_seq
737 \seq_new:N \l__match_right_seq
738 \seq_new:N \l__match_index_seq
739 \int_new:N \l__match_count_int
740 \tl_new:N \l__match_answer_tl
741
742 \dim_new:N \l__match_label_width_dim
743 \dim_new:N \l__match_label_sep_dim
744 \dim_new:N \l__match_col_sep_dim
745 \dim_new:N \l__match_left_text_width_dim
746 \dim_new:N \l__match_right_text_width_dim
747 \dim_new:N \l__match_left_width_dim
748 \dim_new:N \l__match_right_width_dim
749
750 \dim_new:N \l__match_before_first_dim
751 \dim_new:N \l__match_between_pairs_dim
752
753 \dim_set:Nn \l__match_label_width_dim { 1.5em }
754 \dim_set:Nn \l__match_label_sep_dim { 0.5em }
755 \dim_set:Nn \l__match_col_sep_dim { 2em }
756 \dim_set:Nn \l__match_before_first_dim { 0.3em }
757 \dim_set:Nn \l__match_between_pairs_dim { 0.7em }
758
759 \NewDocumentEnvironment{Matching}{ 0{0.5} }
760 {
761   \seq_clear:N \l__match_left_seq
762   \seq_clear:N \l__match_right_seq
763   \seq_clear:N \l__match_index_seq
764   \tl_clear:N \l__match_answer_tl
765
766   \dim_set:Nn \l__match_left_width_dim
767   { #1\linewidth-\l__match_label_width_dim-\l__match_label_sep_dim }
768   \dim_set:Nn \l__match_right_width_dim
769   { \linewidth - \l__match_left_width_dim - \l__match_col_sep_dim }
770
771   \dim_set:Nn \l__match_left_text_width_dim
772   { \l__match_left_width_dim
773     - \l__match_label_width_dim
774     - \l__match_label_sep_dim }
```

```

775 \dim_set:Nn \l__match_right_text_width_dim
776 { \l__match_right_width_dim
777   - \l__match_label_width_dim
778   - \l__match_label_sep_dim }
779 }
780 {
781   \int_compare:nNnT { \seq_count:N \l__match_left_seq } = { 0 }
782     { \msg_error:nn { matching } { empty-pair } }
783
784   \int_compare:nNnF { \seq_count:N \l__match_left_seq } =
785     { \seq_count:N \l__match_right_seq }
786     {
787       \msg_warning:nnx { matching } { odd-number }
788       { \int_use:N \seq_count:N \l__match_left_seq }
789       { \int_use:N \seq_count:N \l__match_right_seq }
790     }
791
792   \int_set:Nn \l__match_count_int
793     { \seq_count:N \l__match_right_seq }
794
795   \int_step_inline:nn { \l__match_count_int }
796     { \seq_put_right:Nn \l__match_index_seq {##1} }
797
798   \seq_shuffle:N \l__match_index_seq
799
800   \par\vspace{\l__match_before_first_dim}
801   \noindent
802   \begin{minipage}[t]{\l__match_left_width_dim}
803     \raggedright
804     \int_step_inline:nn { \l__match_count_int }
805     {
806       \makebox[\l__match_label_width_dim][r]
807         { \PrintNumber{##1} ) }%
808       \hspace{\l__match_label_sep_dim}%
809       \parbox[t]{\l__match_left_text_width_dim}
810       {
811         \setlength{\baselineskip}{1.2\normalbaselineskip}
812         \raggedright
813         \seq_item:Nn \l__match_left_seq {##1}
814         \par
815         \vspace{0.1em}
816       }
817       \par\prevdepth=\dp\strutbox%
818       \vspace{\l__match_between_pairs_dim}
819     }
820   \end{minipage}
821   \hspace{\l__match_col_sep_dim}
822   \begin{minipage}[t]{\l__match_right_width_dim}
823     \raggedright
824     \int_step_inline:nn { \l__match_count_int }
825     {
826       \makebox[\l__match_label_width_dim][r]
827         { \seq_item:Nn \g__exam_letters_seq {##1} ) }%
828       \hspace{\l__match_label_sep_dim}%

```

```

829         \parbox[t]{\l__match_right_text_width_dim}
830         {
831             \setlength{\baselineskip}{1.2\normalbaselineskip}
832             \raggedright
833             \seq_item:Nn \l__match_right_seq
834             { \seq_item:Nn \l__match_index_seq {##1} }
835             \par
836             \vspace{0.1em}
837         }
838         \par\prevdepth=\dp\strutbox%
839         \vspace{\l__match_between_pairs_dim}
840     }
841 \end{minipage}
842 \par
843
844 \tl_clear:N \l__match_answer_tl
845
846 \int_step_inline:nn { \l__match_count_int }
847 {
848     \int_zero:N \l_tmpa_int
849
850     \int_step_inline:nn { \l__match_count_int }
851     {
852         \int_compare:nNnT
853         { \seq_item:Nn \l__match_index_seq {####1} } = { ##1 }
854         { \int_set:Nn \l_tmpa_int {####1} }
855     }
856
857     \tl_put_right:Nx \l__match_answer_tl
858     {
859         \exp_not:N \makebox[5.25em][l]
860         {
861             (\PrintNumber{##1})~
862             $\Rightarrow$~
863             (\seq_item:Nn \g__exam_letters_seq
864             { \int_use:N \l_tmpa_int })
865         }%
866         \qqquad
867     }
868 }
869
870 \tl_gset_eq:NN \g__question_answer_tl \l__match_answer_tl
871 }

```

\MatchPair Defines a matching pair.

```

872 \NewDocumentCommand{\MatchPair}{mm}
873 {
874     \seq_put_right:Nn \l__match_left_seq {#1}
875     \seq_put_right:Nn \l__match_right_seq {#2}
876 }

```

Essay (*env.*) Creates essay questions with ruled or blank lines.

```

877 \int_new:N \l__essay_question_counter_int
878 \tl_new:N \l__essay_answer_tl

```



```

879 \bool_new:N \l__essay_lines_bool
880
881 \dim_const:Nn \l__essay_number_width_dim { 5.3mm }
882 \dim_new:N \l__essay_line_skip_dim
883 \dim_set:Nn \l__essay_line_skip_dim { 0.4\baselineskip }
884
885 \dim_new:N \l__essay_before_first_question_dim
886 \dim_new:N \l__essay_between_questions_dim
887 \dim_new:N \l__essay_after_question_dim
888
889 \dim_set:Nn \l__essay_before_first_question_dim { 0.2em }
890 \dim_set:Nn \l__essay_between_questions_dim { 0.2\baselineskip }
891 \dim_set:Nn \l__essay_after_question_dim { 0.65\baselineskip }
892
893 \NewDocumentEnvironment{Essay}{ 0{true} }
894 {
895   \int_zero:N \l__essay_question_counter_int
896   \tl_clear:N \l__essay_answer_tl
897
898   \str_if_eq:nnTF {#1} {true}
899   { \bool_set_true:N \l__essay_lines_bool }
900   { \bool_set_false:N \l__essay_lines_bool }
901 }
902 {
903   \tl_gset_eq:NN \g__question_answer_tl \l__essay_answer_tl
904 }

```

\EssayQuestion Defines an essay question (no limit on number of lines).

```

905 \NewDocumentCommand{\EssayQuestion}{ 0{4} m m }
906 {
907   \int_incr:N \l__essay_question_counter_int
908
909   \int_set:Nn \l_tmpa_int {#1}
910
911   \int_compare:nNnTF { \l__essay_question_counter_int } = { 1 }
912   { \par\vspace{\l__essay_before_first_question_dim} }
913   { \par\vspace{\l__essay_between_questions_dim} }
914
915   \par\noindent
916   \makebox[5.0mm][r]{\PrintNumber{\l__essay_question_counter_int}.}%
917   \hspace{0.7em}%
918   \parbox[t]{\dim_eval:n{\linewidth-8.0mm}}{
919     {
920       \setlength{\baselineskip}{1.2\normalbaselineskip}
921       #2
922       \par
923     }
924   \par\prevdepth=\dp\strutbox%
925   \vspace{\l__essay_after_question_dim}
926
927   \int_step_inline:nn {#1}
928   {
929     \noindent
930     \hspace*{6.0mm}%

```

```

931         \rule{\dim_eval:n{\linewidth-6.0mm}}
932         { \bool_if:NTF \l__essay_lines_bool {0.4pt} {0pt} }
933         \par\vspace{\l__essay_line_skip_dim}
934     }
935
936     \tl_put_right:Nx \l__essay_answer_tl
937     {
938         \exp_not:N (\PrintNumber{\l__essay_question_counter_int})~
939         $\Rightarrow$~
940         #3
941         \par
942     }
943 }

```

ShortAnswer (*env.*) Creates short answer questions (0, 1, or 2 lines).

```

944 \int_new:N \l__short_question_counter_int
945 \tl_new:N \l__short_answer_tl
946 \bool_new:N \l__short_lines_bool
947
948 \dim_const:Nn \l__short_number_width_dim { 5.3mm }
949 \dim_new:N \l__short_line_height_dim
950 \dim_set:Nn \l__short_line_height_dim { 0.4\baselineskip }
951
952 \dim_new:N \l__short_before_first_question_dim
953 \dim_new:N \l__short_between_questions_dim
954 \dim_new:N \l__short_after_question_dim
955
956 \dim_set:Nn \l__short_before_first_question_dim { 0.2em }
957 \dim_set:Nn \l__short_between_questions_dim { 0.2\baselineskip }
958 \dim_set:Nn \l__short_after_question_dim { 0.65\baselineskip }
959
960 \NewDocumentEnvironment{ShortAnswer}{0}{true} {
961   {
962     \int_zero:N \l__short_question_counter_int
963     \tl_clear:N \l__short_answer_tl
964
965     \str_if_eq:nnTF {#1} {true}
966     { \bool_set_true:N \l__short_lines_bool }
967     { \bool_set_false:N \l__short_lines_bool }
968   }
969   {
970     \tl_gset_eq:NN \g__question_answer_tl \l__short_answer_tl
971   }

```

\ShortQuestion Defines a short answer question (0, 1, or 2 lines, capped at 2 without warning).

```

972 \NewDocumentCommand{\ShortQuestion}{0{1} m m }
973 {
974     \int_incr:N \l__short_question_counter_int
975
976     \int_set:Nn \l_tmpa_int {#1}
977     \int_compare:nNnT {#1} > { 2 }
978     { \int_set:Nn \l_tmpa_int { 2 } }
979
980     \int_compare:nNnTF { \l__short_question_counter_int } = { 1 }

```

```

981     { \par\vspace{\l__short_before_first_question_dim} }
982     { \par\vspace{\l__short_between_questions_dim} }
983
984     \par\noindent
985     \makebox[5.0mm][r]{\PrintNumber{\l__short_question_counter_int}.}%
986     \hspace{0.7em}%
987     \parbox[t]{\dim_eval:n{\linewidth-8.0mm}}
988     {
989         \setlength{\baselineskip}{1.2\normalbaselineskip}
990         #2
991         \int_compare:nNnT {#1} = { 0 }
992         { \quad \underline{\hspace{6em}} }
993     }
994     \par\prevdepth=\dp\strutbox%
995     \vspace{\l__short_after_question_dim}
996
997     \int_compare:nNnT {#1} > { 0 }
998     {
999         \int_step_inline:nn { \l_tmpa_int }
1000         {
1001             \par
1002             \noindent
1003             \hspace*{6.0mm}%
1004             \rule{\dim_eval:n{\linewidth-6.0mm}}
1005             { \bool_if:NTF \l__short_lines_bool {0.4pt} {0pt} }
1006             \par\vspace{\l__short_line_height_dim}
1007         }
1008     }
1009     \par
1010
1011     \tl_put_right:Nx \l__short_answer_tl
1012     {
1013         \exp_not:N (\PrintNumber{\l__short_question_counter_int})~
1014         $\rightarrow$~
1015         #3
1016         \par
1017     }
1018 }

```

ReadingPassage (*env.*) Creates a boxed environment for reading passages.

```

1019 \NewDocumentEnvironment{ReadingPassage}{0}{m}
1020 {
1021     \par
1022     \begin{tcolorbox}[
1023         enhanced,
1024         breakable,
1025         colback=white,
1026         colframe=black,
1027         arc=0pt,
1028         outer~arc=0pt,
1029         boxrule=1pt,
1030         top=10pt,
1031         bottom=10pt,
1032         left=10pt,

```

```

1033     right=10pt,
1034     parbox=true,
1035     fontupper=\linespread{1.4}\selectfont,
1036     coltitle=black,
1037     fonttitle=\bfseries,
1038     title={\textbf{\tl_if_empty:nTF {#2} {Reading Passage} {#2}}},
1039     #1,
1040     attach~boxed~title~to~top~center={
1041         yshift=-3mm,
1042         yshifttext=-1mm
1043     },
1044     boxed~title~style={
1045         colback=white,
1046         colframe=white,
1047         left=5pt, right=5pt
1048     }
1049 ]
1050 }
1051 {
1052     \end{tcolorbox}
1053     \par\smallskip
1054 }

1055 \ExplSyntaxOff

```

Change History

v1.0
 General: Initial public release [1](#)