

# exercise-bank

Typst Package

*Exercise Management & Banking System*

---

A comprehensive solution for creating, organizing, and filtering exercises

Version 0.3.0

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# 1. Introduction

`exercise-bank` is a Typst package for creating and managing exercises with solutions, metadata, filtering, and exercise banks. Perfect for teachers, textbook authors, and educational content creators.

## 1.1. Features

- Exercises with inline or deferred solutions
- Teacher corrections with fallback and append modes
- Draft mode for work-in-progress documents
- Multiple solution display modes
- Metadata support (topic, level, author, competencies)
- Exercise banks: define once, display anywhere
- Powerful filtering by any criteria
- Automatic numbering with reset options
- Customizable labels (localization support)

## 1.2. Installation

Import the package in your Typst document:

```
#import "@local/exercise-bank:0.3.0": exo, exo-setup
```

## 1.3. Quick Start

Code

```
#exo(  
  exercise: [Solve the equation  $2x + 5 = 13$ .]  
)
```

Preview

**Exercise 1** Solve the equation  $2x + 5 = 13$ .

## 2. Basic Usage

### 2.1. Simple Exercise

Code

```
#exo(  
  exercise: [Calculate $3 + 4 times 2$.]  
)
```

Preview

**Exercise 1** Calculate  $3 + 4 \times 2$ .

### 2.2. Exercise with Solution

Code

```
#exo(  
  exercise: [Calculate $3 + 4 times 2$.],  
  solution: [$3 + 4 times 2 = 3 + 8 = 11$],  
)
```

Preview

**Exercise 1** Calculate  $3 + 4 \times 2$ .

**Solution 1**  $3 + 4 \times 2 = 3 + 8 = 11$

### 2.3. Multiple Exercises

Exercises are automatically numbered:

Code

```
#exo(exercise: [Simplify $x^2 + 2x + 1$.])  
#exo(exercise: [Factor $x^2 - 4$.])  
#exo(exercise: [Solve $2x - 6 = 0$.])
```

Preview

**Exercise 1** Simplify  $x^2 + 2x + 1$ .

**Exercise 2** Factor  $x^2 - 4$ .

**Exercise 3** Solve  $2x - 6 = 0$ .

### 3. Solution Display Modes

Control how and where solutions appear using `solution-mode`.

#### 3.1. Inline (Default)

Solutions appear immediately after each exercise:

Code

```
#exo-setup(solution-mode: "inline")

#exo(
  exercise: [Solve  $x + 3 = 7$ .],
  solution: [ $x = 4$ ],
)
```

Preview

**Exercise 1** Solve  $x + 3 = 7$ .

**Solution 1**  $x = 4$

#### 3.2. No Solutions

Hide all solutions (for student worksheets):

Code

```
#exo-setup(solution-mode: "none")

#exo(
  exercise: [Solve  $x + 3 = 7$ .],
  solution: [ $x = 4$ ], // Hidden
)
```

Preview

**Exercise 1** Solve  $x + 3 = 7$ .

#### 3.3. Solutions at End of Section

Collect solutions and display them later:

## Code

```
#exo-setup(solution-mode: "end-section")

#exo(exercise: [Exercise 1], solution: [Answer 1])
#exo(exercise: [Exercise 2], solution: [Answer 2])

#exo-print-solutions() // Print collected solutions
```

## Preview

**Exercise 1** Exercise 1

**Exercise 2** Exercise 2

### Solutions

**Solution 1** Answer 1

**Solution 2** Answer 2

## 3.4. Solutions Only

Show only solutions (for answer keys):

## Code

```
#exo-setup(solution-mode: "only")

#exo(
  exercise: [This is hidden],
  solution: [Only this solution is shown],
)
```

## Preview

**Solution 1** Only this solution is shown

## 4. Corrections (Teacher Version)

Corrections are detailed solutions for teachers, including pedagogical notes and teaching tips.

### 4.1. Exercise with Correction

Code

```
#exo(  
  exercise: [Solve  $x^2 = 9$ .],  
  correction: [  
    *Teacher notes:*  
     $x = \text{plus.minus } 3$   
  
    Common mistake: forgetting the negative root.  
  ],  
)
```

Preview

**Exercise 1** Solve  $x^2 = 9$ .

### 4.2. Fallback to Correction

When fallback-to-correction is enabled, corrections are shown when solutions are missing:

Code

```
#exo-setup(fallback-to-correction: true)  
  
#exo(  
  exercise: [Simplify  $2x + 3x$ .],  
  correction: [  
     $2x + 3x = 5x$   
    (Combine like terms)  
  ],  
)
```

Preview

**Exercise 1** Simplify  $2x + 3x$ .

**Correction 1**  $2x + 3x = 5x$  (Combine like terms)

### 4.3. Appending Solutions to Corrections

Combine corrections with solutions using custom formatting:

## Code

```
#exo-setup(  
  append-solution-to-correction: true,  
  solution-in-correction-style: (  
    weight: "bold",  
    fill: rgb("#1565c0"),  
  ),  
)  
  
#exo(  
  exercise: [Solve  $x^2 = 9$ .],  
  correction: [  
    Look for values where x squared equals 9.  
    Don't forget both positive and negative roots.  
  ],  
  solution: [ $x = 3$  or  $x = -3$ ],  
)
```

## Preview

**Exercise 1** Solve  $x^2 = 9$ .

**Correction 1** Look for values where x squared equals 9. Don't forget both positive and negative roots.  
 $x = 3$  or  $x = -3$



## 5. Draft Mode

Show placeholders for incomplete exercises during document preparation.

### 5.1. With Draft Mode ON

Code

```
#exo-setup(  
  draft-mode: true,  
  solution-placeholder: [_[To be written]_] ,  
)  
  
#exo(  
  exercise: [Solve  $x + 5 = 12$ ],  
  solution: [], // Empty - shows placeholder  
)
```

Preview

**Exercise 1** Solve  $x + 5 = 12$

**Solution 1** *[To be written]*

### 5.2. With Draft Mode OFF (Default)

Empty solutions show minimal space without placeholders:

Code

```
#exo-setup(draft-mode: false)  
  
#exo(  
  exercise: [Solve  $x + 5 = 12$ ],  
  solution: [], // Empty - no placeholder  
)
```

Preview

**Exercise 1** Solve  $x + 5 = 12$

**Solution 1**

## 6. Exercise Banks

Define exercises once, display them anywhere. Perfect for creating reusable exercise collections.

### 6.1. Defining Bank Exercises

Use `exo-define` to register exercises without displaying them:

```
#exo-define(  
  id: "quad-1",  
  exercise: [Solve  $x^2 - 5x + 6 = 0$ .],  
  topic: "quadratics",  
  level: "1M",  
  solution: [ $x = 2$  or  $x = 3$ ],  
)  
  
#exo-define(  
  id: "geom-1",  
  exercise: [Find the area of a circle with radius 5.],  
  topic: "geometry",  
  level: "1M",  
  solution: [ $A = 25\pi$ ],  
)
```

### 6.2. Displaying Bank Exercises

Use `exo-show` to display a specific exercise:

Code

```
#exo-show("quad-1")
```

Preview

**Exercise 1** Solve  $x^2 - 5x + 6 = 0$ .

**Solution 1**  $x = 2$  or  $x = 3$

### 6.3. Selecting Multiple Exercises

Use `exo-select` with filters:

```
// All quadratics exercises  
#exo-select(topic: "quadratics")  
  
// Level 1M exercises only  
#exo-select(level: "1M")  
  
// Multiple topics  
#exo-select(topics: ("quadratics", "geometry"))  
  
// Limit count  
#exo-select(topic: "algebra", max: 5)  
  
// Custom filter  
#exo-select(where: ex => ex.metadata.level == "hard")
```

### 6.4. Including Exercises from External Files

For larger projects, organize exercises in separate files and import them as needed.

## File structure:

```
project/
├─ main.typ
├─ exercises/
│   ├─ algebra.typ
│   ├─ geometry.typ
│   └─ calculus.typ
```

## exercises/algebra.typ:

```
#import "@local/exercise-bank:0.3.0": exo-define

#exo-define(
  id: "alg-linear-1",
  exercise: [Solve  $2x + 5 = 13$ .],
  topic: "linear-equations",
  level: "1M",
  solution: [ $x = 4$ ],
)

#exo-define(
  id: "alg-linear-2",
  exercise: [Solve  $3x - 7 = 2x + 4$ .],
  topic: "linear-equations",
  level: "1M",
  solution: [ $x = 11$ ],
)

#exo-define(
  id: "alg-quadratic-1",
  exercise: [Solve  $x^2 - 5x + 6 = 0$ .],
  topic: "quadratics",
  level: "2M",
  solution: [ $x = 2$  or  $x = 3$ ],
)
```

## main.typ:

```
#import "@local/exercise-bank:0.3.0": *

// Import exercise definitions (registers them in the bank)
#include "exercises/algebra.typ"
#include "exercises/geometry.typ"

// Now use them anywhere in your document
= Linear Equations
#exo-select(topic: "linear-equations")

= Quadratics
#exo-select(topic: "quadratics")

// Or pick specific exercises
= Mixed Review
#exo-show("alg-linear-1")
#exo-show("alg-quadratic-1")
```

## Tips:

- Use `#include` (not `#import`) to execute the file and register exercises
- Exercise IDs must be unique across all included files

- Exercises are registered globally, so include order doesn't matter for display

## 7. Metadata and Filtering

### 7.1. Adding Metadata

Tag exercises for organization and filtering:

```
#exo(  
  exercise: [Solve  $x + 1 = 5$ .],  
  topic: "algebra",  
  level: "easy",  
  authors: ("Prof. Smith",),  
)
```

### 7.2. Filtering Exercises

Display only exercises matching criteria:

```
#exo-filter(topic: "algebra")  
#exo-filter(level: "easy")  
#exo-filter(topic: "algebra", level: "hard")
```

## 8. Competency Tags

Tag exercises with competencies and display them visually.

Code

```
#exo-setup(show-competencies: true)

#exo-define(
  id: "comp-ex",
  exercise: [Solve and explain your reasoning.],
  competencies: ("C1.1", "C2.3", "C4.1"),
  solution: [Detailed solution here],
)

#exo-show("comp-ex")
```

Preview

**Exercise 1** Solve and explain your reasoning.

C1.1 C2.3 C4.1

**Solution 1** Detailed solution here

### 8.1. Filter by Competency

```
#exo-select(competency: "C1.1")
#exo-select(competencies: ("C1.1", "C2.3"))
```

## 9. Configuration

### 9.1. Global Setup

Use `exo-setup` to configure defaults:

```
#exo-setup(  
  solution-mode: "inline",  
  exercise-label: "Exercise",  
  solution-label: "Solution",  
  correction-label: "Correction",  
  counter-reset: "section",  
  show-id: false,  
  show-competencies: false,  
  fallback-to-correction: false,  
  append-solution-to-correction: false,  
  draft-mode: false,  
  badge-style: "box",          // "box", "circled", "filled-circle", "pill", "tag"  
  badge-color: black,         // Color for badge  
)
```

### 9.2. Badge Styles

Change the visual style of exercise badges:

```
// Circled number (no label text)  
#exo-setup(badge-style: "circled")  
  
// Filled circle with white number  
#exo-setup(badge-style: "filled-circle", badge-color: rgb("#2563eb"))  
  
// Pill-shaped badge  
#exo-setup(badge-style: "pill")  
  
// Arrow tag  
#exo-setup(badge-style: "tag", badge-color: rgb("#1e40af"))
```

Available styles: "box" (default), "circled", "filled-circle", "pill", "tag"

### 9.3. Localization

Change labels for different languages:

#### Code

```
// French  
#exo-setup(  
  exercise-label: "Exercice",  
  solution-label: "Solution",  
)  
  
// German  
#exo-setup(  
  exercise-label: "Aufgabe",  
  solution-label: "Lösung",  
)
```

#### Preview

**French:** Exercice, Solution  
**German:** Aufgabe, Lösung  
**Spanish:** Ejercicio, Solución

### 9.4. Counter Reset Options

Control when numbering resets:

```
#exo-setup(counter-reset: "section") // Reset each section
#exo-setup(counter-reset: "chapter") // Reset each chapter
#exo-setup(counter-reset: "global") // Never reset
```

Use hooks to trigger resets:

```
= New Section
#exo-section-start() // Resets if counter-reset: "section"

= New Chapter
#exo-chapter-start() // Resets if counter-reset: "chapter"
```

## 10. Visual Styles

Set the badge style with `exo-setup(badge-style: "...")`.

### 10.1. Box (Default)

Code

```
#exo-setup(badge-style: "box")
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

**Exercise 1** Solve  $x + 3 = 7$

### 10.2. Circled

Code

```
#exo-setup(badge-style: "circled")
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

**1** Solve  $x + 3 = 7$

### 10.3. Filled Circle

Code

```
#exo-setup(
  badge-style: "filled-circle",
  badge-color: rgb("#2563eb"),
)
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

**1** Solve  $x + 3 = 7$

### 10.4. Pill

Code

```
#exo-setup(badge-style: "pill")
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

**Exercise 1** Solve  $x + 3 = 7$



## 10.5. Tag

Code

```
#exo-setup(  
  badge-style: "tag",  
  badge-color: rgb("#1e40af"),  
)  
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

Exercise 1

Solve  $x + 3 = 7$

## 10.6. Border Accent

Code

```
#exo-setup(  
  badge-style: "border-accent",  
  badge-color: rgb("#3b82f6"),  
)  
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

Exercise 1

Solve  $x + 3 = 7$

## 10.7. Underline

Code

```
#exo-setup(badge-style: "underline")  
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

Exercise 1

Solve  $x + 3 = 7$

## 10.8. Rounded Box

Code

```
#exo-setup(badge-style: "rounded-box")  
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

Preview

Exercise 1

Solve  $x + 3 = 7$

## 10.9. Header Card

### Code

```
#exo-setup(badge-style: "header-card", badge-color: rgb("#3b82f6"))  
#exo(exercise: [Solve  $x + 3 = 7$ ])
```

### Preview

#### Exercise 1

Solve  $x + 3 = 7$

## 11. Parameter Reference

### 11.1. `exo` Function

Parameter	Type	Default	Description
<code>exercise</code>	content	none	Exercise content (required)
<code>solution</code>	content	none	Solution content
<code>correction</code>	content	none	Correction for teachers
<code>id</code>	string	auto	Unique exercise ID
<code>topic</code>	string	none	Topic metadata
<code>level</code>	string	none	Difficulty level
<code>authors</code>	array	()	Author names

### 11.2. `exo-define` Function

Same as `exo`, plus:

Parameter	Type	Default	Description
<code>competencies</code>	array	()	Competency tags
<code>points</code>	number	none	Points (for exam mode)

### 11.3. `exo-select` Function

Parameter	Type	Default	Description
<code>topic</code>	string	none	Filter by topic
<code>level</code>	string	none	Filter by level
<code>author</code>	string	none	Filter by author
<code>competency</code>	string	none	Filter by competency
<code>topics</code>	array	none	Filter by any topic
<code>levels</code>	array	none	Filter by any level
<code>competencies</code>	array	none	Filter by any competency
<code>where</code>	function	none	Custom filter function
<code>renumber</code>	bool	true	Renumber sequentially
<code>max</code>	int	none	Maximum exercises

### 11.4. `exo-setup` Function

Content & Behavior:

Parameter	Type	Default	Description
<code>solution-mode</code>	string	“inline”	“inline”, “end-section”, “end-chapter”, “none”, “only”
<code>exercise-label</code>	string	“Exercise”	Label for exercises
<code>solution-label</code>	string	“Solution”	Label for solutions
<code>correction-label</code>	string	“Correction”	Label for corrections
<code>counter-reset</code>	string	“section”	“section”, “chapter”, “global”

show-id	bool	false	Show exercise IDs
show-competencies	bool	false	Show competency tags
show-metadata	bool	false	Show metadata
fallback-to-correction	bool	false	Show correction when solution missing
append-solution-to-correction	bool	false	Append solution to correction
draft-mode	bool	false	Show placeholders for empty content
solution-placeholder	content	<i>To be completed</i>	Placeholder text
correction-placeholder	content	<i>To be completed</i>	Placeholder text

### Visual Styling:

Parameter	Type	Default	Description
badge-style	string	“box”	Style: “box”, “circled”, “filled-circle”, “pill”, “tag”, “border-accent”, “underline”, “rounded-box”, “header-card”
badge-color	color	black	Color for exercise badges
solution-color	color	green	Color for solution badges
correction-color	color	green	Color for correction badges
label-font-size	length	12pt	Font size for badge labels
margin-position	length/auto	auto	Width reserved for badge column (auto = computed from label)
label-extra	length	1cm	Extra space for labels to extend into left margin

## 12. Utility Functions

Function	Description
<code>exo-reset-counter()</code>	Reset exercise numbering to 0
<code>exo-clear-registry()</code>	Clear all registered exercises
<code>exo-section-start()</code>	Call at section start (triggers reset if configured)
<code>exo-chapter-start()</code>	Call at chapter start (triggers reset if configured)
<code>exo-print-solutions()</code>	Print collected solutions (for end-section/chapter modes)
<code>exo-count(topic: ..)</code>	Count exercises matching criteria
<code>exo-show("id")</code>	Display exercise by ID
<code>exo-show-many("a", "b")</code>	Display multiple exercises by ID
<code>exo-filter(topic: ..)</code>	Filter and display matching exercises