

# User's Manual

CMQZ

Version 1.25.0

## Worksheet Generator for Mathematics and Chemistry

Windows 7® - Windows 8® - Windows 10®



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## Introduction

**Worksheet Generator for Mathematics and Chemistry** is a Windows® software to create, save, load and print worksheets of Mathematics and Chemistry for educational purposes.

Please, read this manual carefully to learn all the capabilities of the software.

## Terms of use

In no event shall VaxaSoftware be liable to anyone for direct, indirect, special, collateral, incidental, or consequential damages by the use or impossibility of use of the software, nor by the effects in the operation of other software or the operating system.

Before the installation we recommended to make backup of your data and create a restoration point.

You will be able freely to evaluate the software during the time that considers necessary. Passed this period of evaluation you would have or to register it or uninstall it.

To register the software, please see the option "REGISTER APPLICATION" in the help menu of the software.

After paying the registry fee you will receive by email the REGISTRATION KEY of the software. Once registered the software, it will be able to use the options that were disabled until that moment.

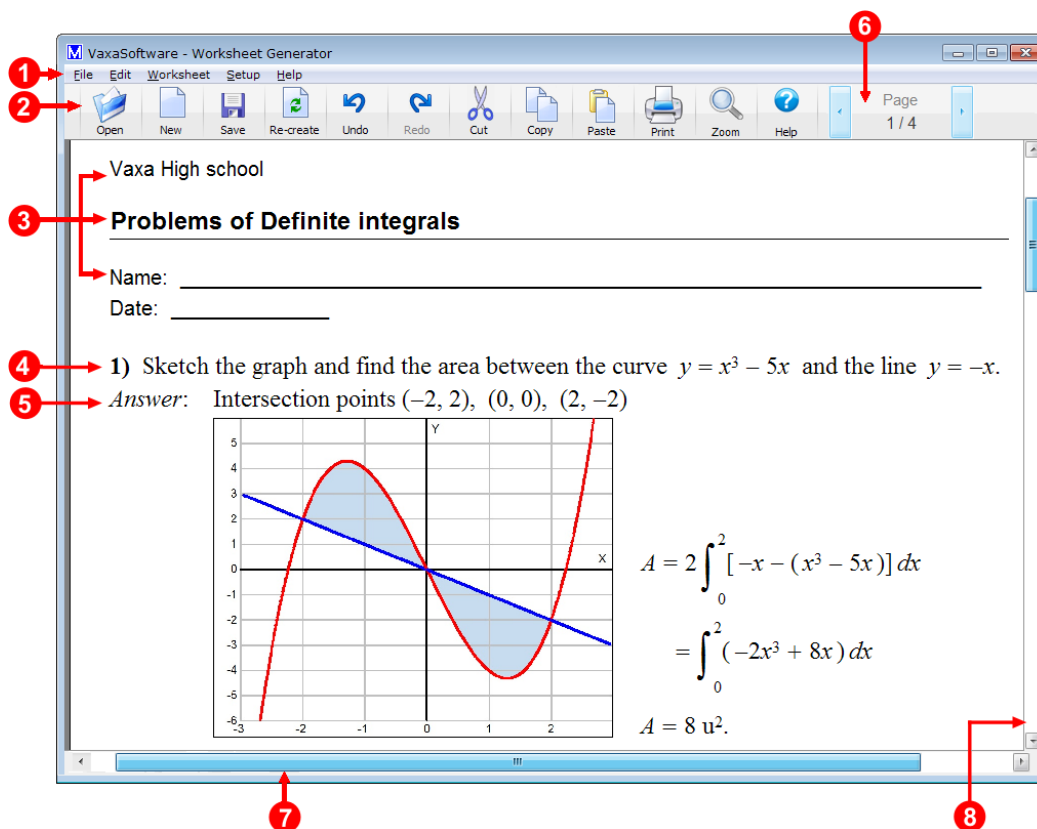
The REGISTRATION KEY is UNIQUE for EACH COMPUTER.

You cannot use the same REGISTRATION KEY for multiple computers.

You can freely distribute unaltered copies of the installation system of the software to other users. You cannot decompile the software nor use no type of reverse engineer for its analysis or modification. You cannot use part or the totality of the software to create a new software.

**Design, products, specifications, and prices are for information purposes only. VaxaSoftware reserves the right to change or modify design, products, specifications, and prices at any time without prior notice.**

## Main window



### 1 Menu bar

It contains the menus: **File**, **Edit**, **Worksheet**, **Setup** and **Help**.

### File menu

#### **New worksheet...** menu

Opens the **Wizard** window that will help us create a new worksheet.

#### **Open...** menu

Opens the dialog window to select and open a worksheet file (\*.col).

#### **Save** menu

Saves the current worksheet. If the worksheet is new or has been re-created, will be saved as a new file and we asked for a file name and a path to save it.

#### **Save as...** menu

Shows the dialog window to select a path and a filename (\*.col) to save the current worksheet.

**Print...** menu

Opens the **Print** window. In it we can select the printer destination and specify the pages we want to print and the number of copies.

<**List of recent files**> menu

Lists recent files opened or saved. To open a file click on its name.

**Exit** menu

Closes the application.

**Edit menu****Undo** menu

Undoes last action.

**Redo** menu

Returns to the state before last Undo.

**Cut** menu

Copies selected problem into the clipboard and deletes it.

**Copy** menu

Copies selected problem into the clipboard.

**Paste** menu

Inserts the problem from the clipboard into the worksheet.

**Delete** menu

Erases the selected problem.

**Move to** menu

Moves the selected problem to another position.

**Move to the beginning** menu

Moves to the top the selected problem.

**Move to the end** menu

Moves to the end the selected problem.

**Move up** menu

Moves up one position the selected problem.

**Move down** menu

Moves down one position the selected problem.

**Activate extra spacing** menu

Shows additional space after the statement of the selected problem or shows additional space between the items of the selected exercise that has this option.

**Disable extra spacing** menu

Hide the additional space after the statement of the selected problem or hide the additional space between the items of the selected exercise that has this option.

◆ **Note**

The extra spacing only applies to problems or exercises that have this option.

### **Re-create problem** menu

Re-creates the selected problem.

The created problem will be of the same type but with other data and/or statement.

The new problem replaces the selected one.

### **Insert another similar problem** menu

Creates another problem of the same type that the selected one.

The created problem will be of the same type but with other data and/or statement.

The new problem will be inserted in the position of the selected one.

### **Edit...** menu

Opens the **Edit** window. In it we can modify the current exercise and insert new exercises.

## **Worksheet** menu

### **Re-create worksheet** menu

Creates another worksheet and replaces the current worksheet.

The new re-created worksheet will be of the same type of problems but with other data and/or statements.

#### ◆ **Note**

This new re-created worksheet is assumed as a new file.

### **No answers** menu

Hides the answers of the problems.

### **Answers after each problem** menu

Puts the answers of each problem after the statement of each one.

### **Answers together at the end** menu

Puts the answers of problems all together at the end of the worksheet.

### **Answers on a separate page** menu

Puts the answers of problems together in new pages at the end of the worksheet.

### **Activate extra spacing globally** menu

Shows additional space after the statement of each problem of the worksheet or shows additional space between the items of each exercise of the worksheet that has this option.

### **Disable extra spacing globally** menu

Hide the additional space after the statement of each problem of the worksheet or hide the additional space between the items of each exercise of the worksheet that has this option.

#### ◆ **Note**

The extra spacing only applies to problems or exercises that have this option.

### **Worksheet properties...** menu

Opens the **Worksheet properties** window to change general properties of the current worksheet.

→ See **Worksheet properties** window for further details.

## **Setup** menu

### **Show Editing buttons** menu

Shows / hides editing buttons: **Undo**, **Redo**, **Cut**, **Copy** and **Paste**.

### **Zoom** menu

Allows us set size of the current worksheet.

The following settings are available:

- **Fit to window's width**                      - **50%**
- **75%**    - **100%**
- **150%**    - **200%**.

### **Worksheet properties...** menu

Opens the **Worksheet properties** window to change general properties of the current worksheet.

→ See **Worksheet properties** window for further details.

### **Application setup...** menu

Opens the **Application setup** window to change properties of the software.

→ See **Application setup** window for further details.

## **Help menu**

### **User's Manual (PDF document)...** menu

Shows this manual.

### **Application registration** menu

Shows the **Registration form** window to register the application.

### **Disabled functions in the non-registered version** menu

Shows the list of disabled functions when the application is not registered.

### **Home page: www.vaxasoftware.com...** menu

Connects to **VaxaSoftware** home page.

An active Internet connection and a browser are required.

### **Contact us...** menu

Connects to **VaxaSoftware** contact page.

An active Internet connection and a browser are required.

### **Updates** menu

#### **Check now...** menu

The software connects to Internet to check for updates.

An active Internet connection is required.

#### **Ckecking period...** menu

Allows us to adjust the period between checks for updates.

The following settings are available:

- **Once a day.**
- **Once a week.**
- **Once a month.**

### **About...** menu

Shows the **Splash** window with the version and description of the application.

## **2 Buttons bar**

### **Open** button

→ See **File / Open** menu for further details.

### **New** button

→ See **File / New worksheet** menu for further details.

### **Save** button

→ See **File / Save** menu for further details.

### **Re-create** button

This button can either re-creates a selected problem or the whole worksheet.

- 1) If nothing is selected the whole worksheet is re-created.  
The new worksheet replaces the old one and is considered as a new file.  
The new re-created worksheet has the same type of problems but with other data and/or statements.
- 2) If there is a selected problem a new problem is re-created.  
This new problem replaces the old selected one. The new problem is similar type but with other data and/or statements.

### **Undo** button

→ See **Edit / Undo** menu for further details.

### **Redo** button

→ See **Edit / Redo** menu for further details.

### **Cut** button

→ See **Edit / Cut** menu for further details.

### **Copy** button

→ See **Edit / Copy** menu for further details.

### **Paste** button

→ See **Edit / Paste** menu for further details.

### **Print** button

→ See **File / Print** menu for further details.

### **Zoom** button

→ See **View / Zoom** menu for further details.

### **Help** button

→ See **Help** menu for further details.

## **3 Educational center, title, and additional text**

Shows us the Educational Center, the title of the worksheet, and additional text  
We can change these items clicking on the **Worksheet / Worksheet properties...** menu.

→ See **Worksheet properties** window for further details.

## **4 Statement of the problem**

Problem number and its statement.

→ We can select a problem clicking on it with the main button of the mouse.  
Then we can edit it using the **Edit** menu options.  
Also we can access the **Edit** menu options clicking the secondary button of the mouse when a problem is selected.

→ See **Edit** menu for further details.

We can change the style of the problems number (initial number, prefix, suffix and color).  
To change the problem number properties we access the properties of the worksheet clicking on the **Worksheet / Worksheet properties...** menu.



## 5 Answer of the problem

Shows us the answer of the problem.

The answer of a problem can be hidid / shown and changed of place.

→ See **Worksheet** menu for further details.

## 6 Page scroll bar

Shows us the number of the current page and the total pages of the worksheet.

We can press buttons on the left and right side of the page number to access to the previous or next page. Also we can press **Page Up** and **Page Down** cursor keys.

To access to the first page we can press the **Home** cursor key, to access to the end one we press the **End** cursor key.

### ◆ Note:

Page numbers shown are ordinals numbers. If our pages are numbered and the first number isn't 1 then the page number that appears on the page does not match that shown in the bar.

### Example:

If the first page of our worksheet is numbered from 15 to 18 the displayed numbers will be the following:

Page 15 is shown as **Pag. 1/4** .

Page 16 is shown as **Pag. 2/4** .

Page 17 is shown as **Pag. 3/4** .

Page 18 is shown as **Pag. 4/4** .

## 7 Horizontal scroll bar

Allows us move current page horizontally if that does not fit entirely in the window.

Also we can press **Left** ← and **Right** → cursor keys.

## 8 Vertical scroll bar

Allows us move current page vertically if that does not fit entirely in the window.

Also we can press **Up** ↑ and **Down** ↓ cursor keys.

## Wizard window

The **Wizard window** allows us select the subject, topics, types and amount of problems we want create.

We have two ways to start the **Wizard window**:

- 1) Clicking on the **File / New worksheet** menu in the **Main window**.
- 2) Clicking on the **New** button in the **Main window**.

We can move through the **Wizard window** pressing **Back** and **Next** buttons.  
To close the **Wizard window** click on **Cancel** button.

The **Wizard window** has the following panels:

- **Welcome panel**
- **Select the subject panel**
- **Types of documents panel**
- **Select topics, types and amount of problems panel**
- **Problem numbers / Page numbers panel**
- **Position of the answers / Sorting method panel**
- **Educational center, title, and additional text panel**

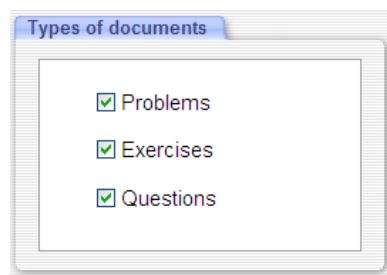
### Welcome panel

Gives us a brief description of the Wizard.

### Select the subject panel

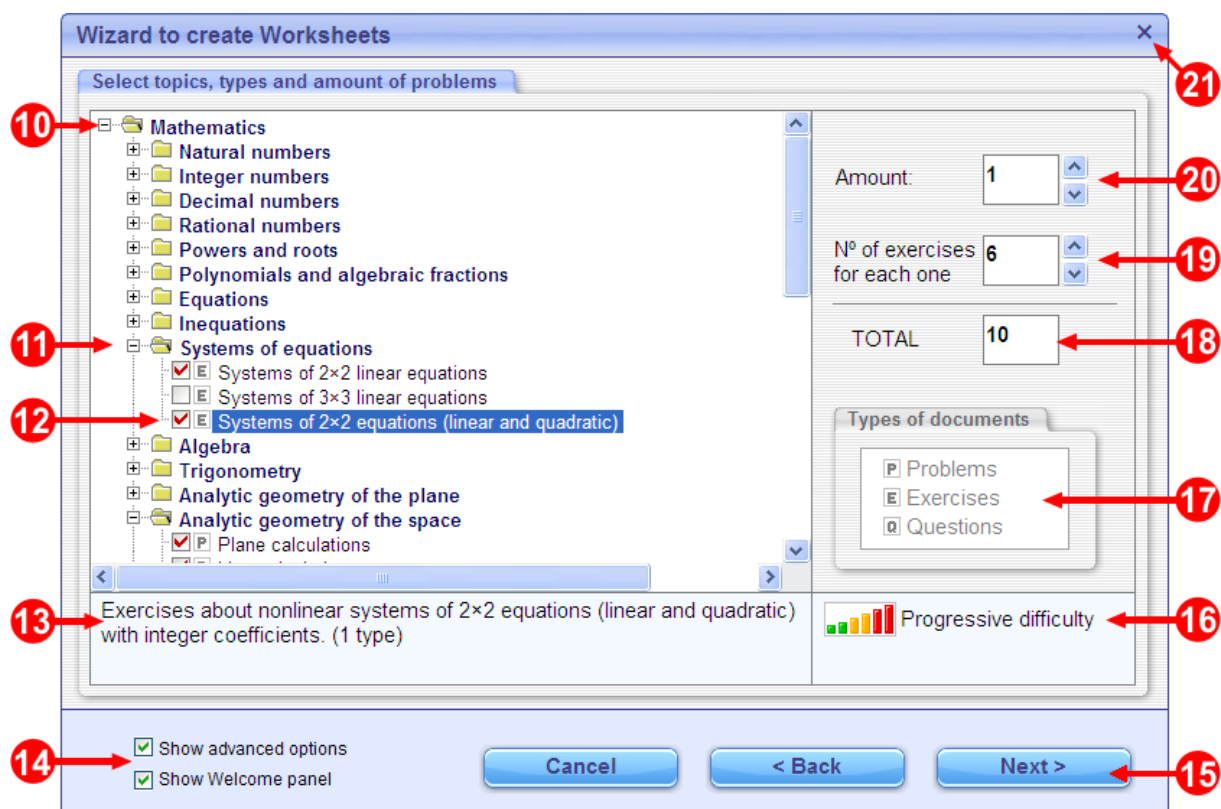
Allows us select the subject of the problems we want create.

### Types of documents panel



Lets us filter the types of documents: **Problems**, **exercises** or **questions**.

## Select topics, types and amount of problems panel



### 10 Subject folder

Displays the name of the subject previously selected.

### 11 Topic folder

Displays the name of the topic.

### 12 Type of document mark: Problem, Exercise, Question

Shows the name and type of document according to the mark to the left of each name: [P] Problems, [E] Exercises, [Q] Questions.

### 13 Description of the current problem

Displays extended information about the problem, exercise or question selected.

### 14 View options

Allows us show or hide panels of the **Wizard** window:

#### Show advanced options

When this option is activated we can access the followings panels:

- Types of documents panel.
- Problem numbers / Page numbers panel.
- Position of the answers / Sorting method panel.

#### Show Welcome panel

When this option is activated the Welcome panel of the **Wizard** window is shown.

## 15 Buttons

### Cancel button

Closes the **Wizard** window.

### Back button


Shows previous panel of the **Wizard** window.

### Next button

Shows next panel of the **Wizard** window.

## 16 Difficulty level mark

Indicates the difficulty level of the selected problem. The difficulty level may be:

Progressive difficulty: 

   **Low difficulty**

   **Medium difficulty**

   **High difficulty**

### ◆ Note

The **Difficulty Progressive** function does not work if the worksheet is created when the **Unsorted** option is activated in the → [Sorting method](#) panel.

## 17 Legend about Types of documents

Shows the type of document according to the mark to the left of each:

[P] Problems, [E] Exercises, [Q] Questions.

## 18 Total amount of documents (problems)

Shows the total number of documents (problems, exercises and questions) selected.

### ◆ Note

We cannot create more than 500 problems in a single worksheet.

If we need more than 500 problems, we have to distribute them in various worksheets with 500 or less problems in each one.

## 19 Amount of elements in each exercise or question

If the document type is exercise or question, we can specify the number of items we want to create within each.

The elements are sorted alphabetically from **a** to **z** (26 elements is the maximum amount).

The default amount is 6.

The minimum amount is 2.

The maximum amount is generally 26.

## 20 Amount of problems (exercise or question)

It allows us specify the amount of problems we want to create of the selected type.

The default amount is 1.

The maximum amount is 99.

## 21 Close button

Closes the **Wizard** window.

## Position of answers / Sorting method panel

Position of answers

No answers

After each problem

Together at the end

On a separate page

Problem	Answer
Problem	Answer
Problem	Answer
Problem	Answer

### Position of answers

Specifies four options for the position of the answers:

- No answers
- Answers after each problem
- Answers together at the end
- Answers on a separate page

→ See Worksheet menu for further details.

Sorting method

Sorted by topics

Unsorted

### Sorting method

Allows us sort the problems by topics or randomly (unsorted).

#### ◆ Note

The **Difficulty Progressive** function does not work if **Unsorted** option is activated.

## Problem numbers / Page numbers panel

Problem numbers

Prefix Start at Suffix

Highlight color for problem number

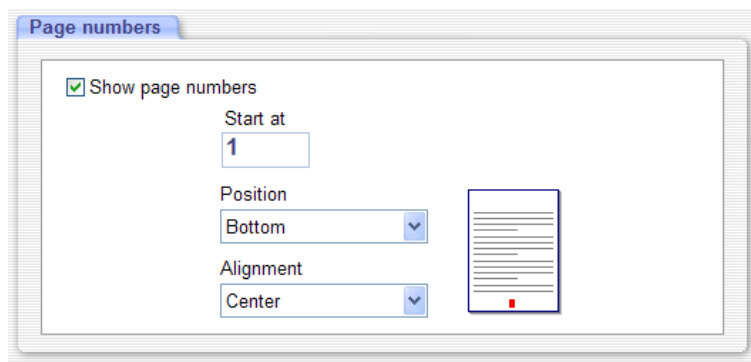
### Problem numbers

Sets the following four properties for the number of the problems:

- Prefix:** Text that appears to the left of the number of each problem. Default is empty.
- Suffix:** Text that appears to the right of the number of each problem. Default is a close parenthesis.
- Start at:** Initial problem number (default is 1).
- Highlight color:** Background color of the problem number text (default is white).

#### ◆ Note

The initial number must be less than 2000.



### Page numbers

Sets the position of page number and its initial value:

**Show page numbers:** Click on this option to turn on/off page numbering.

**Start at:** Specifies the initial number (default is 1).

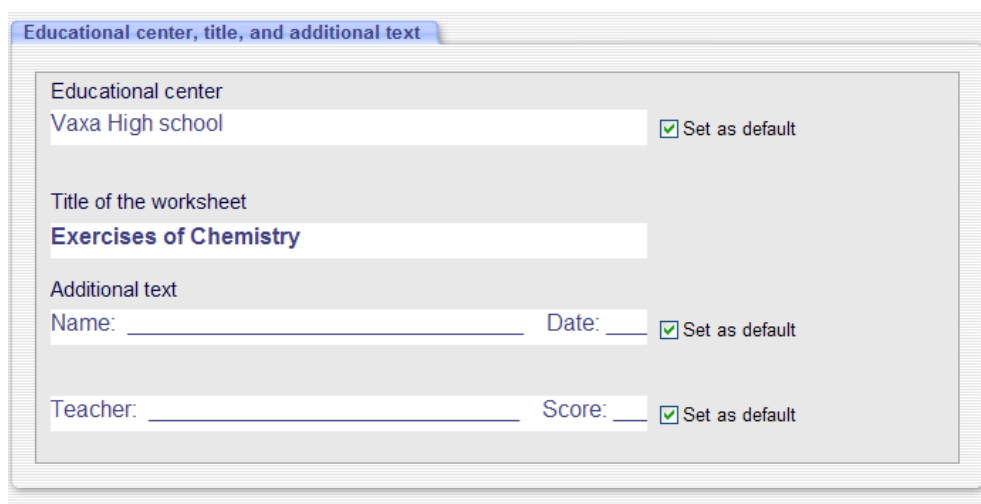
**Position:** Sets the placement of the page number:  
 - Up  
 - Down.

**Alignment:** Specifies the alignment of the page number:  
 - Left  
 - Center  
 - Right  
 - Inside  
 - Outside

#### ◆ Note

The initial number must be less than 2000.

### Educational center, title, and additional text panel



Allows us specify the text that leads all the pages of the worksheet.

Allows us specify **Educational Center**, **Title of the Worksheet**, and **Additional text**.  
 These lines of text will appear in the header of each page of the worksheet.

**Set as default** option:

Sets as default the corresponding text so that it is automatically included in the subsequent worksheets without the need to rewrite it.

## Worksheet properties window

The **Worksheet properties** window allows us modify the properties of the current worksheet.

To access the **Worksheet properties** window click on **Worksheet / Worksheet properties...** menu in the **Main** window.

This window has the following panels:

- **Educational center, title, and additional text** panel
- **Sorting method** panel
- **Position of answers** panel
- **Problem numbers** panel
- **Page numbers** panel

### Educational center, title, and additional text panel

The screenshot shows a dialog box titled "Educational center, title, and additional text". It contains four input fields, each with a "Set as default" checkbox to its right:

- Educational center:** The text "Vaxa High school" is entered in the field.
- Title of the worksheet:** The text "Exercises of Chemistry" is entered in the field.
- Additional text:** The text "Name: \_\_\_\_\_ Date: \_\_\_\_" is entered in the field.
- Teacher:** The text "Teacher: \_\_\_\_\_ Score: \_\_\_\_" is entered in the field.

Allows us specify the text that leads all the pages of the worksheet.

Allows us specify **Educational Center**, **Title of the Worksheet**, and **Additional text**. These lines of text will appear in the header of each page of the worksheet.

**Set as default** option:

Sets as default the corresponding text so that it is automatically included in the subsequent worksheets without the need to rewrite it.

### Sorting method panel

The screenshot shows a dialog box titled "Sorting method" with two radio button options:

- Sorted by topics
- Unsorted

Allows us sort the problems by topics or randomly (unsorted).

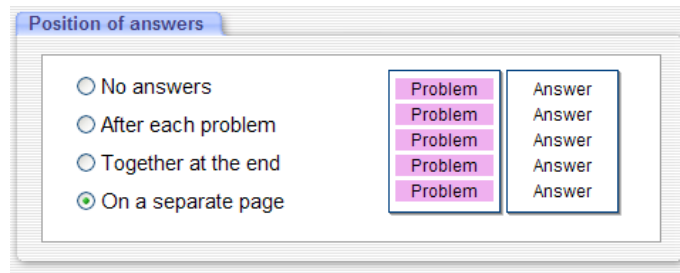
#### ◆ Note 1

We cannot re-sort a worksheet that was created with the **Unsorted** option activated.

#### ◆ Note 2

The **Difficulty Progressive** function does not work if **Unsorted** option is activated.

## Position of answers panel

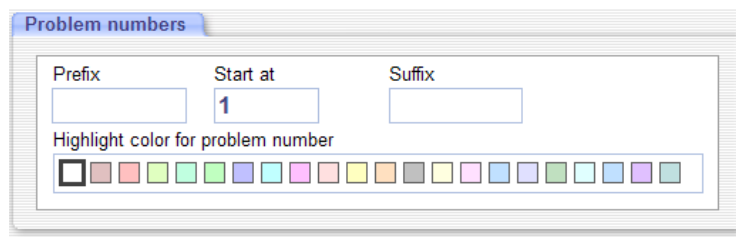


Specifies four options for the position of the answers:

- No answers
- Answers after each problem
- Answers together at the end
- Answers on a separate page

→ See Worksheet menu in Main windows for further details.

## Problem numbers option



Sets the following four properties for the number of the problems:

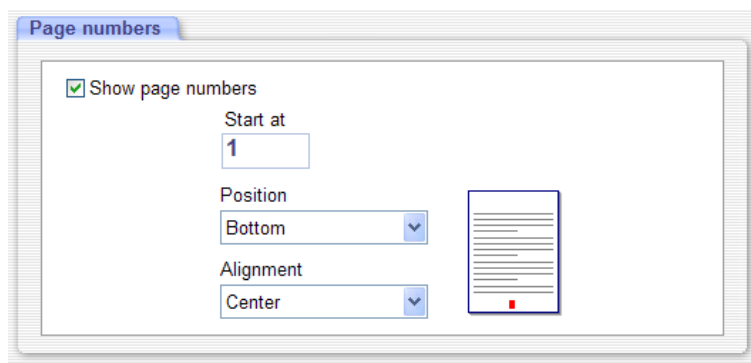
- Prefix:** Text that appears to the left of the number of each problem. Default is empty.
- Suffix:** Text that appears to the right of the number of each problem. Default is a close parenthesis.
- Start at:** Initial problem number (default is 1).
- Highlight color:** Background color of the problem number text (default is white).

### ◆ Note

The initial number must be less than 2000.



## Page numbers panel



Sets the position of page number and its initial value:

**Show page numbers:** Click on this option to turn on/off page numbering.

**Start at:** Specifies the initial number (default is 1).

**Position:** Sets the placement of the page number:  
- Up  
- Down.

**Alignment:** Specifies the alignment of the page number:  
- Left  
- Center  
- Right  
- Inside  
- Outside

### ◆ Note

The initial number must be less than 2000.

## Application setup window

The **Application setup** window allows you to modify various parameters of the application.

To access this window click on the **Setup / Application setup...** menu in the **Main** window.

This window has the following panels:

- Educational Center, title, and additional text.
- Educational system.
- Problems numbers.
- Page Numbers.
- Position of answers.
- Sorting method.
- Decimal and list separators.
- Multiplication and division signs.
- Scientific notation.
- Notation for intervals.
- Notation for statistics.
- Currency.
- Geometrical optics: Sign convention for mirrors.
- Geometrical optics: Sign convention for lenses.
- Wizard window options.
- Editing buttons.

## Shortcut keys

List of keyboard shortcuts available in the **Main** window.

<b>Ctrl + N</b>	New worksheet
<b>Ctrl + O</b>	Open
<b>Ctrl + S</b>	Save
<b>Ctrl + P</b>	Print
<b>Ctrl + F4</b>	Exit
<b>Alt + F4</b>	Exit
<b>Ctrl + R</b>	Re-create worksheet
<b>Ctrl + Z</b>	Undo
<b>Ctrl + Y</b>	Redo
<b>Ctrl + X</b>	Cut
<b>Ctrl + C</b>	Copy
<b>Ctrl + V</b>	Paste
<b>Del</b>	Delete
<b>Ctrl + E</b>	Re-create selected problem
<b>Ctrl + I</b>	Insert a similar problem to the selected one
<b>F1</b>	Help / User's Manual (PDF document...)
<b>F2</b>	Move up selected problem
<b>F3</b>	Move down selected problem
<b>F4</b>	Open <b>Worksheet Properties</b> window
<b>Up arrow</b>	Move down current page
<b>Down arrow</b>	Move up current page
<b>Left arrow</b>	Move right current page
<b>Right arrow</b>	Move left current page
<b>Page Up</b>	Access to previous page
<b>Page Down</b>	Access to next page
<b>Home</b>	Access to first page
<b>End</b>	Access to last page

## List of subjects, topics and types of problems

### ◆ Note

<R> Only available in the registered version.

Blue text: New in this version.

## Mathematics

### Natural numbers

- Addition of natural numbers
- Subtraction of natural numbers
- Multiplication of natural numbers I
- Multiplication of natural numbers II
- Division of natural numbers I
- Division of natural numbers II
- Division of natural numbers III
- Combined operations without parentheses
- <R> Combined operations with parentheses
- Rounding natural numbers
- Expanding natural numbers in powers of 10
- Writing expanded numbers (in powers of 10) in standard notation
- Repeated multiplications as powers
- Powers as repeated multiplications
- Simplifying powers of natural numbers I
- Simplifying powers of natural numbers II
- Convert numbers to roman numerals I
- Convert numbers to roman numerals II
- Convert roman numerals to decimal numbers I
- Convert roman numerals to decimal numbers II
- Converting from other bases to base 10
- Converting from base 10 to other base

### Divisibility

- Finding set of divisors of a number
- Prime factorization of a number
- Gcm of natural numbers
- Lcm of natural numbers

### Integer numbers

- Addition and subtraction of integer numbers
- Combined operations without parentheses
- <R> Combined operations with parentheses
- Simplifying powers of integers numbers I. Positive exponents
- Simplifying powers of integers numbers II. Negative exponents

### Decimal numbers

- Addition and subtraction of decimal numbers
- Multiplication of decimal numbers
- Division of decimal numbers
- Rounding decimal numbers (I)
- Rounding decimal numbers (II)
- Combined operations without parentheses
- <R> Combined operations with parentheses

## Mathematics (continued)

### Rational numbers

- <R> Placing fractions on the Number Line
- <R> Identifying fractions on the Number Line
  - Fraction of shaded shapes I
  - Fraction of shaded shapes II
  - Simplifying fractions
  - Reduce to a common denominator
  - Sorting fractions
  - Addition-subtraction of fractions with like denominators
  - Addition-subtraction of fractions with unlike denominators
  - Multiplication and division with fractions
- <R> Combined operations with parentheses
  - Improper fractions to mixed numbers
  - Mixed numbers to improper fractions
  - Identifying mixed numbers of shaded shapes
  - Addition of mixed numbers
  - Converting decimal numbers to fractions
  - Addition and subtraction of repeating decimal numbers
  - Simplifying powers of rational numbers I
  - Simplifying powers of rational numbers II

### Real numbers

- <R> Intervals I
- <R> Intervals II
- <R> Intervals III
- <R> Intervals IV
- <R> Placing real numbers on the Number Line
  - Rounding real numbers
  - Convert from standard notation into scientific notation
  - Convert from scientific notation into standard notation
  - Multiplication and division in scientific notation
  - Addition and subtraction in scientific notation

### Unit conversion

- Mass conversion (metric)
- Length conversion (metric)
- Time conversion
- Area conversion I (metric)
- <R> Area conversion II: Square meter and hectare
- <R> Volume conversion I: (metric)
- <R> Volume conversion II (metric)
- <R> Volume conversion III (metric)
- Temperature conversion I (Celsius - Fahrenheit)
- <R> Temperature conversion II (Celsius - Fahrenheit - Kelvin)
- <R> Length conversion (metric - imperial)
- <R> Mass conversion (metric - imperial)
  - Convert radians to degrees
  - Convert degrees to radians

### Sexagesimal system

- Time and clock (I)
- Time and clock (II)
- Time addition without carrying
- Time addition with carrying
- Angle addition without carrying
- Angle addition with carrying
- Time subtraction
- Angle subtraction
- Multiplication by a whole number
- Division by a whole number
- Complementary and supplementary angle calculation
- Angle calculation in triangles and other shapes

## Mathematics (continued)

### Powers and roots

- Simplifying powers of natural numbers I
- Simplifying powers of natural numbers II
- Simplifying powers of integers numbers I. Positive exponents
- Simplifying powers of integers numbers II. Negative exponents
- Simplifying powers of rational numbers I
- Simplifying powers of rational numbers II
- Calculation of square roots in your head
- Finding square roots using the square root algorithm I
- Finding square roots using the square root algorithm II
- Writing radicals as rational exponents
- Writing rational exponents as radicals
- Extracting factors from radicals
- Root rationalization I: (monomial)
- Root rationalization II: (binomial)
- Root rationalization III: (n-th roots)
- Addition and subtraction of square roots
- Addition and subtraction of cube roots
- Simplifying n-th roots
- <R> Expanding square roots expressions

### Proportions and percentages

- Finding an unknown quantity in a proportion
- Percentages: Direct calculations

### Polynomials

- Monomials: Coefficient and degree
- Monomials: Addition and subtraction
- Monomials: Multiplication
- Monomials: Division
- Monomials: Powers
- Polynomials: Addition and subtraction
- <R> Square binomials and difference of two squares I
- <R> Square binomials and difference of two squares II
- <R> Polynomials: Multiplication and power
- <R> Binomial theorem
- <R> Polynomials: Division I: Long division
- <R> Polynomials: Division II: Synthetic division
- <R> Polynomials: Division III: With parameters
- Factoring polynomials I: Greatest Common Factor
- <R> Factoring polynomials II:  $(a+b)^2$ ,  $(a-b)^2$ ,  $a^2-b^2$
- <R> Factoring polynomials III:  $(a+b)^2$ ,  $(a-b)^2$ ,  $a^2-b^2$
- <R> Factoring polynomials IV: Ruffini's rule

### Algebraic fractions

- <R> Algebraic fractions I: Simplifying algebraic fractions
- <R> Algebraic fractions II: Multiplications and divisions
- <R> Algebraic fractions III: Additions and subtractions
- <R> Algebraic fractions IV: Combined operations

### Sequences and progressions

- Exercises with sequences
- <R> Arithmetic progressions I
- <R> Arithmetic progressions II
- <R> Geometric progressions I
- <R> Geometric progressions II
- <R> Geometric progressions III

## Mathematics (continued)

### Exponentials and logarithms

- Exponential expression to logarithmic expression
- Logarithmic expression to exponential expression
- <R> Simplifying logarithms
- <R> Evaluate logarithms from another one
- <R> Evaluate logarithms from two other known
- <R> Evaluate logarithms without using a calculator
- <R> Evaluate logarithms using the logarithm change of base rule
- <R> Finding the base of logarithms
- <R> Exponential equations
- <R> Logarithmic equations
- <R> Systems of  $2 \times 2$  exponential equations
- <R> Systems of  $2 \times 2$  logarithmic equations

### Equations. Introduction

- <R> Simplifying linear and quadratic expressions
- <R> Verifying solutions to equations

### Equations. Linear

- Linear equations with integer coefficients. Integer solutions
- Linear equations with integer coefficients. Rational solutions
- Linear equations with rational coefficients. Integer solutions
- Linear equations with rational coefficients. Rational solutions
- <R> Linear equations word problems (integer coefficients)
- <R> Linear equations word problems (rational coefficients)

### Equations. Quadratic

- Incomplete quadratic equations. Integer solutions
- Incomplete quadratic equations. Rational solutions
- Incomplete quadratic equations. Real solutions
- Complete quadratic equations. Integer solutions
- Complete quadratic equations. Rational solutions
- Complete quadratic equations. Real solutions
- <R> Quadratic equations. Constants in the denominator. Integer solutions
- <R> Quadratic equations. Constants in the denominator. Rational solutions
- <R> Quadratic equations. Constants in the denominator. Real solutions
- <R> Quadratic equations. Unknown in the denominator. Integer solutions
- <R> Quadratic equations. Unknown in the denominator. Rational solutions
- <R> Quadratic equations. Unknown in the denominator. Real solutions

### Equations. Other types

- Equations in factored form
- <R> Biquadratic equations. Integer solutions
- <R> Biquadratic equations. Rational solutions
- <R> Biquadratic equations. Real solutions
- <R> Triquadratic equations
- <R> Cubic equations (degree 3)
- <R> Quartic equations (degree 4)
- <R> Equations involving roots (1 square root)
- <R> Equations involving roots (2 square roots)
- <R> Exponential equations
- <R> Logarithmic equations
- <R> Trigonometric equations

### Systems of linear equations

- Systems of  $2 \times 2$  linear equations. Integer solutions
- Systems of  $2 \times 2$  linear equations. Rational solutions
- <R> Systems of  $2 \times 2$  linear equations. Rational coefficients
- <R> Solving system of  $2 \times 2$  linear equations by graphing. Integer solutions
- <R> Systems of  $3 \times 3$  linear equations. Integer solutions
- <R> Systems of  $3 \times 3$  linear equations. Rational solutions
- <R> System of  $2 \times 2$  linear equations word problems
- <R> Systems of  $4 \times 4$  linear equations

## Mathematics (continued)

### Systems of non-linear equations

- <R> Systems of 2×2 equations (linear and quadratic)
- <R> Systems of 2×2 equations (linear and irrational)
- <R> Systems of 2×2 exponential equations
- <R> Systems of 2×2 logarithmic equations

### Inequalities

- Linear inequalities in 1 variable with integer coefficients
- Linear inequalities in 1 variable with rational coefficients
- <R> Absolute value inequalities
- <R> Quadratic inequalities
- <R> Rational inequalities
- <R> Inequalities in 2 variables

### Systems of inequalities

- <R> Systems of 2 linear inequalities in 1 variable
- <R> Systems of 2 linear inequalities in 2 variables

### Matrices, determinants and systems of equations

- Additions and subtractions of matrices
- <R> Multiplication of matrices
- Determinants 2×2 (without parameters)
- Determinants 3×3 (without parameters)
- <R> Determinants 4×4 (without parameters)
- <R> Determinants (with parameters)
- <R> Rank of matrices (without parameters)
- <R> Rank of matrices (with parameters)
- Inverse matrix 2x2 (without parameters)
- <R> Inverse matrix 3x3 (without parameters)
- <R> Inverse matrix (with parameters)
- Matricial equations I
- Matricial equations II: type  $AX+B=C$
- <R> Systems of 2×2 matricial linear equations
- Discuss and solve systems of 3×3 linear equations (without parameters)
- <R> Discuss and solve systems of 3×3 linear equations (with parameters)
- <R> Cayley-Hamilton Theorem: Powers of a matrix
- <R> Cayley-Hamilton Theorem: Inverse and powers of a matrix

### Vector space

- <R> Diagonalization of 2x2 matrices: Eigenvalues
- <R> Diagonalization of 3x3 matrices: Eigenvalues
- <R> Diagonalization of 2x2 matrices: Eigenvalues and eigenvectors
- <R> Diagonalization of 3x3 matrices: Eigenvalues and eigenvectors
- <R> Diagonalization of linear transformations from  $R^3$  to  $R^3$
- <R> Coordinates of a 2D\_vector relative to a given basis
- <R> Coordinates of a 3D\_vector relative to a given basis
- <R> Change of basis matrix for  $R^2$  vectors
- <R> Change of basis matrix for  $R^3$  vectors

### Basic geometry I. Plane shapes

- Pythagorean theorem I
- <R> Pythagorean theorem II
- Similarity I. Ratios of lengths
- Similarity II. Ratios of areas
- <R> Plane shapes I: straight line segments
- <R> Plane shapes II: straight line segments
- <R> Plane shapes III: curved line segments
- <R> Plane shapes IV: curved line segments

### Basic geometry II. Solid shapes

- <R> Solid shapes I: plane surfaces
- <R> Solid shapes II: plane surfaces
- <R> Solid shapes III: curved surfaces
- <R> Solid shapes IV: curved surfaces



## Mathematics (continued)

### Trigonometry

- Convert radians to degrees
- Convert degrees to radians
- <R> Solving triangles
- <R> Solving plane shapes.
  - Trigonometric values from another one
- <R> Reducing to the corresponding acute angle
- <R> Trigonometric values from two other known
- <R> Trigonometric identities
- <R> Trigonometric equations

### Complex numbers

- Plotting complex numbers on the complex plane
- Identifying complex numbers on the complex plane
- Adding and subtracting complex numbers
- Multiplying and dividing complex numbers in cartesian form
- Rectangular (cartesian) to polar conversion
- Polar to rectangular (cartesian) conversion
- Multiplying and dividing complex numbers in polar form
- <R> Powers of complex numbers
- <R> Root extraction of complex numbers
- <R> Calculation of a parameter
- <R> Complex equations
- <R> Complex equations + plotting answers

### Plane analytic geometry

- Points I: Graphing points on the coordinate plane (first quadrant)
- Points II: Identifying points on the coordinate plane (first quadrant)
- Points III: Graphing points on the coordinate plane
- Points IV: Identifying points on the coordinate plane
- <R> Vectors I: Plotting vectors on the coordinate plane
- <R> Vectors II: Identifying vectors on the coordinate plane
- Vectors III
- <R> Vectors IV
- <R> Lines I
- <R> Lines II

### Conic sections

- <R> Circle
- <R> Ellipse centered at the origin
- <R> Ellipse not centered at the origin
- <R> Hyperbola centered at the origin
- <R> Hyperbola not centered at the origin
- <R> Parabola. Vertex at the origin
- <R> Parabola. Vertex is not at the origin
- <R> Matching equation of conic sections to their graphs

### Analytic geometry of Space

- Vectors
- Plane calculations
- <R> Line calculations
- <R> Alignment, coplanarity and distance of points
- <R> Relative position of planes and lines (without parameter)
- <R> Relative position of planes and lines (with parameter)
- <R> Relative position of two lines (without parameters)
- <R> Relative position of two lines (with parameters)

### Limits

- Limits involving rational functions
- <R> Limits involving roots
- <R> Limits involving subtraction of roots
- <R> Limits of powers
- <R> Limits using L'Hôpital's rule

## Mathematics (continued)

### Derivatives

- Average rate of change of a function
- Finding derivatives at a point using the Limit Definition (I)
- Finding derivatives at a point using the Limit Definition (II)
- <R> Finding derivatives of functions using the Limit Definition (I)
- <R> Finding derivatives of functions using the Limit Definition (II)
- <R> Derivative of functions I: No Chain rule - No Trigonometry
- <R> Derivative of functions II: No Chain rule - Trigonometry
- <R> Derivative of functions III: No Chain rule - No Trigonometry
- <R> Derivative of functions IV: No Chain rule - Trigonometry
- <R> Derivative of functions V: Chain rule - No Trigonometry
- <R> Derivative of functions VI: Chain rule - Trigonometry
- <R> Derivative of functions VII: Chain rule - No Trigonometry
- <R> Derivative of functions VIII: Chain rule - Trigonometry
- <R> Derivative of functions IX: Generalized power rule
- <R> Implicit differentiation
- <R> First-order partial derivatives
- <R> Second order partial derivatives
- Tangent line to a curve at a point
- <R> Tangent line to a curve and parallel to a given line
- Normal line to a curve at a point
- <R> Optimization

### Study of functions

- Domain of a function I
- Domain of a function II
- Domain of a function III
- <R> Inverse functions
- <R> Function composition I
- <R> Function composition II
- <R> Finding coefficients of functions involving derivatives (I)
- <R> Finding coefficients of functions involving derivatives (II)
- <R> Asymptotes I: Vertical
- <R> Asymptotes II: Horizontal
- <R> Asymptotes III: Oblique
- <R> Asymptotes IV: Vertical, horizontal and oblique
- <R> Maxima and minima of a function
- <R> Monotonicity and extrema
- <R> Inflection points of a function
- <R> Concavity and inflection points
- <R> Continuity I: Piecewise functions (without parameters)
- <R> Continuity II: Piecewise functions (with 1 parameter)
- <R> Continuity III: Piecewise functions (with 2 parameters)
- <R> Derivability I: Without parameter
- <R> Derivability II: With parameters
- <R> Analyze function using the graph of its derivative I
- <R> Analyze function using the graph of its derivative II
- <R> Analyze function using the graph of its derivative III

## Mathematics (continued)

### Graphing functions

- Matching linear functions to their graphs
- <R> Matching quadratic functions to their graphs
- <R> Matching cubic functions to their graphs
- <R> Matching functions to their graphs
- Formula of a linear function given its graph
- <R> Properties of a piecewise function given its graph I
- <R> Properties of a piecewise function given its graph II
- <R> Formula of a piecewise function given its graph
- Basic I: Linear
- Basic II: Quadratic
- <R> Basic III: Piecewise functions. Linear and constant
- <R> Basic IV: Piecewise functions. Linear and quadratic
- <R> Basic V: Exponential (non base e)
- <R> Basic VI: Exponential (base e)
- <R> Basic VII: Logarithmic
- <R> Basic VIII: Simple rational
- <R> Basic IX: Square root
- <R> Advanced I: Cubic polynomial
- <R> Advanced II: Rational
- <R> Advanced III: Exponential
- <R> Advanced IV: Logarithmic

### Indefinite integrals

- Integration by direct method I. Without trigonometry
- Integration by direct method II. With trigonometry
- <R> Integration by substitution I. Without trigonometry
- <R> Integration by substitution II. With trigonometry
- <R> Integration by parts I
- <R> Integration by parts II
- <R> Integration by parts III
- <R> Integrals of rational functions I
- <R> Integrals of rational functions II
- <R> Integrals of rational functions III
- <R> Integrals of rational functions IV
- <R> Integrating powers of trigonometric functions (I)
- <R> Integrating powers of trigonometric functions (II)
- <R> Integration by trigonometric substitution
- <R> Integrals of trigonometric functions  $\sin(mx) \cdot \cos(nx)$

### Definite integrals

- <R> Definite integrals
- <R> Area between a curve and the X axis. Basic - No graphs
- <R> Area between a curve and the X axis. Basic - With graphs
- <R> Area between a curve and the X axis. Advanced - No graphs
- <R> Area between a curve and the X axis. Advanced - With graphs
- <R> Area between two curves - No graphs
- <R> Area between two curves - With graphs
- <R> Parameters calculation using definite integrals
- <R> Find function by integration of its first derivative
- <R> Find function by integration of its second derivative
- <R> Volumes of revolution
- <R> Improper integral (I)
- <R> Improper integral (II)
- <R> Double integral (I)
- <R> Double integral (II)

### Numerical integration

- <R> Rectangle rule
- <R> Trapezoidal rule
- <R> Simpson's rule

## Mathematics (concluded)

### Vector calculus

- <R> Gradient
- <R> Divergence
- <R> Curl
- <R> Directional derivative

### Differential equations

- <R> Separable
- <R> Linear equations
- <R> Homogeneous equations
- <R> Exact equations
- <R> Second order homogeneous linear equations with constant coefficients
- <R> Bernoulli equations
- <R> IVP / Separable
- <R> IVP / Linear equations
- <R> IVP / Homogeneous equations
- <R> IVP / Bernoulli equations
- <R> IVP / Second order homogeneous linear equations with constant coefficients

### Descriptive statistics

- Pie charts
- One-variable statistics: Ungrouped data (I)
- One-variable statistics: Ungrouped data (II)
- <R> One-variable statistics: Grouped data (I)
- <R> One-variable statistics: Grouped data (II)
- <R> One-variable statistics: Grouped data (III)
- <R> Two-variable statistics: Linear regression analysis

### Probability

- Probability I: Coins
- <R> Probability II: Dice
- <R> Probability III: Marbles
- <R> Probability IV: Cards
- Normal distribution I:  $N(0,1)$
- Normal distribution II: Standardizing
- <R> Normal distribution III: Word problems
- <R> Normal distribution IV: Word problems of sample means

### Recreational mathematics

- Crack the code

#### ◆ Note

- <R> Only available in the registered version.
- Blue text: New in this version.

## Chemistry

### Units and chemical formulae

- Grams and moles conversions
- Grams, moles, molecules, and atoms conversions
- <R> Percent composition
- <R> Determining empirical formula
- <R> Determining empirical and molecular formula (without combustion)
- <R> Determining empirical and molecular formula (with combustion)
  - Mass conversion (metric)
  - Length conversion (metric)
  - Time conversion
  - Area conversion I (metric)
- <R> Area conversion II: Square meter and hectare
- <R> Volume conversion I: (metric)
- <R> Volume conversion II (metric)
- <R> Volume conversion III (metric)
  - Temperature conversion I (Celsius - Fahrenheit)
- <R> Temperature conversion II (Celsius - Fahrenheit - Kelvin)
- <R> Length conversion (metric - imperial)
- <R> Mass conversion (metric - imperial)

### Gases

- Problems of ideal gases I
- <R> Problems of ideal gases II
- <R> Problems of ideal gases III (Dalton's Law)

### Solutions

- Aqueous solutions I
- <R> Aqueous solutions II
- <R> Aqueous solutions III
- <R> Aqueous solutions IV: Dilutions
- <R> Colligative properties of solutions (I)
- <R> Colligative properties of solutions (II)

### Stoichiometry of chemical reactions

- Balancing chemical equations
- Simple stoichiometry of reactions I (pure reagents)
- Simple stoichiometry of reactions II (impure reagents)
- <R> Simple stoichiometry of reactions III
- <R> Simple stoichiometry of reactions IV
- <R> Percent yield of reaction
- <R> Limiting reagents in stoichiometry

### Thermochemistry

- <R> Specific heat
- <R> Specific and latent heat
  - Internal energy and enthalpy
- <R> Enthalpy of reaction
- <R> Hess's Law
- <R> Average bond enthalpies
- <R> Gibbs free energy and spontaneity
- <R> Born-Haber Cycle

### Chemical kinetics

- Basic calculations in chemical kinetics
- <R> Rate law of reaction
- <R> Arrhenius Equation
- <R> Potential energy diagram

## Chemistry (continued)

### Gas phase equilibria

- Basic calculations
- Le Châtelier's principle
- <R> Calculation of the equilibrium constant
- <R> Calculation of composition at equilibrium

### Acid-base equilibria

- <R> Completing acid-base equations
- <R> Acidic, basic and amphoteric compounds
  - Strong acids and bases
- <R> Weak acids I
- <R> Weak acids II
- <R> Weak bases I
- <R> Weak bases II
- <R> Aqueous solutions of salts (acidic, basic or neutral)
- <R> Salt hydrolysis
- <R> Buffer solutions
- <R> Acid-base titrations

### Solubility equilibria

- <R> Solubility product constant and solubility in pure water
- <R> Solubility in the presence of a common-ion

### Redox reactions

- Basic concepts and calculations
- <R> [Balancing redox half-reactions in acidic solution](#)
- <R> [Balancing redox half-reactions in basic solution](#)
- <R> Balancing oxidation-reduction equations in an acidic medium
  - Balancing oxidation-reduction equations in a basic medium
- <R> Balancing oxidation-reduction equations in acidic or basic medium
- <R> Stoichiometry of redox reactions
- <R> Redox titrations
- <R> Galvanic cell
- <R> Electrolysis I
- <R> Electrolysis II

### Atomic structure

- <R> Number of protons, neutrons, and electrons for atoms
- <R> Number of protons, neutrons, and electrons for ions
- <R> Number of protons, neutrons, and electrons for atoms and ions
  - Quantum numbers I
  - Quantum numbers II
  - Quantum numbers III
  - Quantum numbers IV
- <R> Electron configuration, group #, and period #
- <R> Electron configuration, periodic properties, formula and type of bond
- <R> Ranking elements/ions according to radius
- <R> Light: Frequency, wavelength, and energy
- <R> Photoelectric effect
- <R> Emission spectrum of hydrogen atom
- <R> Average atomic mass and isotopic abundances
- <R> Nuclear reactions
  - Nuclear mass and binding energy
- <R> Nuclear disintegration

### Molecular structure

- <R> Lewis dot structure
- <R> Lewis dot structure and molecular geometry

**Nomenclature of inorganic compounds**

- W: Elements
- N: Elements
- W: Monoatomic ions
- N: Monoatomic ions
- W: Oxides
- N: Oxides
- W: Peroxides
- N: Peroxides
- W: Oxides and peroxides
- N: Oxides and peroxides
- W: Hydrides
- N: Hydrides
- W: Hydroxides
- N: Hydroxides
- <R> W: Hydrogen halides and their salts. Nonmetal-nonmetal salts
- <R> N: Hydrogen halides and their salts. Nonmetal-nonmetal salts
- <R> W: Oxyacids
- <R> N: Oxyacids
- <R> W: Neutral salts derived from oxyacids
- <R> N: Neutral salts derived from oxyacids
- <R> W: Acid salts derived from oxyacids
- <R> N: Acid salts derived from oxyacids
- <R> W: Polyatomic ions
- <R> N: Polyatomic ions

**Organic nomenclature. Hydrocarbons**

- D: Linear and branched chains of alkanes
- N: Linear and branched chains of alkanes
- <R> D: Linear and branched chains of alkenes
- <R> N: Linear and branched chains of alkenes
- <R> D: Linear and branched chains of alkenes and alkynes
- <R> N: Linear and branched chains of alkenes and alkynes
- <R> D: Cycloalkanes/alkenes/alkynes and benzene derivatives
- <R> N: Cycloalkanes/alkenes/alkynes and benzene derivatives

**Organic nomenclature. Oxygen-containing**

- <R> D: Alcohols
- <R> N: Alcohols
- <R> D: Ketones
- <R> N: Ketones
- <R> D: Aldehydes
- <R> N: Aldehydes
- <R> D: Ethers
- <R> N: Ethers
- <R> D: Phenols
- <R> N: Phenols
- <R> D: Acids
- <R> N: Acids
- <R> D: Esters
- <R> N: Esters
- <R> D: Multiple oxygen functional groups
- <R> N: Multiple oxygen functional groups
- <R> D: ALL functional groups containing oxygen
- <R> N: ALL functional groups containing oxygen

## Chemistry (concluded)

### Organic nomenclature. Nitrogen-containing

- <R> D: Amines
- <R> N: Amines
- <R> D: Amides
- <R> N: Amides
- <R> D: Nitriles
- <R> N: Nitriles
- <R> D: Nitro compounds
- <R> N: Nitro compounds
- <R> D: Multiple nitrogen (oxygen) functional groups
- <R> N: Multiple nitrogen (oxygen) functional groups
- <R> D: ALL functional groups containing nitrogen (and oxygen)
- <R> N: ALL functional groups containing nitrogen (and oxygen)

### Organic chemistry

- <R> Hybridization state of carbon atoms
- <R> Chain isomers
- <R> Position isomers
- <R> Functional isomers
- <R> Geometric isomers
- <R> Optical isomers
- <R> All types of isomers
- <R> Organic reactions

#### ◆ Note

<R> Only available in the registered version.

**Blue text:** New in this version.



## Specifications

<b>Description</b>	<b>Worksheet Generator for Mathematics and Chemistry</b> is a Windows® software to create, save, load and print worksheets of Mathematics and Chemistry for educational purposes.
<b>Maximum amount of problems in a worksheet</b>	500
<b>Maximum amount of problems of the same type</b>	99
<b>Maximum amount of pages in a worksheet</b>	199
<b>Amount of elements in an exercise or question</b>	Minimum 1 Maximum 26 (or less)
<b>First problem number</b>	Between 1 and 1999
<b>First page number</b>	Between 1 and 1999
<b>Positions of the problems answers</b>	4 positions: - No answers - Answers after each problem - Answers together at the end - Answers in a separate page
<b>Positions of the page number</b>	11 positions *: - No page numbering (1) - Up, down (2) - Left, center, right, inside, outside (5) (* $1 + 2 \times 5 = 11$ )
<b>Highlight colors for problem number</b>	22 colors

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