AplusixEditor: The Aplusix 3 exercise editor
User Manual

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English translation by Arnaud Delobelle
Document written with epsilonwriter

Summary

1. Introduction

Aplusix Exercise Editor can be used to create and edit exercises made of questions and problems. They are saved as ".exo" files.

Exercise questions are specified with a question type (one of Calculate, Write as a fraction, Write as a decimal, Expand and simplify, Simplify, Factorise, or Solve) and an expression.

Problems are divided into sections. Each section contains an information zone, an answer zone and/or a calculation zone. Students read the information then provide an answer and/or perform calculations. Students can use detached steps for separate calculations.

1.1. Exercise questions

An exercise question involves a question type and an algebraic expression. For example, "Expand and simplify $(x - 2)(3x + 4) + 3x^2 - 6x$" is an exercise question in which the question type is "Expand and simplify" and the algebraic expression is $(x - 2)(3x + 4) + 3x^2 - 6x$. The question type must be one of Calculate, Write as a fraction, Write as a decimal, Expand and simplify, Simplify, Factorise, or Solve. It allows Aplusix to validate answers.

A question may have instructions. In this case, the instructions are presented to the student instead of the question type. For example, the instructions "Factorise the greatest common factor" may accompany a Factorise question for a linear expression such as $12x - 18$.

A question may also be tagged with keywords. Keywords help organise and select exercise questions.

1.2. Problems

A problem is expressed in English. It may include figures in bitmap (BMP) or JPEG format. A problem may contain several questions which may or may not be related. These questions are called sections.

A problem is composed of a title, optional keywords and sections.

Sections

Each section of a problem contains:

• A text zone with a section title and a text describing the terms of the problem. The text may include images and algebraic expressions.
• An answer zone which can be one of:
   o   A calculation zone that can be filled by the teacher with a question or left empty,
   o   A simple answer zone, in which the teacher provides a pre-prompt (a very short text that will be placed before the answer), the expected answer, a post-prompt (a very short text that will be placed after the answer), and the comparison mode between the student's answer and the expected answer,
   o   An answer zone "with template" which allows the teacher providing an expression with question marks that will be replaced with adequate values by the student. The teacher also needs to provide a complete answer.

Example.   template: $25 + = 28$ answer: $25 + 3 = 28$

There are three modes for comparing the student's answer with the answer expected by Aplusix:

• Identical expressions.
• Similar expressions. In this mode, Aplusix will use commutativity, associativity and simplifications with 0 and 1 for the comparison. If the student's answer is $\begin{cases} y + x = 1 \\ 2x + 1y = 2 \end{cases}$ and the expected answer is $\begin{cases} 2x + y = 2 \\ x + y = 1 \end{cases}$ the student's answer will be accepted.
• Equivalent expressions. In this mode, Aplusix will use expression equivalence to make the comparison. If the student's answer is $x = 1$ and the expected answer is $2x + 4 = 6$ the student's answer will be accepted.

The most commonly used comparison mode is "similar expressions" because "Identical expressions" is often too strict and "Equivalent expressions" is often too permissive. For answers with template, "Identical expressions" is recommended when the values replacing the question marks are integers.

When the expected answer contains variables, the teacher must indicate whether the student can use different variables from the ones in the expected answer using the check box "Variables can be changed". When "Variables can be changed" is checked, variables must not be specified in the information part of the problem. Conversely, when "Variables can be changed" is not checked, variables must be specified in the information part of the problem. In the information, variables must be written as expressions, i.e., <<x>> for the variable x.

Example of a problem

Below is a problem that can be entered in the editor.

Title

Ostriches and buffaloes

Text

In an African country, ostriches and buffaloes live together in the same area. Altogether there are 60 heads and 172 feet. How many buffaloes and how many ostriches are there?

Write equations to represent the problem.

Type of answer: Calculation area

Type of question: Solve

Expression: $\begin{cases} a + b = 60 \\ 2a + 4b = 172 \end{cases}$

Initial expression expected

Comparison method

Similar d expressions

Variables can be changed

1.3. Exercises

an "Exercise" is a sequence of questions and problems, which can be saved in a file. It also contains general information: name and email of the author, and execution mode which can be left empty or set to Practice / Test.

Practice mode

In Practice mode, students solve questions and problems without any time limit. They can check their score at any moment (from the contextual menu - available only for questions). They can also ask for

the solution (from the contextual menu). These functions are controlled by settings and can be deactivated by the teacher.

Test mode

In Test mode, students have a limited amount of time to solve questions and problems. They can see the remaining time. They cannot access the score and the solution. They can stop the test at any time and review their work using self-correction mode.

2. Creating an exercise

Start the application or select "New exercise" from the File menu. The main window displays an empty list of questions.

Fill in the fields in the upper part of the window. The duration is only taken into account when the execution mode is set to Test. Create questions or problems or both. Save the exercise with "File | Save". It is advisable to do this as soon as possible.

3. Adjusting the settings

It is now possible to adjust settings for an exercise, thanks to the "Settings" button.

These settings are specific to the exercise and replace the usual settings that the student works with.

The settings are presented in the same manner as class settings except that there is an additional value "no choice", which is the default value.

When an exercise file is opened in Aplusix, settings with the "no choice" value are not altered; other settings will take the value specified in the exercise file.

4. Creating a question

In the main window menu, select "Questions | New question". The editing window opens with an empty question.

In the editing window menu, select "Add | Question". A new empty question appears in the editing window.
• Select the question type. Each question type has default instructions; if you want to write custom instructions, fill in the "Instructions" field.
• Enter the expression either by clicking on the "Edit" button or by double clicking on the "Expression" field.
• Check that the question has been correctly created by clicking on the "Question" button of the "Preview" bar, in "With remarks" mode. The preview window open with warnings when something is wrong in the question.
• You may save the exercise by clicking on the "floppy disk" at any time.

You have added a question to the exercise. It now appears in the main window. You can move the question up or down the list using cut and a paste.

5. Creating a problem

In the main window menu, select "Question | New problem". The editing window opens with an empty problem.

In the editing window menu, select "Add | Problem". A new empty problem appears in the editing window.

Each problem is created with one section.
• Enter the problem title. You have the option of specifying keywords.
• Fill in the first section (see below).
• Add and fill in additional sections if required.
• Check that the problem has been correctly created by clicking on the "Problem" button of the "Preview" bar, in "With remarks" mode. The preview window opens with warnings when something is wrong in the problem.
• Save the exercise by clicking on the "floppy disk" button (recommended).

You have added a problem to the list. It now appears in the main window: there is a row for the problem and a row for each section. You can move the problem up and down the list using cut and a paste. You can also rearrange sections within a problem in the same way.

6. Creating a section

Each new problem is created with one empty section.

To add a section to a problem, click on the "New section" button or select "Add | Section".

1) Enter the "Section title".

2) Type in the "Text" of the section. It can be composed of written text, algebraic expressions and images. Using the contextual menu, you can add or remove algebraic expressions and images. For more details see below.

3) Click on the "Answer" tab, choose the answer type as one of "Calculation area", "Simple answer" and "Answer with template" and click "Ok".

a) Calculation area

If you want to give the student a starting point, select "Initial expression provided to the student" at the bottom of the window, then fill in the field as for an exercise question.

If you want the student to enter their own expression, select "Initial expression to be entered by the student", then select the comparison mode and specify whether variables can be changed at the bottom of the window. Then enter the question type, the expression and, optionally, instructions.

b) Simple answer

Enter a pre-prompt (a short text that will be placed before the answer) if required.

Enter the expression.

Enter a post-prompt (a short text that will be placed after the answer) if required.

Select the comparison mode and specify whether variables can be changed at the bottom of the window.

c) Answer with template

This answer type is similar to "Simple answer". The difference is that you can include question marks in the expected answer. The student will have to replace the question marks with correct values / expressions. An example of a template is $3x + = 5x$; the corresponding expression is $3x + 2x = 5x$.

Note

You can change the answer type by clicking on the "Cancel answer" button. In this case, you lose what you entered in the current answer.

4) Check that the section has been correctly created by clicking on the "Section" button of the "Preview" bar, in "With remarks" mode. The preview window opens with warnings when something is wrong in the section.

5) Save the exercise (recommended).

7. Images

Insertion

An image can be inserted into the "Text" field of a problem section. Use the contextual menu for this. Select a file containing an image in bitmap (BMP) or JPEG format. After insertion an item "apx:img" appears in the "Text" field followed by the path of the image relative to the exercises directory.

Deletion

Right-click while the mouse pointer is over the image item in the "Text" field and select "Delete image" from the contextual menu. You can also delete the image item directly in the "Text" field.

8. Algebraic expressions

Insertion

An algebraic expression can be inserted into the "Text" field of a problem section. This can be achieved by right-clicking and selecting "Edit expression" from the contextual menu. A window opens where you can create your expression. You need to close this window when finished. A text representation of the expression (enclosed between "<<" and ">>") appears in the "Text" field of the section.

Edition

Right-click on the expression you want to edit and select "Edit expression" from the contextual menu.

Deletion

Delete the text representation of the expression in the "Text" field (enclosed between "<<" and ">>").

9. Changing the order of questions and problems

In the main window, which contains the table of all questions and problems in the exercise, you can move a question or a problem using cut and paste; you can also move a section of a problem within the problem using cut and paste.

10. Preview and checks

Preview

From the editing window, choose a preview mode in the "Preview" bar, then click on a button of this bar (All, Problem, Question, Section).

From the main window, select "Questions | Preview all".

A preview window opens, showing the field in black and in various colours: the answers, errors, warning and remarks.

Check that the content of this window corresponds to your wishes.

This also allows you to check for errors, warning and remarks.

Checks

From the main window, select "Questions | Check all".

The preview window opens, showing only errors, warning and remarks.

You can easily check that there is no error, no warning and no remark.

11. Working with several exercises

You can work with several exercises by starting several instances of the editor. You can then copy across questions, problems or sections. This is an effective technique to build a new exercise with questions and problems taken from other exercises.

12. Access to exercises directory

"File | Open exercises directory" opens the the Exercises folder. It is an easy way access to this folder and to organise it (e.g. to add, delete files or create subfolders).

13. Moving files

A ".exo" file can be located anywhere on the file system. However, it is advisable to put such files in the "Exercises" folder or in a subfolder.

When the file contains images, note that the images are not embedded in the file (the file only contains references to the images files). If the ".exo" is moved or copied to another place, the image files must be moved or copied accordingly so that they remain the same position relative to the ".exo" file in the filesystem.

A suggested organisation is the following: organise from the start your ".exo" files in subfolders of the "Exercises" folder, each containing only a small number of files (use as many of subfolders as necessary). Put the images in the same folders as the ".exo" files that use them. If necessary, copy the same image into several subfolders. When files have to be copied elsewhere, copy the entire subfolders.

When files are moved, it is strongly recommended to check they can still access the images they refer to. In order to do this, start Aplusix and load the files. If there are missing images, a warning will be displayed.