NUMBER

Cabri has powerful facilities for creating activities involving number.

1. DYNAMIC PROPERTIES OF NUMBER

1.1 Free or Independent Numbers

These are numbers that may be entered and edited by the user. Here are some examples:
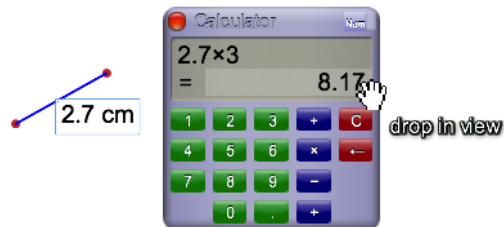
$$3 \qquad -28.4 \qquad \frac{7}{8} \qquad \pi$$

1.2 Dependent Numbers

These numbers are created by means of tools or operations and may not be edited by the user (an attempt to edit such a number will turn the number into text). Here are some examples:
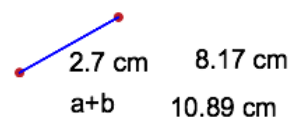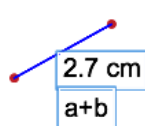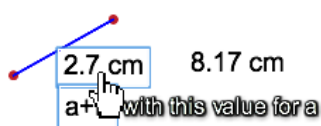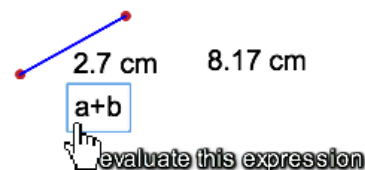
Measurements (to change the accuracy displayed press `ctrl +` or `ctrl −` or use the right-click contextual menu).

2.7 cm
length of this segment

Calculations (see the **CALCULATIONS AND EXPRESSIONS** documentation for details).

Calculator
2.7×3
= 8.17
1 2 3 + C drop in view
4 5 6 × ←
7 8 9 −
0 . +

2.7 cm

Applying Expressions (see the **CALCULATIONS AND EXPRESSIONS** documentation for details).

2.7 cm   8.17 cm
a+b
evaluate this expression

2.7 cm   8.17 cm
a+b   with this value for a

2.7 cm   8.17 cm
a+b   and this value for b

2.7 cm   8.17 cm
a+b   10.89 cm

Point Counter (see **POINT COUNTERS** documentation for details).
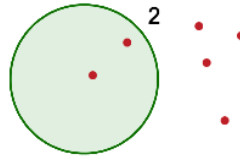
Counters related to containers (see **CONTAINERS AND TOKENS** documentation for details).
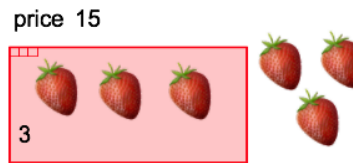
1.3 Others

There are also two numbers which are related to specific objects or events, but which may be edited by the user.

Stopwatches (see the **STOPWATCHES** documentation for details).

Number of Tries counter (see the **INPUT BOXES** and **MULTIPLE CHOICE QUESTIONS** documentation for details).
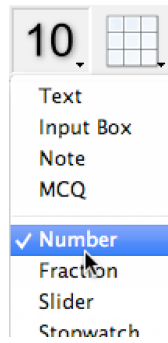
2. CREATING AND EDITING A FREE NUMBER

2.1 The Number tool

The **Number** tool may be used to enter any possible type of number, including π and fractions.

Select the **Number** tool.

Click to position the value.

edit a new value

Type in the number.

-23.4

Press return or click outside the blue box to finish entering the number.

-23.4

To enter the number π, type pi, Pi, or PI.

PI   *press return to get*   π

To enter a fraction such as ¾ type 3 / 4.

3
―
4 this fraction

Double-click or use the **Number** tool to edit the number.

-23.4

edit this value

Use the **Attributes** panel of the Inspector to change the appearance of the number.

-23.4

To give the number units, type the name of the unit after the number using the following:

cm   becomes cm
cm2   becomes cm²
cm3   becomes cm³

-23.4 deg --> -23.4°

deg   becomes °
rad   radian

Note: You may also copy an existing number by positioning the value and then clicking to select the existing number. Note that this new number is dependent on the existing number, however. See Dynamic Numbers below.
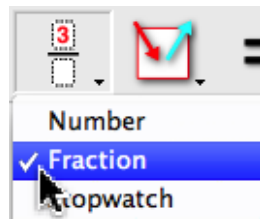
4.5 | 4.5   4.5   4.8   4.8
take this value

2.2 The Fraction tool

This tool may only be used to enter fractions.

Select the **Fraction** tool.

Number
✓ Fraction
Stopwatch

Move the cursor to the desired position.

|

edit a new fraction

Click to position the fraction.

—
1
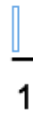
Type in the numerator.

3
—
1

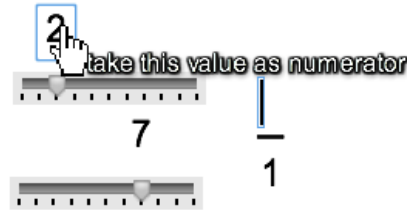Press Return to keep a denominator of 1, or click on the denominator to change it.
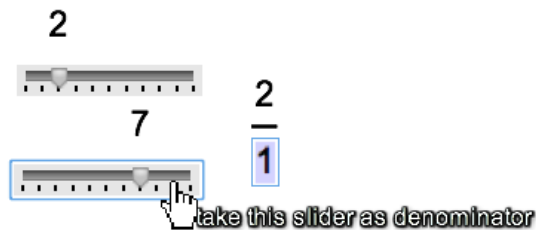
3
—
1

Enter the denominator.

3
—
4

Press Return or click away from the fraction to complete entry.
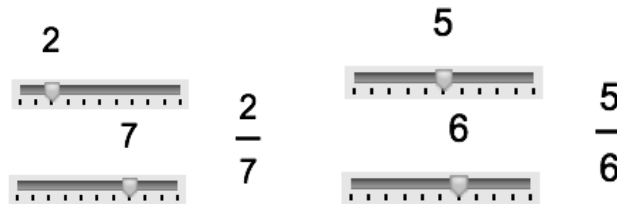
$$\frac{3}{4}$$

Alternatively, you may enter a dynamic copy of an existing number as numerator by clicking on the number.

You may also enter a dynamic copy of an existing number as denominator.
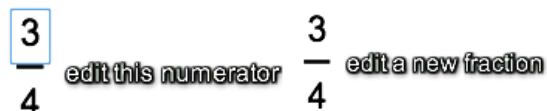
This fraction will change as the copied numbers change.

Note that it is also possible to include dynamic copies in a fraction using the **Number** tool once you have pressed /.
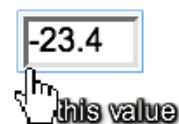
Double-click on the fraction or use either the **Number** or the **Fraction** tool to edit the fraction.

A fraction composed of copied numbers cannot be edited.

2.3 Input Boxes

Once an input box is created, any type of number may be entered into it by typing the number (including units if wanted) directly and edited by clicking on it.

The maximum number of decimal places may be set either by right-clicking and selecting the appropriate option or by using $+$ or $-$ on the keyboard.
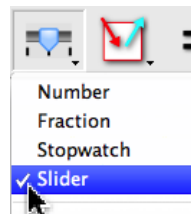
Input boxes may also be constrained to only take numerical input through the right-click menu.

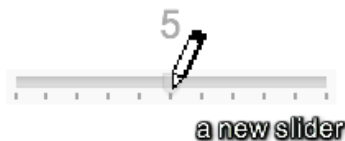See the **INPUT BOXES** documentation for details.

2.4 Sliders

Sliders provide an excellent way to enable the user to change numbers easily within a given range.

Select the **Slider** tool.

Move the cursor to the required position.

Click to position the slider.

Drag the knob to change the value of the slider.

The number shown gives the value of the slider: if this is deleted the slider still has the value given by the position of the knob, and its value may be included in calculations, etc.
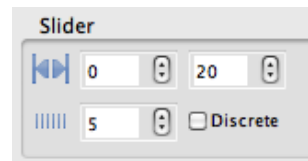
Here is an example of a fraction with numerator and denominator determined by sliders.

take this slider as numerator

1

3
―
1

take this slider as denominator

3
―
8
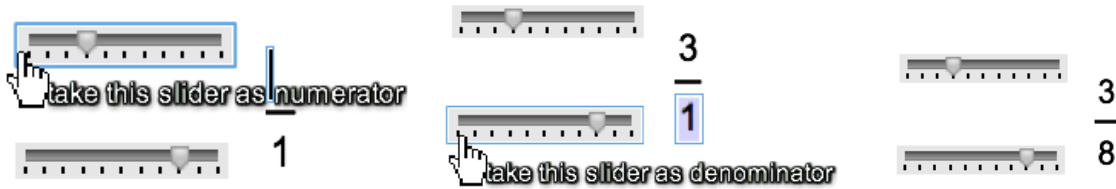
Select the slider and go to the **Attributes** panel of the inspector to change the range and values that the slider may take.

Slider

0   10

11   ☑ Discrete

Chart

☐ Auto 0

Att...   Media   To
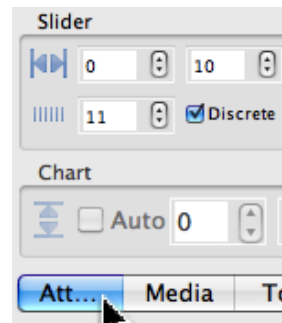
The slider parameters have been changed as shown:

Slider

0   20

5   ☐ Discrete

Here is the resultant slider.

6.6

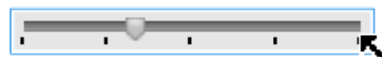To show more decimal places, select the number and press `ctrl +` (for fewer, press `ctrl -`) or use the right-click menu.

6.614

Drag the bottom right corner of the slider to change its length or its orientation.

6.614

this slider

6.614

6.614

The slider color may be changed using the **Attributes** panel of the Inspector.

6.614

Select the number to change its appearance using the **Attributes** panel of the inspector.

6.614

3. ACTIONS TO CHANGE A FREE NUMBER, STOPWATCH OR NUMBER OF TRIES COUNTER

Free numbers (apart from sliders), stopwatches and number of tries counters may be changed by any of the actions to the left. See the **ACTIONS** documentation for further details.

:= Set Values
⬆ Increase Values by 1
⬇ Decrease Values by 1
K Reset Values
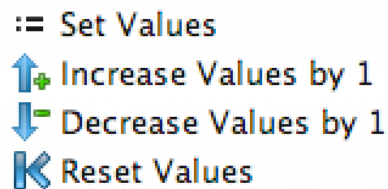
Sliders (choosing the slider itself rather than the associated number) may have their value set or reset, but cannot be increased or decreased by means of actions.

4. COPYING OR DRAGGING AND DROPPING A NUMBER

Copying a number: Select the number (or numbers) and press `Ctrl-C` (`apple-C` on a Mac) or use **Edit – Copy**. Numbers may then be pasted to any page in the activity book.

There are two choices for pasting the number or numbers.

1. **Static.** Paste using `Ctrl-V` (`apple-V` on the Mac) or **Edit – Copy**. This creates a number or numbers with the value that the original number(s) had when copied. The new number(s) will not change when the original number(s) change, and may not be edited. Static copies may be copied to other Cabri Author files, and are unaffected by deletion of the original number(s).

2. **Dynamic.** Paste using `Ctrl-Shift-V` (⌥⌘V `alt-apple-V` on the Mac) or **Edit – Clone Copied Value**. This creates a dynamic copy or clone of the original number or numbers, which will change when the original number(s) change. Dynamic copies may only be created within the file containing the original number, and will be deleted if the original number is deleted. A short-cut to create a dynamic copy on the same page is to use the **Number** tool, click to position the new value, and then click on the number to be copied.

The difference is illustrated in the two screenshots below. In the first screenshot, a dynamic copy and a static copy have been made of a slider number.

<div align="center">

5   Dynamic copy   Static copy

5   5

</div>
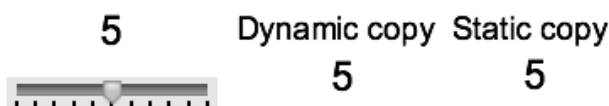
The slider has now been changed.

<div align="center">

7   Dynamic copy   Static copy

7   5

</div>
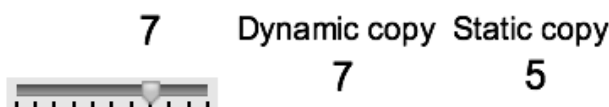
The dynamic copy changes to the value of the slider number, while the static copy remains the same. Neither may be edited.

Note that to make a dynamic copy of a fraction by this method it is necessary to make separate dynamic copies of the numerator and denominator and then combine these in a new fraction.
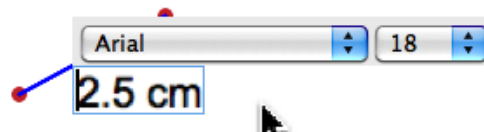
Dragging and dropping a number: numbers may be dragged and dropped into input boxes and table cells (where they replace any existing entries) and also text boxes and MCQs (where they are inserted where dropped). Such numbers are dynamic copies.

5. EMBEDDING A NUMBER IN TEXT AND TABLE CELLS

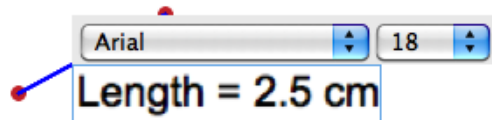### 5.1 Surrounding a number by text

Dependent numbers and the numbers attached to sliders may be surrounded by text.

Double-click on the number. A cursor will appear either to the right or left of the number.
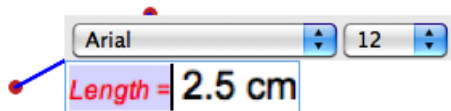Note that if the number is the result of using the **Calculator** tool you will need to select the **Text** tool and then the number.
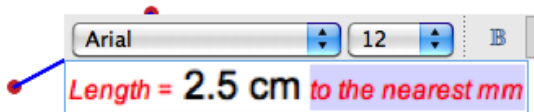
Type in the text that you want.

This text may be formatted differently from the number itself.

Text may also be entered to the left of the number.

Note that any units attached to a measurement may not be edited. Click outside the text to finish editing.

If you copy this number, the text will also be copied (statically). The number may be used in further operations, or included in text as described below. Apart from measurements, calculations, and numbers attached to sliders, if the number is deleted, the text will disappear. Note that dynamic copies of measurements, calculations, and numbers attached to sliders that include text will not disappear if only the number rather than the entire text is deleted.

WARNING: Free numbers (apart from sliders), stopwatches, and number of tries counters may not be surrounded by text in this manner: any attempt to do so will turn the number into text only.

5.2 Inserting a number into text

All types of numbers may be inserted into text. Numbers may be dragged and dropped into existing text, or inserted in text as the text is created as shown below:

Use the **Text** tool and enter some text.

Move the cursor over a number. Make sure the tooltip says "include this X" (where X is value, slider, denominator, numerator or fraction).
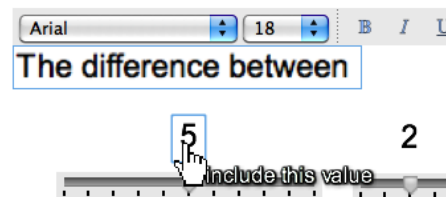
Click on the number. A copy of the number (but not any text surrounding it) will appear in the text.
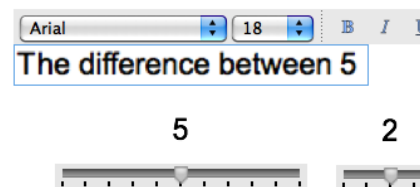
You may insert further numbers (and Booleans) in the same text. Here, the slider numbers 5 and 2 have been inserted.
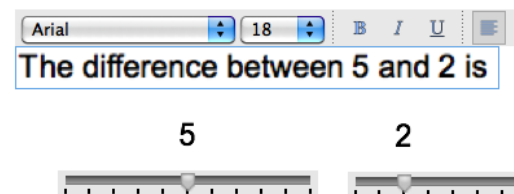
The numbers represented in the text will change as the originals change, and may be selected for further operations.

If the original numbers are deleted their copies will disappear from the text but the text will remain.

Here is an example of a fraction inserted into text. Numerators and denominators may be separately inserted.

$$\frac{3}{5}$$

The fraction to the left appears as 3/5 when inserted into text. It has the numerator 3 and denominator 5.

Note that any number typed directly into text will be treated as text only.

5.3 Embedding a number into a table cell

To enter a number into a table cell, the number must already exist elsewhere. Drag the number to the table and drop it into the required cell to create a dynamic copy of the number in the cell.

1.7 cm include this value

WARNING: If you type any number directly into the cell it will be treated as text only.