Splash!
from the keyboard

Access to Shape, Drawing and Number

www.splash-city.com

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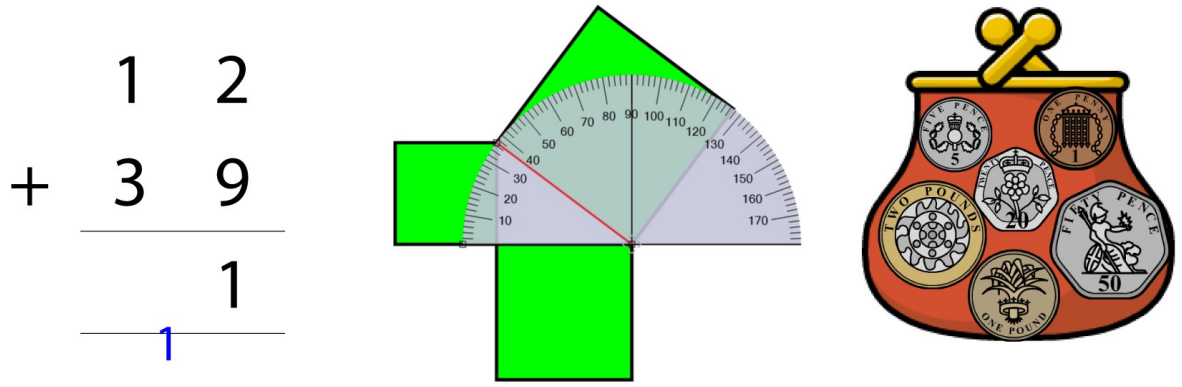
What is Splash!

Introduction

Splash! is a fully accessible maths and graphics application. It provides users with workspaces, and a way for teachers to create worksheets for subjects like Mathematics, Science and Design. It was originally based on the award winning ACE Centre program 'AccessMaths' and its companion 'Number Navigator', improving and combining them into one package, and greatly extending their functionality.

Who can use Splash!

The interface configuration capabilities mean that resources, activities and worksheets, can be created for a large range of educational stages and curriculum areas from early years, to secondary education, 16 years or older.



Splash! gives Access to drawing, working with shape, and number activities

Accessibility

Splash! is accessible to users with a large range of physical difficulties and is designed to be fully controllable with a range of input devices. All functionality can be accessed from a keyboard or equivalent with no pointer use; or with a pointer device and no keyboard – using an existing on-screen keyboard for normal typing.

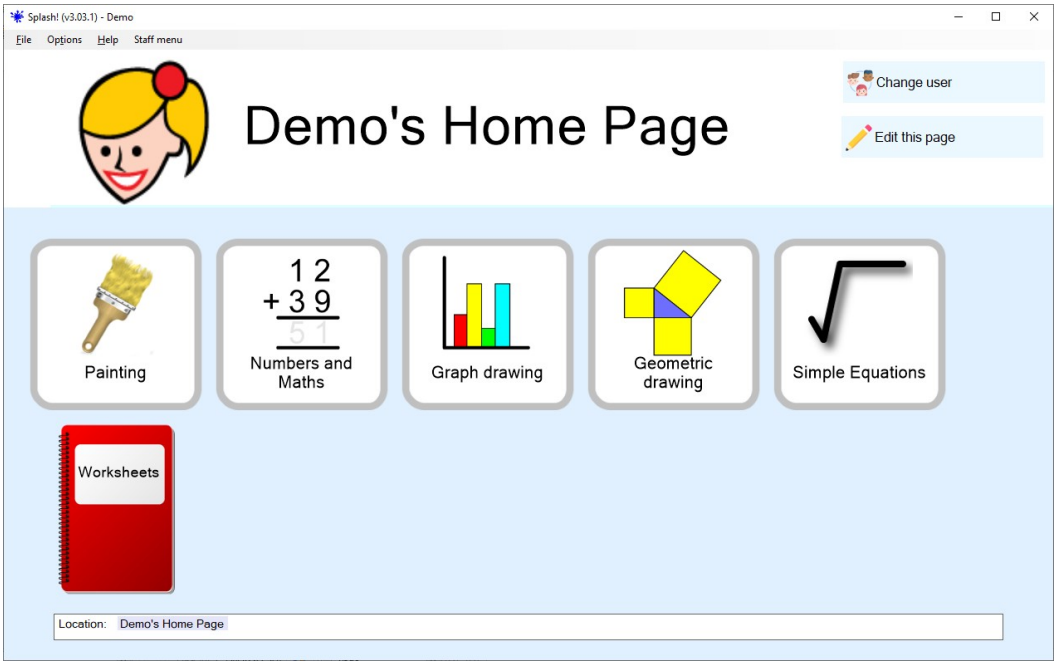
User and Teacher Modes

When using Splash! screen and tools can be viewed in one of two ways. The user will have tools specific to their requirements of the current activity.

The teacher has more power and teacher mode can be turned on from the Options Menu on the toolbar or a keyboard command (Control + T). This will give access to many more tools, palettes and configuration possibilities.

Opening screen / User's menu

When the software first starts it will open in the user's menu screen, for example:



Splash can store profiles for multiple users. Press the "Change user" button at the top right to switch users or create new ones. When the software is first installed it will usually create two or more default users for different KS levels.

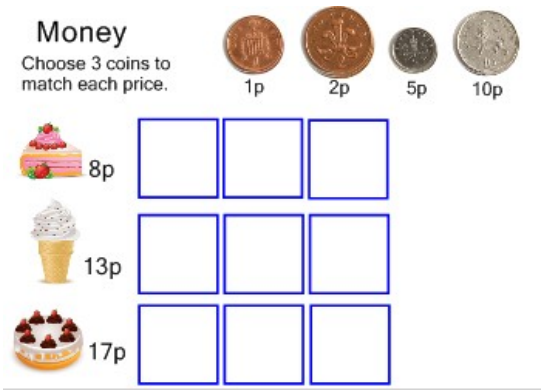
Activities

The large buttons on the page are the main functional activities of Splash. An "Activity" is a resource which has selected tools and capabilities customised to the users' needs and the educational stage. When any of these buttons is selected the main work screen is displayed with a blank page, but different tools and options suited to that activity.

The buttons included here are initially determined by the KS level selected when the profile was created, but individual options can be added or removed later.

Worksheets

The last button is a folder of sample worksheets. These contain content within the work area as well as a selection of tools, similar to a printed worksheet, for example:



Typically the worksheet would contain the tools from one of the standard activities; however it is possible to customise these fully for individual worksheets, for example to

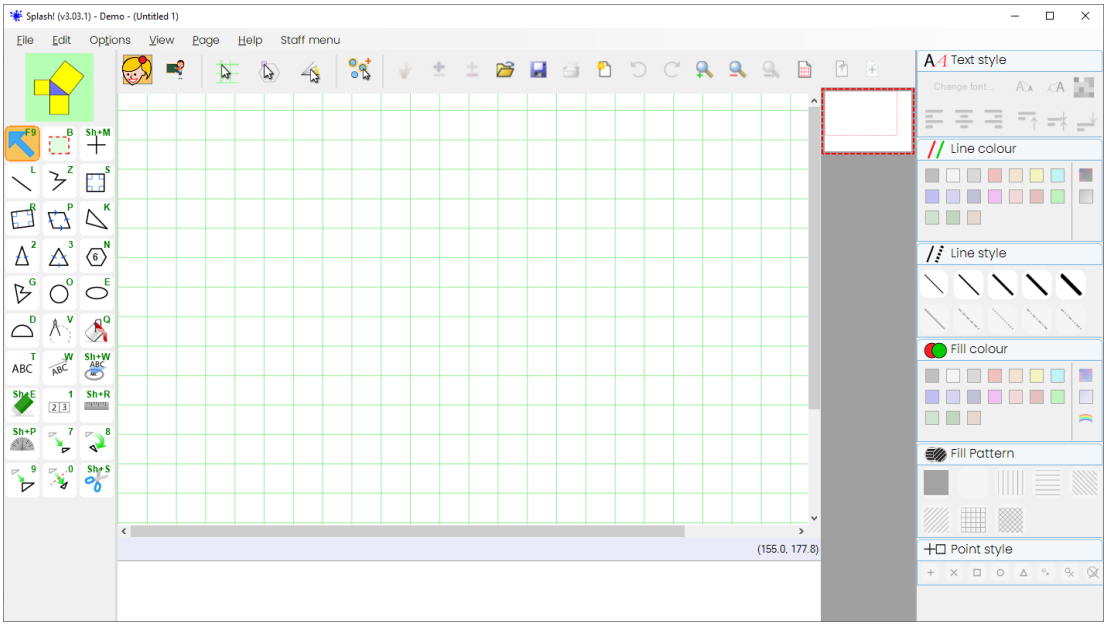
hide irrelevant features, so that the user only sees the tools options and palettes that are relevant

Again it is possible to remove these and/or add your own worksheets and folders or sub-folders to the menu.

You can alternatively open an existing Splash file from disc, which isn't on the user's menu, using the File menu.

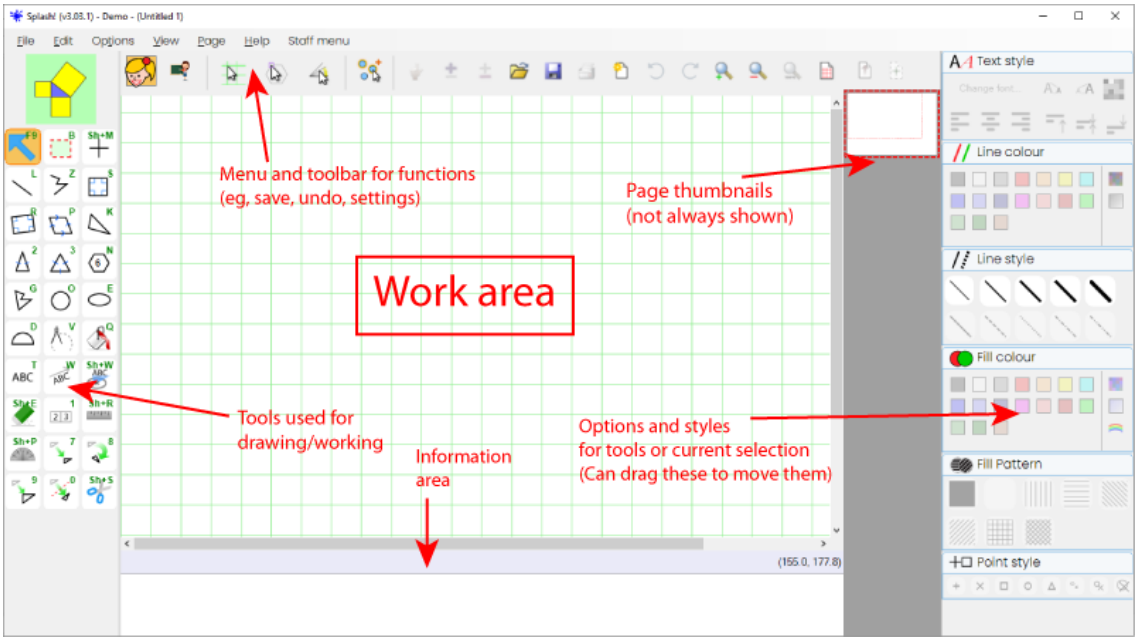
Using the Splash! Drawing Screen

The parts of the screen



The Splash! workspace is framed by controls - the picture above shows the default, with almost all options visible.

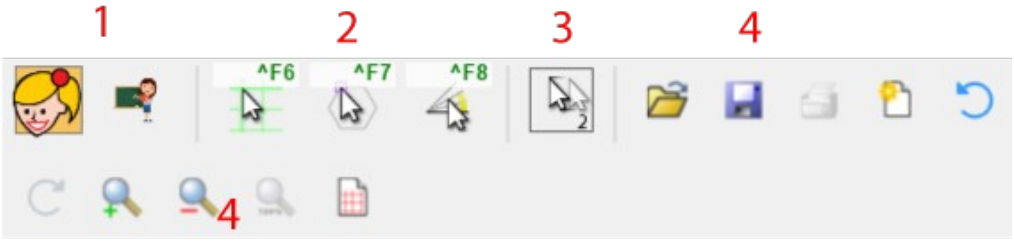
The main parts of the screen are:



All of these can be customised or hidden to suit the user or current work. This is explained below (see p18), but first we will briefly describe the different areas:

Toolbar and Menus

The toolbar has 4 main groups of items:



1 – The first 2 buttons switch between User and Teacher modes. Teacher mode has some extra editing and configuration options. It is also possible to create worksheets which are protected so that the user can only modify parts of the document – the rest is edited in Teacher mode. Control+U and Control+T can also be used to swap between these.

2 – The next 3 buttons select if the pointer position is snapped, and how (see p10). The key combinations Control + F6 to F8 select these and Control+F5 selects no snapping.

3 – For keyboard users a button represents the step size when the pointer is moved by the keyboard arrow keys.

4 – And the remaining buttons are general functions such as Save, Open file, Undo etc. All these have key equivalents – these can be see in the equivalent options in the menu.

The buttons in the functions area can be individually added and removed. The other sections can be hidden as a group. See p18.

Menus

The menus above the toolbar are fully accessible with a keyboard, use Alt + mnemonic key (the key underlined when Alt is pressed, for example Alt + 'F' for the file menu). You then use the mnemonic menu item keys or arrow keys to highlight the item you want to use and press Enter to activate. The menus also have reminders of the direct keyboard short-cuts like Control + P for Print.

If the user finds the menu easier to access than using key combinations to select tools, an extra menu can be added which includes all the items in the tools palette on the left. This is changed in *Settings > Screen Contents and Layout > Screen Contents*.

Tools area

On the left of the screen are all the tools which can be used to draw, write or create content. These are explained individually later in these instructions. The items listed here depend on the activity selected when opening the work screen.

Each has a key combination that can be used to select it, which is displayed on the button.

The large button above the tools allows the user to change between the activities (they might, for example want to swap back and forth between graph drawing and equations on the same page), or to return to their menu. F12 is the equivalent of clicking on this button and opens a menu which keyboard users can navigate using the arrow keys and Enter.

Palettes – options and styles

On the far right (initially) are the various palettes which offer styling (such as colours, font

size etc) and other options for the selected tool – for example when working with equations these show the various things that can be added such as square roots, divisors and so on.

Some of these palettes will show a key combination which can be used to select the palette as long as keyboard-only was selected in the accessibility settings – this is generally the case for the styling ones. Some others wouldn't typically be used by keyboard users as they offer pointer users access to things which would otherwise be typed (this is the case for most with extra content for individual tools)

All of these palettes can be undocked and moved around the screen by dragging the title, or selecting it and these using the key combinations Shift+Alt+M to move or Shift+Alt+R to resize followed by the arrow keys and Enter to finish.

Page thumbnails

To the left of the palettes are thumbnails showing the pages in the document and the current page. Keyboard users can navigate between pages with Control+Page Up/Down. Other page related keys are shown on the Page menu at the top.

Keyboard Control Introduction

Splash! can be fully accessed by users who have no control of a mouse pointer or other devices like tracker balls, head pointers or eye gaze.

Note: the pointer remains active even if the user is only using the keyboard. This means an assistant can still use the mouse within the software.

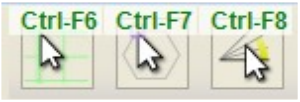
The main keys used by Splash! are:

- the arrow keys move the pointer around the screen
- The F2, F3, F4 keys switch between small, medium and large steps (by default for users with keyboard-only access a button on the toolbar shows the current selection and can change it. This button can be hidden in the user settings however). The default is for (approximately) 1, 4, and 25 mm steps respectively per key press but this can also be changed in the user options.
- 'Space bar' or 'Insert' are equivalent to a left click
- 'Return' or 'Enter' is the same as left double click
- 'Escape' cancels or undoes the last step when drawing out a shape (which pointer users do with a right-click)

Using Key combinations

For those users that have problems holding down one key when pressing another, rather than including the accessibility within Splash! we recommend that the '**Sticky keys**' facility in the system settings are used.

Snap to...

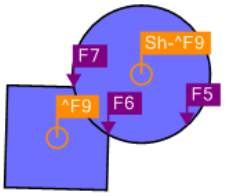


To assist positioning, Splash has a versatile mechanism for snapping the position where a user clicks, so that the user does not need to be so precise. There are three basic 'Snap to' modes in Splash!. The user can change between them at any time by pressing the key combination shown below.
Each time a point is fixed on the screen when creating shapes and using tools the current

point will move automatically to a nearby point depending on the mode:

- The nearest page grid intersection - Control + F6
- An existing nearby shape - Control + F7.
- Fix the angle of any line being draw to the nearest 15 degrees. - Control + F8. When moving existing shapes this restricts movements to either horizontal or vertical.

To switch 'Snap to' off, press Control + F5.



Keyboard users can optionally enable an additional 'snap to' a set of shortcuts to the nearest important points (see picture right, and details below).

Snap to Grid

Every page of Splash! worksheet can have a grid assigned to it (see p21). This grid may be invisible.

The grid configuration - size and style are set in the menu: *Page > Edit grid and background*. If snap to grid is enabled then each time a shape or tool is created or edited, the point will always jump to the nearest grid intersection.

Snap to Shape

Snap to existing shapes: When this is selected the software will automatically select part of an existing item on the page if the user clicks nearby. This includes lines, corners, and where lines cross. A purple highlight shows when the pointer is close enough to a shape that the software will lock on to it. When moving shapes it will try to snap them together so that they tessellate.

Angle

'Snap to angle' does not affect all shapes and tools.

Lines, including the sides of shapes not fixed by the geometry of the drawing being drawn are restricted to steps of 15 degrees – 15, 30, 45, 60, 90. When moving existing shapes this restricts movements to either horizontal or vertical. The initial point of a shape is not snapped with this option.

Snap to Near Points for Keyboard Users

These can optionally be switched on for keyboard users in *Settings > Accessibility > Keyboard settings > Display automatic mouse jump shortcuts in document*.

These appear as key shortcuts within the document, using the keys F5 - F8, which jump the pointer directly to likely nearby locations.

Editing shapes

This section covers the general editing of shapes. Look into the 'Transformations' section for mathematical changes regarding translation, rotation, mirroring and enlargement.

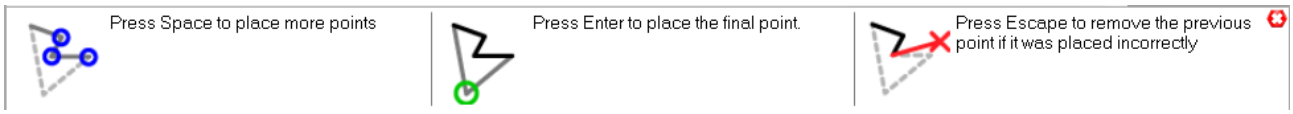
Adding shapes to the page

There are instructions for each tool starting on page 42. However, the principle is the same for most:

- Select the tool, by pressing its key combination (shown in green on the button); or by clicking on the tool in the palette on the left.

- Move the pointer to the position on the page where you want to start drawing and press Space. For text shapes this positions the cursor and then you can start typing.
- Move the pointer to the next position of the shape and press Space again. The exact result depends on the shape: for most simple polygons these 2 points form the first line of the polygon. For a circle the first point is the centre, and the second a point on the edge setting the size. See page 42 for details
- If the shape has an unlimited number of points (eg the 'Irregular polygon' or curve tools), then press 'Enter' instead of Space to place the last vertex and complete the shape.
- At any time press Escape to remove the last point that was placed. You can press Escape repeatedly to remove several vertices in shapes that have many lines.

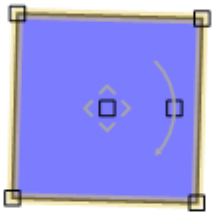
At the bottom of the screen, in the info panel, the software displays the main actions available at the current moment for the shape being drawn.



Selecting existing shapes

Select

To select a shape or other object - press F9 to select the pointer tool. Move inside the object and press Space. The object will be selected, it will be outlined and the editing 'handles will appear'
If two or more objects are on top of each other then pressing Space again will select the next one underneath.



Selecting multiple objects

Splash! is able to make certain changes such as Colour Fills and Line style to more than one object at the same time. In order to do this multiple objects have to be selected. This can be done with the Bounding Box selector 'B', or "Shift selecting" the others:

- With the select tool move to the first object and press Space.
- Move to the next object, press Shift + Space.
- Repeat this until all the objects you want are highlighted.
- To un-select an object Shift + Space it again.

Note: This selection method will not select objects which are underneath other objects, you have to select by pointing to unique points within the objects to be selected.

Other keys

- Control + F9 will select the next shape in order
- Shift + Control + F9 will select the previous one.
- Control + A selects all objects on the page

Moving or Editing a shape

Moving

Objects can be moved by using the F9 tool.

Move into the object to be changed and press Space.

The Handles (editing points) for the shape will appear, depending on the shape(s) selected. The central handle moves a shape around the page. The one to the right of that rotates it. Many shapes will display handles at the corners allowing it to be stretched.

Move the pointer over the central handle and when it flashes and press Space again. Move the shape with the arrow keys and when you want to fix the change press Space. If you made an error then pressing Escape will restore the object back to its starting position.

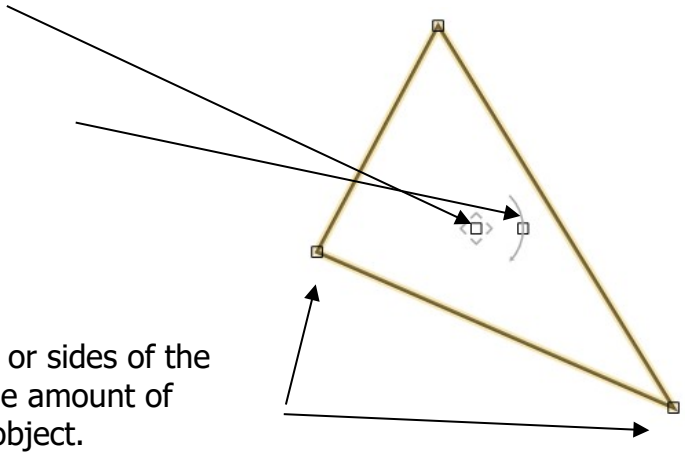
The key combinations Shift + Arrow key, can also be used as a shortcut to immediately move the selected shape(s) a small amount without needing to select the central grab handle.

Adjustment handles on a shape

The central handle moves the shape

Rotating

To rotate an object point to the handle with a short arc going through it, when it flashes – press Space then use the arrow keys to move.



Re-sizing/shaping

To re-size choose the handles on the corners or sides of the shape to be re-sized then use arrow keys. The amount of reshaping that can be done depends on the object.

Moving the handles on the edges of the selected object(s) will change the proportions of the object(s). For lines the vertices, ends and critical points can be moved individually.

Deleting a shape

Just select the shape and then press either Backspace or Delete to remove it.

Normal editing functions

Standard editing functions, such as copying and pasting are available from the *Edit* menu. Likewise you can undo (or redo) recent changes. These work just like in most other software. There are key shortcuts for of these functions (these are the standard key combinations used in most software):

- Control + C = Copy
- Control + X = Cut
- Control + V = Paste
- Control + Z = Undo last change
- Control + Y = Redo last change which was undone

You can, in theory, a copy and paste from Splash into other software. However, due to the complex, but it is often interactive, nature of Splash shapes this is rarely successful. If

you want to add an image of a Splash page into a document, it is usually best to either export the entire page as an image (using the File menu), or use the Window snipping tool to grab an image from the screen.

Secondary pointer

Most keyboard users are moving the normal Windows cursor around the screen using the keyboard arrow keys (or equivalent). Splash can optionally, however, use 2 separate cursors: a separate one for the keyboard user, with the standard Windows pointer one being controlled by the mouse as normal. This mode may be useful when an assistant needs to help the student with some work – the assistant can use the standard cursor to perform some actions such as changing colours or tools, while the student uses the keyboard pointer within the drawing area.

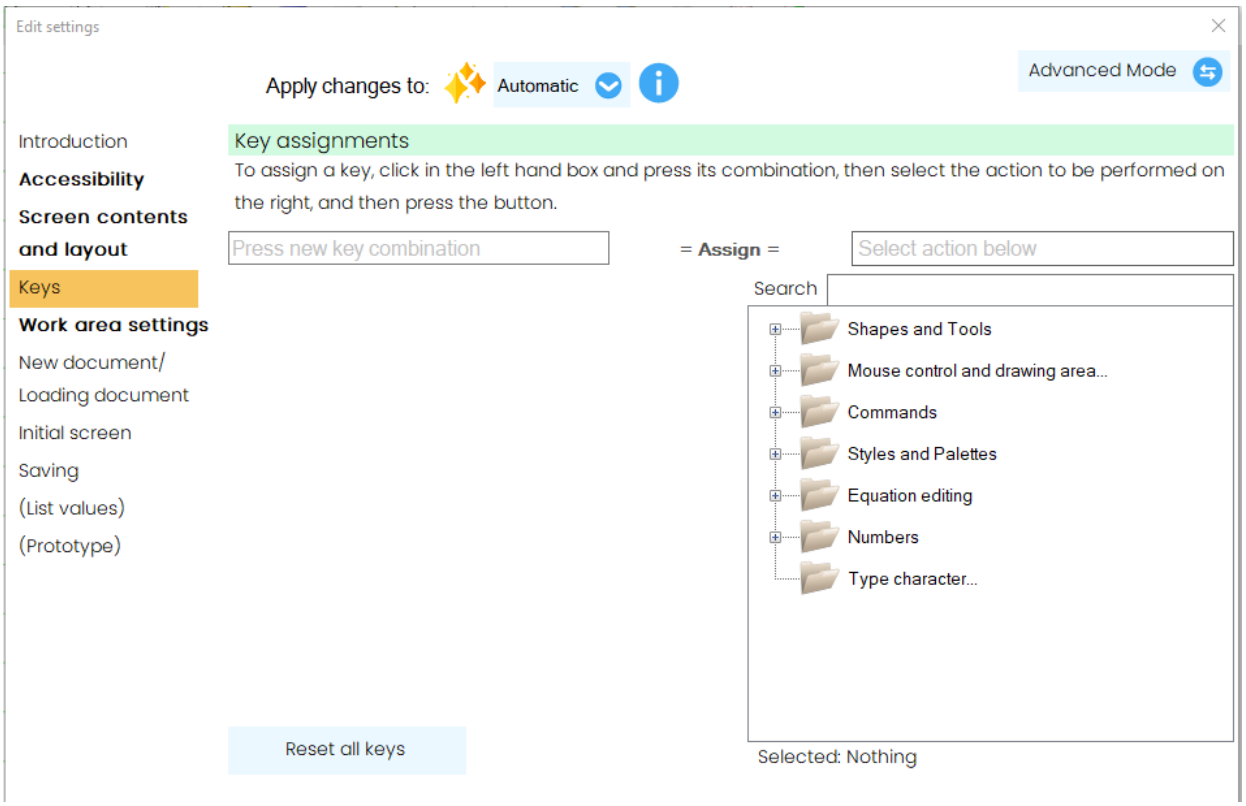
This option is switched on in Settings > Accessibility > Keyboard settings > "Use separate keyboard drawing cursor". Once enabled both cursors move completely separately, and either can be used for any function . The space and Enter keys will draw at the location of the keyboard cursor; clicking the mouse draws at its location. Once you start a shape with one, it must be completed with the same mode. For example if you press Space to start a shape, clicking the mouse would no longer complete it (but could still be used to change the selected colour)

Changing Key assignments

Every key assignment or short-cut can be changed. This can be done either in the user settings, to change keys to ones a user finds more convenient. The teacher counts as a different user profile if changing keys in the user settings. Alternatively specific key combinations can be assigned within individual worksheets or activities - usually to assign keys to any custom tools that they use.

A copy of the default keyboard short-cuts is given in Appendix 1.

You can change the assignment of keys in the settings screen. (Select from the menu: *Options > Edit settings > Edit settings for (user name)* and then select the Keys page on the left.



To set a key:

- Click in the box top-left and press the key combination. It can be any key plus any combination of the Shift, Control and Alt keys. Below the box the software will tell you what, if anything, the combination currently does.
- Then select the action from the list on the right. The actions can be drawing tools, almost anything from the menus, and most options on the palettes on the right. The actions are organised into folders - but you can also search for an action by typing part of the name in the search box. The selection will move through the list as you search. Press 'enter' in the search box to jump between different entries matching the search (eg if you enter "Polygon", pressing enter will jump between Regular Polygon and IrregularPolygon)
- The software tells you the keys, if any, that already perform the action - you may be able to use this rather than assign a new key.
- If you want to make the change press the long '= Assign =' button.

Changing the display

Different activities and worksheets will display different options and tools. There are various things that you can change to make it easier to work with a particular document.

Zoom

You can zoom in or out on any document. If you zoom in scrollbars will be displayed; if you zoom out so that the entire document is visible these will not be shown. You can scroll with the keyboard by pressing Control plus the arrow keys. Some users may find it difficult to use a view which needs scrolling. You can zoom using keyboard shortcuts (or the toolbar buttons or entries in the 'Options' menu):

- Control + = zooms in
- Control + - zooms out
- Control + 1 resets to 100% size.
- Control + 2 zooms so that the entire document is visible without scrolling
- Control + 3 zooms so that the width of the document fits the screen. It will not be necessary to scroll horizontally, but may be necessary to scroll vertically.

Rotation

It is possible to rotate the document on screen – as a student might rotate a piece of paper on their desk. The following keys can be used:

- Shift + Alt + Left arrow: rotate left.
- Shift + Alt + Right arrow: rotate right.
- Shift + Alt + "=": reset display to the normal way up.

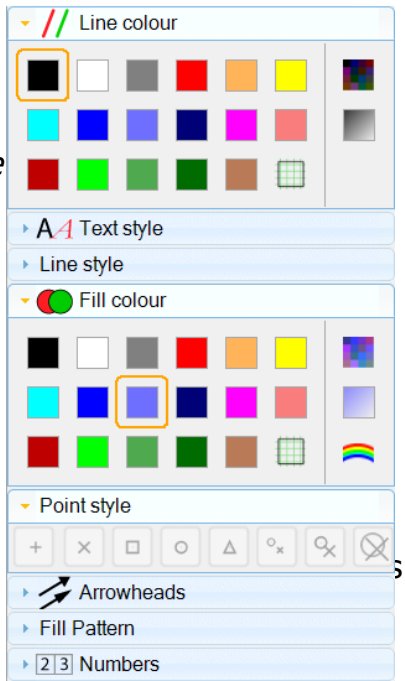
Rotation is done in 1/16ths of a complete rotation. Ie rotating 4 times rotates through 90 degrees.

Full screen view

Pressing shift + control + F11 at any time enters or leaves "full screen view". This view removes the toolbar at the top of the screen, the page thumbnails for multiple pages, and the information areas at the bottom. The tools on the left, and the styling palettes (usually on the right, but moveable) are still displayed.

Palettes

Note: This section describes using the mouse to move palettes - often this will be done by a teaching assistant. The key equivalents that allow a keyboard-only user to do the same are also listed.



By default the palettes containing the styling for shapes and various other options are displayed on the right-hand side. Exactly which ones are displayed depends on the worksheet or activity, and the user settings - you can quickly change which are displayed by pressing F10 (see p18)

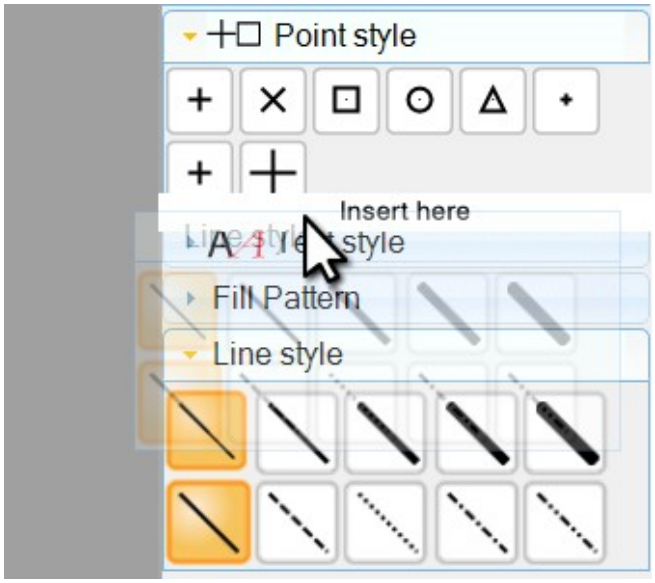
If there are many palettes some will collapse to show just

their title, as in this picture. Just click the title to expand the palette to use it.

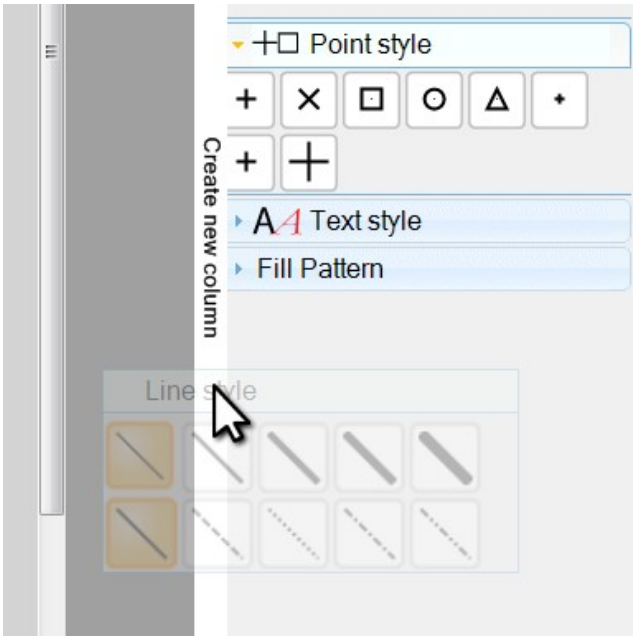
It is also possible to move the palettes anywhere on the screen. Just click and drag on the title of a palette to move it. They can be dragged away from the area on the right so that they float freely above the page (it may be useful for a user with limited control to place a palette they are using frequently very close to where they are working)

From the keyboard to move a palette, press the key combination to select it, and then press Shift + Alt + M. Then use the arrow keys to move it and either 'Enter' to confirm or Escape to cancel.

If you drag a palette to the area on the right it will dock with the others. Where you drop the palette vertically determines the sequence in which they appear - so you can move the dock palettes up and down the list by dragging them. An indicator will show where it will dock: (the white bar labelled "Insert here")



You can create extra columns of palettes by dropping a palette at the edge of the existing column like this:



You can do this on the left-hand side of the screen as well as the right. So it is possible to sswitch the palettes to the left-hand side, by dragging each one over to that side.

Resizing palettes

You can make the entire column of palettes docked at the edge of the screen smaller or larger by clicking and dragging on the very left-hand edge of them (the pointer changes when you are in the right place to do this)

If a palette is undocked and floating, you can resize it by clicking and dragging in the bottom right-hand corner of the palette.

Alternatively, if you right-click on the title of a palette a menu is displayed. The "Make smaller" and "Make larger" options will change the size by about 25%.

From the keyboard to resize a floating palette, press the key combination to select it, and then press 'Shift + Alt + R'. Then use the arrow keys to resize it and either 'Enter' to confirm or 'Escape' to cancel. You cannot resize an entire column of docked palettes simultaneously from the keyboard.

Resetting palettes

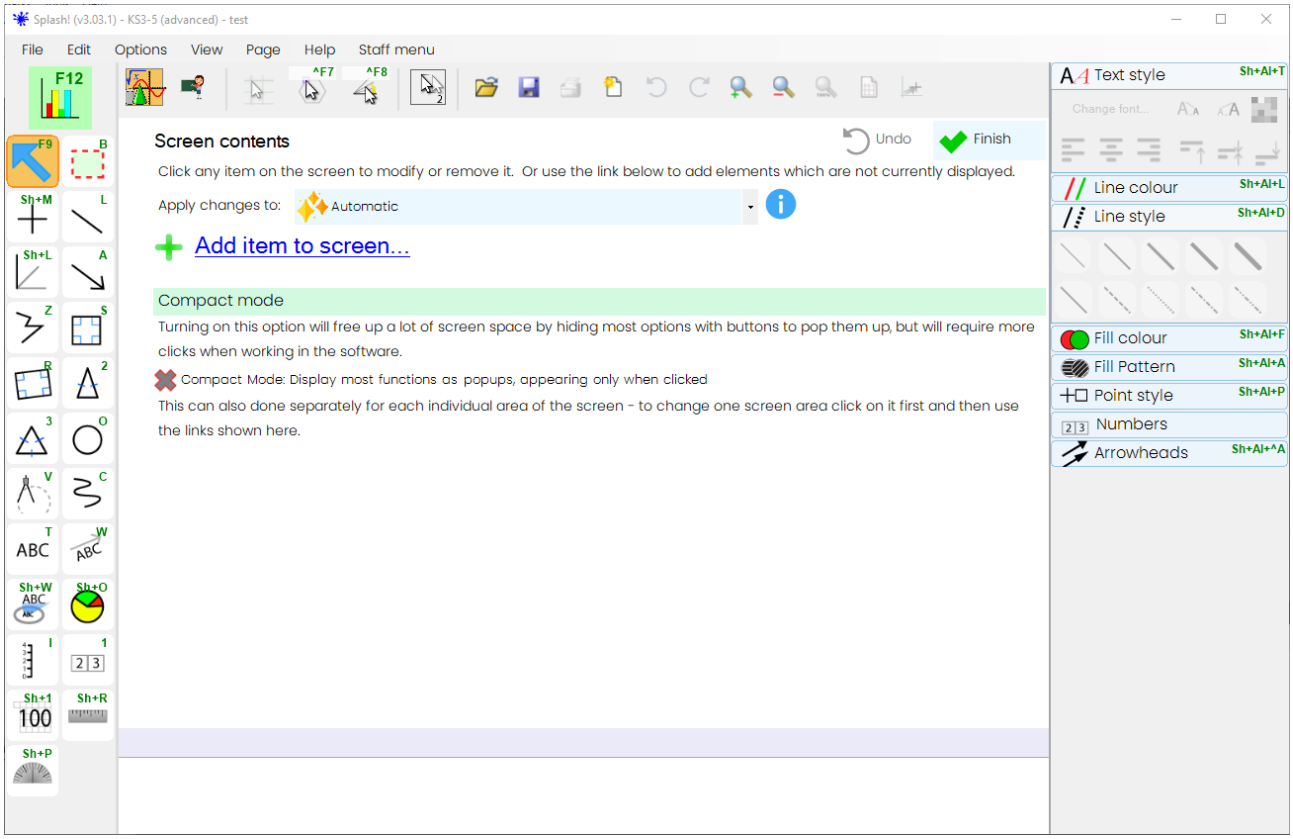
If palettes have been moved you can reset them all to their default locations (usually docked on the right) by selecting from the menu: Options > Reset positions of palettes. This does not change *which* palettes are displayed, only *where*.

Adding or removing screen elements

Hint: the view is configured separately for User and Teacher modes. Generally teacher mode displays almost the entire Splash interface. If you are a teacher or assistant wanting to temporarily use some feature which is not currently displayed, the easiest way is to switch to teacher mode.

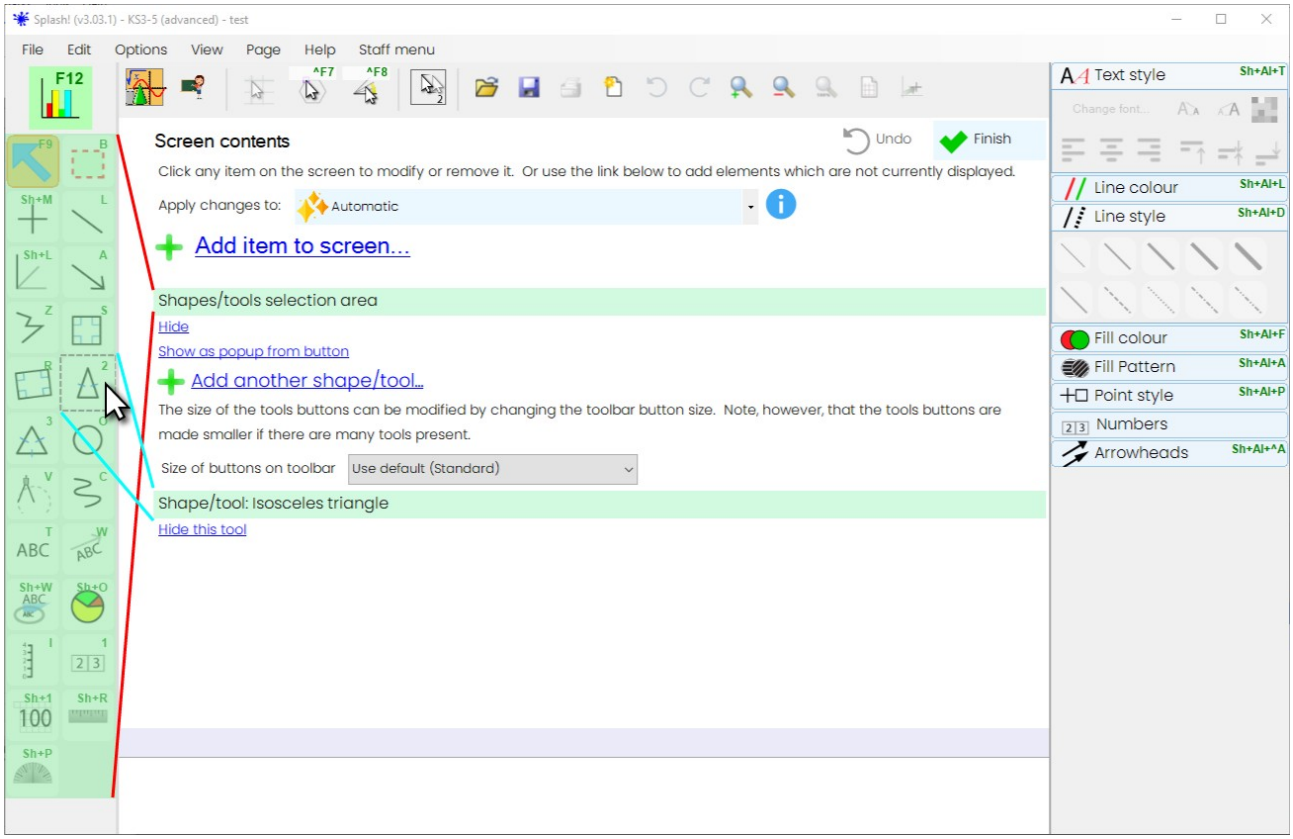
Most of the parts of the full Splash work screen can be hidden or displayed in the settings. Hiding unnecessary elements can make more space for the document on a smaller screen. Most worksheets, especially for younger users, start with a minimal interface. Most activities show all the general elements (such as the information line at the bottom), but will only include tools and palettes relevant to the activity.

Version 3 contains a new function to more easily change what is shown on the screen. In the main work area, press F10 to display the screen content editor:



To add something which is not currently displayed, use the "Add item to screen" link. This will show a menu of screen areas and tools.

To modify or remove something, click on it first. While this content editor is open none of the rest of the Splash screen will affect your document – instead the content editor will highlight it and show options to modify whatever you click:



As in the screenshot above, this may show options both for the general part of the screen

(the tools area in this case), and for the specific button. So in this case it's possible to hide the tool button selected, or to hide/modify the entire tools area. The exact options available depend on what was selected.

To close the content editor press F10 again, or click the "Finish" button.

Scope of changes

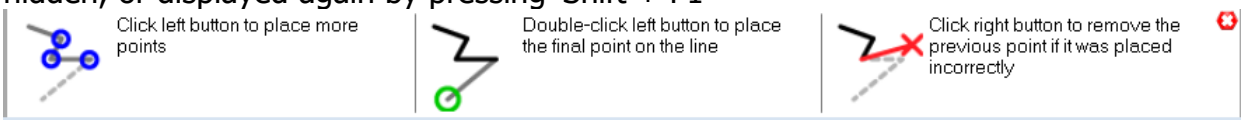
Splash will automatically decide for any changes how widely they should be applied. In general adding/removing tools or palettes will only affect the current activity for the user. So a change in the equations activity won't affect the geometric drawing, for example. Most other changes, including adding or removing buttons from the functions toolbar at the top (which has Open, Save, Undo etc by default) would apply for the user throughout the software.

You can force changes to be applied differently by changing the "Apply changes to:" option at the top. You can choose to have changes apply only while the current document is open – which may be helpful for adding unusual tools needed for a particular exercise, but which the student wouldn't often want.

Shortcuts

There are shortcuts that can help show or hide some screen items more directly:

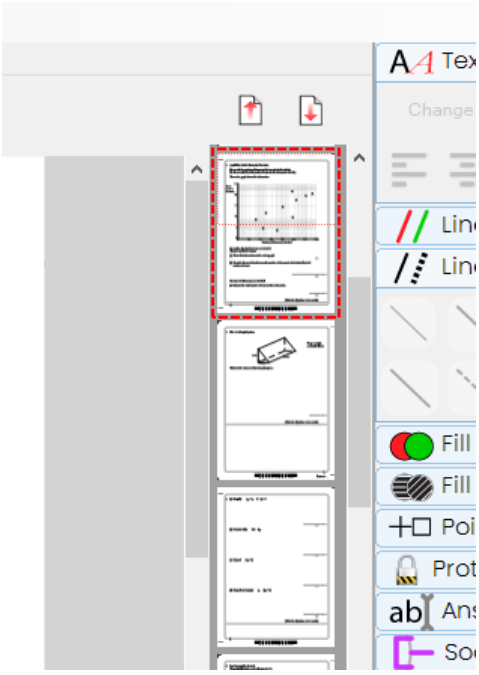
- The prompts panel at the bottom which shows actions that can be performed can be hidden by clicking the close button in the top right corner. It can also be hidden, or displayed again by pressing 'Shift + F1'



- You can change the tools visible on the left by switching to teacher mode and right-clicking anywhere on this panel. This displays a menu which can add or remove tools.
- Any palette can be hidden by right-clicking on it's title and selecting Hide from the pop-up menu.

Multiple pages and modifying the page

Multiple pages



Although many documents are 1 page, they can contain any number of pages. Thumbnails of the pages are shown between the main display and the style palette on the right.

Note: for many worksheets and for KS1 users this is usually hidden.

The following keys can be used:

- Control + Page up moves to the previous page, if any.
- Control + Page down moves to the next page. If you already on the last page, it creates a new, blank page. However, it will only do this if the last page is not currently blank: further pages will not be added until some content is added to the last page.

The Page menu has further options for changing the list of pages, such as deleting a page or changing their sequence; or use the following key combinations:

- Shift + Control + Delete: Delete the current page.
- Shift + Control + Backspace: Clear the current page without removing it
- Control + Alt + Page Up/Down: Move the current page up and down the list-size
- Shift + Alt + Insert: Insert a copy of the current page
- Shift + Control + Insert: Insert a blank page after the current one (if you are on the last page Control + Page down would do this – but this combination can also insert pages in the middle of the document)
- Shift + Control + Alt + Insert: Insert a blank page before the current one

Changing the page

Both the size of the page and the background can be changed:

Use the menu: *Page > Change page size...* to change the size of the page.

Use the menu: *Page >Edit grid and background...* (or key combination Shift + Control + Alt + P) to change the background grid, colour or image. Splash! Has a wide spectrum of paper styles which can be applied to any page in a document. The paper can set to a number of styles from plain to graph and the drawn graticule.

From the keyboard, the arrow keys will step through the initial options, and Space will select one. The Tab key should be used to step around the other controls on the screen.

Both of these options are described fully in the "Creating worksheets" manual.

Saving and documents

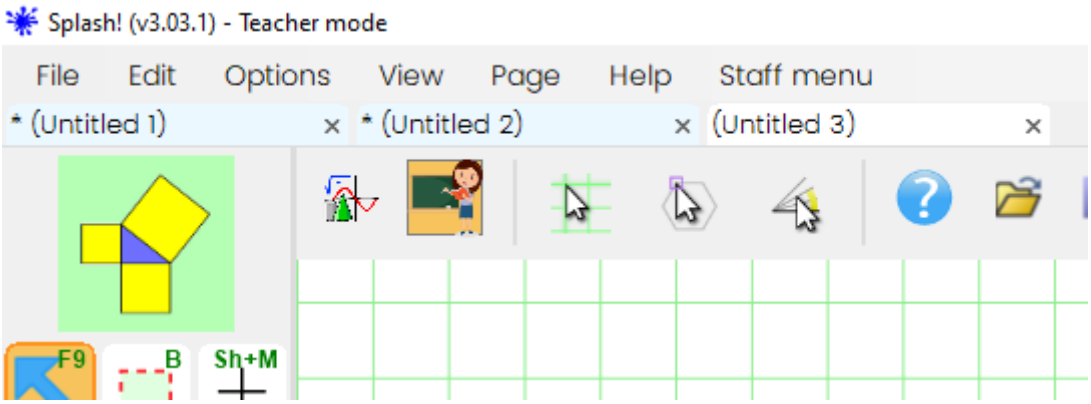
Note: this section initially describes the default behaviour. It can be simplified for users - see pError: Reference source not found.

Splash documents can be saved to disk much like with any other software, using the options on the File menu:

- *Save* (Control + S) saves the current document, overwriting the copy it was loaded from, if applicable. If it is a new document, Splash will ask where to save it.
- *Save as > Splash!* (Control + Shift + S) also saves to disk, but always asks where to save, instead of replacing the previous copy.
- *New* (Control + N) creates a new, blank document of the current type.
- *Open* (Control + O) opens a document previously saved on disc. To open a worksheet from the user's menu, use the first option to return to the menu instead.

In user mode, for simplicity, Splash usually only keeps one document open at a time. If you create a new document, or load one from disc, it will replace the current one. If the current document is not already saved, Splash will prompt to save it first.

Teacher mode allows multiple documents to be opened, which are represented by tabs at the top of the screen:

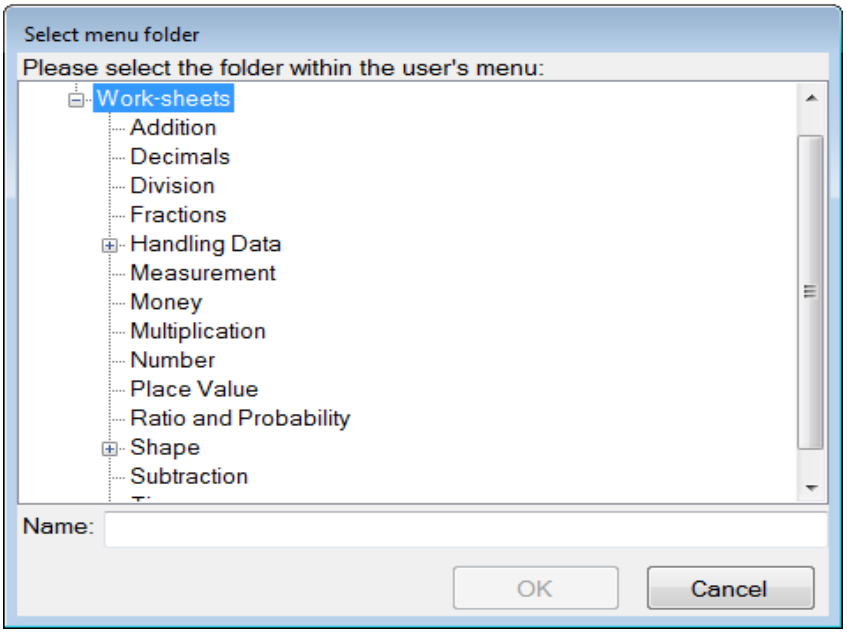


You can switch on multiple documents for user mode (or off for Teacher mode) using Settings > Show/Hide... > Other > "Display tabs allowing multiple documents to be open at once". Note that the multiple document selection is not keyboard accessible.

Saving into the menu

Hint: you can also preselect a single folder in the user's menu which all files should be saved into - see the Setting up Splash users" manual for details.

As an alternative to saving to a folder on disc, you can save a file directly into the current user's menu, using the menu option: File > Save into user's menu. This opens a screen listing all the folders in the menu:



Select one of the folders, and enter a name for the file at the bottom, and click OK to save it. The advantage of doing this is that the user can later access the file easily from the menu. This saving screen is also easier to navigate than the standard Windows file saving screen.

Technical note: files saved like this are stored on the hard drive, within Splash's internal data folder (usually c:\programdata\splash 3)

Exporting the document

There are other options on the File menu to export the Splash document in other formats. These only export the graphics, and cannot be with be loaded into Splash. They can be useful, however, in order to export a copy of a student's work that can be viewed by other software, without requiring Splash.

These page export options are only available in Teacher mode, or for advanced users.

- *Save as > Save as Splash! V2 file* saves in a format compatible with older versions of Splash!. Only use this if the file needs to be opened by someone else who does not have the current version.
- *Save as > Export as PDF* saves a PDF file containing the current document. This is the best option if you need to store a record of a student's work readable by someone who does not have Splash. PDF files are effectively not editable – if you load the PDF back into Splash it will not be the same as the original document.
- The *Export page* submenu has options to export just the current page in various graphics formats (or as a separate Splash file).

Simplifying the saving process

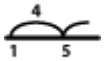
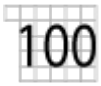
For younger users, or users who struggle with Windows files due to the accessibility issues, it is possible to simplify the way that documents are saved. This is done from the Settings > Saving page.

See the "Getting started with a new user" manual for details.

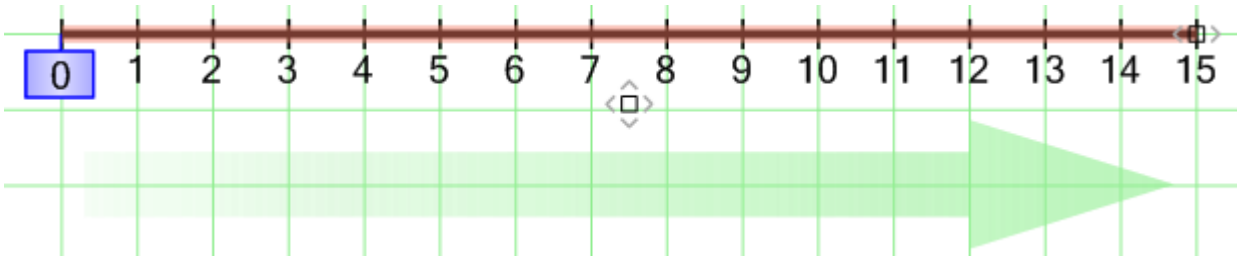
Tools for teaching Arithmetic

Splash contains several tools which can be used when teaching arithmetic. All of these are interactive and do not simply draw a shape on the page. These tools can be used both directly by the user, or can be used by an assistant in Teacher mode to set up exercises.

Each of these tools include numerous features and can be configured for different exercises. Each is described fully on the following pages.

	Number Line	A line with numbered points, as used in the early teaching of arithmetic.
	Blank Number Line	Users can use this tool to replicate exercises done on pen and paper where the student draws out arithmetic tasks using a blank line and arcs joining numbers.
	Tally	A counting tool for drawing tallies.
	Number / Arithmetic	This types numbers on the page, which automatically positioned in a grid, for laying out standard arithmetic sums. It includes features for crossing out, carrying numbers, total lines etc
	Number Square Grid	Displays, by default, a 10x10 grid of numbers within which the user can move around and colour/highlight numbers. Can be configured in teacher mode for different exercises.
	Clock	Displays a clock with movable hands. The exact features can be configured in teacher mode.

Number line



Adding a Number Line to the page: (this might be done by either the student or teacher)

- Select the number line tool, by pressing Shift + N.
- Move to the start position of the line and press space.
- A counting line will be created with the default length.
- Use the right arrow key to lengthen the line.
- If it is too long use the left arrow to shorten it.

- To create the line press space again.

Using the Number Line (select it first using F9)

- Press Space to count.
- Use the + or - keys to restart counting at the current position. + will count up, and - will count down. For "+" there is no need to press Shift if using the key on the main keyboard (so you are technically pressing "=")
- Press Escape to reset it.

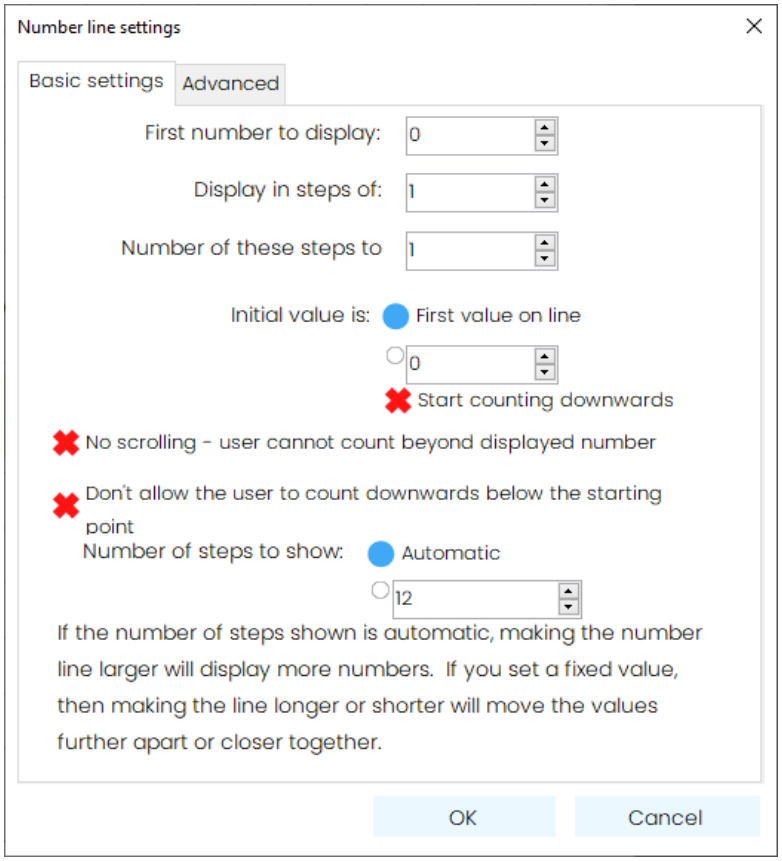
If you try to count beyond the end of the line the numbers will scroll as you count (this scrolling can be disabled - see creating number lines, below).

The keys Alt + Left arrow and Alt + Right arrow can also be used to move the start point to the left or right. If a teaching assistant is using a mouse they can also click anywhere on the line to set a new start position.

Configuration of the Number Line

The display and functionality of the Number Line can be changed by double-clicking it in teacher mode.

Basic settings:

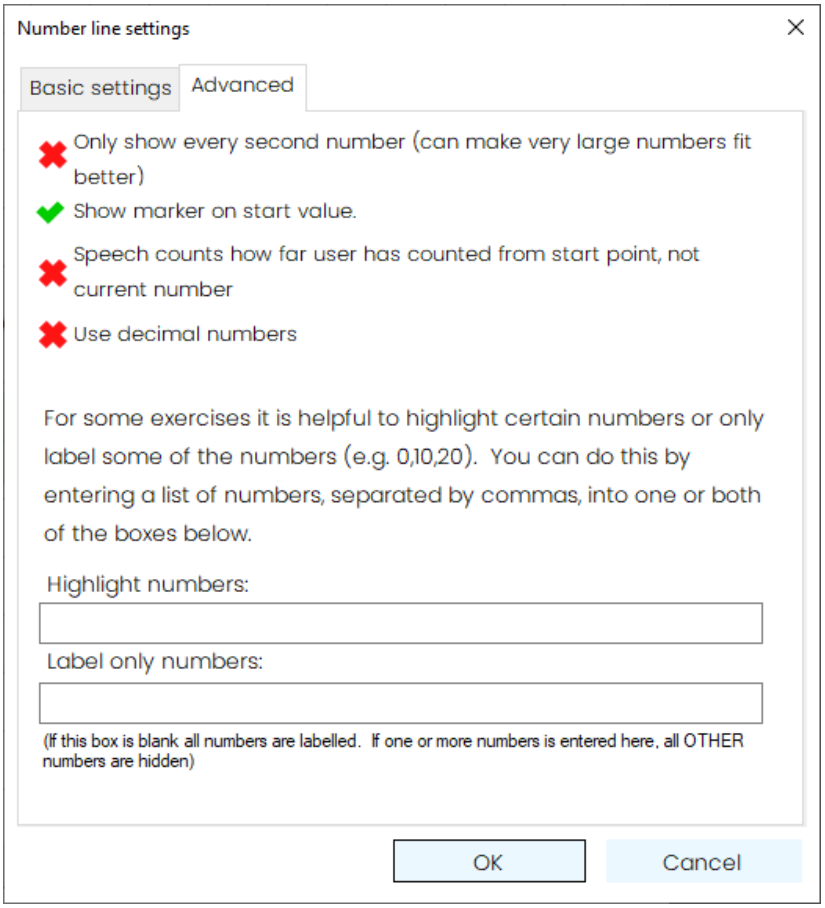


- *First number to display*: the number at the left hand end.
- *Display in steps of:* the difference between consecutive numbers on the line.
- *Number of steps to move:* sets the number of jumps made at each count. This is the number of steps, so if the steps are displaying in 10s and this is 2, then each click will count on 20.
- *Initial value is:* sets where on the line the initial marker is set and where the marker

will re-set to.

- *Start counting downwards* does just that when the page is first displayed.
- *No scrolling:* if this is ticked then the line will not scroll, and the user cannot count above or below the numbers displayed.
- *Don't allow the user to count downwards below the starting point:* If this is ticked the user can count up and down, but will not be able to count down below the initial number. If scrolling is enabled, ticking this ensures the user cannot count down below 0 (assuming 0 is the first value)
- *Number of steps to show:* this adjusts the number of ticks and therefore the space between them. Usually they are 1cm apart, and making the line longer displays more numbers. If you set a fixed number of steps, then stretching the line moves the ticks and numbers closer together or further apart.

Advanced options:



- *Only show every second number:* an alternative to *Label only numbers* which can be used more easily to display only alternate numbers. This can be helpful if counting in large numbers, or if the user requires very large text, and there isn't space to display every number.
- *Show marker on start value:* by default this is ticked. Clearing this will remove the blue indicator showing the initial value.
- *Speech counts how far user has counted from start point, not current number:* If speech output is switched on for the user (in Settings > Accessibility > Speech) then the Number Line will speak each number. Ticking this box makes it speaks the

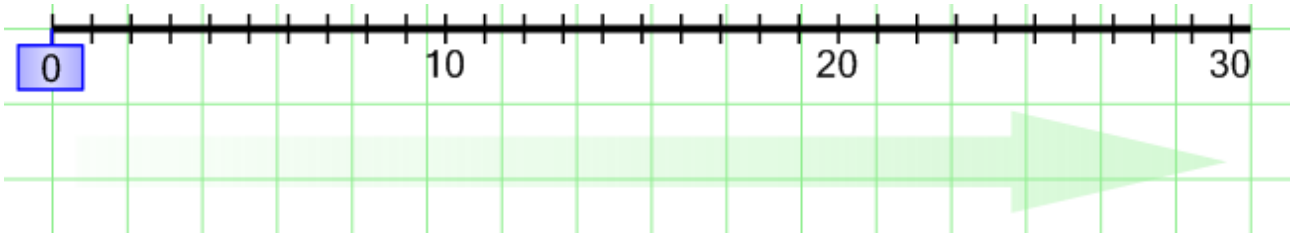
number of steps, rather than the current value. If the user started from 0 there is no difference, but for any other starting value this has an effect.

- *Use decimal numbers*: If this is ticked, then the first 2 values on the Basic Settings tab can use decimal points to set up a number line which is not counting in whole numbers. Ticking this makes no difference to the line itself unless you enter decimals on the first tab.

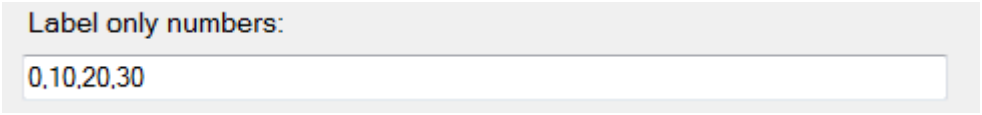
For some exercises it is helpful to highlight certain numbers or only label some of the numbers (e.g. 0,10,20). You can do this by entering a list of numbers, separated by commas, into one or both of the boxes.

- *Highlight numbers:* enter a list of numbers separated by commas, these numbers will be highlighted on the number line. This box must be blank or contain a comma-separated list of numbers.
- *Label only numbers:* Normally all numbers (or every other number – tick box) are labelled. Numbers listed here separated by commas will be the **only** ones shown on the number line. This box must be blank or contain a comma-separated list of number.

Example



This Number Line has a fixed number (30) steps displayed, causing the individual ticks to be much closer together than normal. And then on the advanced page it was specified that only 0,10,20 and 30 should be labelled:

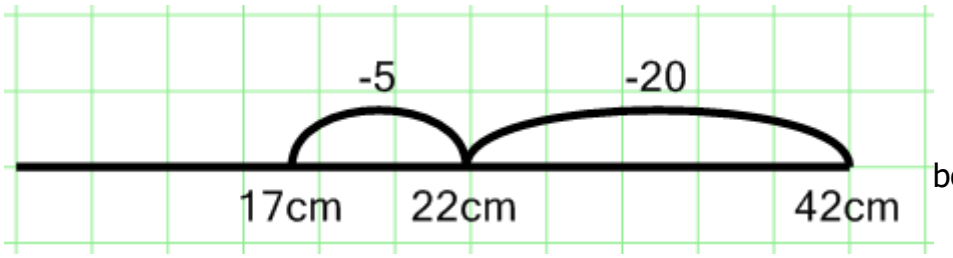


Feedback sound

You can switch on a feedback sound - a clicking noise made each time the user steps along the line - by ticking this option in the settings: Settings > Work area settings > Shape/Number settings > "Use feedback sound when stepping along Number Line"

Blank Number Line

The Blank Number line (sometimes called the "Empty Number Line") can be used to work out a range of maths problems including addition, subtraction, multiplication, division, questions about time etc. The pupil works out an answer by creating "jumps" or arcs along a line and writing down the value of each jump and the number that is added/subtracted. It is also used to work out word problems such as: A piece of string is 42cm long. You cut off 25cm. How much is left?



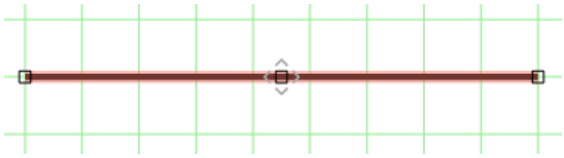
board users

42 is placed at the end of the blank number line, 20 is subtracted to get to 22 and 5 is subtracted to arrive at the correct answer 17cm.

To start your number line

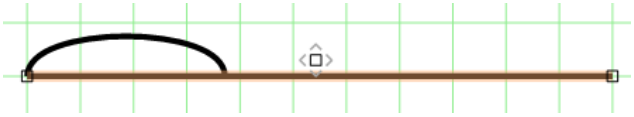
Select the blank number line tool (Alt+N)

Move to where you would like the number line to start and press Space. Move across the page and press 'Space' again when you want the line to finish:



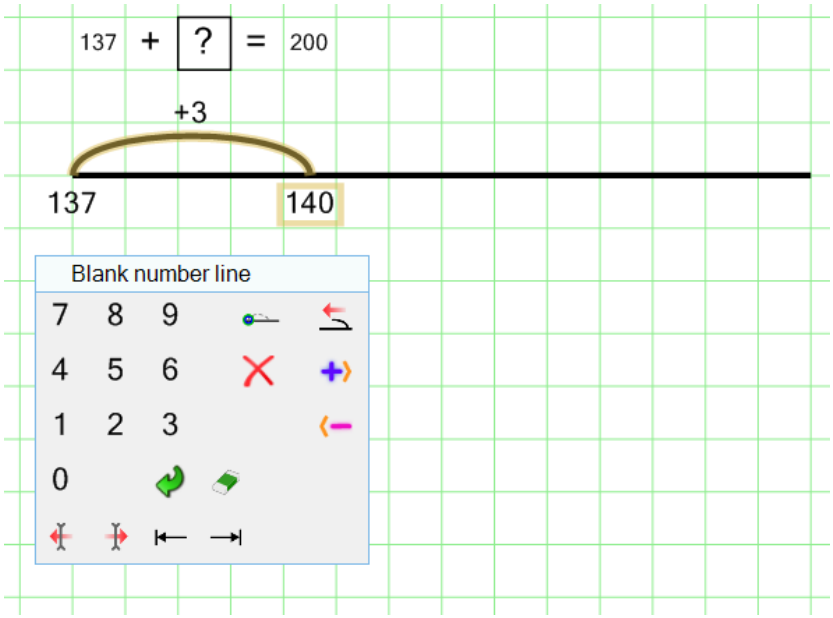
With the line selected, press Space to start a new arc. The first arc will start at the left end of the line.

Once the arc has been started, move the pointer along the line to extend the arc and press Space again when you want to fix the arc. To abandon an arc, press Escape.



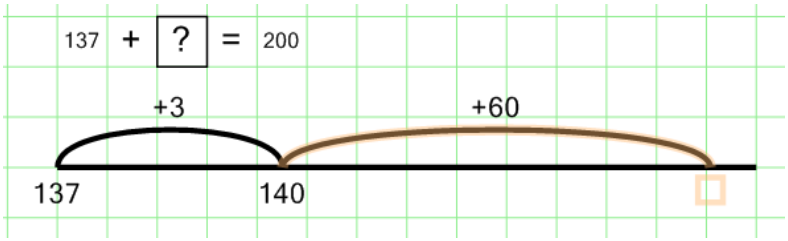
To start putting in the numbers, press the Enter key. (Pressing the Enter key repeatedly moves between the possible positions to enter numbers). You can write numbers and/or words into these boxes.

To produce the example below, after pressing Enter, type "137" into the first box that appears. Press the green arrow again to place a box above the arc. Type "+3". Press Enter again to place a box at the end of the arc. Type "140".



To begin a new arc press Enter until the arc itself is selected, and you are not typing into any of the boxes. Then press Space again to start a new arc. The arc will start at the pointer position – note that if the pointer is beyond the left or right of the line, this will be ignored. Alternatively press Control + Space to start an arc which adjoins the previous arc, ignoring the pointer position.

Extend the arc and press Enter to place another box above the number line to write the number "+60". The final box will be for the number 200. The sum of the jumps (60+3) will give the answer.

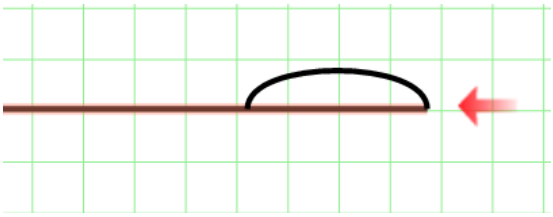


Using the Blank Number Line with arcs from left to right.

If you wish the first arc to go backwards, starting on the right, press the '-' key before starting the first arc.

When you press Space the first arc will start from the right hand side of the blank number line. Extend the arc by moving the pointer along the line and left-clicking when you want to fix the arc. Add boxes and write in numbers as above using the green arrow.

Until the first arc is completed, a red arrow is displayed to indicate the line is working right-to-left.



Editing an existing line

To make changes to an existing line with arcs

- Use Tab/Shift + tab to select individual arcs, or the base line (but once typing tab will instead move around the typing positions, like 'Enter')
- When an arc is selected, use the '+' and '-' keys to adjust the length of it. (For '+' you can press Shift + '=' or just the '=' key)
- Pressing Delete removes the arc
- When an arc is selected, pressing Enter moves around the positions in which you can type. Use the keyboard and backspace as normal to change the numbers or text in these positions.

Tally

This tool allows the user to count with tallies, even if the user doesn't have sufficient coordination to place the lines correctly, whether on paper or on the computer.

To create a tally:

- Select the Tally tool on the left
- Move anywhere on the page and press 'Space# to start a new tally with one vertical line
- Count onwards using the \ key to add a vertical, or / key to add a diagonal.
- Press backspace to delete the last line. This can be used repeatedly to erase each line all the way back to the start, if desired.

Note that Splash does not enforce the correct count of 4 verticals followed by a diagonal line. The intention is that the user must still understand the method and choose the correct line, while Splash deals with the line positioning that the user may not be physically able to do.

Pressing | adds another vertical on the end, no matter what came before. Pressing / adds a diagonal line through the last verticals, no matter how many there were. If there was no vertical, it just adds a separate diagonal line, so it is possible to create a very wrong tally:

Numbers tool

The number tool allows the user to place numbers in regular rows and columns, in order to write out arithmetic exercises. The numbers are placed in squares defined by the square paper setting. The tool also supports carrying, decomposition, crossing out etc.

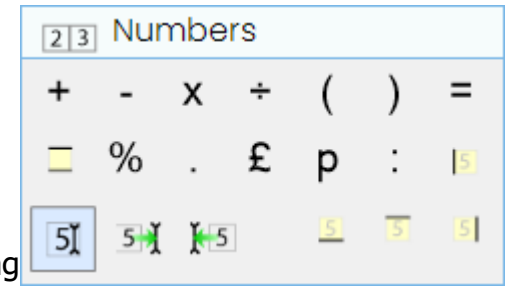
To activate this tool press 1.

The arrow keys are used to move around the square array. Use the number keys to enter values. You can enter up to 3 digits in a square. Backspace deletes digits in reverse order. Pressing Shift + arrow key will move to the next *empty* space in the appropriate direction. (Tab can also be used to go to the first empty cell to the right).

Pressing Shift + Enter will perform a carriage return: it will move to the next line, and also move left so that the typing position is under the first digit of the previous line.

Auto-move: you can switch on auto-move so that the typing position immediately move to the next cell after typing any digit by pressing Shift + Control + Left/Right arrow (left/right arrows giving different directions of movement). The first 3 buttons on the numbers palette, below, can also be used to control this. To switch off auto-move use Shift + Control + Up arrow.

The numbers palette can be used by both pointer and keyboard users to enter other symbols, and do some formatting. The first line of buttons, and most of the second just type the symbols.

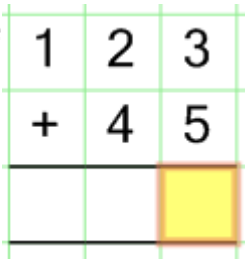


All of the functions on here can also be accessed via the keyboard. Simple symbols are typed using the keyboard as normal. "+" can also be typed by pressing the = key twice.

The division symbol, "÷" is typed using the / key. (Note: if there is already a number in the cell then "/" does decomposition instead)

Lines around the cell are added or removed by pressing the \ key (lines above and below) or "|" (ie Shift + \) repeatedly. The latter adds or removes vertical lines. This functionality is also available using the four buttons bottom right on the palette, and the first button on the second line.

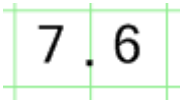
In order to create lines both above and below quickly, for the total at the bottom of a sum, use the # key. This adds lines above and below. If the auto-move is switched on, pressing this will also move to the next cell.



Letters and many other symbols, such as "?" or "%" can be typed as usual with their normal keys. All currency keys (£ $ and €) will type the local currency symbol based on the machine settings.

Decimal points

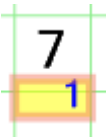
By default the decimal point will appear *between* two cells unlike all other symbols. Pressing the "." key in an empty cell places the point to the left. If a number has already been typed in the cell, then the decimal point goes to the right, and the typing position automatically moves right. The behaviour of the decimal can be changed in the settings so that it occupies its own cell, see below.



Pressing "," will also type a decimal point to support European languages where the comma is the decimal separator.

Other Number tool functions

";" key = Carry: press this to enter another number, smaller, under the current cell indicating a carried value. Press the button again, or the up arrow, to return to the main number. Initially a "?" will appear in the carry position until a number is entered.

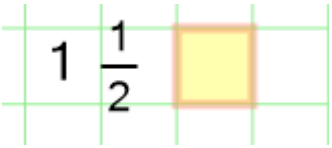


"/" key = Decomposition: pressing this will cross out the original number and allow a new number to be typed in the same cell. Note: the behaviour of this key changes when a number is entered. If this key is pressed in an empty cell it types the division symbol. If pressed after a number is entered it performs decomposition. To remove the decomposition press backspace to delete the second number.

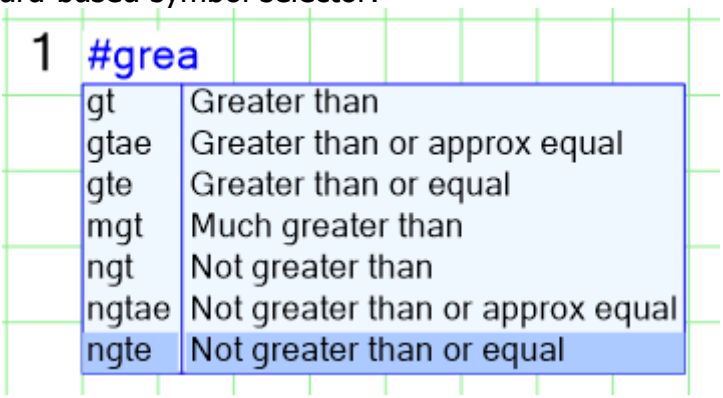
Space key = Prefix 1: Pressing this inserts a smaller "1" to the left of the main number. Press the key again to remove it. This only applies once a number has been entered in a cell. Pressing "Space" in an empty cell does nothing.

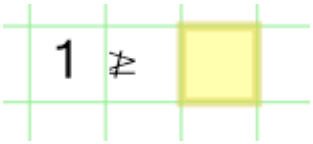
"[" key= prefix digit: Pressing this adds another, smaller number to the left of the main number. Initially a "?" appears until a number is typed. Press backspace to remove a prefix number. If no number has been typed, pressing this key again will remove the "?" placeholder. This option can only be used if 1 digit has been typed. If 2 or 3 digits have already been entered in the cell, then this key is ignored.

Control + / key: Enter a fraction in a single cell using the equations tool. Once pressed a divisor line appears and you are typing the top half of the fraction. Use the down arrow to move to the bottom half. And the right (or left) arrows to step out of the fraction and return to the number tool.



Control + "#" key: This will start entering any item or symbol from the equations tool. It brings up the keyboard-based symbol selector:





Type either the code for the symbol, if known, or usually just part of the description to search for the item that you want. Once you have started in the equation tool further typing will use the equation tool, until you use the left or right arrows to navigate the typing position off the end – at which point it will revert to the numbers tool. You can tell which is being used as the numbers tool always highlights a cell on the page, whereas the equations tool just has a regular typing cursor.

Number tool settings

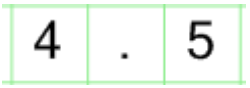
There are three settings which affect the Number tool. These can be found in Settings > Work area settings > Shape/Number settings.

Hint: as with all settings, changing these would usually change the user settings, affecting all of that user's work, but you can select to adjust these only for the current document.

- Only one digit can be entered in each cell using the numbers tool
- In Numbers tool decimal point is typed half-way between two boxes. When off, the decimal point occupies a separate box.
- In Numbers tool mouse pointer automatically follows the typing position

The first option, if ticked, prevents more than one digit being typed in any cell. By default up to 3 digits can be typed.

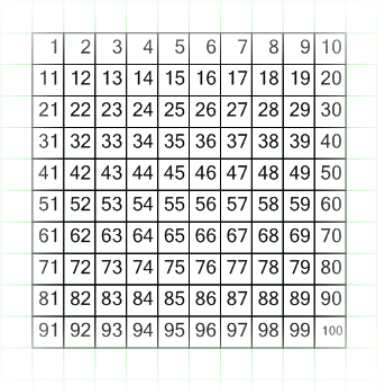
The second changes how a decimal point is displayed. By default this is ticked and a decimal point appears between 2 cells. If this option is switched off then a decimal point occupies an entire cell as shown here.



Note that this also changes slightly how it must be typed. When the decimal appears between 2 cells the user does not need to navigate, they can just press "4", ".", "5" in sequence. If the decimal occupies a cell, then it behaves like any other symbol and pressing it will overwrite any number already in the current cell. So the user must now press "4", "right arrow", ".", "right arrow", "5" to type this number. (unless auto-move is switched on)

The third option controls the pointer movement. If this option is on, then the Windows pointer is moved automatically to track the typing position.

Number Square Grid



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The Number square is a powerful tool in maths teaching. The default square displays numbers from 1 to 100 in rows of 10.

Move the pointer over a cell in the square with the arrow keys and press Space to select it. The number square is navigated with the arrow keys. Cells can be highlighted and have the highlight removed with the Space key

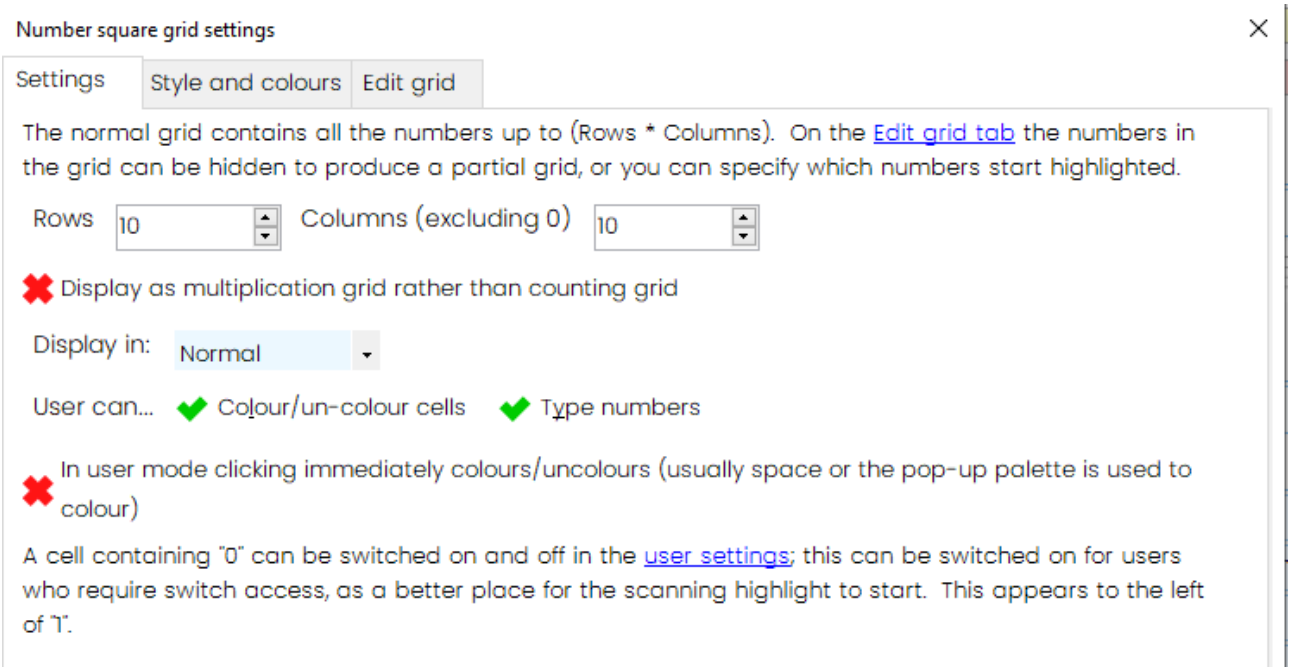
Making a Number Square

Choose the Number square tool.

Move to where you want the top left corner and Space will place the square.

Editing the Number Square

Configuration of the Number Square is usually done by an assistant. Select the square and press Control + Enter to open the number square editor.



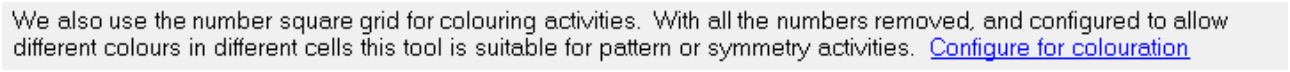
The first tab of the settings controls what grid is displayed and how it is used. The number of rows and columns can be set to a maximum of 25 each. The "Display in" option can be used to display tens or hundreds instead of unit numbers.

The multiplication grid option changes the numbers displayed: showing a times table grid rather than a count.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

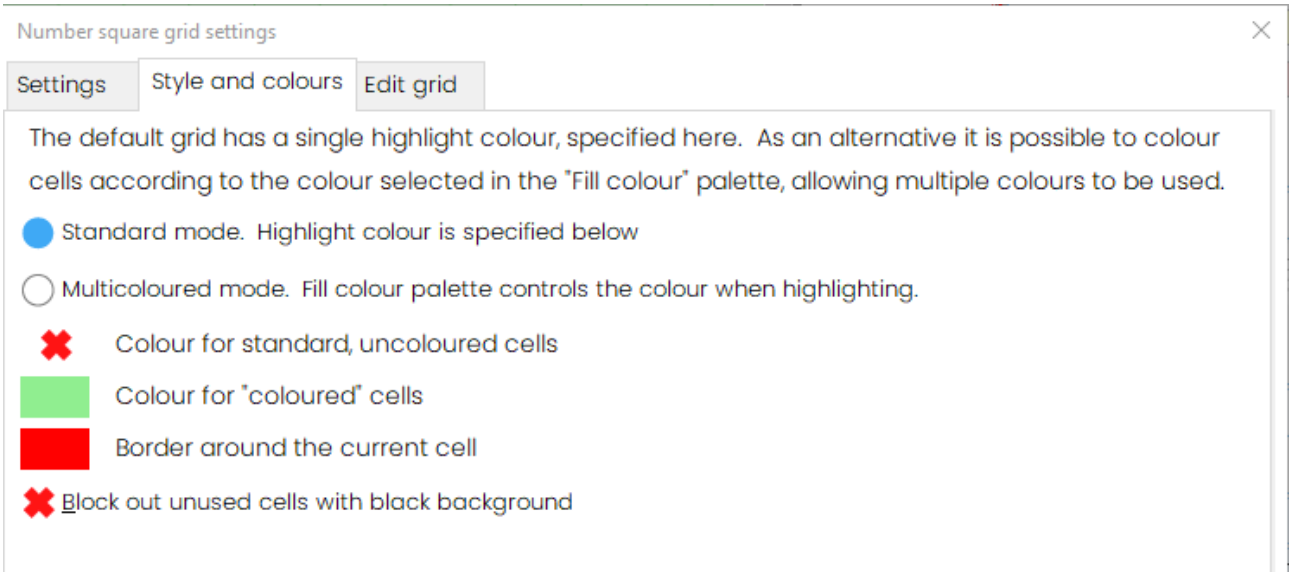
The next options control how the user interacts with the grid. By default they can colour/uncolour cells and also type their own number and delete existing numbers. For many activities only one of these is required: the user might colour multiples within a grid, but not need to change any numbers. Or for a different exercise the user might be filling in missing numbers, but no colouring is needed.

The last line at the bottom of this tab is a shortcut that changes several of the options:



This tool is sometimes used to make activities that don't use numbers at all: for example making reflections of patterns. Clicking this link removes all numbers, giving a plain white grid. It also switches to multi-colour mode (see below).

The second tab changes the colouration of the grid:



The first choice is whether there is a single highlight colour (the default), or whether the user should be allowed to colour each cell differently using the Fill Palette. The latter option is more usually used for shape/pattern activities, with no numbers, rather than mathematical exercises. When switched on Space applies the colour currently selected in the Fill Palette. Selecting a new colour in the Fill Palette does not change the currently selected cell in the grid.

The next options select the colours used the grid.

The final option changes the display of "unused" cells - see below. By default these are invisible, but can instead be blacked out like the unused boxes in a crossword.

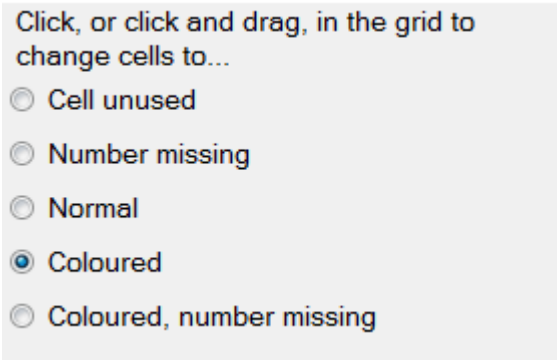
The last tab allows each cell to be modified. This can be used to create partial grids, or change which cells are coloured when the exercise is started.

Each cell in the square can be:

- Unused (1 and 6 in the example)
- Number missing (5 and 9)
- Coloured (3,4 and 8)
- Coloured and number missing (14)

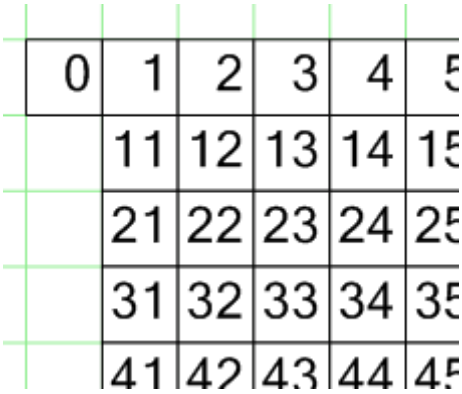
The user cannot navigate to "unused" cells, colour them or enter numbers.

To make changes, first click on the option on the right that you want to apply. Then click on a cell in the grid to change it to that state. Or click-and-drag to change an entire rectangle. In this way a large number of cells can be changed quickly.



The 0 square

It is possible to add a '0' square at the top left of the grid:



This is mainly used by switch users. Having the highlight start at 0 rather than number one is often easier for them.

This is switched on in the settings: Settings > Work area settings > Shapes/Number settings > "Display '0' cell in number square grid". There is also a link to this in the first tab of the number grid editing screen. Because this is in the settings, it will affect all grids, not just the current one.

Clock

This places a clock, with movable hands on the page. The appearance and behaviour of the clock can be adjusted for different exercises. To place the clock:

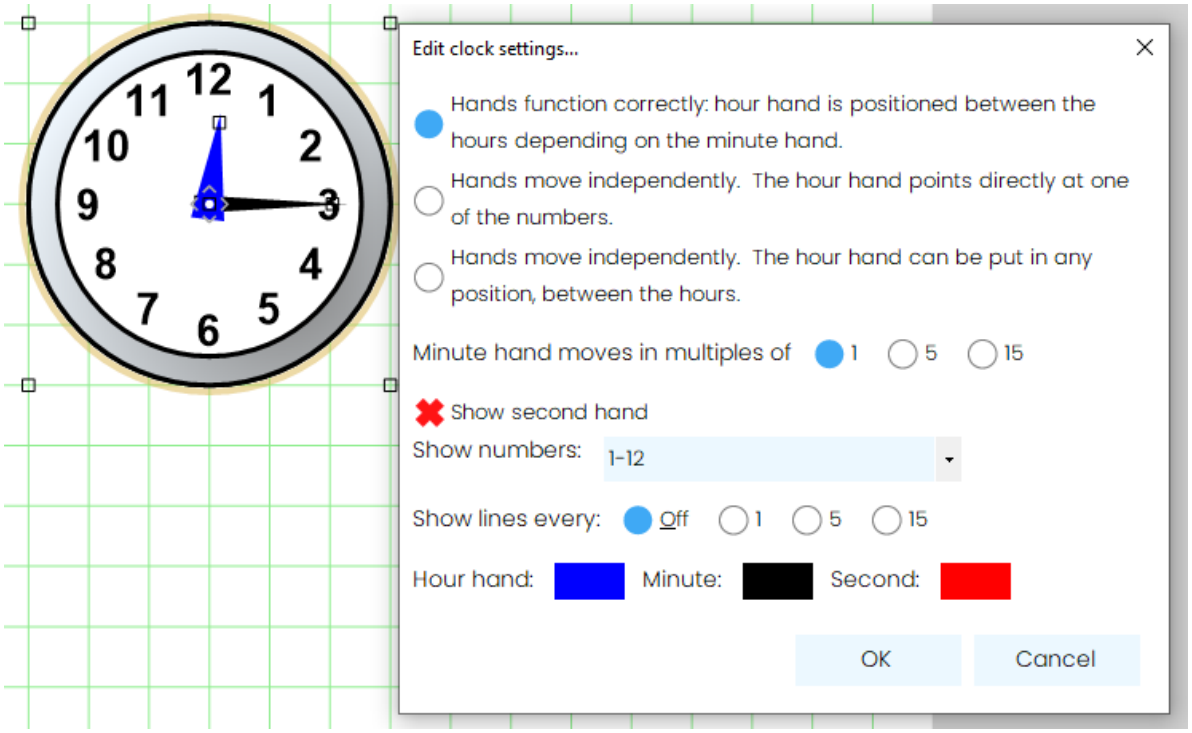
- Select the Clock tool (Alt + C)
- Move to the top left corner of an imaginary square containing the clock, and press Space.
- Move to the bottom right corner and press Space again to finish..

To change the time:

- Press Enter to select a hand or +change which hand is selected
- Press + or – to adjust the selected hand.

Usually the hour hand will move slightly as the minute hand moves, but this can be changed.

To change the behaviour of the clock either double-click it or select it and press control+Enter in Teacher mode. This opens the editing screen:

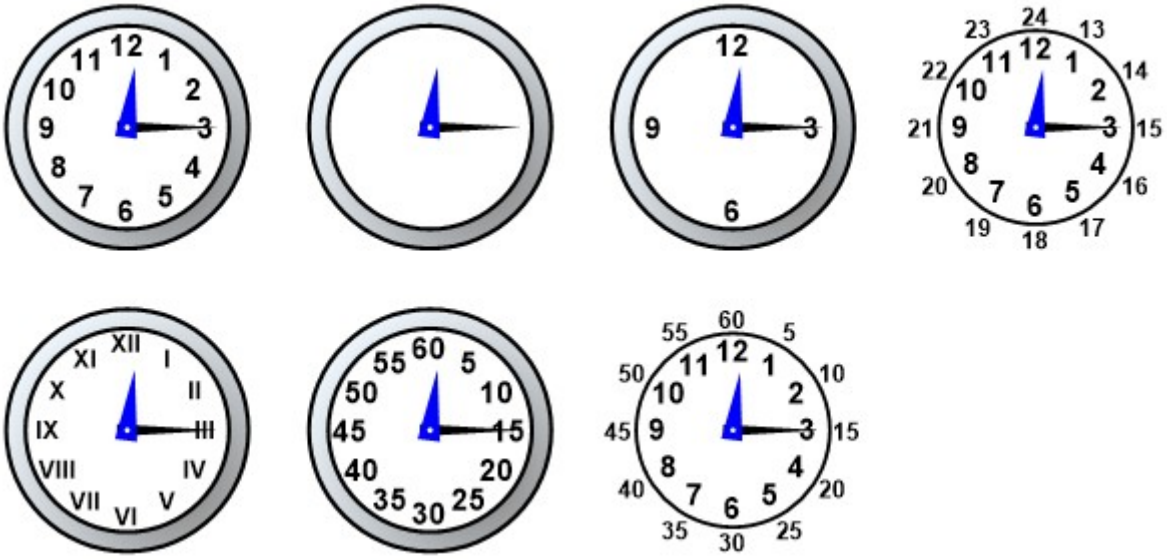


The first three lines choose the different ways in which the hands can operate. The first, default option makes them interact correctly: if the minute hand is at "6" then the hour hand will sit halfway between 2 hours. The second option causes the hour hand only to point directly at hours: this can be used for simplicity with some younger users doing early exercises with clocks. The last option allows the hand to be moved completely independently. Use this if you want the student to place the hour hand correctly without any help.

The next option lets you restrict the movement of the minute hand. You might select the "15" option with younger users who are only working with quarter and half hours so far.

All the remaining options change the display of the clock. If the second hand is displayed it always works independently of the other hands. Moving the second hand will not move the minute hand.

The "Show numbers" option chooses between one of these displays:



∑q Equation

Note: below is a brief introduction to the equation editor. There is a separate manual for the Equation editor. Select 'Equation editor' from the menu: Help > Manuals.

The equation editor is a WYSIWYG editor which allows equations - simple or very complex - to be typed:

$$x+y=1$$

$$\frac{[\Gamma(x)]^2}{\Gamma(2x)} = ½ \int_0^1 (¼-¼\ \tau)^{x-1}\ \tau^{-½}\ d\ \tau = 2^{1-2x} \frac{\Gamma(x)\Gamma(½)}{\Gamma(x+½)}$$

Getting started

To write an equation:

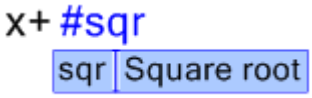
- Select the Equation tool
- Click on the page where you want to start typing and press Space.
- Type…
- The arrow keys will now act to move the typing position within the equation. Press escape to stop typing and have the arrow keys again move the Windows pointer.

To edit an existing equation, use the Equation tool and press Space when the pointer is over the equation. Alternatively, if an equation is selected using the F9 Selector tool, pressing control + Enter will start typing into it again.

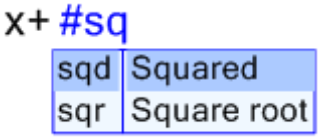
Typing symbols

Standard characters should be typed using the keyboard. Special symbols can be entered in one of two ways. There are special palettes on the right hand side giving access to most symbols (the exact palettes which appear depend on which option was selected in the user menu). However these are more useful for pointer users. For keyboard users, all the symbols can be accessed by pressing the "#" key to show the symbols menu. Each symbol has a short code. You can either type the code, or just part of the description to search for it. Then press Enter to select.

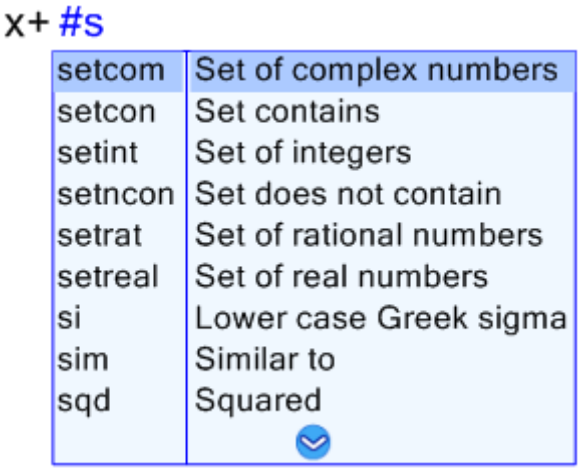
For example the square root symbol has the code "sqr". You can add a square root to the page by typing "#sqr" and then pressing Enter. The code appears in blue as it is typed:



Beneath the code you are typing appears the meaning. If an incomplete or incorrect code is typed, beneath this lists all possible matches:



Initially this lists all codes starting with the letters that have been typed so far. Use the up and down arrows to scroll through the list, and press Enter to select one of the options. The list may be long if only 1 letter is pressed and will scroll if necessary:



Searching by name: If you don't know the code for the symbol you want, just type part of the name. When you type something that doesn't match any of the short codes, then Splash will search the names of the symbols instead and list all matches:

x+ #arrow

adn	Arrow down
alt	Arrow left
art	Arrow right
aup	Arrow up
reeq	Reaction equilibrium arrow
rele	Reaction left arrow
reri	Reaction right arrow
vec	Vector arrow above

Again use the up and down arrows to move through the list, and Enter to select.

Moving around the equation

Move the typing position using the arrow keys, or by clicking where you want to type. Note that all four arrow keys may be needed: the up and down arrows are needed where some part of the equation is laid out vertically.

Structural elements

While many of the symbols are just that - symbols - some items within an equation provide structure and can contain any amount of other symbols. For example brackets, divisors, square roots, integrals. Splash will automatically size and lay these out.

In general press the button for the structure first before typing anything that goes within it. The typing position will then move within. For example to create a divisor press the button first. This will show a short horizontal line with the typing position on the top of the divisor:

$$\frac{}{}$$

Type the top half of the divisor. The line will stretch to fit automatically:

$$\frac{(x+y+z)}{}$$

Press the down arrow key to move down to the bottom half of the divisor, and again start typing:

$$\frac{(x+y+z)}{(x-y)}$$

The same works for any part of an equation containing more content, they will automatically expand as more content is added:

$\sqrt{} > \sqrt{x+y} > \sqrt{\frac{x^2+y^2}{x^2-y^2}}$

$() > (\cos\theta) > \left(\frac{\cos\theta}{\sin\theta}\right)$

If you have typed the content first at want to add brackets/a divisor/root around it, then you can do this. For example, in the root example above, if you typed the $x^2 + y^2$ first:

$$x^2+y^2$$

then select the entire text by moving the cursor to one end and then using shift+arrow keys to select the text:

$$x^2+y^2$$

Then type the code (#div) for a divisor:

$$\#\text{div}\ y^2$$

div	Divisor
divs	Division symbol

While you are typing the #div code it may overlay the selected text, and look messy. Don't worry about this; once the code is selected, it will placed around the text correctly:

$$\frac{x^2}{+y^2}$$

The just press the down arrow to move to the bottom half of the divisor. The same can be done to add the root: select the entire divisor and then type the #sqr for the square root.

Starting new equations

There are 2 buttons on the palettes which help with starting another equation directly beneath the one you are currently typing:

will start a new empty equation. On the keyboard you can press Enter to do this.

 will duplicate the current equation on the next line and start typing in it. Press Shift + Enter to do this from the keyboard.

Alternatively, you can start a new equation elsewhere on page by just using the Equation tool again

Special keys

There are some key combinations that can be used to type common symbols:

Alt + P = π (lower case pi)

Alt + / = ÷ (division symbol)

Alt + 0 = ° (degree symbol)

Alt + 8 = · (multiplication dot)

Alt + X = Curly x

Alt + Y = Curly y

The key combination for the degree symbol can be used throughout Splash! The other keys only apply within the equation editor.

Working with other tools

Shapes and tools can be selected by single keys or key combinations. For example 'S' will choose Square, R the rectangle and Shift + R opens the ruler etc. The default set of key assignment can be found in Appendix 1

Simple shapes: Lines and polygons

Splash! has a number of different line and simple geometric tools. All lines can have their style changed with the Line Colour', 'Arrowheads' and 'Line Style' Palettes.

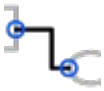
All of the simple shapes are drawn in the same way:

- Choose the appropriate tool
- Move to the start of the line / at the start of one edge for a polygon.
- Press Space to fix that point
- Move to the end of the line / other end of that edge for a polygon
- Press Space to fix that point
- For shapes with an unlimited number of elements, repeat this to place additional points, and press Enter instead of Space to place the last point and complete the shape.
- For shapes with a fixed number of elements, press Space place each point - placing the last point completes the shape.

Shapes that can be drawn this way:

	Line	
	90/45 degree line	As line, but it will always be drawn horizontally, vertically or at 45 degrees.
	Arrow	As line, but it will be drawn with an arrow head on one end. (Arrow-heads on lines can be controlled in detail using the Arrow-heads palette - which is usually only visible in Teacher mode)
	Joined line	Any number of straight lines joined together. Use Enter to place the last vertex and complete the shape.
	Irregular Polygon	This is like the joined line, but always forms a closed shape. Click to place each point, and use Enter to place the last point, completing the shape.
	Curved line	This works exactly like the joined line and is created by placing a series of points; but rather than a jagged line a smooth curve is produced. (See also freehand curve) Note: if the end point is placed almost on top of the start point, this automatically converts to a closed curve.
	Closed curve	This is almost the same as the curved line, except that the shape is always closed - joining back to the start point.
	Square	The first two points place any edge. Moving the pointer then chooses between the square being left or right of this line,

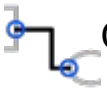
and clicking a third time completes it.

	Rectangle	Placing 3 points completes this shape.
	Orthogonal Rectangle	This also drags a rectangle, but it is always drawn aligned horizontally and vertically. Unlike most shapes **the first 2 points do not form one edge**, but should be opposite corners. *(Note: by default this shape is not enabled in most activities. It is used instead of the rectangle in Maths/Arithmetic activities)*
	Parallelogram	Like the rectangle, placing 3 corners completes this shape.
	Equilateral triangle	Triangle with 3 equal sides
	Isosceles triangle	Triangle with 2 equal sides. The first 2 points form the other, non-equal side.
	Scalene triangle	Triangle with 3 different sides
	Regular polygon	A regular polygon with any number of sides from 3-20 *See below*
	Connector line	A line connecting 2 other shapes *See below*
	Free-hand line	A line drawn by moving the cursor free-hand - this shape is not very effective using only keyboard control who are better using the Curved Line tool listed above.

Just a few of these have special behaviours:

Regular polygon

Like most simple shapes, the first 2 points determine one side. Move to either side and press Space again to determine whether the shape is on the left or right of this line. You can also change how many sides the polygon has at any time by pressing the + and - keys)



Connector Line

This is used in technical diagrams to show a connection between 2 other shapes on the page. It displays a line between the shapes - and the line may (automatically) form multiple segments in order to connect without crossing over either of the shapes. **If one of the shapes the line is connected to is moved, then the connecting line will automatically move with the shape**. One or both ends of the connector can be left dangling - not connected to any shape.

The line is drawn just like a simple line: just place the 2 end points. Any zigzags needed to join the 2 ends will be created automatically.

Note: the 'Snap to' setting (see p10) is ignored when adding a connector - it automatically connects to certain points on a target shape. When adding or moving a connector, the possible locations it can connect to will be indicated with purple circles.

Circles

Each of the circles requires marking 2 or 3 points - exactly where depends on the shape:

Circle

Move to the centre of the circle and press space
Move to any point on the edge of the circle and press Space again (ie the second click sets the radius of the circle)

Ellipse

To draw an ellipse you first place the long axis of the ellipse. ie:

- Move to one narrow end of the ellipse and press Space
- Move to the opposite narrow end of the ellipse and press Space
- Then move to indicate how wide the ellipse is and press Space again to finish.

Semi-circle

To draw a semi circle, first place the baseline, by indicating each end. Then move to one side and press Space again to specify which side of the baseline the semi-circle appears.

Geometry tools

Ruler

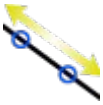
Measures distances. *Note: by default this does not remain permanently on the page, and is only used for measurement.*

Protractor

Measures angles. *Note: by default this does not remain permanently on the page, and is only used for measurement.*

Compass/Arc

Performs the functions of a compass when doing geometry with pen and paper. *See below*.



Infinite line

This draws a line, and is used just like the normal line tool (see p42). However the line is always drawn extending all the way to the edge of the page. This can be used in some geometry exercises where a line needs to be drawn *through* 2 points, but extending onwards.

Angle label

This tool is a convenient way of adding a label indicating an angle. It is more often used when making worksheets, and less often by students themselves. The size of the angle is automatically displayed – unless the software is in exam mode, in which case the number is omitted.

Compass or Arc tool

This replicates the function of a compass tool when writing with pencil and paper. It draws arcs - and can be used to draw several arcs with the same radius. It does not produce a closed curve and cannot be filled.

Unlike most other shapes, when drawing several arcs, they do not start completely afresh. The first arc can affect the subsequent ones. This matches the way a physical compass is used: it can be used to draw several arcs with the same centre, and/or several arcs with the same radius.

To draw the first arc:

- Move to the **centre** of the circle of which this arc is part and press Space
- Move to **one end** of the arc and press Space
- Move to the other end of the arc and press Space (or Enter - see below)

This completes the arc, and **immediately starts drawing another arc with the same centre**. If you don't want another arc, either press the escape key afterwards to cancel the new arc; OR press Enter instead of Space when completing the previous arc. If you press Enter it indicates you have finished, and don't want to draw more arcs from the same circle.

Once you have finished drawing arcs around the same centre, **the radius of the arc remains fixed**. This is like a physical compass: it is often lifted off the page and moved to draw another arc of the same size. The next arc drawn will automatically have the same size as the previous. The arc button on the tools palette which gains a lock symbol when the radius is fixed:

Drawing the first arc: the radius is not yet set.

Radius is now fixed for subsequent arcs.

Subsequent arcs with the same radius are drawn just like the first: to the centre of the circle, press Space, then moved to each end of the arc. However wherever you press for the first end of the arc the radius will be adjusted to match the first arc - you are only setting the angle.

*Note: if the option at Settings > Work area settings > Editing in Work Area > "Automatically change to the selector tool after placing any shape on the page" is switched on, then the radius will **not** be remembered. Changing tools in the palette resets the radius so that it must be selected for the next arc.*

To draw a new arc with a different radius, just select the arc tool in the palette again, by pressing V - the lock symbol will be removed and the next arc will be drawn afresh with adjustable radius.

At any time the radius of the current arc can be changed by pressing the + / - buttons on the keyboard. This can be used to draw arcs of different radii around the same centre point.

If you want to use the compass the measure a distance without drawing, so you can draw an arc elsewhere on the page with that same radius, then click at both ends of the line you want to measure, as if drawing an arc. Then press the key to select the Arc tool again. This fixes the radius of the compass, until it is unlocked as above. It also clears the current shape so that nothing is drawn at the current location.

 Ruler

***Note**: there is usually only one ruler on the page. Starting a new measurement with the ruler tool automatically removes the current ruler, and they are not saved if the document is saved.*

- To open the ruler press Shift + R
- Move to the place you want to measure from and press Space
- The zero point on the ruler will be fixed and when you move the cursor the ruler will be drawn out. Default length is 10cm or 6", but it will extend automatically if the pointer is moved further from the start.
- A red line shows the current point of measurement and, depending on the options chosen, this measurement will be shown as a digital read-out at the bottom left of the drawing area.
- Move to the point that you want to measure to and press Space again

To make a new measurement just press Space again to place a new ruler – the first will automatically be removed.

Keeping the ruler on the page

If you want to keep the ruler as part of the document permanently, so that it is not automatically removed, once it has been placed, press Control + Enter. This turns it into a regular shape which can be selected, moved and deleted as normal.

Settings

By default the ruler works in millimetres. The measurement units used by the software can be changed in the settings (either the user settings, or it can be changed to a single document in the document settings). Go to Settings > Work area settings > Display settings > "Display measurements in:" to change this. Is the units are changed to cm, the display of the ruler does not change, but the measurement in the information line at the bottom of the screen will be in centimetres. If you select inches, the ruler will be displayed in inches.

Usually the ruler displays a tick every 1 mm. If the display is zoomed out this may be reduced automatically to make it more readable. You can also change the number of text labels to use in the settings under: Settings > Work Area Settings > Shape/Number settings > "Ruler displays ticks (at most) every:". This may make the ruler easier to read for VI users.

You can also increase the size of the numbers on the ruler by ticking this option: Settings > Work Area Settings > Display settings > "Use large text on ruler and protractor". (This option is also included on the VI page)

 Protractor

***Note**: there is only ever one protractor on the page. Starting a new measurement with the protractor tool automatically removes any protractor currently displayed on the page and it is not saved with the document.*

The protractor allows you to measure angles or to be used to construct shapes at measured angles.

- Move to the point where you want the centre of the protractor to be and press Space
- A faint line will be drawn in the workspace.
- Move so that this is along the line you want to start measuring from – this will form the flat base of the protractor (in 180 degree view) – and press Space again.
- Move so that the red line which appears is coincident with the angle you wish to measure or the angle is the value you want; press Space
- The red line shows the current measurement and, depending on the options chosen, this measurement will be shown as a digital read-out at the bottom left of the drawing area.

Keeping the protractor

As with the ruler, if you want to keep the protractor on the page permanently, after placing it press Control + Enter.

Ruler and protractor hints:

- If using the Ruler or Protractor to measure other shapes, it is helpful to switch on Snap to Shape (see p10)
- By default, the measurement is displayed in the information line at the bottom of the screen. If the user is doing an exercise where they must read the value themselves and this should not be displayed, it can be hidden by going to Settings > Screen Contents and layout > Screen contents > "Display info/measurements line". To do this for one exercise only, change the "Apply Changes to:" option at the top to "This document" before making changes.

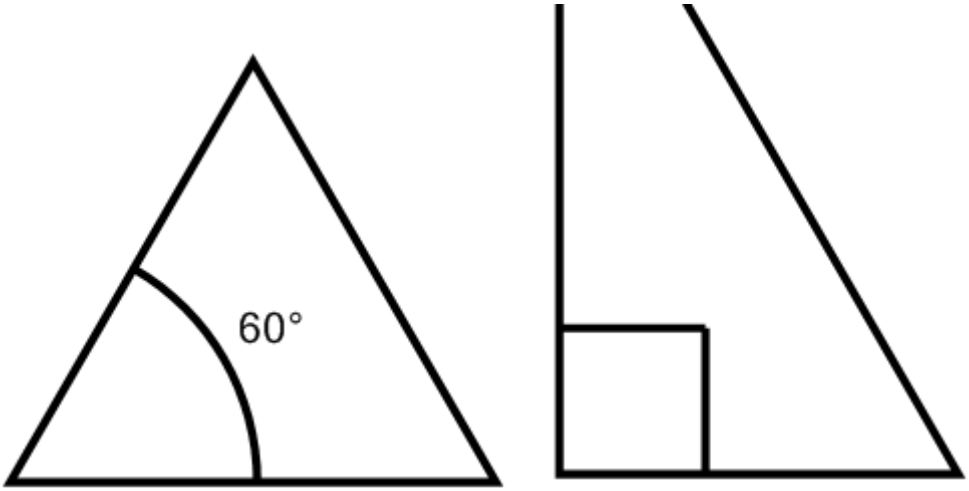
 Angle label

Hint: this works best if snap-to-shape mode is selected.

To place the label:

- Move to the apex of the angle to be labelled and Space
- Move to one of the ends of the arc which will be drawn and Space
- Move to the other end of the arc and press Space to finish

The text displaying the size of the angle appears automatically once it is completed. If the angle is exactly 90° it will be displayed as a right angle instead, as is usual in geometry:



The way in which this is drawn is very similar to the Arc/Compass tool. However, it is simpler to use – it only draws a single arc, and never locks the radius. And it automatically adds the text.

The text is omitted whenever Splash is in exam mode.

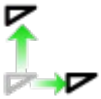
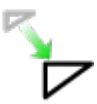
Transformations

There are 5 transformations that can be applied to any shape or group of shapes. These tools do not draw new shapes on the page, rather transform existing shapes. They can either move the existing shape, or make copies.

Note: the transformation tools can be used to either remove the original shape, or make copies. The current mode is selected using these buttons.

For a keyboard user, the key combination Shift + Ctrl + = will toggle between the 2 modes. If the left-hand option is highlighted then the transformations will move shapes. If the right and option is highlighted then the transformation tools will make copies. When copying, multiple copies can be created. The user should use Space when placing each copy if they want to create more, and Enter to place the only or final copy.

The transformation tools can be used in geometry, but some can also be useful for basic manipulation of the shapes for users with imprecise control.

 Move (translation)	Moves the shape: first select the shape, then move and click to place it in its new position.
 Move Horizontally / Vertically	As Move, but will only move either horizontally or vertically. If the user tries to move at an angle the shape will move horizontally or vertically depending which is closest.
 Scale	Enlarges (or reduces) the shape. First select the vanishing point - where imaginary lines of perspective drawn from the old and new would meet. Then Click on the shape to transform. Move to scale the shape and Click again to fix it.
 Rotate	Rotates the shape. First select the point about which to rotate. Then Click on the shape. Then move to rotate and Click again to fix the new position.

Reflect — Creates a mirror image of the shape. Unlike the other transformations, select the shape first. Then move to any point on the line of the mirror and Click. Finally moved to another point on the mirror line and Click again to finish.

Copy shape(s) — This acts exactly like the Move tool, but always functions to make copies rather than move shapes. The usual option to select between move copy is not displayed.

Advanced Notes:

- The Move tool performs the same action as the Move Horizontally / Vertically tool if snap-to-angle (see p10) is enabled. The specific tool is used when the complexity of selecting the separate snapping mode would be inappropriate, or in worksheets were only horizontal or vertical movement is needed.
- Usually the transformations default to movement mode. This can be changed in the settings, especially when creating a worksheet where only copying is required. To change this go to settings > Shapes/Number settings > "Transformations default a copy, not move, mode"
- The option to choose between movement or copying mode can be hidden in the settings. Go to Settings > Screen contents and layout > Screen contents > "Display move/copy transformation option"

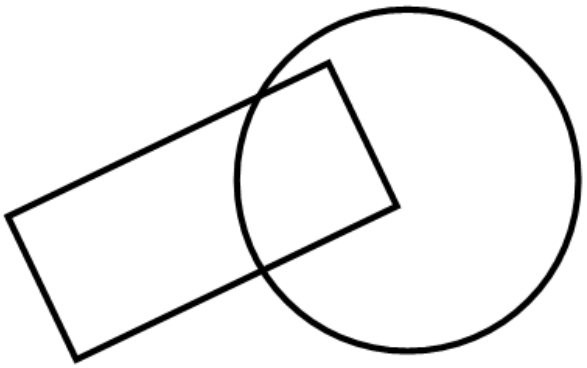
Other drawing tools

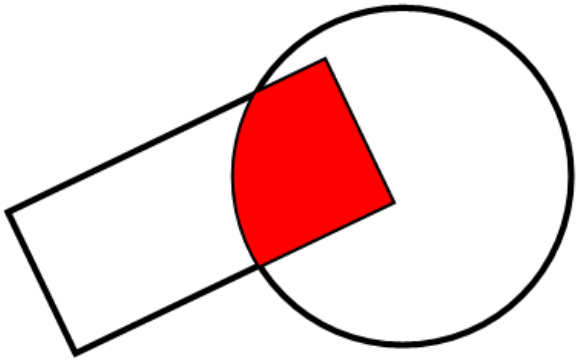
Colour filler

An area bounded by overlapping shapes including lines can be filled with another shape with the Colour fill tool - Q . This works like the flood fill option which is used in most pixel-based drawing. It can be used very simply as a click-to-colour tool, but is also capable of creating complex shapes.

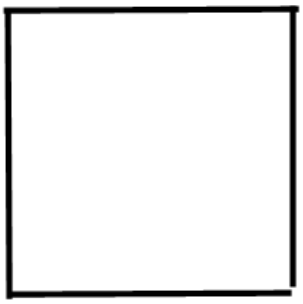
- Select the Colour Filler tool.
- Move to the area to be filled and Space.
- A new shape will be created bounded by the overlapping shapes. If a single shape is selected, which doesn't overlap with any others the shape will be changed to that colour – as if the colour was selected on the "Fill Colour" palette.

For example, filling in the middle of the shapes on the left, fills the area around the click:



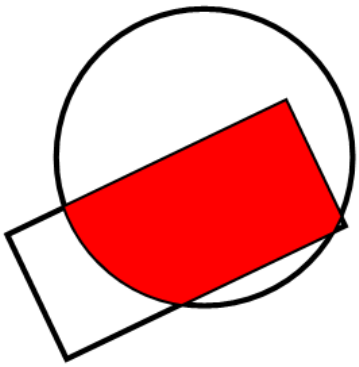


Note: the place where you fill must be enclosed. If there are not lines completely enclosing the area, so that the flood fill would leak out and fill the entire page, then nothing happens. For example, the rectangle on the right was drawn manually with 4 lines without using snap-to-grid or snap-to-shape. Trying to fill this rectangle will be ignored, because there is a gap at the bottom right and the area is not actually enclosed.



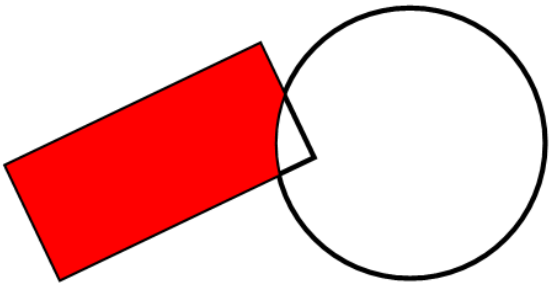
Working with the fill

The filled area actually creates a new dynamic shape. If any of the shapes around it are moved, then the fill will automatically flow to fill the new lines.



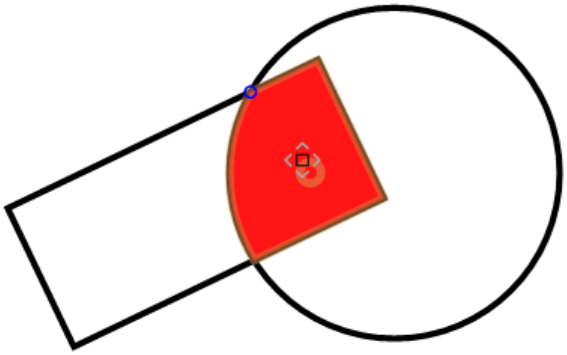
If one of the enclosing shapes is moved from one side of this to another, in the filled area may change substantially like this:

The circle has been moved so that the fill is now outside the circle



You can move to the filled area and select it using the F9 selector tool:

There is a grab handle in the centre which allows the fill to be moved like any other shape. There is also a pulsing circle (visible just below the grab handle in this picture) which shows where the fill was created. It will always flow outwards from that point.



Note: if it is moved manually, then it will no longer flow automatically and becomes a fixed shape. However you can select it and press Control + Enter it at any time to make it flow again (assuming it is in an area that is enclosed).

Simple mode

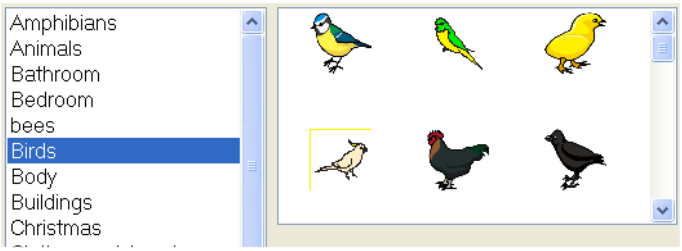
This tool has an alternative, much simplified, method of operation which can be enabled by ticking this box in the settings: Setting > Work area settings > Shape/Number settings > "Colour fill (paint bucket) changes the colour of single shapes as the user clicks on them…" (this setting is only remembered for the current document)

If this option is enabled then the filler only changes the colour of single shapes, exactly as selecting the shape with the F9 selector and choosing a different colour from the palette. This option is mainly used for making simplified colouring worksheets for younger users.

Picture Stamps

Picture Stamps are created from a library of images.

To create a stamp image press M.



Choose the image you want to use. You can use the arrow keys to move up and down the category list on the left, and then press Tab to move to the images on the right, and finally Enter to select. Use Shift+Tab to move back to the category list.

Once the image is selected, move with the arrow keys and press Space or Enter to draw the image on the page. Space will continue drawing more copies; Enter places one and finishes.

While moving around a transparent image is displayed to indicate where the stamp will be drawn. To change to a different image, select the Stamp tool again.

Hint: to make several images more easily accessible from the tools palette for an exercise, in Teacher mode, draw each on the page, select it and then select from the menu Options > Add selected shape to Palette. The image on the page can then be deleted.

Crayon, Chalk, Paint brush and Pixel pen

Note: although these tools can be used from the keyboard, there are more useful for users who can operate some form of pointer control.

These 4 tools work in the same way. Unlike most of the other tools these use pixel-based drawing. They do not create independent shapes that can be selected, moved around, or deleted. Rather they draw directly onto the page itself. They are used in the KS1 Painting activity and not generally mixed with most of the other tools.

For any of these press Space to start drawing, move the pointer around the page with the arrow keys and press Space again to stop drawing. This is the same method as the Free Hand Line, except that the Free Hand Line creates an object which can be modified

afterwards.

The difference between these 4 tools is the texture of the output. The picture on the right shows each (from the top: crayon, chalk, brush, pen). With all three tools it is possible to go over the same spot on the page again to get a darker colour, just like on physical paper.

Note: using any one of these tools somewhat changes the behaviour of the Colour Filler and Eraser tools on the page. The Colour Filler will no longer create independent objects and instead does pixel-based drawing, just like these tools. This difference won't be obvious to most users.

The eraser also changes to pixel-based. Therefore the eraser tool is usually used with these tools to "rub out" mistakes.

Graph drawing tools

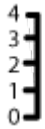
Many of the regular tools would be used when drawing a graph: lines, curves etc. See in particular the lines and polygons on p42. However Splash has several tools specifically to help with certain aspects of graph drawing.

Pie chart

- Choose tool: press Shift + O.
- Move to the centre of the pie chart and press Space.
- Move so as to draw out the radius of the pie chart and position the first dividing line and press Space.
- Move to around the pie chart to draw the first segment and press Space.
- Move further around the chart to draw the next segment and press Space.
- To complete the final segment - press Enter instead of Space. Or press Escape at any time to cancel the current segment and finish.

Once the pie chart has been draw its segments can be deleted, moved, rotated and re-sized individually - each segment is a separate shape. Each segment can be filled etc. using the palettes on the right.

HINT: Choose the rainbow fill colour before starting to automatically fill each segment with a new colour.



Graph axis

Hint: it is usually best to switch on Snap to Grid first, so that the axis is aligned on the grid.

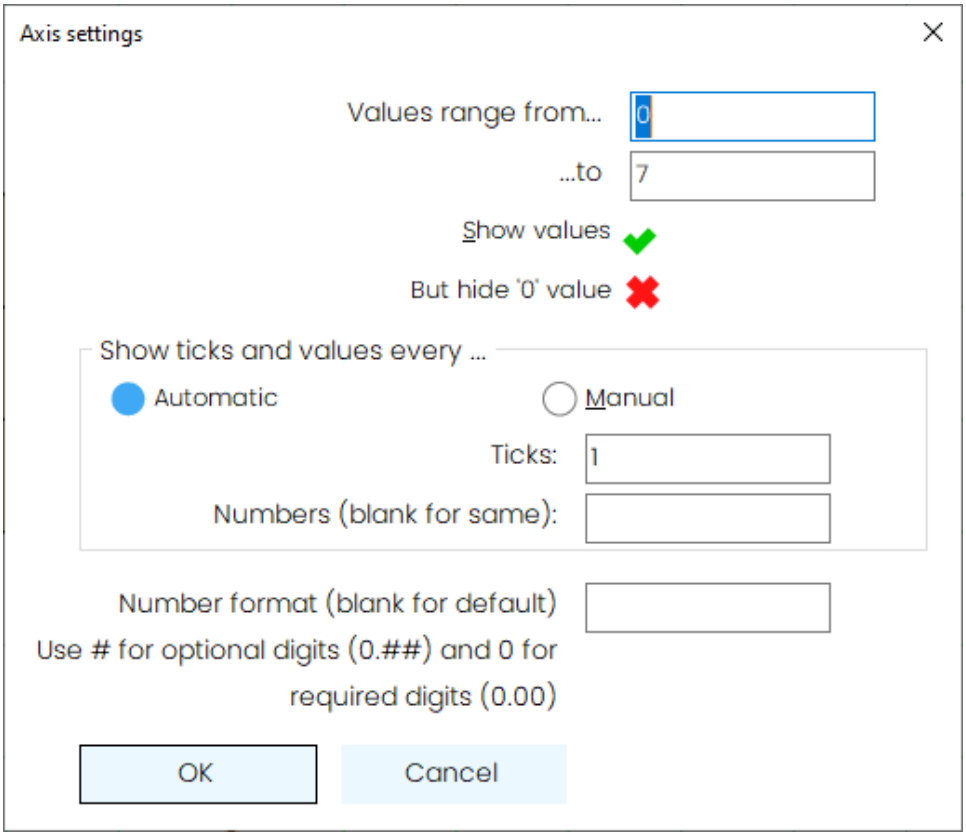
This draws an entire axis, either horizontally or vertically, including tick marks and labels. These axes are intended to be used mainly with squared graph paper.

- Choose the tool by pressing I.
- Move to the position where you want the left hand or bottom end of the axis to be (this is not the 0 point if you are using negative axes) and press Space.
- To reselect this position press Escape.
- Move to the top or right hand end and press Space to finish.

The axis will initially have one value per (large) grid square on the page, if this makes sense; if not it defaults to 10 divisions. If you want the values displayed to be different press Control + Enter to open the settings screen.

Styling: the line colour and thickness can be changed using the standard styling palettes (Line Colour and Line Style). The font size, and colour, of the labels can be changed using the Text Style palette.

Axis settings



Values range from: sets the first and last values on the axis. Note that the second value can be smaller, in which case the values count down from left to right or bottom to top.

Show values: If this is not ticked, then no numbers are displayed. The axis can still display check marks however. This might be used when text labels are to be used in a bar chart, for example. Or perhaps the student needs to add the values themselves.

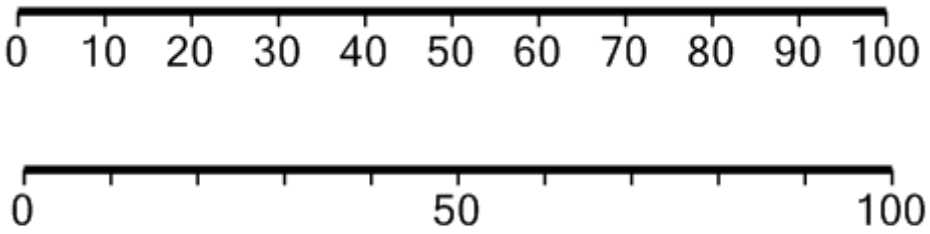
But hide '0' value: This only applies if the values are displayed. This will omit the 0. This can be used when horizontal and vertical axes are used, both including 0. In this case, if both axes include the '0' label, then the labels tend to overlap each other. It is best to omit the 0 in one axis.

Show ticks and values every... These options control how many values are labelled. On a simple 0-10 axis every value would be labelled by default. On a 0-1000 axis, however, this is clearly impossible.

Automatic / Manual: If the Automatic option is selected, then the software will choose something appropriate. Any values entered below are ignored

Ticks: The amount the value between each tick mark on the axis.

Numbers (blank for same): the interval between each number. This can be left blank, in which case the same value is used, and every tick mark has a numeric label. However, if different, then only some tick marks will be have numbers beside them. This value must be a multiple of the value in *Ticks*. For example, the first of these has a tick every 10th number (and the *Numbers* option is left blank). The second also has 50 in the *Numbers* option:



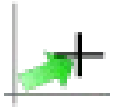
Number format: (Advanced!) This allows you specify how numbers are displayed. It can be used to fix a certain number of decimal places, or include currency symbols, etc. Use "0" to indicate compulsory digits, and "#" for optional. So "0.##" would display a maximum of 2 digits after a decimal place. The code "£0.00" will display in English currency. The value 7 would appear as "£7.00". The full list of codes is available on this webpage: https://msdn.microsoft.com/en-us/library/0c899ak8%28v=vs.110%29.aspx

"Marker" - Graph points

This tool can be used to draw scatter graphs, or mark points on a line graph. Each shape is simply a single point - but can be indicated by a choice of symbols commonly used on graphs.

- Choose the Graph point tool by pressing Shift + M.
- Choose the size and shape of the point you want from the Point Style Palette (this can be selected from the keyboard with Shift + Alt + P).
- Move to the position you want to place each point and press Space.
- If the point is incorrect press press Delete (or move it, see p13).

The colour of these can be changed with the Line Colour palette and the style of the lines within the points can be changed with the Line Style Palette as for any other shape (see p59). The actual shape and size of the marker can be changed with the "Point style" palette:



Graph Origin

The graph origin (the 0,0 point) can be set for each page of a document from the menu: *Page > Set origin*. This affects coordinates displayed in the information line at the bottom of the screen. For example, the origin could be placed at the origin of a graph, so that the information is measuring coordinates within the graph.

This option does not draw anything on the page.

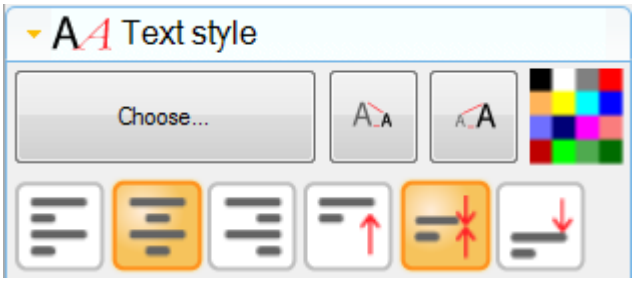
Choose this option from the Page menu, move to the point where you want the 0.0 point and press Space.

Typing text

There are 3 tools which can be used to enter text.

For each of these backspace can be used to delete, and all 4 arrow keys can move through the text as normal.

For any of the text tools the Text style palette can be used to change the appearance of the text. It is not possible to change selections within the text; one style applies to the entirety of each block of text



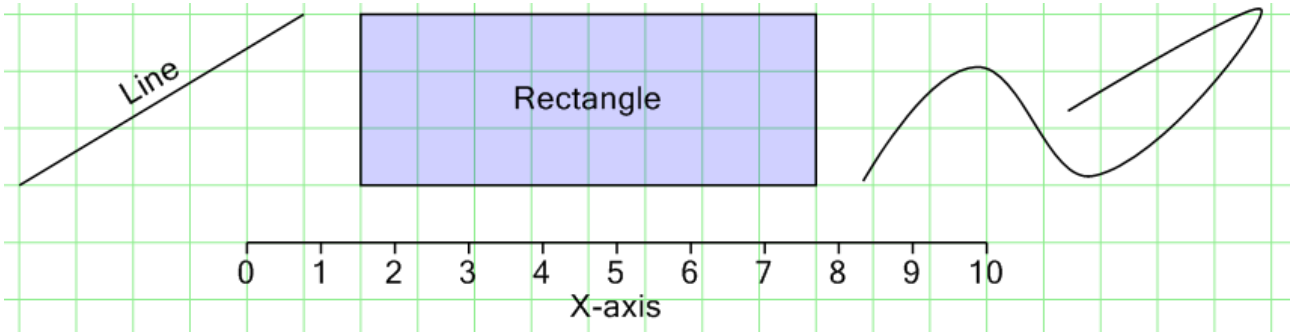
To edit an existing piece of text (for any of the 3 tools), use the F9 selector tool press Space to select it, and then press Control+Enter to start editing the text.

ABC	Text area	The simplest text tool. Move where you want the top left of the text to be and press Space. The text is always placed horizontally. Pressing Enter/Return starts a new line - the text will not automatically wrap onto a new line without pressing Enter.
	Text on a line	This allows text to be placed at any angle, and to automatically wrap onto new lines if it is too long. To start move to the beginning and then end of the first line of text and press Space at each end, then start typing. If the text you type reaches the end point it will automatically flow to a new line. Enter/Return can be used to manually start a new paragraph.
	Text in/on another shape	See below.
	Numbers Tool	The Numbers tool used for arithmetic can also enter letters in cells as well as numbers. So for small amounts of text within an arithmetic exercise, or for individual letters which need to be laid out in grids this tool may be best. See p30.

Σq	Equation Editor	If the text is to include mathematical equations or symbols, then the equation editor would be a better choice. This allows normal text to be typed as part of an equation. See p37.

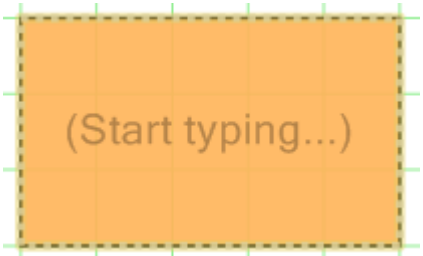
Text within another shape

This allows text to be placed within or on an existing shape. The exact position of the text depends on the shape, and is not possible to add text to some shapes, such as curved lines. For example:



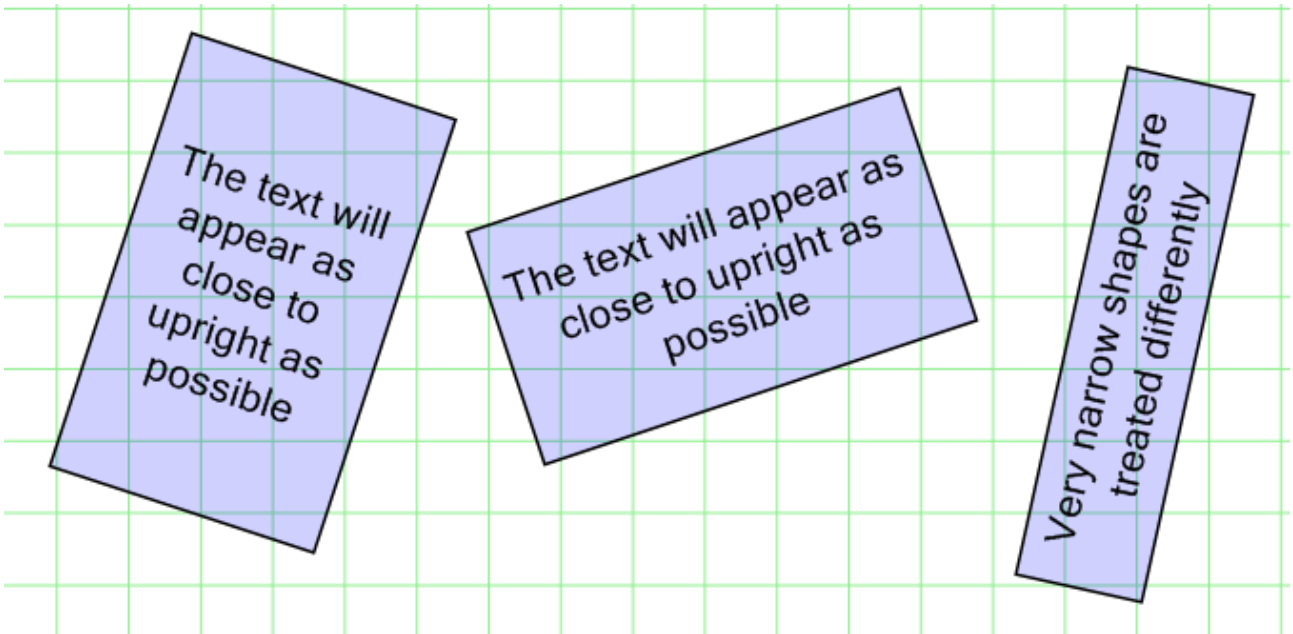
To add text:

- Select the "text within another shape" tool
- Move the pointer over the shape and press Space. A prompt will appear...
- Start typing. The text will wrap automatically at the end of a line if appropriate for the shape.

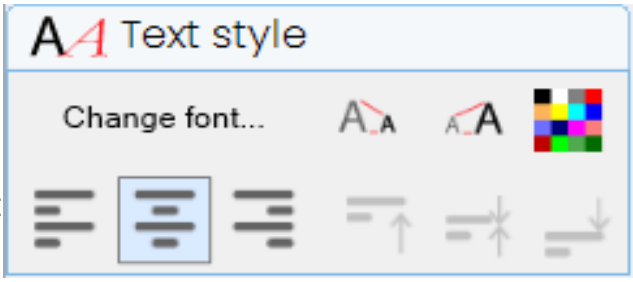


Alternatively, for most shapes, you can select them with the F9 selector tool and press control + Enter to start typing (this doesn't work on some complex shapes where control + Enter opens the options screen for the shape)

The orientation of the text is done automatically:



The buttons at the bottom of the Text Style palette can be used to change the alignment of the text:



Again, which options are available depends on the shape. On a line, for example, it is possible to align to the left, centre or right, but not to change the vertical positioning.

From the keyboard the key combination Shift + Alt + T will select this palette. The keys Control + , (comma) and Control + . (full stop) make the text smaller or larger.

Special-purpose tools

None of these tools are used by students.

 Button

This is used when designing custom palettes (like those that appear on the right-hand side of the screen).

 Container

This is used when designing custom palettes, and some worksheets. This makes a container on the page: any shapes dropped inside the container will move if the container is moved.

 Flowing container

This is similar to the container, but any shapes dropped into it automatically arranged in one or more lines.

 Alternate selector

This tool is not used in the current version.

 Sockets

This tool is used when creating worksheets. It is used to make complex shapes fit together correctly. See the separate *Creating Worksheets in Splash* manual.

Editing shapes and styling

Styling shapes

The palettes, other than the main Tools Palette on the left, provide a wide range of formatting options for colour and style for many shapes and other objects.

Palettes from the keyboard

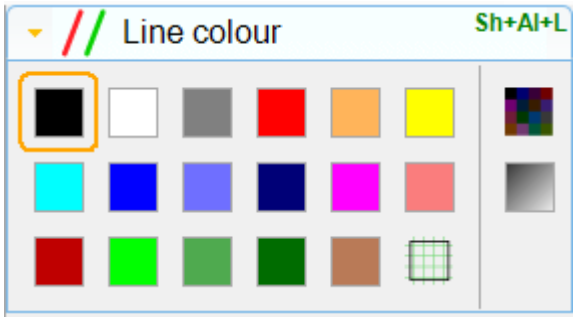
Each palette has a key combination which selects it. To make a selection from any of these palettes, first press the key combination, then use the arrow keys to move the selection around the palette, and press Enter to finalise the selection and return the focus to the drawing area. The header of a palette changes to a green colour when it is selected, and the typing focus is in the palette.

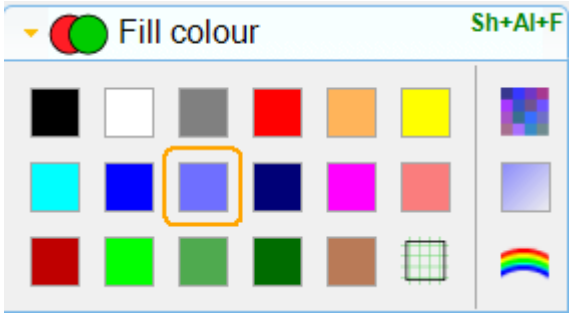
If a palette contains buttons performing actions (such as the Choose and text size buttons in the Text style palette) use Tab / Shift + Tab to move the focus around the buttons and Space to trigger a button.

Colours

For most shapes the colour of the line and the colour filling the shape can be changed separately. There is a palette for each, which are almost identical:

(for text-only shapes selecting from the Line Colour palette will change the text colour. There is also a colour button within the Text style palette which changes text colour on all shapes, including those containing lines and text)

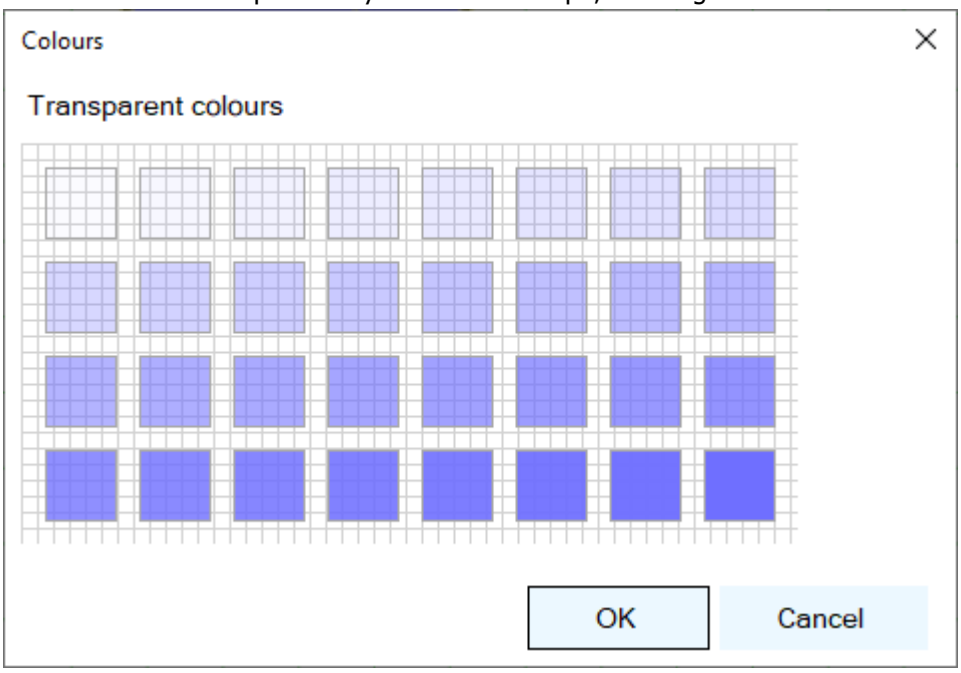




The main part of each palette is the 18 standard colours. Use the arrow keys to move the selection. The last colour (bottom right) is transparent.

On the right-hand side are 2 or 3 extra options. There is a key combination to trigger each of these. From top to bottom these are:

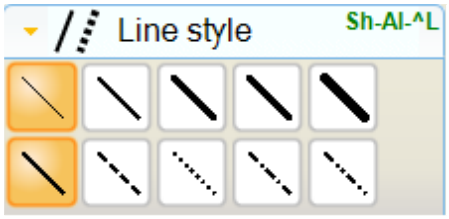
- Refine colour (key = Alt + S): this displays more shades similar to the current colour. By selecting the closest colour amongst the standard 18 first, and then clicking this is possible to choose from nearly 1000 colours in total.
  Advanced: in the Settings > Work area settings > Editing in work area, there is an option which changes the behaviour of this button: "Refinement button in the colour panel should show the standard Windows colour chooser instead". The Windows colour chooser allows access to all colours. However using it requires good pointer control.
- Transparency (Alt + T): this lets you make the current colour partially transparent. Again, select the colour first and then click this to show the transparency options:



- Rainbow colours (Alt + 'R'): this is only available for the fill colour, and not the line colour. If this is selected then every shape is drawn in a different colour, cycling through the standard colours. This can be useful, for example, with pie charts so that each slice automatically is a different colour to the previous one.

Note: by default these extra options on the right are not displayed for KS1 users. They can be turned on or off for any user using the option: Settings > Screen contents/layout > Screen contents > Display advanced colour buttons

Line styles



The line styles cover line thickness and broken (dashed or dotted) lines. The thickness and broken styles are independent of each other. Line arrow endings are on a separate palette.

Arrow-heads

Note: by default this palette is only displayed in Teacher mode or for KS3+ Advanced profiles (see p18 for how to change this)

It is possible to display a variety of arrowheads at each end of lined shapes (this is not available on closed shapes such as polygons). Arrowheads are added or changed using the Arrowheads palette:

The beginning and end of the line are changed separately, and for each end 2 selections are made: the size of the arrowhead (on the first line of buttons) and the shape of the arrowhead (the second line of buttons)

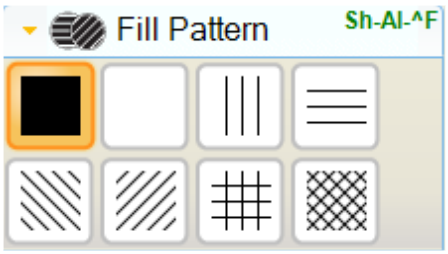
Use the 'S' and 'E' keys while the palette is selected to switch between the Start and End selections. Use the Tab key to switch between changing the size and style of the current end.

Fill effects

All closed shapes can be filled with colour, patterns, and textures in great variety. The colour of the fill, and optionally transparency, is set using the Fill colour palette, above. There are 2 further possibilities:

Patterns

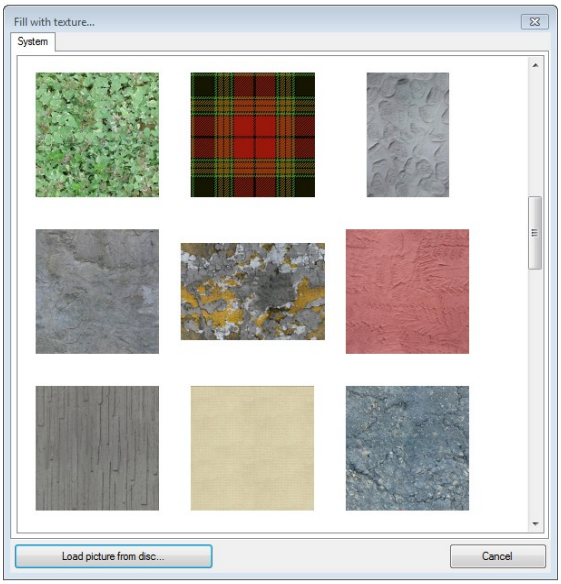
Shapes can be filled with hatching patterns. The shapes otherwise become transparent; the hatching lines take the Fill colour. The blank fill (second option) pattern makes the shape transparent.



Textures

Shapes can alternatively be filled with a texture or pattern. This is done via the menu: *Edit > Fill with texture...*

This displays a screen with possible textures. Alternatively, use the button at the bottom left to select any image from disc to use as the texture.



Text Styles

Text is adjusted using the Text style palette. Click the "Change font" button to choose the font, font size and select bold and/or italic.

The next two buttons are a simpler way to adjust the font size: the first makes the text smaller, the second larger. Click the last button on that line to change the text colour.

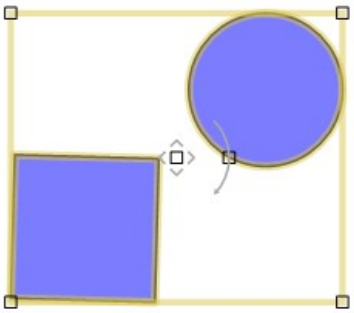
From the keyboard use Tab to navigate to these buttons, and Space to activate them.

The 6 buttons on the next line change the alignment of the text. For text shapes only the first three (left, centre, right) are available and change how the text is positioned in relation to the starting point. When text is added to a shape the last 3 buttons are also available; these change the vertical alignment of the text within a shape.

Note: There can only be one text style within any given object. It is not possible to embolden (for example) one word. If you use a font that is not available on another computer the font will revert to Arial.

Further editing

Creating a grouped object



To create a grouped object, select all the members of the group and press Control + G. Once grouped, all the shapes behave as a single shape and are moved or resized as a single item.

To un-group select a grouped object use Shift + Control + G. This restores the original shapes so that they can be edited invidually.

Arranging and aligning shapes

There are several options on the Edit sub-menus which can be used to reposition shapes. The "Quick Transform" submenu has options to rotate or flip the currently selected shape(s). These options also available on the "Quick transform" palette; but, by default, this is only displayed in teacher mode or for advanced users. These options can be accessed from the keyboard using Alt + arrow keys:

- Alt + Down arrow = flip horizontally
- Alt + Up arrow = flip vertically
- Alt + Left arrow = Rotate left 90°
- Alt + Right arrow = Rotate right 90°

The "Align shapes" submenu has options to move shapes, such as left-aligning them with each other. Most of these require several shapes to be selected and will align them with each other in different ways. Each option moves shapes either horizontally or vertically, but never both.

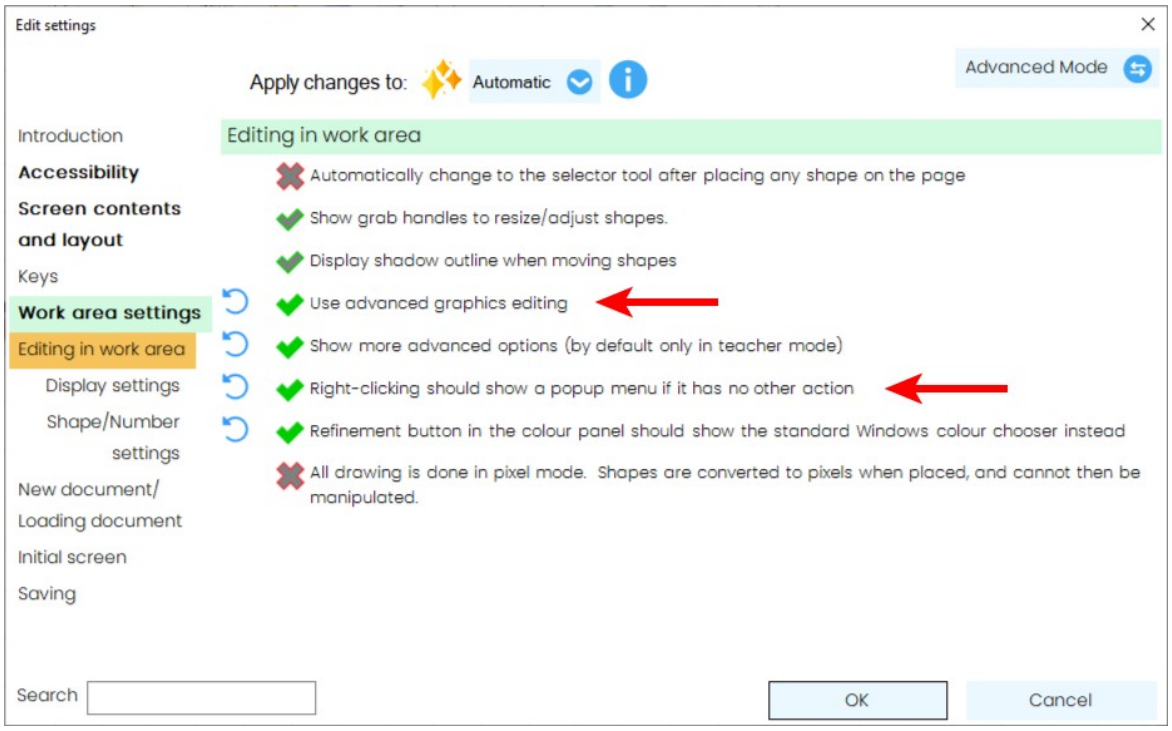
The last 3 options on this submenu can be very useful. Each of them relates to one of the "Snap to" modes (see p10), and modifies the selected shape(s) so that it is positioned as if the snapping mode was selected when the shape was drawn. There are key shortcuts for each of these:

- "Align with grid" (Shift + Control + F6) will try to align the shape(s) with the current grid.
- "Align with other shapes" (Shift + Control + F7) will move shape(s) which are nearly touching other shapes so that they exactly touch at edges or corners.
- "Align: tidy angle" (Shift + Control + F8) tries to modify shapes so that lines are as a multiple of 15°. If a technical or geometric diagram has been drawn without any grid snapping, then most likely the lines are not quite orthogonal and look messy. This will tidy them to be exactly vertical, horizontal or other multiples of 15°.

"Advanced" graphics

Usually the graphics editing in Splash is kept fairly simple. However, Splash does support vector graphics editing using grab handles to adjust curves, in the way that standard vector graphics/Art packages work. To use advanced graphics you must turn on 2 options in the settings:

- Settings > Work Area Settings > Editing in work area > Right-clicking should show a popup menu if it has no other action
- Settings > Work Area Settings > Editing in work area > Use advanced graphics editing



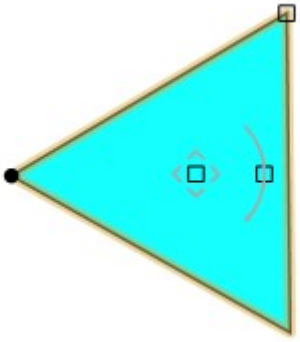
Pop-up menu

Using the advanced graphics features requires using the pop-up menu. This can be displayed by right clicking with the mouse, but keyboard users can also use the menu key on the keyboard instead (the key is usually at the bottom right of the keyboard between the control and Windows keys).

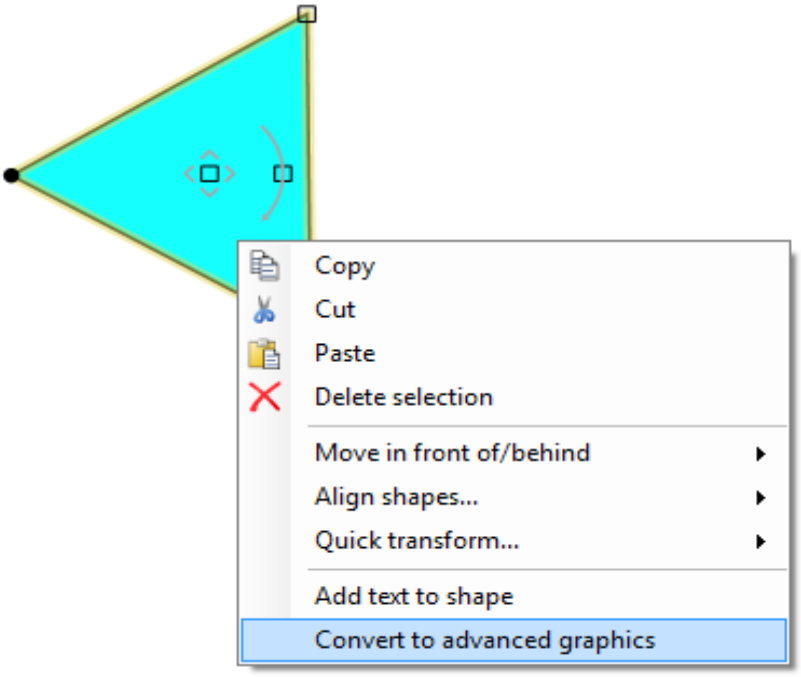
The location where the menu is displayed can be important, so use the mouse or arrow keys to position the pointer first.

Editing with advanced graphics

Most shapes in splash maintain their inherent nature even when modified. For example if you draw an isosceles triangle it will remain an isosceles triangle after editing. If you select such a triangle, there is only one grab handle to change the size, which will change all 3 sides:

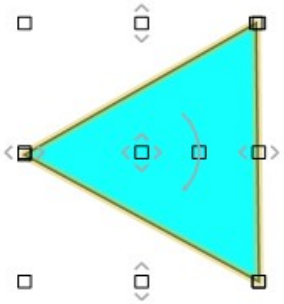


If you want to use complete vector graphics editing on a shape, the first step is to convert it, so that it loses its inherent shape and now permits unrestricted editing. This is done by placing the pointer over the shape and selecting "Convert to advanced graphics" from the popup menu:



If this option is not included on the menu, then the shape already supports the full advanced graphics editing.

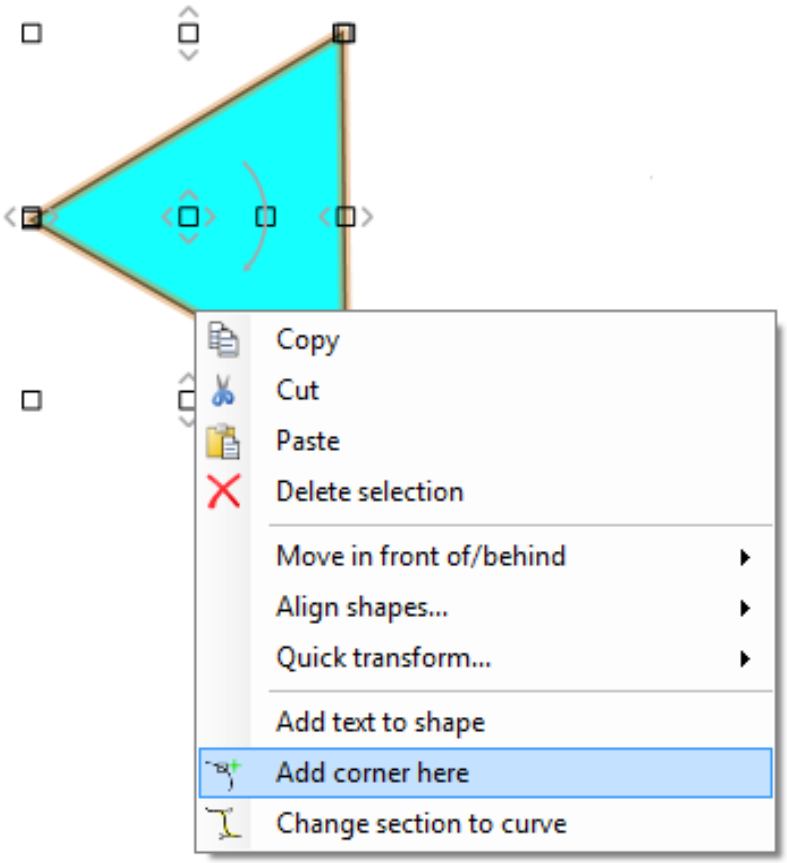
The shape itself does not change. The only visual difference is that now different grab handles are displayed when it is selected:



Using these grab handles it is possible to move any vertex, or stretch the shape in one direction so that it is no longer an isosceles triangle.

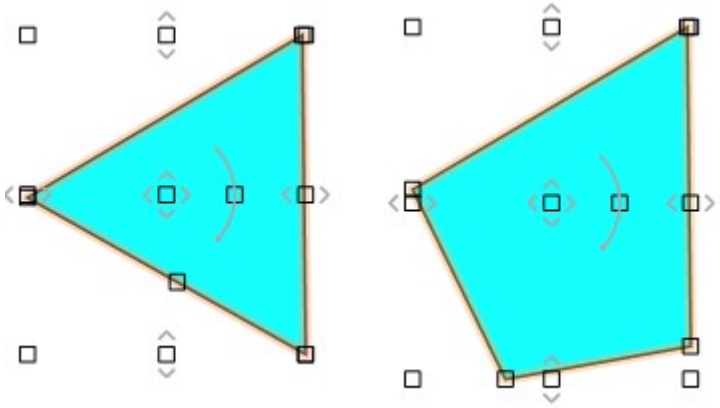
Adding and removing vertices

Once the shape supports advanced graphics, you can add and remove vertices. To add a new the text of the shape, position the pointer over one of the lines and bring up the popup menu using the Menu key. Then select *Add corner here* from the menu:

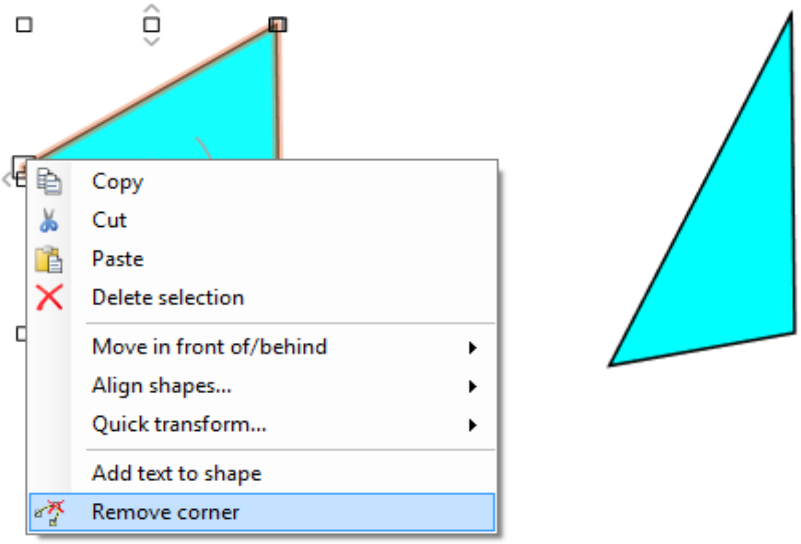


(The pointer was positioned where the top left corner of the menu is)

This adds a new vertex, as can be seen from the extra grab handle in the shape (left picture). This grab handle can be moved like any other (right picture):

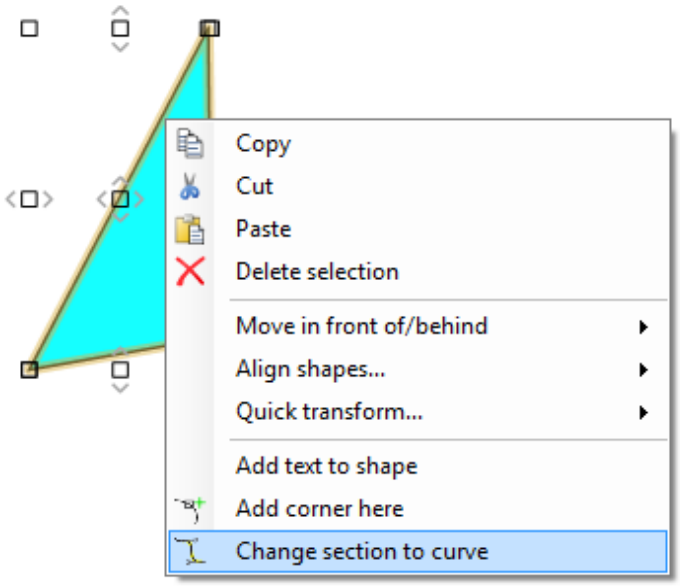


Similarly, a vertex can be removed by positioning the pointer over the vertex, and selecting *Remove corner* from the menu. This will remove the vertex, leaving a line joining the preceding and following vertices:

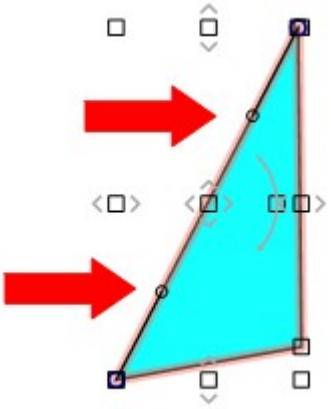


Curve editing

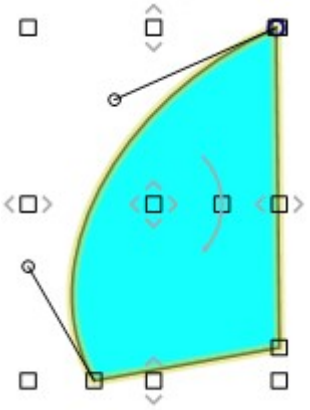
The main function of the advanced graphics is curve editing. Since our example shape consists only of straight lines, we first need to convert one of the lines to a curve. This is done by moving the pointer over the line (the top left line in this example) and selecting *Change section to curve* from the pop-up menu:



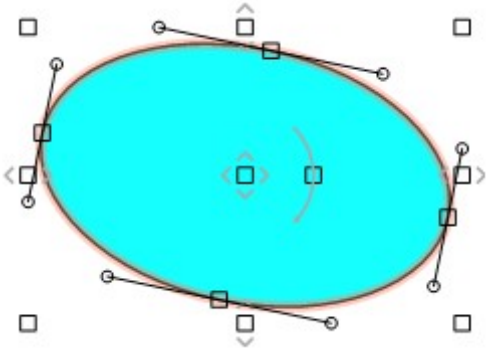
Again, this doesn't make any immediate change in the shape. It does however, add two more grab handles:



These handles allow curves to be adjusted, and work in the same way as any standard vector graphics software. If, for example, both grab handles are moved to the left, the line that we have now converted to a curve, becomes bowed out to the left:



These curve adjusting grab handles are displayed as circles, which differentiates them from all other grab handles which are displayed as squares. They are displayed on all curved parts of a shape once advanced graphics is enabled. For example, an ellipse which has been converted to advanced graphics:



Adding and removing vertices, and using the curve-editing grab handles allows complete adjustment of any complex shape.

Appendix 1: Default keyboard assignments

These are the general key assignments for the work area, and almost all of these can be changed from the settings. A few shapes have specific keys described above, which are generally not changeable, and are not listed here. (For example 'H' and 'M' in the clock to select one of the hands)

Key	-	+Shift	+Control	+Shift+Control
Enter	Complete	Duplicate current equation	Shape custom action - depends on shape	
Escape	Cancel			
Space	Choose			
PgUp	Page up		Go to previous page	
PageDown	Page down		Go to next page	
Home	Return keyboard control to drawing area		Return to menu page	
Left arrow	Move cursor left		Scroll left	Number tool auto-move left
Alt-Left arrow	Rotate right 90°			
Up arrow	Move cursor up		Scroll up	Number tool auto-move off
Alt-Up arrow	Flip vertically			
Right arrow	Move cursor right		Scroll right	Number tool auto-move right
Alt-Right arrow	Rotate left 90°			
Down arrow	Move cursor down		Scroll down	
Alt-Down arrow	Flip horizontally			
Ins	Choose			
Del	Delete selection			
0	Reflect shapes			
Alt+0	Type degree symbol			
1	Numbers	Number square grid	Display at 100%	
2	Isosceles triangle		Fit entire page on screen	
3	Equilateral triangle		Fit width of page, scroll vertically	
7	Move or copy shapes	Move or copy shapes horizontally or vertically		

8	Rotate shapes			
Alt+8	Type · (equations only)			
9	Scale shapes			
A	Arrow	Label an angle (tool)	Select all	
Alt-A		Select *Fill Pattern* palette		Select *Arrowhead style* palette
B	Selection box			
C	Curve	Closed curve	Copy	
Alt-C	Clock	Edit settings for document only		
D	Semicircle		Clear selection	
Alt+D		Select *Line style* palette		
E	Ellipse	Eraser		
F	Curve drawn free hand			
Alt-F			Select palette (Fill colour)	
G	Irregular polygon	Irregular polygon	Group	Ungroup
I	Graph axis			Add image to page from disk
Alt-I				Import image from library...
J	Connector			
K	Triangle			
L	Line	Vertical/ Horizontal line		Horizontal text alignment=Left
Alt-L		Select palette (Line colour)		
M	Picture stamp	Marker		
Alt-M		Move current palette		
N	Regular polygon	Number line	New	
Alt-N	Blank Number Line (tool)		Select palette (Numbers)	
O	Circle	Pie chart	Open...	
P	Parallelogram	Protractor	Print...	Print preview...
Alt-P	Type pi symbol (equations only)	Select palette (Point style)		Edit grid and background...
Q	Colour filler	Equation (tool)		Quit
R	Rectangle	Ruler		Orthogonal rectangle
Alt-R	Rainbow *(within a colours palette)*	Resize current palette		
S	Square	Shape cutter	Save	

Alt-S	Choose similar colour *(within a colours palette)*			
T	Simple text		Teacher mode	Fill with texture...
Alt-T	Transparent colours *(within a colours palette)*	Select palette (Text style)		
U	Tally		User mode	
V	Arc		Paste	
W	Text at any angle	Text in Shape		
X	Cross		Cut	
Y	Socket (connection point for grouped shapes)		Redo	
Z	Multiple connected lines		Undo	
NumPad +	Increment			
NumPad -	Decrement			
F1		Show/hide prompts at bottom of screen		
F2	Small step			
F3	Medium step			
F4	Large step			
F5	Jump to target 1		Cursor snapping off	
F6	Jump to target 2		Grid snap	Align with grid
F7	Jump to target 3		Shape snap	Align with other shapes
F8	Jump to target 4		Constrain to 15°	Align: tidy angle
F9	Selection pointer		Select next shape	Select previous shape
F11				Full-screen view on/off
=	Increment	Increment	Zoom in	
Comma			Make text larger	
Minus sign	Decrement		Zoom out	
Full stop			Make text smaller	
[				Send to back
]				Bring to front
Alt-P	Type ÷(equations only)			
`	Move keyboard cursor to Windows cursor position			