

Overview of Calcularis Games

1 Summary

Calcularis contains **17 games with a total of 48 different variants**. Calcularis automatically analyzes the weaknesses and strengths of each User and selects the games individually for each User, in order that each User achieves optimal learning progress.

The games train skills in the following areas:

Number Processing (NP)

Addition/Subtraction (A/S)

Multiplication/Division (M/D)

These games cover the following number ranges:

Number range 0 - 10

Number range 0 - 20

Number range 0 - 100

Number range 0 - 1,000

2 Game Selection

2.1 Customization to the User

At the beginning of learning with Calcularis in the Guided Training, all users start with the simplest game in the number range from 0 – 10. After each input Calcularis recalculates the knowledge level of the User. Depending on the level of knowledge, it examines it for the next game and **thus automatically adapts to the user**. When all the skills of a number range are mastered, Calcularis moves to the next number range.

Thanks to the adaptation to the User, the users develop the skills **at their own pace** and according to their own learning pattern. At the same time, Calcularis ensures that no needed skill is skipped, and that users systematically build their skills.

2.2 Testing Individual Games

As a User's supervisor, you can select the so-called "Trial Mode" from the upper right menu. In this trial mode, you can select the number range, the game and the variant. During 2022, the "Trial Mode" will be replaced by the "Free Training", which also allows students to directly select individual games,

3 The Games at a Glance

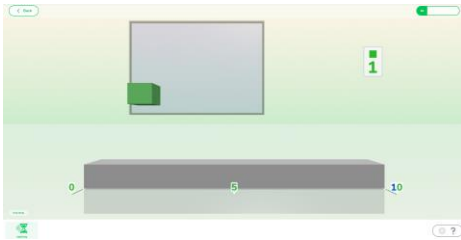
3.1 Preliminary Remarks

The sequence of games in the following list does not correspond to the sequence of games as followed by the Guided Training of Calcularis. Instead, Calcularis chooses the games depending on User's individual abilities.

For each game, one or more "skills" are specified, which this game is intended to train in particular. At the same time, however, each game implicitly trains other skills. In particular, transcoding skills are needed in almost every game. These skills, which are not the main training goal of a game, are not listed.

3.2 List of games

Lightning



Description: Trains the simultaneous acquisition of objects.

Area: Number Processing

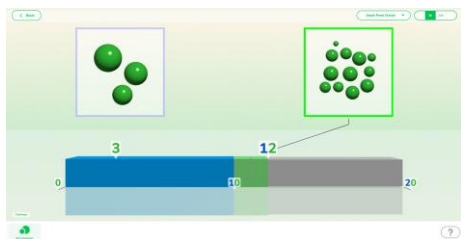
Number Range: **Skill(s):**

10

Subitizing

simultaneous acquisition of quantities of up to 4 objects

Comparison



Description: The user must click on the larger of two structured sets, point clouds or numbers. The game exists in 4 variants, which are handled in the same way.

Area: Number Processing

Number Range: **Variant** **Skill(s):**

10, 20

"Structured Amounts"

Estimation
Larger/Smaller (cardinal)

20, 100

"Small Point Clouds"

Estimation
Larger/Smaller (cardinal)

1000

"Large Point Clouds"

Estimation
Larger/Smaller (cardinal)

10, 20, 100

"Arabic"

Single Digit Comparison,
Larger/Smaller

Estimation



Description: In the "Arabic" variant, the user must click on one of three point clouds, which corresponds to the displayed Arabic number. In the variant "Number Line", the user must click on one of three point clouds or Arabic numbers, which corresponds to the displayed position on the number line.

Area: Number Processing

Number Range: **Variant** **Skill(s):**

100, 1000

"Arabic"

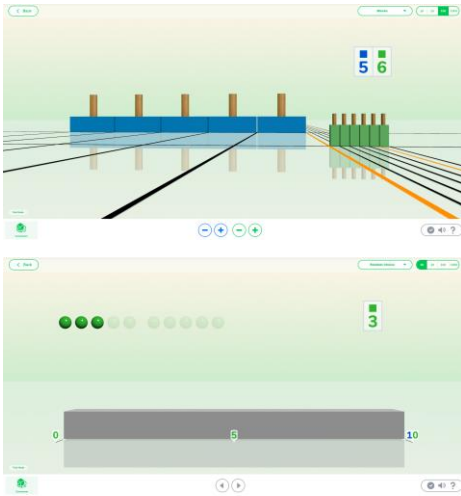
Estimation

20, 100, 1000

"Number Line"

Estimation
Ordinality

Conversion



Description: The user must either type in a presented number in Arabic, select it as a structured set, or place it on the number line with blocks.

Area: Number Processing

Number Range: **Variant** **Skill(s):**

10, 20, 100, 1000 "Arabic" Transcode to Arabic representation

10, 20, 100, 1000 "Blocks" Transcode to blocks on the 3D number line

10, 20 "Structured Amounts" Transcode to structured quantities

Sequence



Description: The user must specify whether a series of three numbers is sorted in ascending order or not.

Area: Number Processing

Number Range: **Skill(s):**

10, 20, 100, 1000 Larger/Smaller, Ordinality

Secret Number



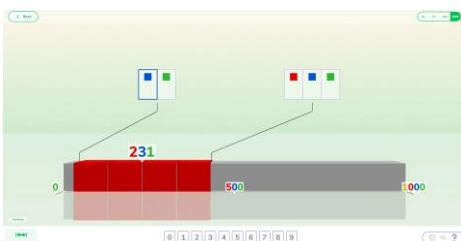
Description: The user must guess the number that Calcularis has remembered.

Area: Number Processing

Number Range: **Skill(s):**

10, 20, 100, 1000 Larger/Smaller, Ordinality

Distance



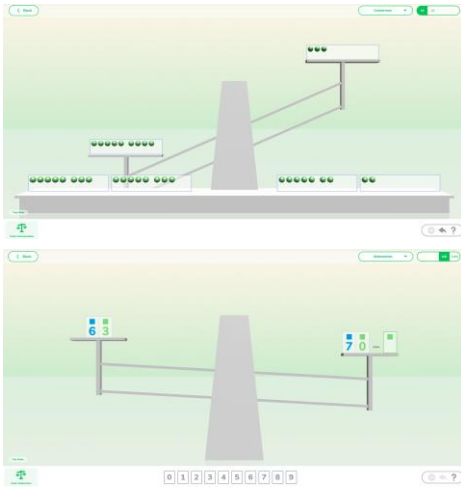
Description: The User must specify the predecessor, pre-predecessor or pre-pre-predecessor in 1s, 10s or 100s.

Area: Number Processing, partly addition/subtraction

Number Range: **Skill(s):**

10, 20, 100, 1000 Predecessor/successor, decimal system

Scale


Description:

On both sides of the scale, the user has to put down "the same amount". The scale is used in 5 variants.

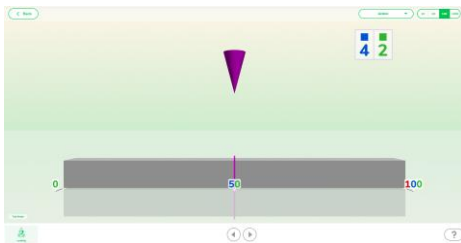
Area:

"Conversion" and "Decomposition" variants → Number Processing
 Variants "Split", "Subtraction" and "Subtraction of 10s and 1s" → Subtraction

Number Range:
Variant
Skill(s):

10	"Conversion"	Comparing Cardinal quantities
10, 20	"Decomposition"	Transcode Arabic by cardinality, decompose
100	"Composition"	Subtraction as addition
100	"Subtraction of 10s and 1s"	Subtraction without transition of 10
100, 1000	"Subtraction"	Subtraction

Landing


Description:

Place the falling cone on the number line. The position is spoken or given in Arabic notation, as a structured set or point cloud.

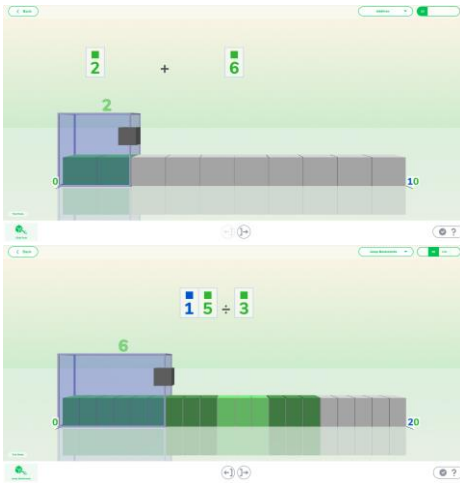
Area:

Number Processing

Number Range:
Variant
Skill(s):

10, 20, 100, 1000	"Spoken"	Transcode spoken by number line
10, 20, 100, 1000	"Arabic"	Transcode Arabic by number line
20	"Structured Sets"	Transcode cardinality by number line
100	"Point Clouds"	Set acquisition, transcoding cardinality by number line

Slide Rule

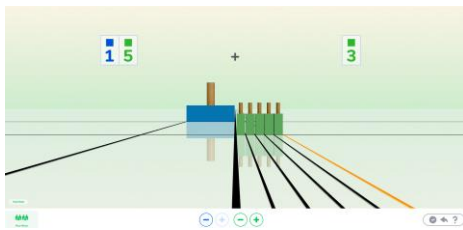


Description: Model an addition or subtraction by pulling a glass box larger or smaller. The game is used in 3 variants.

Area: Variants "Addition" and "Subtraction": A/S
Variant "Jump Backwards": M/D

Number Range:	Variant	Skill(s):
10	"Addition"	Addition as enlarging a set and navigating forward on the number line
10	"Subtraction"	Subtraction as shrinking a set and as navigating backwards on the number line
20, 100	"Jump Backwards"	Division as multiple subtraction

Plus-Minus



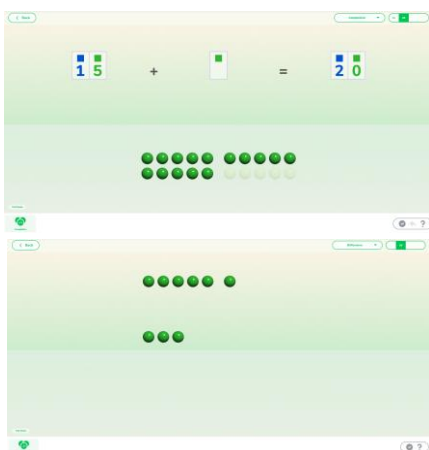
Description: Model addition and subtraction with blocks.

Area: Addition/Subtraction

Number Range:	Skill(s):
20, 100, 1000	Forward and backward navigation on the number line A/S as changing sets

Within Plus-Minus, Calcularis increases the difficulty depending on the user's abilities. For example Calcularis trains "Addition without Carrying" before "Addition with Carrying", "Subtraction without Carrying" before "Subtraction with Carrying". These gradations can be selected in trial mode.

Calculating with Spheres

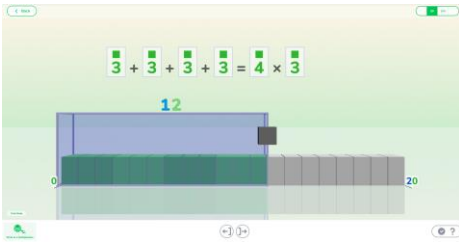


Description: Model addition and subtraction using structured sets. The game exists in 2 variants.

Area: Addition/Subtraction

Number Range:	Variant	Skill(s):
10, 20	"Completion"	Supplement on the next 10s
20	"Difference"	Subtraction as the difference between sets

Write as a Multiplication



Description: A multiple addition must first be written as a multiplication and then modeled as a multiple addition with a glass box.

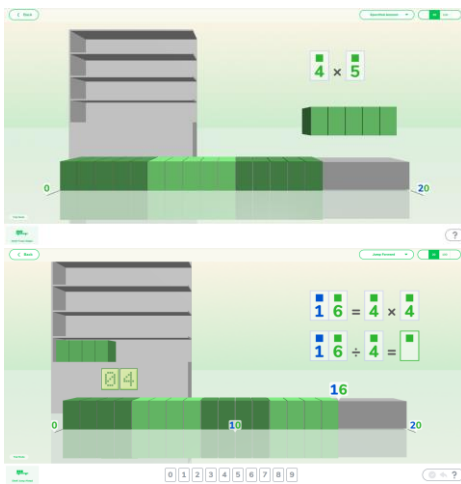
Area: Multiplication/Division

Number Range: **Skill(s):**

20, 100 Notation of multiplication

20, 100 Multiplication as multiple addition

Shelves



Description: In two variants, blocks of 1 of the same cardinality must be placed on the number line to model the displayed multiplication. In the third variant, the division is introduced as the inverse of multiplication.

Area: Multiplication/Division

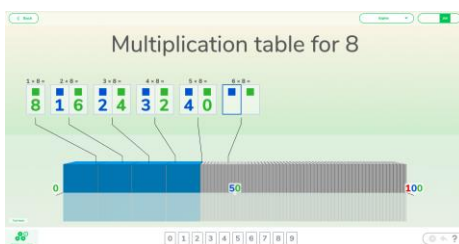
Number Range: **Variant** **Skill(s):**

20, 100 "Specified Amount" Multiplication as multiple addition

20, 100 "Free Multiplication" Multiplication as multiple addition

20, 100 "Jump Forward" Division as jumping and reversal of multiplication

Series



Description: Three numbers in a series must be filled in as a gap text.

Area: Multiplication/Division

Number Range: **Skill(s):**

20, 100, 1000 Support rows (1, 2, 5, 10)
Rows (further rows up to 12)

Distribution



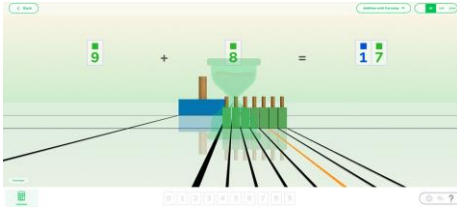
Description: Blocks must be distributed over a predetermined number of baskets to model the division.

Area: Multiplication/Division

Number Range: **Skill(s):**

20 Division as Distribution

Calculator



Description: Solve tasks with mental arithmetic. A wide variety of skills are practiced in different game variants.

Area: Addition/Subtraction, Multiplication/Division

Number Range:	Variant	Skill(s):
10, 20, 100, 1000	"Addition"	Addition without transitions
20, 100, 1000	"Addition with Carrying"	Addition with transitions
10, 20, 100, 1000	"Subtraction"	Subtraction without transitions
20, 100, 1000	"Subtraction with Carrying"	Subtraction with transitions
10, 20	"Math Facts"	Retrieval of math facts
20, 100, 1000	"Difference"	Subtraction as difference
10, 20, 100, 1000	"Completion"	Add to the next 10s, 100s, etc.
20, 100, 1000	"Multiplication"	Multiplication
20, 100, 1000	"Division with One Unknown"	Division as multiplication
20, 100, 1000	"Division"	Division